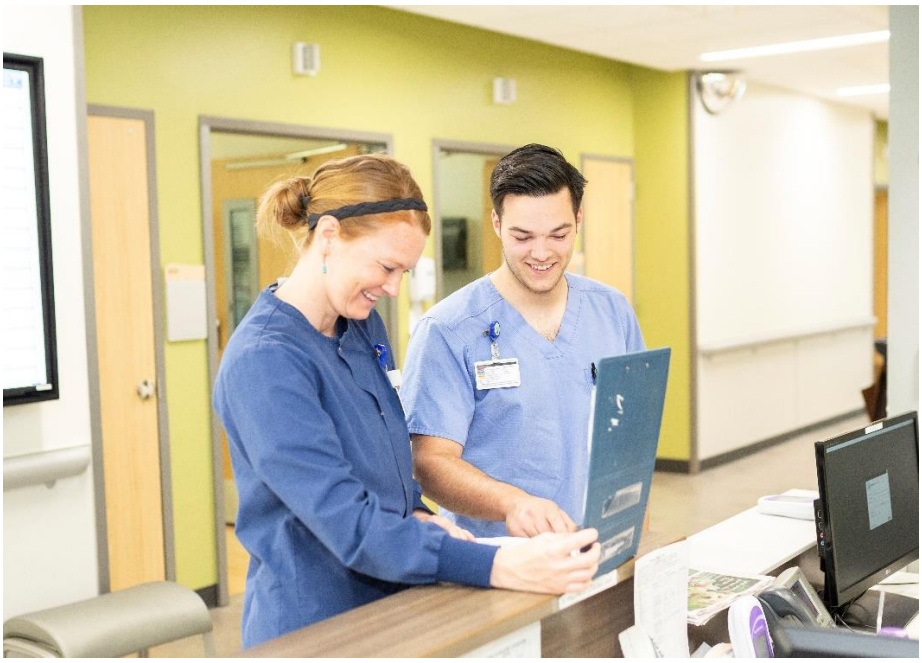
# Full Report

# The Post-COVID Outlook for Idaho Health Care Workers



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IDAHO DEPARTMENT OF LABOR
BRAD LITTLE, GOVERNOR
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# 2022

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# Summary

The onset of the COVID-19 pandemic was a shock to the Idaho economy and its citizens, especially health care workers. This study analyzes the impact of COVID-19 on health care workers by comparing pre-pandemic, current and projected data in the areas of employment and wages, job postings, health care program completions and Idaho Department of Labor occupational and industry projections.

Additional insights were gained through interviews with stakeholders overseeing health care education programs, Idaho hospital and clinic administrators, and people who work for occupational and professional license boards.

A survey of health care workers measured the anticipated number of labor market and occupational exits for certain groups and, in the case of registered and licensed practical nurses, attempts to estimate what compensation level is required to retain these professionals if they are planning an exit.

### Outlook and recommendations

- While the long-term outlook will likely shift back to pre-COVID trends as many pandemic shocks subside, the **near-to-medium-term outlook will be one of acute shortages for specialized health care practitioners** — like physicians and surgeons — and ongoing shortages for several critical occupations including nurses and pharmacists.
- Efforts at expanding interest in health care-related occupations are important, but **education and training programs must be able to expand**. For many, expansion will require investments into classrooms and teaching technology, increased funding to hire and retain teaching faculty, and expansion of clinical training sites at local hospitals and clinics.
- Efforts must also focus on **attracting** trained health care workers from out of state. This will come at a considerable cost, given workers generally require additional compensation to relocate and Idaho wages already trail nearby states. Rising housing costs are also a barrier to entry for many health care workers.

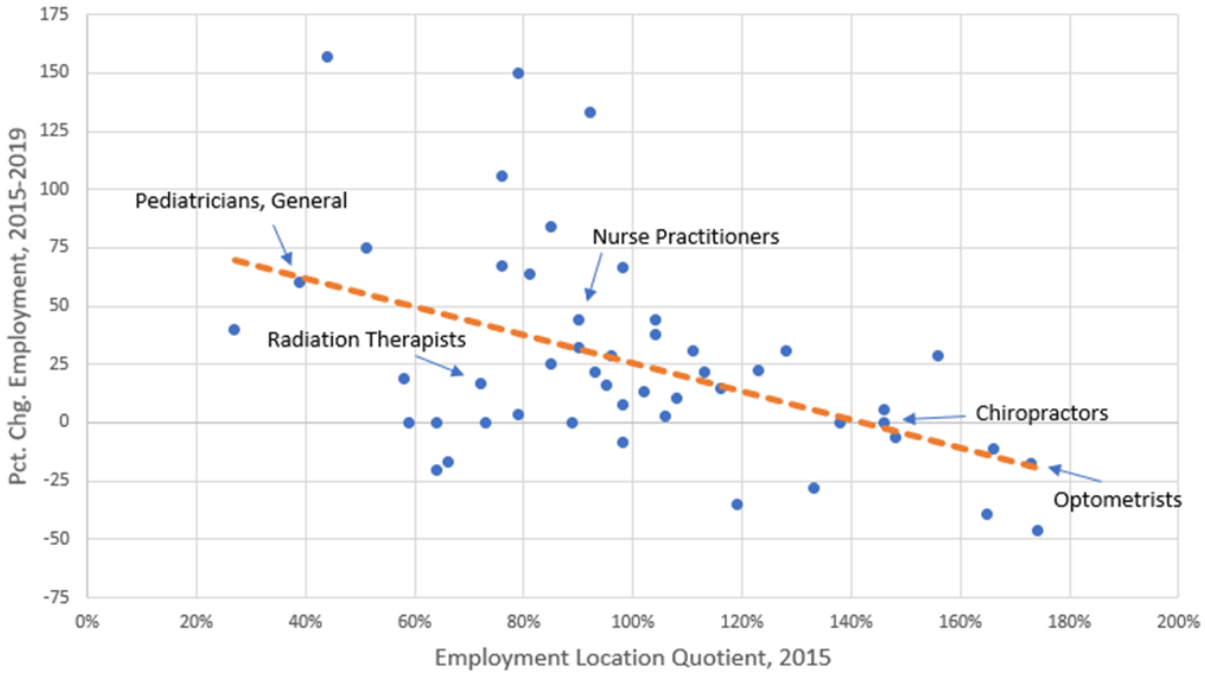
  Efforts may be needed to **stem the outflow** of health care workers due to labor market exits and occupational transfers. Several references by stakeholders surrounding rising housing and education costs might help frame wider policy discussions as they constitute a set of general economic issues that closely relate to the ongoing health care worker shortage.

### Pre-pandemic trends in Idaho

- Employment levels for Idaho health care practitioners, technicians and health care support workers were growing at a combined annual average rate of 8.9% several years prior to the pandemic — much faster than overall employment and population growth.

- Average annual wages for health care practitioners and technicians grew at 2.5% per year, slightly faster than Idaho's overall wage growth of 2.4%. Wage growth for health care support workers was considerably slower than average at 1.2%.
- This aggregate trend during the pre-pandemic period did not hold for all Idaho health care occupations. Those with high employment relative to the national average, like chiropractors and optometrists, saw slower employment growth or even declines, whereas occupations underrepresented in the labor force, like nurse practitioners, saw faster employment growth, as evidenced in Figure 1.

## Figure 1: Employment growth vs. job concentration by occupation, Idaho 2015-2019




**Source:** May 2015 and May 2019 Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.
**Notes:** Location quotients expressed as a percentage. A value of 100% (an LQ of 1.0) represents Idaho's concentration for an occupation compared to the national concentration of the same occupation. A share for Idaho at 100% would be the same as the national concentration. Values greater than 100% (an LQ greater than 1.0) indicate higher concentration compared to the nation, while values less than 100% (an LQ less than 1.0) indicate relative scarcity.

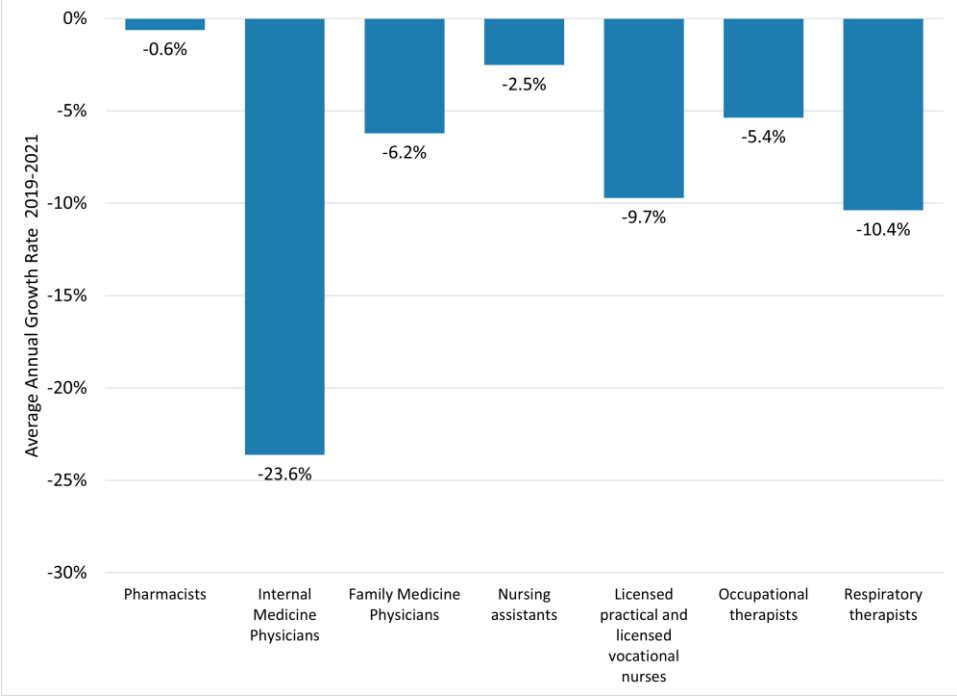
- Growth in average annual wages was stronger in occupations with slower employment growth or those where employment shrunk. Average wage growth was slower, and sometimes negative, in occupations where employment grew fastest. This negative correlation, while not necessarily causal, suggests that wage growth may be driven more by the supply of workers, as opposed to demand.
- Even though underrepresented occupations grew faster over this period, many specialized groups of workers that were relatively scarce in 2015 remained so in 2019 — including general pediatricians, magnetic resonance imaging technologists, nuclear medicine technologists, radiation therapists and nurse practitioners.

- Job postings for health care-related occupations grew between 2012 and 2017 but dipped and plateaued between 2017 and 2019 (see Figure 7). Occupations in high demand relative to the national average included critical care nurses and nurse assistants, dietitians and nutritionists, and radiation therapists.
- Health care-related education and training program completions grew at an average annual rate of 3.3% between 2015 and 2019, slower than employment growth overall. Among the fastest growing occupations were public health assistants and physical therapy assistants. Completion rates for registered nurses, on the other hand, tapered off, while pharmacy completions began to decline. Idahoans admitted to the Washington, Wyoming, Alaska, Montana, and Idaho (WWAMI) medical program remained at 40 with an average retention rate of just over half.
- Health care occupations with the lowest projected turnover rates were generally those with the highest salaries, as occupational transfers "up the wage ladder" become increasingly less probable.

**Pandemic trends**

- The arrival of COVID-19 increased the demand for some occupations while the supply decreased because of accelerated retirements and occupational transfers due to burnout. These combined effects pushed wages up for health care workers and increased wage dispersion across occupations.
- Health care occupations where employment shrunk through the pandemic included general internal medicine physicians, family medicine physicians, licensed practical and vocational nurses, nursing assistants, pharmacists, and occupational and respiratory therapists (Figure 2).

## Figure 2: Employment trends for select occupations in Idaho, 2019-2021




**Source:** Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.

- Job postings for health care workers more than doubled from 2019 to 2021. Registered nurses grew the most in absolute terms, with large increases for respiratory therapists, respiratory therapy technicians and mental health professionals.

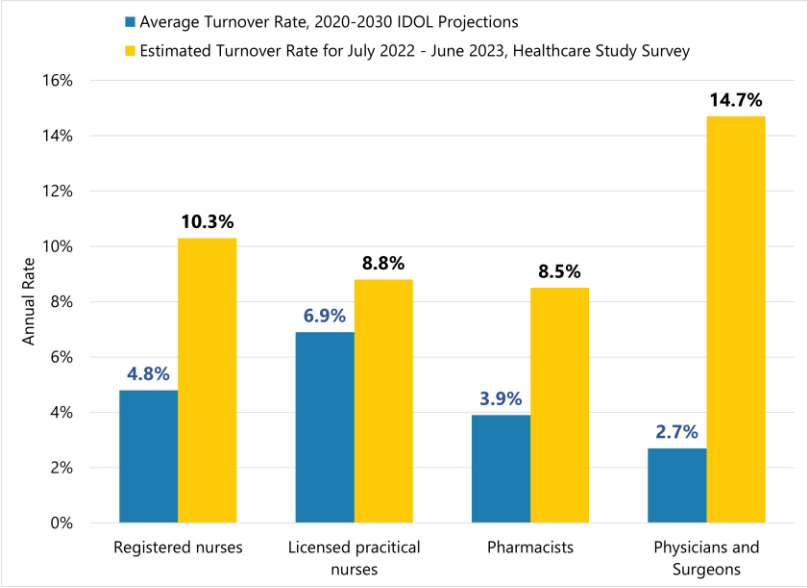
- Discussions with education stakeholders revealed the pool of qualified applicants for health care occupational training programs still generally exceeds the number of available admission spots. Present challenges to program expansion include recruitment and retention of teaching faculty, costs to upgrade and expand classrooms, and the lack of available clinical training sites within Idaho. Rising education costs — and consequently student loan balances — may be a barrier to entry as many workers may find salaries in the state unattractive compared to the cost of their degree.

- Discussions with the Idaho Hospital Association and a survey of its members found a rise in employee turnover. They identified nurses, especially RNs, as the occupation in most immediate need. Rising housing costs are one of many barriers to entry for hospital and clinic workers, with some candidates having to turn down job offers due to a lack of affordable housing. The Idaho Hospital Association also noted geographic disparities in hiring difficulties as well as fiscal constraints, with rural hospitals adversely impacted by both.

### Surveying Idaho health care professionals

- A direct survey of health care workers through their respective license boards points to short-term occupational turnover rates in the coming year well above long-term Idaho Department of Labor projections based in part on data from 2020, before any developing data that might explain the consequences of the pandemic was available. Assuming entrant rates for new workers held to pre-pandemic rates, this could mean an outright decline in the supply for nurses (RNs and LPNs), pharmacists, physicians and surgeons (Figure 3).

## Figure 3: Projected turnover rates by occupation




**Source:** 2020-2030 Employment Projections, IDOL; Survey of Health Care Professionals.

- Among Idaho nurses, the most common reasons for a labor market exit or occupational transfer were retirements, career changes or advancement, and moving out of state. In their open-ended responses many cite burnout and inadequate pay relative to costs of living. Notably, young and less-experienced nurses had an elevated likelihood of an exit relative to slightly older and more experienced nurses, as evidenced in Figures 13a and 13b.
- Idaho nurses who expect some form of occupational or market exit would require wages in the top 25% of their occupations to stay. The youngest and least experienced nurses (LPNs and RNs) looking for a career change would require slightly higher wages than older and more experienced nurses to stay.
- In general, young and less experienced RNs looking to move out of state would require a lower wage to stay versus older RNs looking to relocate. RNs from Utah and Wyoming may be persuaded to move at salaries comparable to their Idaho counterparts, but those in Nevada, Oregon and Washington would require considerably higher pay if they were to move to Idaho.
- For Idaho pharmacists, retirement constitutes the largest source of occupational turnover, followed by those relocating in search of career advancement as a distant second. Additional reasons cited by those anticipating a relocation are the relative ease of being a travelling pharmacist.
- According to Idaho physicians and surgeons, retirements make up the largest source of occupational exits, but relocation decisions are a close second with over half of all respondents anticipating a move.
- Among all the health care occupations surveyed, nurses, pharmacists, physicians and surgeons mentioned Idaho's cultural or political climate as a reason for a labor market exit or relocating out of state. A changing cultural and political environment are more difficult issues to tackle, with the flight of human capital as an unintended consequence of these shifts.

# 1.0 Pre-COVID trends in employment, wages, job postings and program completions

Idaho's health care workforce had been growing at a brisk pace prior to the pandemic, with wages rising on average for the various occupational groups. Health care practitioners and technical occupations along with health care support occupations had been initially underrepresented in the Idaho workforce but had been converging to the national average. Idaho's growing population and an increased share of Idahoans nearing or at retirement age contributed to this trend. Annual job postings — which had been growing but plateaued — began to contract right before the pandemic, indicating demand for these major occupational groups shifted from high- to low-growth. On the supply side, college program completions in health care fields were also growing during this period.

These aggregate trends were not mirrored in all occupations. Some relatively over-represented occupations experienced employment declines alongside wage declines, indicative of an initial oversupply. Other under-represented occupations experienced employment growth concurrent with wage gains, indicative of a potential excess in demand. These factors, combined with increasing specialization, may explain the widening pay dispersion among health care practitioners and technical occupations.

Several comparatively under-represented groups, including particularly specialized occupations, remained under-represented by 2019 despite employment and wage gains, possibly due to strong demand, barriers to entry or strong preferences to work elsewhere or in other fields. Job posting gains were mixed across occupations. Some occupations like nurses were starting to decline while others, like occupational therapists, saw strong growth.

Program completions at the occupational level were mixed. Based upon projected future occupational employment and turnover rates, the pipeline of entrants into key professions such as pharmacy, nursing and medicine was either just keeping pace with demand growth or falling behind. This required out-of-state professionals to fill this gap and, when that was not enough, likely contributed to upward pressure on wages for many occupations.

## 1.1 U.S. Bureau of Labor Statistics' Occupational Employment and Wage data

Tables 1 and 2 provide a subset of the annual U.S. Bureau of Labor Statistics Occupational Employment and Wages (OEWS) surveys in May 2015 and 2019, specifically for health care practitioners and technical occupations and health care support occupations in Idaho. Due to the survey sample, some occupations with a Standard Occupational Code (SOC) may not be represented in either or both tables. Confidentiality rules sometimes require values to be omitted for particularly small occupations or high-earning individuals. Despite these shortcomings, a few notable trends are discernible.

Between 2015 and 2019 (see Tables 1 and 2), the estimated number of workers classified under these two broad occupational groups — health care practitioners and technical workers (all occupations beginning with two-digit SOC 29) and health care support workers (all occupations beginning with two-digit SOC 31) — grew by 40.9%, or 8.9% on an average annual basis. Comparatively, the resident state

population grew 8.3% over this same period (2.0% annualized)[1] and Idaho's total nonfarm employment grew 13.2% (3.1% annualized).[2] Looking at broad occupational groups specifically, health care practitioner and technical occupation employment grew by 20% (4.6% annualized). Health care support occupation employment grew by an even larger 81.7% (16.1% annualized).

Employment growth in these occupational groups is due in no small part to the state's growing population. Simply put, more people living in Idaho means an increased demand for health care services and a growing need for services ranging from a rising share of high-demand populations such as older residents. Idahoans 62 years and older grew from an estimated 18.2% percent of the population in 2015 to 19.9% in 2019.[3]

Employment growth was attributed in part to a convergence in the share of health care practitioners and technical and health care support occupations to the national average. Given Idaho's rural character and small and youthful population, it is no surprise that health care workers historically represented a comparatively smaller share. However, with in-migration from other states and growth in urban areas, the composition of Idaho's workforce is now less of an outlier and closer to what we see nationally. One way to measure under-/over-representation of an occupation is its location quotient (LQ) – the ratio of that group's employment share in Idaho to its employment share nationally. Values of less than one indicate under-representation. Looking at the broad occupational groups in 2015, health care practitioners and technical occupations had an LQ of 0.94, whereas health care support occupations were slightly less under-represented at 0.98. By 2019 however, the former group narrowed the gap to 0.98 while the latter had grown to slight over-representation at 1.02.

Over the 2015-2019 period, the average annual wage for health care practitioners and technical occupations grew by about 10.6% (2.5% annualized). Health care support occupations experienced more subdued growth at only 5.0% (1.2% annualized).[4] This may be due to a larger positive supply shift for the latter group of workers, as seen in the 16.1% annualized employment growth rate over the same period. Put another way, while demand for health care support occupations grew, the supply of workers appeared to keep pace, translating into a much lower rate of wage growth. Moreover, wage dispersion within health care practitioners and technical occupations — as measured by the ratio of the 75th and 25th wage percentiles — grew from 1.83 to 1.91. This may reflect divergent trends in wages between specific occupations due to increasing specialization and job differentiation.

Digging more deeply into the OEWS tables by specific occupations starts to show differences in the employment and wage trends for different health care occupations and helps illustrate how the supply-side contributes to the overall story.

Figure 4 provides a scatterplot of the four-year percentage change in employment by occupation against each initial location quotient in 2015, with data points scaled to each occupation's employment level in 2015. Even more apparent than aggregate movements, there is a clear negative correlation between an occupation's initial employment concentration relative to the national average and its percentage

[1] Annual resident population estimates. Population Estimates Program, U.S. Census Bureau.
[2] End-of-year total nonfarm employment, seasonally adjusted. Current Employment Statistics Program, U.S. Bureau of Labor Statistics.
[3] American Community Survey 1-year estimates. U.S. Census Bureau.
[4] For a point of comparison, the statewide average annual salary in 2015 and 2019 were $40,810 and $44,890, respectively, with a cumulative growth rate of 10.0% (2.4% annualized).

change in employment over the medium term. This is indicative of a movement in the state workforce's occupational distribution towards the national average: Relatively abundant jobs in Idaho tend to see slower job growth or even decline while comparatively scarce jobs tend to see faster job gains.

Figure 5 plots the percentage change in the average wage against the percentage change in employment by occupation. If the two outliers in the upper right quadrant are ignored (audiologists, orthotists and prosthetists), there is a negative correlation between wage growth and employment growth. (The Pearson's product-moment correlation was -0.434, which was statistically significant at the 0.005 level.) While this is only a descriptive relationship and not necessarily causal, it would appear wage growth was strongest among occupations with slow-growing or outright declining employment. This is consistent with a narrative that a declining labor supply in many health care-related occupations is driving movements in wages. In contrast, a positive correlation would point more to a demand-driven story.

Finally, Figure 6 provides a scatterplot of initial job concentration measured by location quotient against subsequent job concentration, with the color scale indicating the percentage change in average annual wage and point size indicating the initial average annual wage for that occupation.

Many of the points are concentrated around the unit (45-degree) line, indicating that job concentration after four years was still correlated with an occupation's initial concentration. Contrast this with Figure 4. Even though relative abundance/scarcity of jobs by occupation was negatively correlated with their percentage growth, any mean reversion to the national average was particularly slow at a four-year horizon.

Second, many of the occupations with both an initially high average annual wage and below-average representation in the Idaho workforce remained under-represented after four years. Such occupations included general pediatricians, magnetic resonance imaging technologists, nuclear medicine technologists, radiation therapists and nurse practitioners. This contrasts with the simple "Econ 101" theory that high wages should entice greater supply. The reasons why this would fail could be wages reflect compensating differentials for these occupations such as greater work risks or increased costs of entry from advanced degree requirements. Demand complementarities such as clinics and hospitals tend to have target ratios of advanced specialists to more general staff, in which case supply constraints for some occupations prevent growth in others.[5]

[5] A textbook example of demand complementarities are shoes. Consumers typically want shoes in pairs – one left, one right. If a supplier hypothetically increased the price of only left shoes, consumers will purchase fewer of both.

## Table 1: Occupational Employment and Wages Statistics, Idaho 2015

| SOC Code | Occupation Title | Employment | | Salary Distribution Percentile | | | Mean |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | $25^{th}$ | $50^{th}$ | $75^{th}$ | |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 35,150 | 0.94 | 42,130 | 58,600 | 76,910 | 70,790 |
| 29-1011 | Chiropractors | 220 | 1.46 | 41,390 | 46,800 | 62,930 | 55,810 |
| 29-1021 | Dentists, General | 460 | 0.98 | 105,340 | 178,190 | # | 191,140 |
| 29-1023 | Orthodontists | ** | ** | 55,360 | 60,910 | 98,480 | 87,880 |
| 29-1029 | Dentists, All Other Specialists | ** | ** | # | # | # | 256,950 |
| 29-1031 | Dietitians and Nutritionists | 270 | 0.98 | 42,870 | 51,340 | 61,750 | 52,140 |
| 29-1041 | Optometrists | 290 | 1.73 | 64,010 | 116,340 | 141,930 | 112,670 |
| 29-1051 | Pharmacists | 1,410 | 1.02 | 105,610 | 115,900 | 127,040 | 113,560 |
| 29-1061 | Anesthesiologists | 100 | 0.75 | 168,640 | # | # | 212,770 |
| 29-1062 | Family and General Practitioners | 820 | 1.38 | 130,330 | 182,020 | # | 187,270 |
| 29-1064 | Obstetricians and Gynecologists | 70 | 0.79 | # | # | # | # |
| 29-1065 | Pediatricians, General | 50 | 0.39 | 133,550 | 152,250 | # | 185,900 |
| 29-1067 | Surgeons | 120 | 0.64 | # | # | # | # |
| 29-1069 | Physicians and Surgeons, All Other | ** | ** | 137,810 | # | # | 207,890 |
| 29-1071 | Physician Assistants | 590 | 1.28 | 84,060 | 93,980 | 108,200 | 101,150 |
| 29-1081 | Podiatrists | 40 | 0.82 | 70,060 | 93,270 | 152,890 | 130,710 |
| 29-1122 | Occupational Therapists | 400 | 0.76 | 54,840 | 71,220 | 82,190 | 67,800 |
| 29-1123 | Physical Therapists | 1,010 | 1.04 | 63,340 | 78,210 | 91,260 | 76,830 |
| 29-1124 | Radiation Therapists | 60 | 0.72 | 69,920 | 79,990 | 97,600 | 86,750 |
| 29-1125 | Recreational Therapists | 40 | 0.51 | 44,240 | 50,120 | 58,810 | 50,790 |
| 29-1126 | Respiratory Therapists | 500 | 0.90 | 47,860 | 54,470 | 60,490 | 54,600 |
| 29-1127 | Speech-Language Pathologists | 500 | 0.81 | 53,930 | 67,640 | 79,800 | 69,950 |
| 29-1131 | Veterinarians | 450 | 1.48 | 68,590 | 82,240 | 99,200 | 92,290 |
| 29-1141 | Registered Nurses | 12,140 | 0.95 | 52,650 | 60,960 | 71,490 | 61,280 |
| 29-1151 | Nurse Anesthetists | ** | ** | 143,600 | 160,170 | # | 196,430 |
| 29-1171 | Nurse Practitioners | 570 | 0.90 | 81,330 | 92,490 | 105,090 | 94,570 |
| 29-1181 | Audiologists | 40 | 0.79 | 46,080 | 54,200 | 66,650 | 57,100 |
| 29-1199 | Health Diagnosing and Treating Practitioners, All Other | 90 | 0.55 | 31,250 | 49,650 | 67,510 | 54,100 |
| 29-2011 | Medical and Clinical Laboratory Technologists | 580 | 0.77 | 53,020 | 60,450 | 70,030 | 60,630 |
| 29-2012 | Medical and Clinical Laboratory Technicians | 590 | 0.80 | 26,460 | 30,620 | 37,750 | 33,110 |
| 29-2021 | Dental Hygienists | 1,460 | 1.56 | 66,680 | 73,250 | 79,950 | 72,460 |
| 29-2031 | Cardiovascular Technologists and Technicians | 320 | 1.33 | 51,240 | 59,820 | 70,470 | 58,120 |
| 29-2032 | Diagnostic Medical Sonographers | 340 | 1.19 | 58,220 | 67,380 | 74,950 | 66,440 |
| 29-2033 | Nuclear Medicine Technologists | 60 | 0.66 | 64,840 | 72,250 | 79,920 | 72,100 |
| 29-2034 | Radiologic Technologists | 770 | 0.85 | 43,680 | 50,850 | 59,890 | 52,020 |
| 29-2035 | Magnetic Resonance Imaging Technologists | 100 | 0.64 | 55,720 | 65,600 | 75,080 | 66,340 |

| SOC Code | Occupation Title | Employment | | Salary Distribution Percentile | | | Mean |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | *25th* | *50th* | *75th* | |
| 29-2041 | Emergency Medical Technicians and Paramedics | 1,090 | 0.98 | 25,740 | 33,300 | 41,220 | 34,550 |
| 29-2051 | Dietetic Technicians | 80 | 0.59 | 18,860 | 23,670 | 29,750 | 24,740 |
| 29-2052 | Pharmacy Technicians | 1,700 | 0.96 | 26,990 | 32,280 | 37,790 | 32,550 |
| 29-2053 | Psychiatric Technicians | 290 | 1.08 | 25,730 | 29,830 | 34,310 | 31,430 |
| 29-2055 | Surgical Technologists | 680 | 1.46 | 35,580 | 42,230 | 48,490 | 43,080 |
| 29-2056 | Veterinary Technologists and Technicians | 510 | 1.13 | 23,650 | 27,480 | 31,160 | 27,640 |
| 29-2057 | Ophthalmic Medical Technicians | 160 | 0.85 | 29,740 | 34,510 | 38,380 | 34,420 |
| 29-2061 | Licensed Practical and Licensed Vocational Nurses | 2,560 | 0.79 | 34,710 | 39,500 | 45,320 | 39,870 |
| 29-2071 | Medical Records and Health Information Technicians | 860 | 0.97 | 28,000 | 34,130 | 40,850 | 35,330 |
| 29-2081 | Opticians, Dispensing | 400 | 1.16 | 26,440 | 32,410 | 40,270 | 34,290 |
| 29-2091 | Orthotists and Prosthetists | 30 | 0.92 | 28,970 | 42,690 | 64,430 | 49,330 |
| 29-2092 | Hearing Aid Specialists | 40 | 1.38 | 39,200 | 49,590 | 59,720 | 49,140 |
| 29-2099 | Health Technologists and Technicians, All Other | 380 | 0.78 | 31,460 | 42,030 | 51,320 | 44,390 |
| 29-9011 | Occupational Health and Safety Specialists | 340 | 1.04 | 52,500 | 59,160 | 74,400 | 64,090 |
| 29-9012 | Occupational Health and Safety Technicians | 50 | 0.64 | 32,650 | 39,820 | 56,020 | 44,240 |
| 29-9091 | Athletic Trainers | 100 | 0.89 | 32,500 | 41,150 | 48,440 | 39,680 |
| 29-9099 | Healthcare Practitioners and Technical Workers, All Other | 70 | 0.38 | 38,420 | 49,000 | 74,860 | 57,380 |
| 31-0000 | Healthcare Support Occupations | 18,130 | 0.98 | 21,270 | 26,120 | 31,070 | 27,320 |
| 31-1011 | Home Health Aides | 2,800 | 0.73 | 17,610 | 19,770 | 24,860 | 21,710 |
| 31-1014 | Nursing Assistants | 7,030 | 1.06 | 20,530 | 23,690 | 27,820 | 24,340 |
| 31-1015 | Orderlies | 410 | 1.65 | 21,640 | 23,890 | 28,230 | 25,160 |
| 31-2011 | Occupational Therapy Assistants | 70 | 0.44 | 46,970 | 55,850 | 66,450 | 58,360 |
| 31-2012 | Occupational Therapy Aides | ** | ** | 25,260 | 28,550 | 34,730 | 30,310 |
| 31-2021 | Physical Therapist Assistants | 320 | 0.85 | 35,900 | 52,180 | 63,170 | 50,390 |
| 31-2022 | Physical Therapist Aides | 410 | 1.74 | 20,670 | 23,500 | 28,100 | 24,800 |
| 31-9011 | Massage Therapists | 310 | 0.73 | 25,240 | 33,630 | 43,500 | 34,760 |
| 31-9091 | Dental Assistants | 1,850 | 1.23 | 29,030 | 33,790 | 37,820 | 33,790 |
| 31-9092 | Medical Assistants | 3,030 | 1.08 | 26,180 | 29,470 | 34,560 | 30,420 |
| 31-9093 | Medical Equipment Preparers | 180 | 0.76 | 25,490 | 28,800 | 33,700 | 29,910 |
| 31-9094 | Medical Transcriptionists | 450 | 1.66 | 29,800 | 34,500 | 38,490 | 34,060 |
| 31-9095 | Pharmacy Aides | 50 | 0.27 | 22,820 | 27,200 | 30,660 | 27,330 |
| 31-9096 | Veterinary Assistants and Laboratory Animal Caretakers | 390 | 1.11 | 20,550 | 25,440 | 29,250 | 25,010 |
| 31-9097 | Phlebotomists | 510 | 0.93 | 26,090 | 29,310 | 33,860 | 29,810 |
| 31-9099 | Healthcare Support Workers, All Other | 260 | 0.58 | 23,040 | 29,460 | 39,570 | 31,070 |

**Source**: May 2015 Occupational Employment and Wage Statistics Survey, U.S. Bureau of Labor Statistics.

**Notes**: * indicates that a wage estimate is not available; ** indicates that an employment estimate is not available; # indicates a wage greater than or equal to $90 per hour or $187,200 per year.

## Table 2: Occupational Employment and Wages Statistics, Idaho 2019

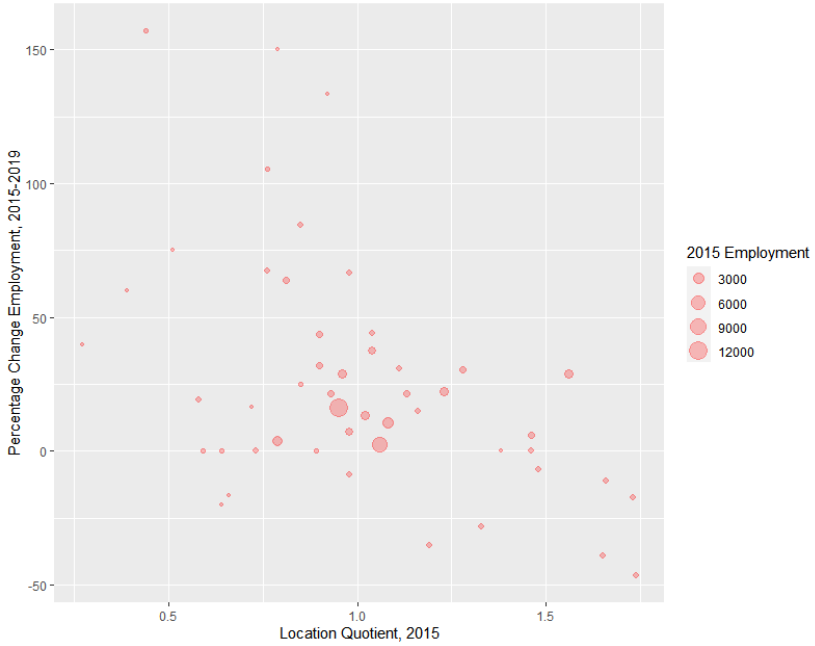
| SOC Code | Occupation Title | Employment | | Salary Distribution | | | |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | Percentile 25th | Percentile 50th | Percentile 75th | Mean |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 42,100 | 0.98 | 45,510 | 65,620 | 87,080 | 78,290 |
| 29-1011 | Chiropractors | 220 | 1.29 | 42,600 | 62,790 | 80,490 | 86,210 |
| 29-1021 | Dentists, General | 420 | 0.77 | 136,300 | 190,040 | # | 204,060 |
| 29-1031 | Dietitians and Nutritionists | 450 | 1.36 | 36,090 | 47,590 | 62,910 | 51,050 |
| 29-1041 | Optometrists | 240 | 1.21 | 82,920 | 107,910 | 123,960 | 101,960 |
| 29-1051 | Pharmacists | 1,600 | 1.04 | 112,260 | 123,530 | 138,970 | 121,360 |
| 29-1071 | Physician Assistants | 770 | 1.30 | 91,500 | 108,180 | 125,830 | 112,000 |
| 29-1122 | Occupational Therapists | 670 | 1.02 | 71,000 | 86,550 | 98,770 | 83,980 |
| 29-1123 | Physical Therapists | 1,390 | 1.20 | 68,390 | 80,640 | 96,610 | 80,360 |
| 29-1124 | Radiation Therapists | 70 | 0.77 | 65,470 | 82,960 | 96,190 | 80,070 |
| 29-1125 | Recreational Therapists | 70 | 0.76 | 26,560 | 34,840 | 49,370 | 37,920 |
| 29-1126 | Respiratory Therapists | 660 | 1.01 | 53,020 | 58,840 | 64,920 | 59,210 |
| 29-1127 | Speech-Language Pathologists | 820 | 1.07 | 55,520 | 72,150 | 89,500 | 72,470 |
| 29-1131 | Veterinarians | 420 | 1.14 | 73,850 | 92,260 | 116,810 | 103,080 |
| 29-1141 | Registered Nurses | 14,110 | 0.96 | 58,720 | 69,320 | 79,540 | 69,480 |
| 29-1151 | Nurse Anesthetists | ** | ** | 139,620 | 150,630 | 161,630 | 150,670 |
| 29-1171 | Nurse Practitioners | 820 | 0.82 | 88,170 | 111,750 | 128,480 | 110,860 |
| 29-1181 | Audiologists | 100 | 1.47 | 63,630 | 73,680 | 86,140 | 74,190 |
| 29-1211 | Anesthesiologists | ** | ** | # | # | # | 267,700 |
| 29-1215 | Family Medicine Physicians | 830 | 1.53 | 161,640 | # | # | 227,160 |
| 29-1216 | General Internal Medicine Physicians | 120 | 0.55 | 24,040 | 202,230 | # | 173,190 |
| 29-1221 | Pediatricians, General | 80 | 0.52 | 138,490 | 161,890 | # | 181,210 |
| 29-1223 | Psychiatrists | ** | ** | 157,520 | 192,670 | # | 212,930 |
| 29-1228 | Physicians, All Other; and Ophthalmologists, Except Pediatric | ** | ** | 135,170 | # | # | 234,390 |
| 29-1248 | Surgeons, Except Ophthalmologists | 190 | 1.04 | 193,040 | # | # | 250,670 |
| 29-1292 | Dental Hygienists | 1,880 | 1.72 | 68,670 | 75,510 | 83,140 | 75,910 |
| 29-1298 | Acupuncturists and Healthcare Diagnosing or Treating Practitioners, All Other | 120 | 0.66 | 61,230 | 88,040 | 190,750 | 131,010 |
| 29-2010 | Clinical Laboratory Technologists and Technicians | 1,280 | 0.79 | 32,960 | 42,980 | 61,250 | 48,250 |
| 29-2031 | Cardiovascular Technologists and Technicians | 230 | 0.82 | 37,470 | 62,250 | 79,550 | 60,940 |
| 29-2032 | Diagnostic Medical Sonographers | 220 | 0.61 | 67,620 | 76,880 | 88,930 | 76,920 |
| 29-2033 | Nuclear Medicine Technologists | 50 | 0.60 | 71,970 | 81,670 | 95,160 | 83,260 |
| 29-2034 | Radiologic Technologists and Technicians | 980 | 0.95 | 51,000 | 60,100 | 70,800 | 60,680 |

| SOC Code | Occupation Title | Employment | | Salary Distribution Percentile | | | Mean |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | *25th* | *50th* | *75th* | |
| 29-2035 | Magnetic Resonance Imaging Technologists | 100 | 0.54 | 65,510 | 74,990 | 85,870 | 74,040 |
| 29-2040 | Emergency Medical Technicians and Paramedics | 1,170 | 0.91 | 27,780 | 35,810 | 49,210 | 39,330 |
| 29-2051 | Dietetic Technicians | 80 | 0.58 | 21,580 | 24,320 | 33,680 | 34,130 |
| 29-2052 | Pharmacy Technicians | 2,190 | 1.06 | 31,420 | 36,150 | 41,860 | 36,600 |
| 29-2053 | Psychiatric Technicians | ** | ** | 22,650 | 27,330 | 34,420 | 28,850 |
| 29-2055 | Surgical Technologists | 720 | 1.34 | 40,970 | 47,820 | 56,700 | 48,500 |
| 29-2056 | Veterinary Technologists and Technicians | 620 | 1.13 | 26,470 | 30,290 | 35,740 | 32,030 |
| 29-2057 | Ophthalmic Medical Technicians | 200 | 0.68 | 24,720 | 29,270 | 35,490 | 30,910 |
| 29-2061 | Licensed Practical and Licensed Vocational Nurses | 2,650 | 0.77 | 39,190 | 45,780 | 52,350 | 46,430 |
| 29-2081 | Opticians, Dispensing | 460 | 1.29 | 27,350 | 31,910 | 37,890 | 33,550 |
| 29-2091 | Orthotists and Prosthetists | 70 | 1.39 | 55,210 | 70,800 | 85,110 | 70,790 |
| 29-2092 | Hearing Aid Specialists | 40 | 0.91 | * | * | * | * |
| 29-2098 | Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other | 1,710 | 1.04 | 32,720 | 41,050 | 50,230 | 42,350 |
| 29-9091 | Athletic Trainers | 100 | 0.70 | 40,920 | 47,030 | 57,440 | 51,480 |
| 29-9098 | Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers, All Other | 110 | 0.42 | 35,840 | 44,680 | 61,230 | 57,640 |
| 31-0000 | Healthcare Support Occupations | 32,950 | 1.02 | 22,290 | 26,300 | 32,890 | 28,680 |
| 31-1120 | Home Health and Personal Care Aides | 16,270 | 1.04 | 20,660 | 23,160 | 26,200 | 24,380 |
| 31-1131 | Nursing Assistants | 7,210 | 1.03 | 24,740 | 28,470 | 32,340 | 28,950 |
| 31-1132 | Orderlies | 250 | 1.07 | 25,870 | 30,360 | 36,890 | 32,810 |
| 31-2011 | Occupational Therapy Assistants | 180 | 0.82 | 29,980 | 57,230 | 66,240 | 53,200 |
| 31-2021 | Physical Therapist Assistants | 590 | 1.22 | 31,310 | 55,360 | 63,300 | 51,170 |
| 31-2022 | Physical Therapist Aides | 220 | 0.88 | 21,540 | 24,490 | 30,130 | 34,810 |
| 31-9011 | Massage Therapists | 310 | 0.58 | 32,110 | 48,130 | 62,840 | 51,630 |
| 31-9091 | Dental Assistants | 2,260 | 1.30 | 29,180 | 34,440 | 39,510 | 34,580 |
| 31-9092 | Medical Assistants | 3,350 | 0.95 | 29,160 | 34,480 | 39,310 | 34,710 |
| 31-9093 | Medical Equipment Preparers | 370 | 1.32 | 26,840 | 30,630 | 36,690 | 31,470 |
| 31-9094 | Medical Transcriptionists | 400 | 1.45 | 23,410 | 29,990 | 39,280 | 32,390 |
| 31-9095 | Pharmacy Aides | 70 | 0.40 | 24,590 | 29,050 | 36,210 | 30,970 |
| 31-9096 | Veterinary Assistants and Laboratory Animal Caretakers | 510 | 1.07 | 22,350 | 27,160 | 31,950 | 27,580 |
| 31-9097 | Phlebotomists | 620 | 0.97 | 27,940 | 32,360 | 38,010 | 33,110 |
| 31-9099 | Healthcare Support Workers, All Other | 310 | 0.67 | 25,580 | 32,880 | 45,810 | 36,600 |

**Source**: May 2019 Occupational Employment and Wage Statistics Survey, U.S. Bureau of Labor Statistics.

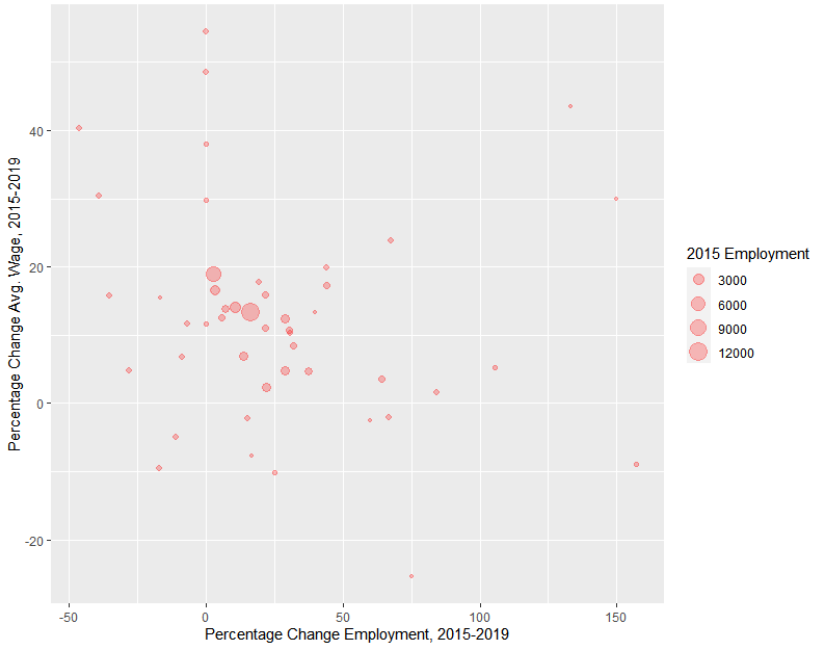
**Notes**: * indicates that a wage estimate is not available; ** indicates that an employment estimate is not available; # indicates a wage greater than or equal to $100 per hour or $208,000 per year.

## Figure 4: Employment growth vs. job concentration by occupation, Idaho 2015-2019



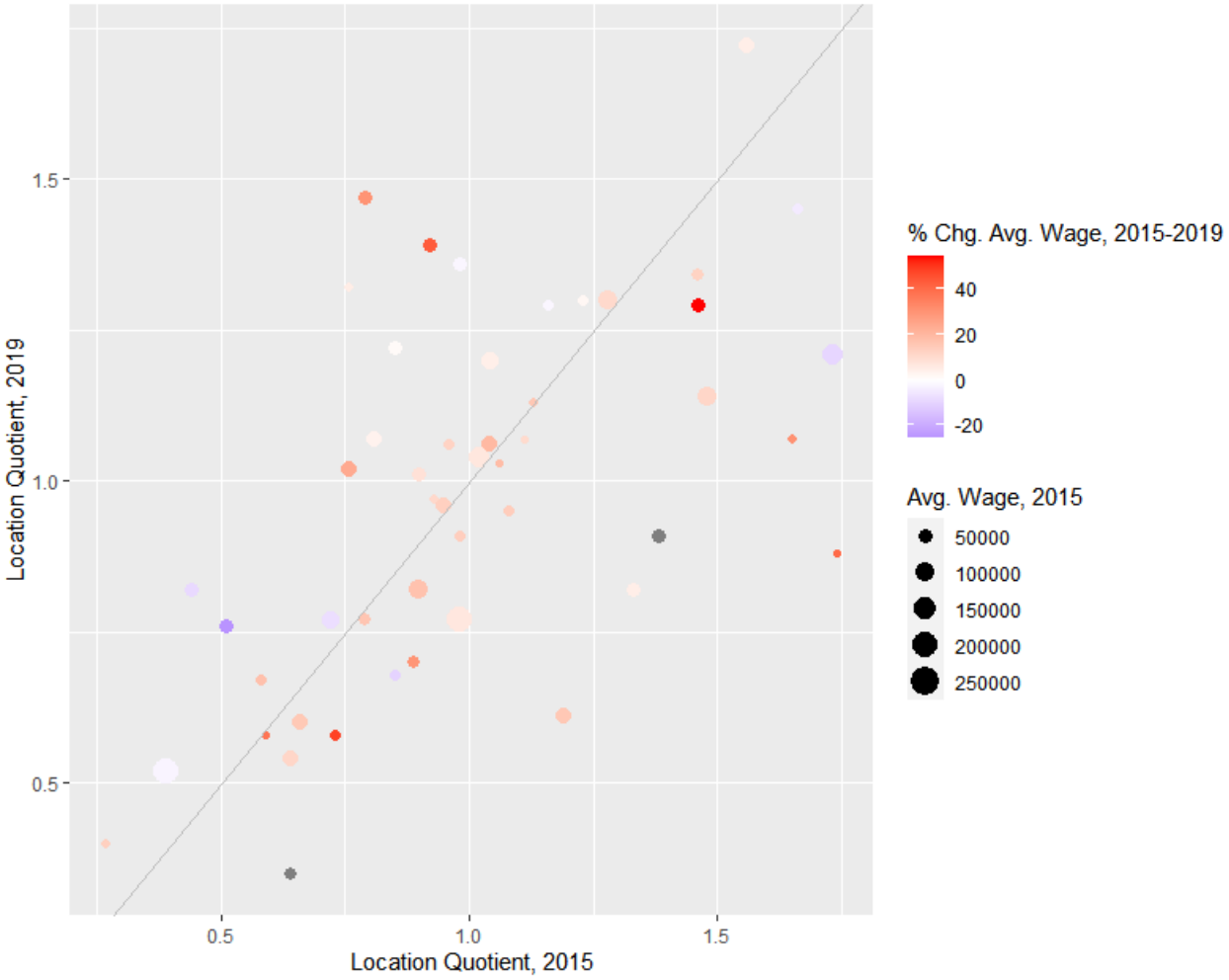

**Source**: May 2015 and May 2019 Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.

## Figure 5: Employment vs. average wage growth by occupation, Idaho 2015-2019




**Source**: May 2015 and May 2019 Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.

## Figure 6: Initial vs. final job concentration by occupation, Idaho 2015-2019




**Source**: May 2015 and May 2019 Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.
**Notes**: Black/grey data points indicate wage data was not available for that occupation either in 2015 or 2019. The unit (45-degree) line is included for comparison.

### 1.2 Conference Board data on job postings

Job posting data collected by The Conference Board's Help Wanted Online database (Table 3) aggregates job listings across multiple job boards and other websites. The system removes duplicate postings and organizes them according to geography, industry and occupation among other variables. Lightcast (formerly known as Emsi-Burning Glass) provides summary data from The Conference Board. Unfortunately, occupational classifications from The Conference Board are not exactly one-to-one with the BLS Standard Occupational Classification system. A similar system put together by the Occupational Information Network (O*Net), an online database sponsored by the U.S. Department of Labor, is used instead. Note job openings account for both new positions created as well as typical turnover from job switchers and the replacement of market exits with market entrants.

Figure 7 provides a time series plot of monthly Idaho job postings for the same major occupational groups for the years preceding the pandemic — health care practitioners and technical and health care

support. As the state population grew, there appeared to be a period of increasing demand for these occupations in addition to health care workers growing in share. This period of demand growth appeared to have tapered by 2017, and between 2017 and 2019 the demand declined before beginning to trend upward (if slightly). While population growth continued to increase demand, the shift in relative occupational demand converged toward the national average. Moreover, the demographic transition toward an older state population may have slowed over this period, in which case demand from a larger share of older Idahoans might have slowed.

Digging into the occupational postings highlights some of the divergent trends in labor demand. Figure 8 plots percentage growth in job postings by occupation in comparison to the initial concentration based on the occupation's job location quotient. Figure 4 shows that Idaho jobs in high demand in comparison to their national share of job postings experienced slower growth, and conversely, jobs low in demand experienced greater gains in job postings.

The likely explanation for this trend is a long-run convergence in the relative demand for health care professionals toward their national average. Population level and density as well as socioeconomic and demographic makeup skewed the initial demand for health care workers compared to the nation overall. With in-migration and a diversifying economy over time, the demand for various health care practitioners, specialists and support staff begin to look like the rest of the country. This explanation is worth mentioning as it would go against explanations on the demand-side centered on the unique characteristics of the Idaho economy — at least in the long-run. In short, even if Idahoans did not initially have a particularly strong demand for OB-GYNs, neurologists or pharmacy technicians relative to Americans overall, they will begin to look less unique over time and more closely parallel their national counterparts. Moreover, one might also say trends for national health care demand are informative for state demand trends over the medium-to-long term.

## Table 3: Annual job postings for health care occupations, Idaho 2016 and 2019

| | | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| O*Net Code | Occupation Title | 2016 | 2019 | % Change | 2016 | 2019 |
| 29-1011.00 | Chiropractors | 2 | 14 | 600.0 | 0.4 | 0.7 |
| 29-1021.00 | Dentists, General | 89 | 66 | -25.8 | 0.8 | 0.6 |
| 29-1022.00 | Oral and Maxillofacial Surgeons | 2 | 3 | 50.0 | 0.2 | 0.3 |
| 29-1023.00 | Orthodontists | 2 | 2 | 0.0 | 0.6 | 0.3 |
| 29-1024.00 | Prosthodontists | 4 | *NA* | *NA* | 1.5 | *NA* |
| 29-1029.00 | Dentists, All Other Specialists | 2 | 5 | 150.0 | 0.3 | 0.7 |
| 29-1031.00 | Dietitians and Nutritionists | 449 | 259 | -42.3 | 2.1 | 1.4 |
| 29-1041.00 | Optometrists | 27 | 32 | 18.5 | 1.1 | 0.6 |
| 29-1051.00 | Pharmacists | 461 | 357 | -22.6 | 1.2 | 1.4 |
| 29-1061.00 | Anesthesiologists | 3 | 18 | 500.0 | 0.1 | 0.4 |
| 29-1062.00 | Family and General Practitioners | 220 | 181 | -17.7 | 0.8 | 0.8 |
| 29-1063.00 | Internists, General | 160 | 196 | 22.5 | 0.5 | 0.6 |
| 29-1064.00 | Obstetricians and Gynecologists | 48 | 120 | 150.0 | 0.7 | 1.3 |
| 29-1065.00 | Pediatricians, General | 17 | 60 | 252.9 | 0.4 | 1.3 |
| 29-1066.00 | Psychiatrists | 164 | 62 | -62.2 | 0.9 | 0.4 |
| 29-1067.00 | Surgeons | 44 | 38 | -13.6 | 0.6 | 0.4 |
| 29-1069.00 | Physicians and Surgeons, All Other | 394 | 289 | -26.6 | 0.9 | 0.8 |
| 29-1069.02 | Dermatologists | 22 | 34 | 54.5 | 0.7 | 0.9 |
| 29-1069.03 | Hospitalists | 74 | 53 | -28.4 | 0.5 | 0.5 |
| 29-1069.04 | Neurologists | 14 | 56 | 300.0 | 0.3 | 1 |
| 29-1069.06 | Ophthalmologists | 2 | 7 | 250.0 | 0.3 | 0.8 |
| 29-1069.07 | Pathologists | 3 | 21 | 600.0 | 0.7 | 3.8 |
| 29-1069.08 | Physical Medicine and Rehabilitation Physicians | 3 | 1 | -66.7 | 0.6 | 0 |
| 29-1069.09 | Preventive Medicine Physicians | 4 | 16 | 300.0 | 0.4 | 2.1 |
| 29-1069.10 | Radiologists | 2 | 6 | 200.0 | 0.2 | 0.2 |
| 29-1069.11 | Sports Medicine Physicians | 95 | 5 | -94.7 | 4.3 | 0.3 |
| 29-1069.12 | Urologists | 12 | 12 | 0.0 | 0.5 | 0.4 |
| 29-1071.00 | Physician Assistants | 160 | 131 | -18.1 | 0.5 | 0.8 |
| 29-1071.01 | Anesthesiologist Assistants | 14 | 11 | -21.4 | 0.8 | 0.5 |
| 29-1081.00 | Podiatrists | 8 | *NA* | *NA* | 0.6 | *NA* |
| 29-1122.00 | Occupational Therapists | 796 | 399 | -49.9 | 1.7 | 1.3 |
| 29-1122.01 | Low Vision Therapists, Orientation and Mobility Specialists, and Vision Rehabilitation Therapists | 4 | 2 | -50.0 | 1.1 | 0.5 |
| 29-1123.00 | Physical Therapists | 926 | 471 | -49.1 | 1.1 | 0.8 |
| 29-1124.00 | Radiation Therapists | 31 | 51 | 64.5 | 2.1 | 2.4 |
| 29-1125.00 | Recreational Therapists | 17 | 25 | 47.1 | 0.7 | 0.9 |
| 29-1125.02 | Music Therapists | *NA* | 1 | *NA* | *NA* | 0 |

| | | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| O*Net Code | Occupation Title | 2016 | 2019 | % Change | 2016 | 2019 |
| 29-1126.00 | Respiratory Therapists | 142 | 168 | 18.3 | 1.1 | 1.1 |
| 29-1127.00 | Speech-Language Pathologists | 626 | 524 | -16.3 | 1.1 | 1.3 |
| 29-1128.00 | Exercise Physiologists | 5 | 15 | 200.0 | 0.6 | 1.4 |
| 29-1131.00 | Veterinarians | 44 | 55 | 25.0 | 0.6 | 0.7 |
| 29-1141.00 | Registered Nurses | 6371 | 5391 | -15.4 | 1 | 1.1 |
| 29-1141.01 | Acute Care Nurses | 1 | 1 | 0.0 | 0 | 0 |
| 29-1141.02 | Advanced Practice Psychiatric Nurses | 4 | 2 | -50.0 | 0.4 | 0.2 |
| 29-1141.03 | Critical Care Nurses | 1502 | 909 | -39.5 | 1.1 | 1.3 |
| 29-1141.04 | Clinical Nurse Specialists | 10 | 12 | 20.0 | 0.6 | 1.2 |
| 29-1151.00 | Nurse Anesthetists | 17 | 5 | -70.6 | 0.4 | 0.1 |
| 29-1161.00 | Nurse Midwives | 17 | 6 | -64.7 | 1.4 | 0.9 |
| 29-1171.00 | Nurse Practitioners | 602 | 468 | -22.3 | 1 | 1 |
| 29-1181.00 | Audiologists | 15 | 20 | 33.3 | 0.7 | 1.2 |
| 29-1199.00 | Health Diagnosing and Treating Practitioners, All Other | 55 | 74 | 34.5 | 0.9 | 1.2 |
| 29-1199.01 | Acupuncturists | 2 | 3 | 50.0 | 1.2 | 0.7 |
| 29-2011.00 | Medical and Clinical Laboratory Technologists | 108 | 156 | 44.4 | 0.7 | 1.2 |
| 29-2011.01 | Cytogenetic Technologists | 14 | 2 | -85.7 | 1.7 | 0.4 |
| 29-2011.02 | Cytotechnologists | *NA* | 2 | *NA* | *NA* | 0.3 |
| 29-2011.03 | Histotechnologists and Histologic Technicians | 7 | 15 | 114.3 | 0.3 | 0.6 |
| 29-2012.00 | Medical and Clinical Laboratory Technicians | 455 | 391 | -14.1 | 1 | 0.9 |
| 29-2021.00 | Dental Hygienists | 48 | 48 | 0.0 | 1.2 | 0.8 |
| 29-2031.00 | Cardiovascular Technologists and Technicians | 226 | 210 | -7.1 | 1.3 | 1.2 |
| 29-2032.00 | Diagnostic Medical Sonographers | 152 | 147 | -3.3 | 1.2 | 1.1 |
| 29-2033.00 | Nuclear Medicine Technologists | 21 | 15 | -28.6 | 1.9 | 1.1 |
| 29-2034.00 | Radiologic Technologists | 165 | 229 | 38.8 | 1 | 1.2 |
| 29-2035.00 | Magnetic Resonance Imaging Technologists | 102 | 126 | 23.5 | 1.1 | 1.1 |
| 29-2041.00 | Emergency Medical Technicians and Paramedics | 113 | 96 | -15.0 | 0.8 | 0.7 |
| 29-2051.00 | Dietetic Technicians | 18 | 36 | 100.0 | 0.8 | 1.4 |
| 29-2052.00 | Pharmacy Technicians | 287 | 552 | 92.3 | 0.7 | 1.2 |
| 29-2053.00 | Psychiatric Technicians | 167 | 94 | -43.7 | 3.2 | 1.4 |
| 29-2054.00 | Respiratory Therapy Technicians | 4 | 1 | -75.0 | 2.2 | 0 |
| 29-2055.00 | Surgical Technologists | 158 | 300 | 89.9 | 0.8 | 1.4 |
| 29-2056.00 | Veterinary Technologists and Technicians | 28 | 38 | 35.7 | 0.7 | 0.8 |
| 29-2057.00 | Ophthalmic Medical Technicians | 20 | 28 | 40.0 | 0.9 | 1 |
| 29-2061.00 | Licensed Practical and Licensed Vocational Nurses | 1200 | 971 | -19.1 | 1.1 | 1.1 |
| 29-2071.00 | Medical Records and Health Information Technicians | 653 | 513 | -21.4 | 1 | 0.8 |
| 29-2081.00 | Opticians, Dispensing | 31 | 18 | -41.9 | 1.8 | 0.7 |
| 29-2091.00 | Orthotists and Prosthetists | 4 | 9 | 125.0 | 0.9 | 1.6 |
| 29-2092.00 | Hearing Aid Specialists | 10 | 7 | -30.0 | 1.4 | 0.9 |

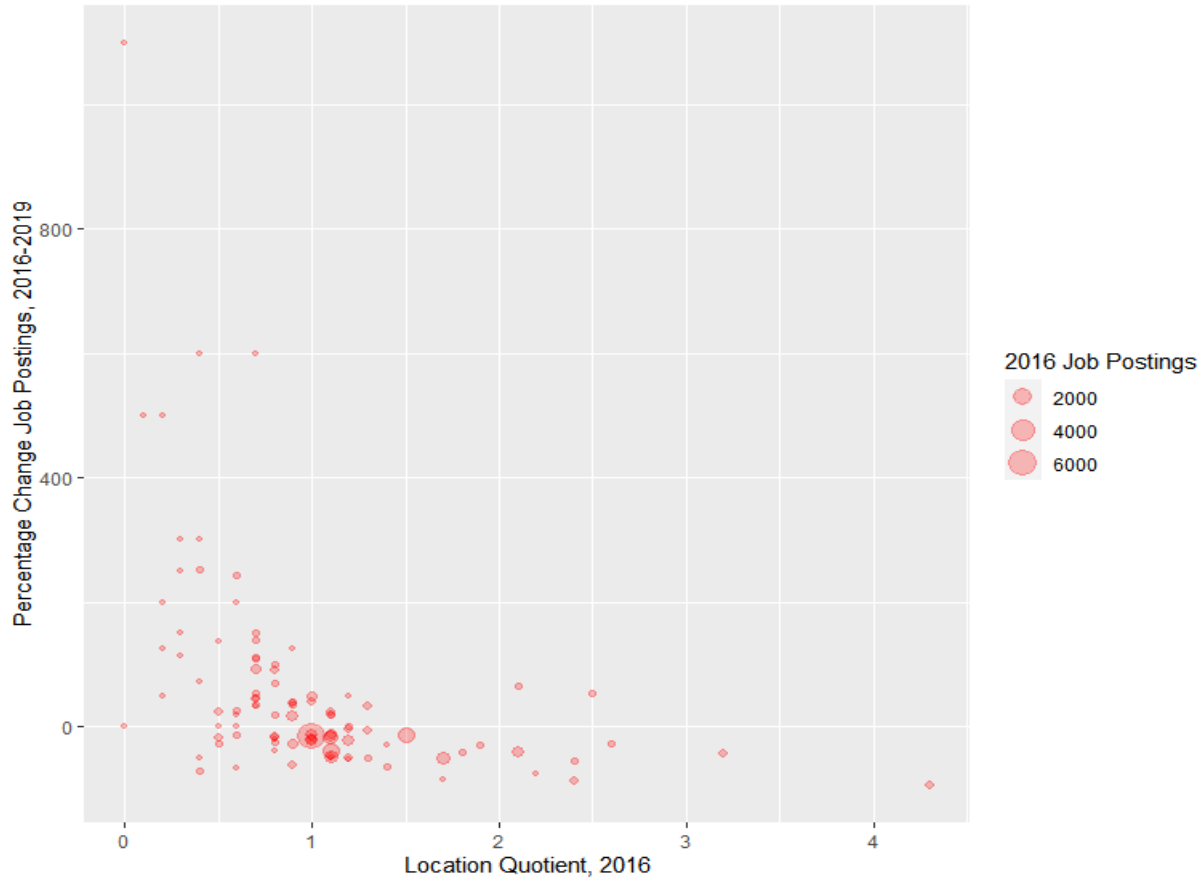
| | | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| O*Net Code | Occupation Title | 2016 | 2019 | % Change | 2016 | 2019 |
| 29-2099.00 | Health Technologists and Technicians, All Other | 357 | 532 | 49.0 | 1 | 1.1 |
| 29-2099.01 | Neurodiagnostic Technologists | 8 | 19 | 137.5 | 0.5 | 1 |
| 29-2099.06 | Radiologic Technicians | 27 | 32 | 18.5 | 0.8 | 0.7 |
| 29-2099.07 | Surgical Assistants | 4 | 9 | 125.0 | 0.2 | 0.4 |
| 29-9011.00 | Occupational Health and Safety Specialists | 77 | 162 | 110.4 | 0.7 | 1.2 |
| 29-9012.00 | Occupational Health and Safety Technicians | 77 | 56 | -27.3 | 2.6 | 1.4 |
| 29-9091.00 | Athletic Trainers | 18 | 43 | 138.9 | 0.7 | 1.3 |
| 29-9092.00 | Genetic Counselors | 13 | 6 | -53.8 | 1.2 | 0.6 |
| 29-9099.00 | Healthcare Practitioners and Technical Workers, All Other | 5 | 3 | -40.0 | 0.8 | 0.6 |
| 29-9099.01 | Midwives | *NA* | 2 | *NA* | *NA* | 1.6 |
| | Total, Healthcare Practitioners and Technical Occupations | 18265 | 15525 | -15.0 | | |
| 31-1011.00 | Home Health Aides | 353 | 317 | -10.2 | 1.1 | 0.9 |
| 31-1013.00 | Psychiatric Aides | 1 | 12 | 1100.0 | 0 | 1.5 |
| 31-1014.00 | Nursing Assistants | 1657 | 1453 | -12.3 | 1.5 | 1.5 |
| 31-1015.00 | Orderlies | 35 | 73 | 108.6 | 0.7 | 1.2 |
| 31-2011.00 | Occupational Therapy Assistants | 149 | 73 | -51.0 | 1.2 | 0.9 |
| 31-2012.00 | Occupational Therapy Aides | 49 | 24 | -51.0 | 1.3 | 0.5 |
| 31-2021.00 | Physical Therapist Assistants | 197 | 104 | -47.2 | 1.1 | 0.8 |
| 31-2022.00 | Physical Therapist Aides | 26 | 40 | 53.8 | 2.5 | 1.8 |
| 31-9011.00 | Massage Therapists | 33 | 113 | 242.4 | 0.6 | 1.1 |
| 31-9091.00 | Dental Assistants | 160 | 213 | 33.1 | 1.3 | 1.4 |
| 31-9092.00 | Medical Assistants | 502 | 585 | 16.5 | 0.9 | 0.8 |
| 31-9093.00 | Medical Equipment Preparers | 68 | 115 | 69.1 | 0.8 | 1.1 |
| 31-9094.00 | Medical Transcriptionists | 187 | 24 | -87.2 | 2.4 | 0.7 |
| 31-9095.00 | Pharmacy Aides | 17 | 14 | -17.6 | 1 | 0.5 |
| 31-9096.00 | Veterinary Assistants and Laboratory Animal Caretakers | 11 | 19 | 72.7 | 0.4 | 0.4 |
| 31-9097.00 | Phlebotomists | 143 | 197 | 37.8 | 0.9 | 1.2 |
| 31-9099.00 | Healthcare Support Workers, All Other | 91 | 41 | -54.9 | 2.4 | 1.2 |
| 31-9099.02 | Endoscopy Technicians | 3 | 18 | 500.0 | 0.2 | 1.3 |
| | Total, Healthcare Support Occupations | 3682 | 3435 | -6.7 | | |
| | Total | 21947 | 18960 | -13.6 | | |

**Source**: The Conference Board via Lightcast (formerly Emsi-Burning Glass).

## Figure 7: Monthly job postings for health care practitioners and technical and health care support occupations, Idaho


**Source**: Lightcast (formerly Emsi-Burning Glass) using data from The Conference Board.

## Figure 8: Job posting growth vs. initial posting concentration by occupation, Idaho




**Source**: The Conference Board via Lightcast (formerly Emsi-Burning Glass).

## 1.3 Lightcast data on health care program completions

Lightcast collects data on program completions for public and private colleges and universities, organized by the Classification of Instructional Programs (CIP) coding system. Table 4 provides data program completions for 2019, the four-year growth rate of program completions, and average annual openings for health professions and related clinical sciences (CIP two-digit code 51). While CIP codes are not easily mappable to SOC and O*Net occupational codes, Lightcast provides its own estimate of annual job openings for each program using Conference Board data along with government labor force statistics. In some cases, there is a large difference between annual openings and program completions. Job openings entail both new positions created as well as the turnover, or churn, from job switchers and the replacement of market exits with market entrants. Lastly, some programs were omitted for the sake of brevity, so summing across programs will not equal the reported total value in the table.

Aggregate program completions in health professions and related clinical sciences grew 14% between 2015 and 2019 (3.3% annualized). Compare this first to Idaho Occupational and Employment Wage Statistics on employment growth of 40.9% (8.9% annualized). While there may be some discrepancy between program definitions and occupational definitions that hinder comparison, some of the employment growth is due to in-migration of health care workers as opposed to Idahoans entering these fields after completing their program studies.[6] Discussions with individuals from several Idaho educational institutions also highlighted a nonsignificant number of health care program graduates leaving the state to practice due to competitive out-of-state pay,[7] out-of-state personal ties[8] and difficulties placing Idaho students in-state for their clinical training. Nevertheless, where students go for their clinicals is strongly correlated with where they land their first job out of school.

According to discussions with health care providers and individuals from the Idaho Division of Occupational and Professional Licenses, the most cited needs during this period were for registered nurses (RNs), nurse practitioners (NPs), licensed practical and vocational nurses (LPN/LVNs), registered pharmacists (RPhs), and pharmacy technicians and assistants. In the years leading up to the pandemic, gains in program completions for nurses had slowed considerably; the three-year growth rate for RNs was a mere 2%, while gains for LPNs/LVN completions had fallen 26%. For registered pharmacists, program completions fell by 10%, and for pharmacy technicians and assistants, program completions fell 41%.

[6] While a detailed breakdown of labor force growth between growth from natural increases and migration is not available, the breakdown of population growth is informative as a point of comparison. The U.S. Census Bureau's estimates for Idaho showed 73% of growth coming from in-migration between July 2017 and July 2018.

[7] While a national comparison was not included, a glance at the national tables would show that Idahoan health care workers (e.g., registered nurses and pharmacists) make less than their national peers on average.

[8] For example, many cited Brigham Young University-Idaho's student population is comprised of a large number of out-of-state residents, many of whom return to their home state upon graduating.

## Table 4: Health care program completions, Idaho

| CIP Code | Program Description | Completions 2019 | % Change 2015-2019 | Avg. Annual Openings |
|---|---|---|---|---|
| 51.0000 | Health Services/Allied Health/Health Sciences, General | 106 | 159% | 1,331 |
| 51.0202 | Audiology/Audiologist | 8 | -11% | 29 |
| 51.0203 | Speech-Language Pathology/Pathologist | 41 | -2% | 142 |
| 51.0204 | Audiology/Audiologist and Speech-Language Pathology/Pathologist | 36 | 6% | 172 |
| 51.0601 | Dental Assisting/Assistant | 95 | -21% | 397 |
| 51.0602 | Dental Hygiene/Hygienist | 100 | 1% | 222 |
| 51.0701 | Health/Healthcare Administration/Management | 151 | 64% | 4,013 |
| 51.0707 | Health Information/Medical Records Technology/Technician | 10 | -50% | 1,511 |
| 51.0710 | Medical Office Assistant/Specialist | 29 | -28% | 6,570 |
| 51.0714 | Medical Insurance Specialist/Medical Biller | 3 | -84% | 535 |
| 51.0801 | Medical/Clinical Assistant | 186 | -29% | 565 |
| 51.0805 | Pharmacy Technician/Assistant | 22 | -41% | 308 |
| 51.0806 | Physical Therapy Assistant | 92 | 136% | 176 |
| 51.0899 | Allied Health and Medical Assisting Services, Other | 2 | -95% | 3,200 |
| 51.0904 | Emergency Medical Technology/Technician (EMT Paramedic) | 41 | -11% | 737 |
| 51.0907 | Medical Radiologic Technology/Science - Radiation Therapist | 23 | -30% | 200 |
| 51.0908 | Respiratory Care Therapy/Therapist | 195 | 95% | 151 |
| 51.0909 | Surgical Technology/Technologist | 78 | 7% | 251 |
| 51.0911 | Radiologic Technology/Science - Radiographer | 123 | 102% | 293 |
| 51.0912 | Physician Assistant | 74 | 28% | 112 |
| 51.0913 | Athletic Training/Trainer | 56 | 12% | 742 |
| 51.1005 | Clinical Laboratory Science/Medical Technology/Technologist | 43 | 39% | 159 |
| 51.1101 | Pre-Dentistry Studies | 1 | -67% | 137 |
| 51.1102 | Pre-Medicine/Pre-Medical Studies | 17 | 31% | 1,056 |
| 51.1103 | Pre-Pharmacy Studies | 4 | -20% | 115 |
| 51.1199 | Health/Medical Preparatory Programs, Other | 0 | 0% | 7,489 |
| 51.1501 | Substance Abuse/Addiction Counseling | 9 | 80% | 754 |
| 51.1505 | Marriage and Family Therapy/Counseling | 37 | 12% | 374 |
| 51.1508 | Mental Health Counseling/Counselor | 17 | 42% | 754 |
| 51.2001 | Pharmacy | 79 | -10% | 497 |
| 51.2201 | Public Health, General | 15 | 200% | 2,033 |
| 51.2207 | Public Health Education and Promotion | 345 | 117% | 503 |
| 51.2299 | Public Health, Other | 17 | -35% | 2,033 |
| 51.2306 | Occupational Therapy/Therapist | 9 | -10% | 85 |
| 51.2308 | Physical Therapy/Therapist | 34 | 6% | 109 |
| 51.2309 | Therapeutic Recreation/Recreational Therapy | 0 | 0% | 14 |
| 51.2310 | Vocational Rehabilitation Counseling/Counselor | 0 | 0% | 200 |
| 51.2706 | Medical Informatics | 8 | 700% | 1,736 |
| 51.3101 | Dietetics/Dietitian | 30 | 58% | 105 |
| 51.3201 | Bioethics/Medical Ethics | 0 | 0% | 1,980 |

| CIP Code | Program Description | Completions 2019 | % Change 2015-2019 | Avg. Annual Openings |
|---|---|---|---|---|
| 51.3501 | Massage Therapy/Therapeutic Massage | 113 | 19% | 336 |
| 51.3801 | Registered Nursing/Registered Nurse | 1,214 | 2% | 1,629 |
| 51.3802 | Nursing Administration | 12 | -8% | 1,446 |
| 51.3805 | Family Practice Nurse/Nursing | 15 | Insf. Data | 1,282 |
| 51.3901 | Licensed Practical/Vocational Nurse Training | 159 | -26% | 311 |
| | Total | 4,069 | 14% | |

**Source**: Lightcast (formerly Emsi-Burning Glass).
**Note**: Idaho graduates from the WWAMI Regional Medical Education Program are not included. The state of Idaho has supported 40 students entering the program every year, of which 51% typically go on to practice in Idaho after graduating.[9]

## 1.4 Idaho Department of Labor 10-year occupational projections – 2020 to 2030

Idaho's long-term occupational employment projections cover the decade running from 2020 to 2030 and are based on six interrelated models — labor force, the aggregate economy, final demand, industry output, employment by industry and employment by occupation. These models factor out fluctuations tied to the business cycle. The projections include employment forecasts and an estimated 10-year employment growth rate for each occupation, as well as annual averages for job openings from growth and occupational turnover (i.e., the sum of labor force exits and occupational transfers). Published in 2021, the most recent set of long-term projections were based in part on data from 2020 when the pandemic and its consequences were unknown or just beginning to be understood. Therefore, Labor projections should be interpreted as a counterfactual had the pandemic not occurred. As such, these data sets can still provide a baseline for what the state expected and therefore a point of comparison for the trends we are currently observing.

Looking first at the aggregates in Table 5, the department's projections anticipated combined health care practitioners and technical and health care support occupations growing 19.7% over 10 years. Annualized, those occupations were projected to grow by only 1.8%, a fifth of the growth rate experienced between 2015 and 2019. Compare this to the growth rate across all occupations of 14.8%, or 1.4% when annualized (not reported here but found in Table 1.06 of the Statewide Occupational Projections). The projected slowdown is due to several factors. First and foremost, much of the growth in health care over the preceding years related to demographic aging of the population, principally the baby boomer generation moving into retirement, followed next by the somewhat smaller Generation X. However, the age structure of the U.S. population was expected to stabilize through the 2020s. The share of the national population 65 years and older would grow from around 13% in 2010 to 16.9% in 2020, 20.6% in 2030 and only 21.6% in 2040.[10] Because the growth rate of share of older Idahoans is slowing, we would expect healthcare employment growth slow as well, though perhaps not at the same rate. While the state population was also expected to grow, high growth rates experienced in the years preceding the pandemic were not expected to continue indefinitely, with in-migration slowing and out-migration increasing as rising costs make the state less attractive. Together, these factors would subdue growth in demand for health care occupations as well as supply, thereby reducing employment growth.

[9] Idaho WWAMI webpage, University of Idaho
[10] 2017 National Population Projections Tables, U.S. Census Bureau.

However, employment in health care occupations was still expected to increase faster than employment overall; therefore, health care was expected to comprise a larger share of the workforce by 2030.

The estimated turnover from workers leaving these occupations — either due to labor force exits or occupational transfers — should also be considered. Taking the midpoint between 2020 and 2030 employment levels and dividing that into total turnovers produces projected annual turnover rates of around 5.1% for health care practitioners and technical occupations and 10.8% for health care support occupations. Contrast this with the turnover rate of 10.2% computed across all occupations (not reported here but found in Table 1.06 of the Statewide Occupational Projections). This difference in turnover rates between health care practitioners and technical occupations and health care support occupations is largely reflective of higher average pay among the former group. Health care practitioners had an average wage of $78,290 in 2019, while health care support staff had an average wage of $28,680 (see Table 2). Higher paying occupations tend to see lower turnover because workers have fewer available options for moving up the income distribution ladder. Figure 9 provides a scatterplot showing this relationship.

Looking at a few individual health care occupations including pharmacists, pharmacy technicians, nurses (including RNS, NPs and LPV/LVNs), physicians and surgeons and provides further insight. Employment growth for pharmacists was forecasted to be around 1.2% on an annualized basis, with an estimated annual turnover rate of around 3.9%. Taking these growth rates together would imply a pharmacist entrant rate for Idaho of 5.1%.[11] Compare this with the pre-pandemic implied entrant rate of 4.9% — 79 program completions in 2019 (Table 4) combined with 2019 employment of 1,600 (Table 3), presuming all graduating pharmacists will practice in Idaho. Of course, some graduates may move out of state, but net migration data suggests more will in-migrate. It would appear the projections are reasonable based on pre-pandemic trends; however, if the turnover rate were to increase by 1.2%, employment growth would be nil.

For pharmacy technicians, Idaho projections placed employment growth at a slightly slower pace of 11.5% over 10 years (1.1% when annualized). Combined with an average projected turnover rate of 7.4% per year, this implies an entrant rate of 8.5%, far larger than the 1% entrant rate implied by pharmacy tech program completions and employment in 2019. Absent a comparatively large inflow into the occupation from elsewhere (e.g., out-of-state pharmacy techs moving to Idaho), projections would appear to overstate employment growth, possibly projecting growth when there may in fact be a decline. Based upon discussions with the Idaho Division of Occupational and Professional Licenses, education program administrators and others, the reality was probably closer to the pessimistic story. A shortage of pharmacy techs before the pandemic was mentioned on a few occasions.

Turning to nursing, registered nurses, nurse anesthetists, nurse midwives and nurse practitioners, all were projected to have an average turnover rate of around 4.8% to 4.9%, whereas annualized employment growth was projected to be 1.8%, 2.4%, 2.5% and 1.9%, respectively. Using the same calculations for prior occupations, this would imply respective entrant rates of 6.6%, 7.2%, 7.4% and 6.8%. By comparison, data from 2019 showed 1,214 RN program completions, with 14,110 RNs employed, yielding an implied entrant rate from completions of 8.6%. It would also appear the inflow of

[11] The annual change in occupational employment is the sum of the negative of turnover from labor force exits and occupational transfers plus entrants: $\Delta Emp = Entrants - Turnover$. Dividing by employment level provides the growth rate as the difference in entrant and turnover rates.

new nurses would be enough to meet these projections at least for RNs. This contrasts with discussions involving several stakeholders, many of whom cited a nursing shortage prior to the pandemic. One possible explanation for this discrepancy is the implied entrant rate from program completions overstates the true number of new Idaho nurses. Nursing graduates from BYU-ID have a much higher tendency to leave the state after graduating,[12] and a nonsignificant number of RNs graduating from public Idaho universities choose to practice elsewhere, due in part to more competitive pay as well as having completed their clinical training in other states.[13] Additionally, the occupational projections may understate the turnover rate. Whatever the reason, common reports of a nursing shortage prior to the pandemic along with an employment location quotient of 0.96 in 2019 support a nursing shortage narrative over what is implied by projections and program completions.

Moving briefly on to LPNs/LVNs, employment growth was projected at an annualized rate of 1.6% and the annual turnover rate was projected to be 6.9%, implying an entrant rate of 8.5%. This contrasts with the implied entrant rate from program completions of 6% in 2019 and conforms with stakeholder discussions which similarly noted a shortage of LPNs/LVNs in the leadup to the pandemic.

In the case of physicians and surgeons, the projected annual turnover rate from all these occupations taken together was around 2.7%, whereas the annualized employment growth rate was 1.9%, implying an entrant rate of 4.6%. By comparison, 40 Idahoans enter the WWAMI Regional Medical Education Program annually, with an average of 51% choosing to practice in Idaho. Using 2019's employment statistics, this would imply an entrant rate of only 1.6%, one-third of the projected new entrants, meaning the remaining two-thirds would need to be filled by individuals moving to Idaho to practice. Worse yet, absent growth in the program and/or increasing graduate retention in state, a growing employment level for physicians and surgeons would require an ever-growing share of out-of-state practitioners coming to Idaho to practice. This was echoed in discussions with education program administrators as well as hospital and clinic administrators.

Putting it all together, the pipeline of new health care professions was either just keeping pace with demand (pharmacists) or falling short (pharmacy technicians, nurses, physicians and surgeons) for many key occupations. One immediate consequence is that this shortfall would need to be filled by individuals relocating to Idaho from out of state, likely contributing to higher labor costs as workers typically expect to be compensated for relocating long distances. Any increase in occupational turnover from market exits or occupational transfers — say, from accelerated retirements and career changes due to burnout from a multiyear pandemic — would further exacerbate these trends, requiring a larger set of effects to correct this imbalance (e.g., a larger inflow of workers from out of state, or rising wages and benefits to retain workers considering an exit).

[12] Lightcast's estimates for 2020 had BYU-ID graduating 276 of the 1,363 registered nurses in Idaho, or roughly a fifth of all RN program completions that year. However, given the large number of out-of-state residents who attend BYU-ID, it is not surprising for a large share of graduates to return to their home state upon graduation.

[13] Discussions with education program administrators noted ongoing difficulties placing nursing students in clinics and hospitals in-state for the clinical portion of their training, owing to limited capacity at sites in proximity to universities or students' homes. Discussions with clinic and hospital administrators also noted this limitation.

# 2.0 COVID trends in employment, wages, job postings and program enrollments

Since 2019, COVID-19 has contributed to many difficulties among health care workers and employers. Some of these effects only exacerbated pre-pandemic trends, such as regional disparities in recruitment and the shortage of nurses and other critical health care personnel. However, the pandemic also posed new challenges, including accelerating retirements among older workers and increasing occupational turnover as some workers no longer found their chosen line of work attractive enough to continue. In short, COVID-19 appeared to work on both sides of the labor market by shifting demand for specific occupations (some, like nurses, notably increased) as well as shifting supply as workers' opportunity costs were affected.

Program admissions and enrollment do not appear to have been significantly affected. Most programs have ample qualified applicants (pharmacy being the notable exception). Pre-pandemic difficulties including faculty recruitment and retention and a lack of clinical training sites were only aggravated by the pandemic, meaning any further increases in this pipeline will require additional investments in education, hospitals and clinics. On the demand side, employers cite increased turnover and difficulties with recruiting essential occupations — especially nursing — in addition to growing concern over affordable housing as a deterrent for many potential workers. With pandemic relief funds drying up, providers — especially in rural areas — will be in an even more difficult position to meet these challenges.

## 2.1 U.S. Bureau of Labor Statistics - Occupational Employment and Wage Statistics

Between May 2019 and May 2021 (Tables 2 and 6, respectively), there was an aggregate increase in employment among health care occupations of 6.2% (3.1% annualized), 6.7% for health care practitioners and technical occupations (3.3% annualized), and 5.5% for health care support occupations (2.7% annualized). Some of this would have occurred in the absence of the COVID-19 pandemic, as previously shown in the occupational employment projections in Table 5. A 1.8% annualized growth rate was projected for health care practitioners and technical occupations as well as health care support occupations. This aggregate growth across health care occupations trailed the national trend, as evidenced by the decline in employment location quotient for both major groups. Growth of the average wage in aggregate was 7.4% (3.6% annualized), stronger than the average Idaho wage growth of 7% (3.3% annualized).

## Table 5: Detail projected annual employment and openings by occupation – 2020 - 2030

| | | Employment | | | Projected Annual Openings, 2020-30 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| SOC Code | Occupation Title | 2020 | 2030 | % Change | Labor Force Exits | Occu-pational Transfers | Total Turnover | Openings Due to Growth | Total Projected Openings |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 44,365 | 53,107 | 19.7% | 1,241 | 1,242 | 2,483 | 874 | 3,357 |
| 29-1000 | Health Diagnosing and Treating Practitioners | 31,244 | 37,696 | 20.7% | 842 | 703 | 1,544 | 645 | 2,189 |
| 29-1011 | Chiropractors | 359 | 469 | 30.6% | 6 | 3 | 9 | 11 | 20 |
| 29-1021 | Dentists, General | 461 | 565 | 22.6% | 11 | 4 | 15 | 10 | 25 |
| 29-1022 | Oral and Maxillofacial Surgeons | - | - | - | - | - | - | - | - |
| 29-1023 | Orthodontists | 60 | 74 | 23.3% | 1 | 1 | 2 | 1 | 3 |
| 29-1029 | Dentists, All Other Specialists | - | - | - | - | - | - | - | - |
| 29-1031 | Dietitians and Nutritionists | 396 | 445 | 12.4% | 14 | 12 | 26 | 5 | 30 |
| 29-1041 | Optometrists | 257 | 317 | 23.3% | 5 | 3 | 8 | 6 | 14 |
| 29-1051 | Pharmacists | 1,522 | 1,714 | 12.6% | 34 | 29 | 62 | 19 | 82 |
| 29-1071 | Physician Assistants | 857 | 1,052 | 22.8% | 14 | 35 | 49 | 20 | 69 |
| 29-1081 | Podiatrists | 20 | 24 | 20.0% | 1 | 1 | 1 | 0 | 2 |
| 29-1122 | Occupational Therapists | 796 | 981 | 23.2% | 20 | 26 | 46 | 19 | 65 |
| 29-1123 | Physical Therapists | 1,773 | 2,200 | 24.1% | 37 | 37 | 74 | 43 | 117 |
| 29-1124 | Radiation Therapists | 58 | 67 | 15.5% | 1 | 2 | 3 | 1 | 4 |
| 29-1125 | Recreational Therapists | 99 | 114 | 15.2% | 3 | 3 | 5 | 2 | 7 |
| 29-1126 | Respiratory Therapists | 743 | 906 | 21.9% | 20 | 17 | 36 | 16 | 53 |
| 29-1127 | Speech-Language Pathologists | 756 | 907 | 20.0% | 18 | 26 | 44 | 15 | 59 |
| 29-1128 | Exercise Physiologists | 49 | 61 | 24.5% | 2 | 2 | 3 | 1 | 4 |
| 29-1129 | Therapists, All Other | 23 | 27 | 17.4% | 1 | 1 | 1 | 0 | 2 |
| 29-1131 | Veterinarians | 592 | 659 | 11.3% | 10 | 9 | 20 | 7 | 26 |
| 29-1141 | Registered Nurses | 15,352 | 18,402 | 19.9% | 458 | 351 | 809 | 305 | 1,114 |
| 29-1151 | Nurse Anesthetists | 734 | 935 | 27.4% | 15 | 25 | 40 | 20 | 60 |
| 29-1161 | Nurse Midwives | 43 | 55 | 27.9% | 1 | 1 | 2 | 1 | 4 |
| 29-1171 | Nurse Practitioners | 859 | 1,032 | 20.1% | 20 | 27 | 47 | 17 | 64 |
| 29-1181 | Audiologists | 70 | 88 | 25.7% | 2 | 2 | 4 | 2 | 5 |
| 29-1211 | Anesthesiologists | 317 | 393 | 24.0% | 6 | 4 | 10 | 8 | 17 |
| 29-1215 | Family Medicine Physicians | 1,206 | 1,463 | 21.3% | 22 | 14 | 36 | 26 | 62 |
| 29-1216 | General Internal Medicine Physicians | 128 | 153 | 19.5% | 2 | 2 | 4 | 3 | 6 |
| 29-1218 | Obstetricians and Gynecologists | 17 | 22 | 29.4% | 0 | 0 | 1 | 1 | 1 |
| 29-1221 | Pediatricians, General | 97 | 120 | 23.7% | 2 | 1 | 3 | 2 | 5 |
| 29-1223 | Psychiatrists | 156 | 194 | 24.4% | 3 | 2 | 5 | 4 | 9 |
| 29-1228 | Physicians, All Other; and Ophthalmologists, Except Pediatric | 1,150 | 1,372 | 19.3% | 20 | 14 | 34 | 22 | 56 |
| 29-1248 | Surgeons, Except Ophthalmologists | 100 | 117 | 17.0% | 2 | 1 | 3 | 2 | 5 |

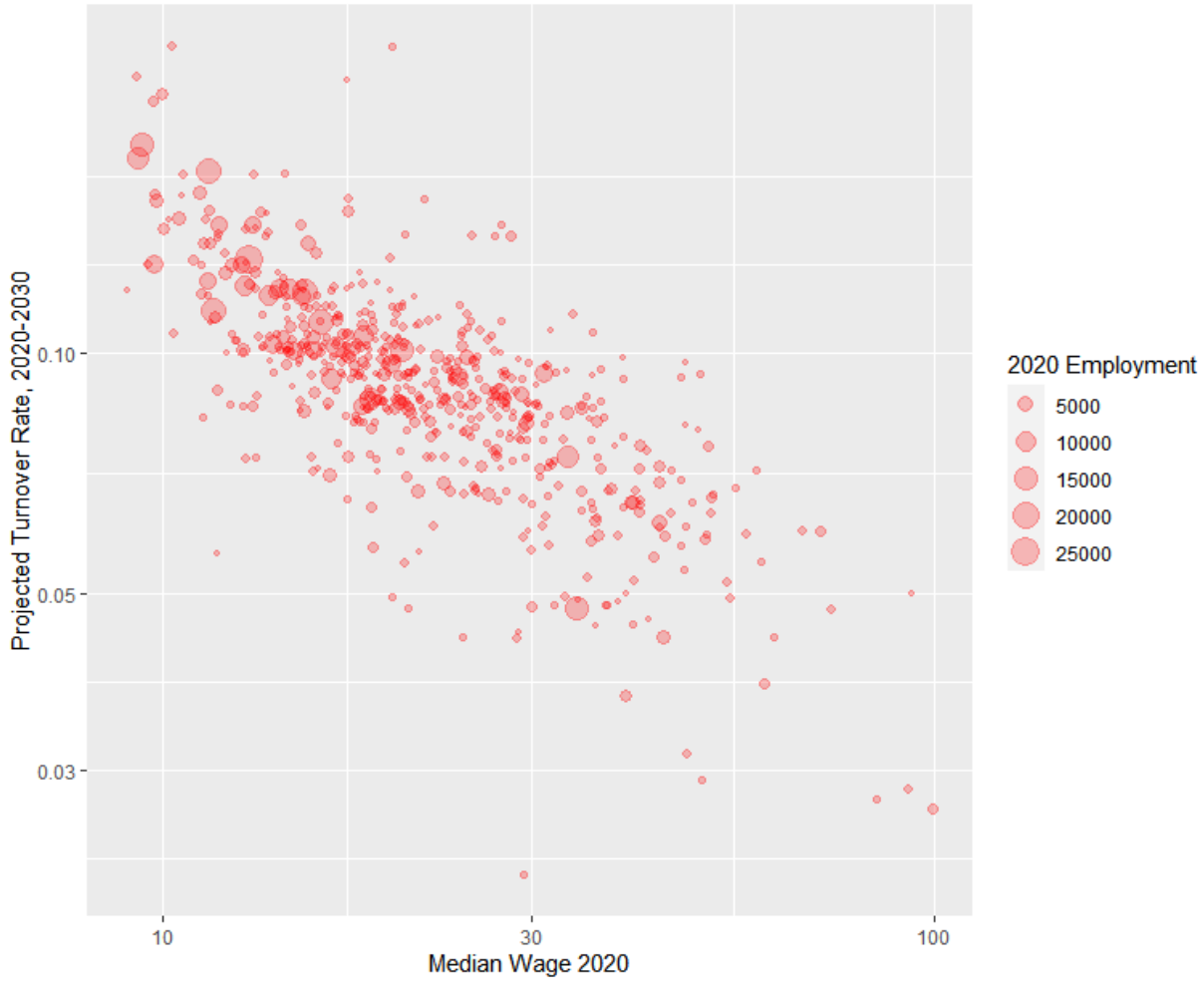
| SOC Code | Occupation Title | Employment | | | Projected Annual Openings, 2020-30 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | % Change | Labor Force Exits | Occu-pational Transfers | Total Turnover | Openings Due to Growth | Total Projected Openings |
| 29-1292 | Dental Hygienists | 2,050 | 2,611 | 27.4% | 89 | 49 | 138 | 56 | 194 |
| 29-1298 | Acupuncturists and Healthcare Diagnosing or Treating Practitioners, All Other | 129 | 142 | 10.1% | 4 | 2 | 6 | 1 | 8 |
| 29-2000 | Health Technologists and Technicians | 12,882 | 15,143 | 17.6% | 394 | 532 | 926 | 226 | 1,152 |
| 29-2010 | Clinical Laboratory Technologists and Technicians | 508 | 625 | 23.0% | 15 | 16 | 31 | 12 | 43 |
| 29-2031 | Cardiovascular Technologists and Technicians | 298 | 363 | 21.8% | 8 | 8 | 16 | 7 | 23 |
| 29-2032 | Diagnostic Medical Sonographers | 290 | 363 | 25.2% | 8 | 8 | 16 | 7 | 23 |
| 29-2033 | Nuclear Medicine Technologists | 73 | 91 | 24.7% | 2 | 2 | 4 | 2 | 6 |
| 29-2034 | Radiologic Technologists | 1,030 | 1,257 | 22.0% | 27 | 28 | 55 | 23 | 78 |
| 29-2035 | Magnetic Resonance Imaging Technologists | 182 | 227 | 24.7% | 5 | 5 | 10 | 5 | 14 |
| 29-2040 | Emergency Medical Technicians and Paramedics | 1,112 | 1,233 | 10.9% | 20 | 48 | 67 | 12 | 79 |
| 29-2051 | Dietetic Technicians | 83 | 98 | 18.1% | 3 | 4 | 7 | 2 | 8 |
| 29-2052 | Pharmacy Technicians | 2,043 | 2,277 | 11.5% | 61 | 99 | 160 | 23 | 183 |
| 29-2053 | Psychiatric Technicians | 380 | 440 | 15.8% | 12 | 19 | 30 | 6 | 36 |
| 29-2055 | Surgical Technologists | 837 | 1,024 | 22.3% | 26 | 43 | 69 | 19 | 88 |
| 29-2056 | Veterinary Technologists and Technicians | 688 | 771 | 12.1% | 21 | 33 | 54 | 8 | 62 |
| 29-2057 | Ophthalmic Medical Technicians | 222 | 284 | 27.9% | 7 | 12 | 19 | 6 | 25 |
| 29-2061 | Licensed Practical and Licensed Vocational Nurses | 2,770 | 3,257 | 17.6% | 98 | 109 | 207 | 49 | 256 |
| 29-2081 | Opticians, Dispensing | 597 | 706 | 18.3% | 27 | 20 | 46 | 11 | 57 |
| 29-2091 | Orthotists and Prosthetists | 96 | 108 | 12.5% | 3 | 4 | 7 | 1 | 8 |
| 29-2092 | Hearing Aid Specialists | 44 | 47 | 6.8% | 1 | 2 | 3 | 0 | 3 |
| 29-2098 | Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other | 1,629 | 1,972 | 21.1% | 52 | 75 | 126 | 34 | 160 |
| 29-9000 | Other Healthcare Practitioners and Technical Occupations | 239 | 268 | 12.1% | 5 | 7 | 13 | 3 | 15 |
| 29-9091 | Athletic Trainers | 150 | 173 | 15.3% | 3 | 5 | 8 | 2 | 10 |
| 29-9092 | Genetic Counselors | - | - | - | - | - | - | - | - |
| 29-9098 | Health Information Technologists, Medical Registrars, Surgical Assistants, & Healthcare Practitioners, AO | 88 | 94 | 6.8% | 2 | 3 | 5 | 1 | 5 |
| 31-0000 | Healthcare Support Occupations | 36,297 | 43,462 | 19.7% | 2,169 | 2,119 | 4,288 | 717 | 5,004 |
| 31-1000 | Nursing, Psychiatric, and Home Health Aides | 25,889 | 30,666 | 18.5% | 1,669 | 1,420 | 3,089 | 478 | 3,567 |
| 31-1120 | Home Health and Personal Care Aides | 17,399 | 20,638 | 18.6% | 1,173 | 970 | 2,143 | 324 | 2,466 |
| 31-1131 | Nursing Assistants | 8,238 | 9,723 | 18.0% | 482 | 437 | 918 | 149 | 1,067 |
| 31-1132 | Orderlies | 207 | 255 | 23.2% | 12 | 11 | 24 | 5 | 28 |
| 31-1133 | Psychiatric Aides | 45 | 50 | 11.1% | 3 | 2 | 5 | 1 | 5 |

| SOC Code | Occupation Title | Employment | | | Projected Annual Openings, 2020-30 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2020 | 2030 | % Change | Labor Force Exits | Occu-pational Transfers | Total Turnover | Openings Due to Growth | Total Projected Openings |
| 31-2000 | Occupational Therapy and Physical Therapist Assistants and Aides | 931 | 1,149 | 23.4% | 42 | 64 | 106 | 22 | 128 |
| 31-2011 | Occupational Therapy Assistants | 198 | 247 | 24.7% | 10 | 12 | 21 | 5 | 26 |
| 31-2012 | Occupational Therapy Aides | 21 | 23 | 9.5% | 1 | 1 | 2 | 0 | 2 |
| 31-2021 | Physical Therapist Assistants | 493 | 613 | 24.3% | 22 | 36 | 57 | 12 | 69 |
| 31-2022 | Physical Therapist Aides | 219 | 266 | 21.5% | 10 | 16 | 25 | 5 | 30 |
| 31-9000 | Other Healthcare Support Occupations | 9,477 | 11,647 | 22.9% | 457 | 635 | 1,093 | 217 | 1,310 |
| 31-9011 | Massage Therapists | 481 | 548 | 13.9% | 30 | 22 | 52 | 7 | 59 |
| 31-9091 | Dental Assistants | 2,644 | 3,368 | 27.4% | 129 | 172 | 301 | 72 | 374 |
| 31-9092 | Medical Assistants | 3,635 | 4,515 | 24.2% | 156 | 249 | 405 | 88 | 493 |
| 31-9093 | Medical Equipment Preparers | 337 | 414 | 22.8% | 20 | 20 | 40 | 8 | 47 |
| 31-9094 | Medical Transcriptionists | 559 | 650 | 16.3% | 33 | 40 | 73 | 9 | 82 |
| 31-9095 | Pharmacy Aides | 73 | 83 | 13.7% | 4 | 5 | 9 | 1 | 10 |
| 31-9096 | Veterinary Assistants and Laboratory Animal Caretakers | 543 | 609 | 12.2% | 28 | 54 | 82 | 7 | 89 |
| 31-9097 | Phlebotomists | 717 | 897 | 25.1% | 30 | 46 | 76 | 18 | 94 |
| 31-9099 | Healthcare Support Workers, All Other | 488 | 563 | 15.4% | 28 | 28 | 56 | 8 | 63 |
| | Total | 80,662 | 96,569 | 19.7% | 3,410 | 3,361 | 6,771 | 1,591 | 8,362 |

**Source**: Long-Term Occupational Projections 2020-2030, Idaho Department of Labor.

**Notes**: Occupational openings are defined as due to turnover or growth. Turnover openings are caused by an existing worker leaving the workforce altogether (labor force exits), such as due to retirement or by a worker leaving their job to enter a new occupation (occupational transfers). Growth openings are job openings produced when a new job is created by the economy. Labor Force Exits + Occupational Transfers = Total Turnover; Total Turnover + Growth Openings = Total Annual Openings.

## Figure 9: Projected turnover rate vs. median hourly wages by occupation, Idaho




**Source**: Idaho Department of Labor.
**Note**: Horizontal and vertical axis rescaled using the base-10 logarithm. All occupations from projection table included.

Diving into individual occupations, a similar pattern as seen in the pre-pandemic period is apparent between occupational employment growth and average wage growth by occupation, as shown in Figure 10. Occupations exhibiting the greatest employment growth tended to have lower — sometimes negative — growth in average earnings. Occupations that grew slower — or even declined — tended to see the highest growth in average earnings. (The Pearson's product-moment correlation was -0.299 and was statistically significant at the 0.05 level.) This is only a descriptive relationship and should not be inferred as causal but is consistent with a supply-driven rather than a demand-driven narrative. Put another way, one might focus on supply-side factors including labor force exits and occupational transfers when explaining the change in occupational wages over this two-year period.

Notable outliers in Figure 10 would include general internal medicine physicians, which experienced a decline in employment from 120 to 70 (-41.7%), and an increase in average annual wage from $173,190 to $280,340 (+61.9%). Another outlier was family medicine physicians, where employment declined from 830 to 750 (-12%) and average annual earnings rose from $227,160 to $305,960 (+34.7%). Pharmacy aides are one notable outlier at the other extreme — employment grew by 185.7% while the

average annual wage shrunk by 3.4%. Still another outlier at this extreme was general dentists with employment growing from 420 to 720 (+71.4%) and the average wage falling by 38.9%. Due to the sample-based nature of the OEWS, these outliers may reflect statistical noise and therefore the exact magnitudes should be taken with caution.

Looking at specific occupations by their location quotient, there are again a few notable groups to mention.

While the employment of registered nurses grew, this growth was by a mere 2.1% (1.0% annualized), considerably slower than employment growth overall and part of a declining share of nurses in the labor force relative to the national average. The location quotient for RNs dropped from 0.96 in 2019 to 0.88 in 2021. This was accompanied by slightly slower growth in the average wage of RNs at only 6.0% over the same two-year period (3.0% annualized). This was unexpected, given the many interviews and a survey of nurses (see Section 3 below) that mentioned the financial rewards for working as a traveling nurse during the pandemic. This lack of growth in compensation may reflect the fact that surveys are conducted at the establishment level. Traveling nurses, though working in a hospital in Coeur D'Alene, for example, may be technically employed by the traveling nurses service located out of state, in which case their wages and employment may be recorded out of state instead of in Idaho. Still, the anemic growth of RNs in the Idaho labor force as measured by the Occupational and Employment Wage survey corresponds to the high frequency of mentions of RNs as being in high demand by Idaho hospitals (see Section 2.4 below).

Physicians and surgeons also saw their share of the Idaho labor force shrink relative to the nation overall. The location quotient for internal medicine physicians fell from an already small 0.55 to 0.23, owing in large part to the previously mentioned 41.7% decline in employment for these occupations. Family medicine physicians, whose employment level fell 12% percent, saw their location quotient fall from 1.53 in 2019 to 1.31, though this value being above 1.0 still indicates a relative abundance in comparison to the nation overall.

There were a few other notable employment declines (either absolute or in relative terms) worth mentioning before moving on to job postings. Physical therapists' employment in Idaho contracted from 1,390 in 2019 to 980 in 2021 — a 29.5% decline — which helped drive that occupation's location quotient to 0.96 from an initial 1.2. Licensed practical and vocational nurses (LPNs/LVNs) and nursing assistants also saw employment declines over this period, contributing to their declining share of the Idaho labor force relative to the nation. LPNs/LVNs saw employment decline by 18.5% between 2019 and 2021 and their location quotient fell from 0.77 to 0.63. Nursing assistant employment, on the other hand, shrunk by 5% during this period and their location quotient fell from 1.03 to 0.97. Respiratory therapists declined in absolute and relative terms, falling from 660 to 530 persons (-19.7%) and shrinking in relative share of the labor force from an LQ of 1.01 to 0.74. Lastly, pharmacists' employment fell from 1,600 to 1,580 — a 1.3% decline — and their location quotient fell from 1.04 to 0.94.

## 2.2 Conference Board data on job postings

Demand for health care workers of nearly all stripes increased during the first two years of the pandemic. Job posting data from The Conference Board indicate the demand for health care practitioners and technical occupations as well as health care support occupations more than doubled

between 2019 and 2021, as seen in Figure 11's monthly time series, which extends the time series shown in Figure 7 to the present. Monthly job postings in Idaho for these two occupational groups grew from around 1,000 in the first three quarters of 2019 to around 1,500 through early- and mid-2020, then topping 2,000 throughout most of 2021 and all of 2022. Looking at job postings by occupation, however, reveals how varied the demand was for these workers (see Table 7).

Respiratory therapy technicians saw a significant increase in job postings owing to the pandemic, rising from only one in 2019 to 17 to 2021, a 1,600% increase. Demand for respiratory therapists grew 272% (168 to 625) over the same period. Nurses of nearly all types became highly sought after during this period as well because of their indispensability in hospitals and clinics. Job postings for nurse anesthetists rose by 1,560%, nurse midwives by 250%, RNs by 170%, LPNs/LVNs by 145%, critical care nurses by 120%, nursing assistants by 104% and NPs by 93%. Among the consequences of the pandemic has been a noticeable increase in demand for mental health and psychiatric services, as seen in the large increase in job postings for advanced practice psychiatric nurses (+550%), psychiatrists (+137%) and psychiatric technicians (+133%).

Registered pharmacists, whose representation in the Idaho labor force was roughly on par with the national average in 2019 — an employment LQ of 1.04 (Table 2) — found themselves in high demand as increased needs for prescriptions and other pharmacy-related services from the pandemic were accompanied by a notable decline in registered pharmacist employment numbers (see Tables 2 and 6). The 1.3% decrease in employment and the location quotient drop to 0.94 were likely due to a combination of market exits from early retirements and career changes from pandemic-related burnout. These adverse supply and demand shocks would have surely contributed to the 111.5% increase in job postings between 2019 and 2021.

Among physicians and surgeons, the pandemic's effects varied considerably by specialization. At one extreme were preventive medicine physicians and general pediatricians, whose job postings declined between 2019 and 2021 by 94% and 37%, respectively. At the other extreme were sports medicine physicians (+500% growth in job postings), urologists (+475%), surgeons (+337%), radiologists (+217%) and physical medicine physicians (+200%). These gains may be due in part to temporary emergency standards of care imposed during the pandemic, with many elective operations and procedures that were not time sensitive canceled or rescheduled. This would have contributed to lower-than-expected demand for some specialists and higher-than-expected demand for others. However, some of the discrepancies might also have been driven by growing demand for specialized care for a growing and aging population, making cost-minimizing economies of scale feasible for specialized staff.

## Table 6: Occupational Employment and Wages Statistics, Idaho 2021

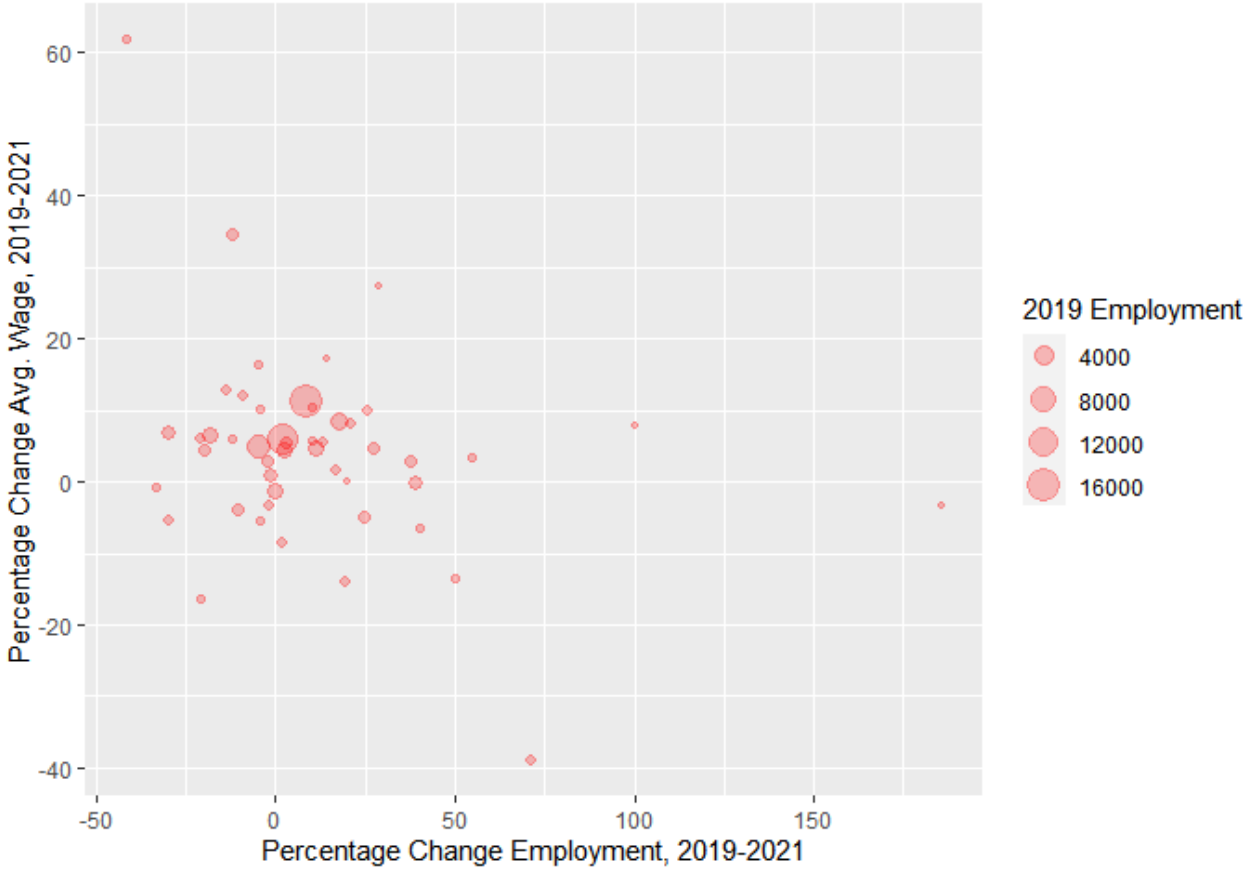
| SOC Code | Occupation Title | Employment | | Salary Distribution Percentile | | | Mean |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | *25th* | *50th* | *75th* | |
| 29-0000 | Healthcare Practitioners and Technical Occupations | 44,920 | 0.95 | 46,940 | 63,880 | 91,870 | 84,190 |
| 29-1011 | Chiropractors | 210 | 1.08 | 48,400 | 75,470 | 79,360 | 81,520 |
| 29-1021 | Dentists, General | 720 | 1.23 | 78,540 | 109,580 | 164,850 | 124,750 |
| 29-1031 | Dietitians and Nutritionists | 410 | 1.15 | 38,250 | 59,540 | 68,950 | 57,150 |
| 29-1041 | Optometrists | 190 | 0.91 | 49,030 | 78,280 | 105,820 | 85,200 |
| 29-1051 | Pharmacists | 1,580 | 0.94 | 121,620 | 127,940 | 131,080 | 122,420 |
| 29-1071 | Physician Assistants | 980 | 1.37 | 99,860 | 125,950 | 127,790 | 117,220 |
| 29-1081 | Podiatrists | 30 | 0.71 | 101,680 | # | # | 208,680 |
| 29-1122 | Occupational Therapists | 600 | 0.88 | 75,460 | 78,180 | 95,590 | 80,760 |
| 29-1123 | Physical Therapists | 980 | 0.81 | 77,190 | 80,340 | 99,040 | 85,880 |
| 29-1124 | Radiation Therapists | 80 | 0.88 | 79,870 | 99,560 | 102,060 | 93,830 |
| 29-1125 | Recreational Therapists | 90 | 1.04 | 36,930 | 47,670 | 57,640 | 48,250 |
| 29-1126 | Respiratory Therapists | 530 | 0.74 | 59,640 | 60,570 | 62,680 | 61,900 |
| 29-1127 | Speech-Language Pathologists | 800 | 1.01 | 58,780 | 76,260 | 96,210 | 74,580 |
| 29-1128 | Exercise Physiologists | 80 | 2.28 | * | * | * | * |
| 29-1131 | Veterinarians | 490 | 1.19 | 78,010 | 99,360 | 125,560 | 104,790 |
| 29-1141 | Registered Nurses | 14,400 | 0.88 | 61,030 | 75,560 | 79,360 | 73,640 |
| 29-1151 | Nurse Anesthetists | 490 | 2.07 | 154,440 | 164,860 | 164,900 | 171,790 |
| 29-1161 | Nurse Midwives | 110 | 2.63 | 48,000 | 61,410 | 78,480 | 61,740 |
| 29-1171 | Nurse Practitioners | 1,020 | 0.81 | 91,330 | 102,060 | 128,550 | 105,290 |
| 29-1181 | Audiologists | 140 | 1.97 | 51,880 | 75,660 | 79,250 | 69,460 |
| 29-1214 | Emergency Medicine Physicians | ** | ** | # | # | # | # |
| 29-1215 | Family Medicine Physicians | 730 | 1.31 | # | # | # | 305,960 |
| 29-1216 | General Internal Medicine Physicians | 70 | 0.23 | 60,190 | # | # | 280,340 |
| 29-1221 | Pediatricians, General | ** | ** | 134,620 | 169,660 | 206,800 | 175,750 |
| 29-1224 | Radiologists | 90 | 0.59 | * | * | * | * |
| 29-1229 | Physicians, All Other | 1,580 | 1.15 | # | # | # | 284,810 |
| 29-1249 | Surgeons, All Other | 80 | 0.48 | # | # | # | 320,740 |
| 29-1291 | Acupuncturists | 90 | 2.33 | 23,320 | 37,100 | 37,350 | 40,230 |
| 29-1292 | Dental Hygienists | 1,880 | 1.69 | 72,940 | 77,460 | 78,430 | 75,040 |
| 29-1299 | Healthcare Diagnosing or Treating Practitioners, All Other | 140 | 1.00 | * | * | * | * |
| 29-2010 | Clinical Laboratory Technologists and Technicians | 1,780 | 1.04 | 30,140 | 44,390 | 60,250 | 48,120 |
| 29-2031 | Cardiovascular Technologists and Technicians | 220 | 0.72 | 37,990 | 64,360 | 91,460 | 67,150 |
| 29-2032 | Diagnostic Medical Sonographers | 340 | 0.81 | 76,920 | 78,480 | 79,360 | 79,450 |
| 29-2033 | Nuclear Medicine Technologists | 60 | 0.67 | 77,030 | 79,360 | 98,030 | 83,360 |
| 29-2034 | Radiologic Technologists and Technicians | 1,350 | 1.16 | 48,360 | 60,570 | 76,600 | 62,370 |

| SOC Code | Occupation Title | Employment | | Salary Distribution Percentile | | | Mean |
|---|---|---|---|---|---|---|---|
| | | Level | LQ | *25th* | *50th* | *75th* | |
| 29-2035 | Magnetic Resonance Imaging Technologists | 110 | 0.55 | 77,030 | 78,870 | 94,690 | 81,720 |
| 29-2042 | Emergency Medical Technicians | 1,270 | 1.46 | 26,840 | 28,820 | 36,660 | 33,080 |
| 29-2043 | Paramedics | 590 | 1.14 | 36,750 | 46,460 | 57,680 | 47,630 |
| 29-2051 | Dietetic Technicians | 160 | 1.36 | 23,300 | 28,350 | 35,840 | 36,790 |
| 29-2052 | Pharmacy Technicians | 2,240 | 0.96 | 29,910 | 36,910 | 45,850 | 38,210 |
| 29-2053 | Psychiatric Technicians | 890 | 1.78 | 23,450 | 28,820 | 36,030 | 33,610 |
| 29-2055 | Surgical Technologists | 740 | 1.26 | 45,490 | 47,830 | 59,850 | 51,130 |
| 29-2056 | Veterinary Technologists and Technicians | 750 | 1.18 | 29,380 | 36,330 | 37,310 | 34,660 |
| 29-2057 | Ophthalmic Medical Technicians | 190 | 0.53 | 29,060 | 36,010 | 37,480 | 35,970 |
| 29-2061 | Licensed Practical and Licensed Vocational Nurses | 2,160 | 0.63 | 44,770 | 47,450 | 55,980 | 49,440 |
| 29-2072 | Medical Records Specialists | 1,390 | 1.43 | 36,930 | 46,480 | 49,520 | 45,400 |
| 29-2081 | Opticians, Dispensing | 520 | 1.31 | 29,270 | 30,720 | 37,570 | 35,400 |
| 29-2092 | Hearing Aid Specialists | 40 | 0.75 | 40,550 | 60,110 | 60,110 | 54,390 |
| 29-2099 | Health Technologists and Technicians, All Other | 550 | 0.73 | 36,750 | 38,860 | 59,380 | 47,380 |
| 29-9021 | Health Information Technologists and Medical Registrars | 90 | 0.43 | 38,090 | 59,120 | 76,600 | 71,300 |
| 29-9091 | Athletic Trainers | 110 | 0.81 | 44,260 | 47,850 | 58,900 | 54,420 |
| 29-9093 | Surgical Assistants | ** | ** | 35,870 | 37,050 | 46,640 | 38,040 |
| 29-9099 | Healthcare Practitioners and Technical Workers, All Other | 90 | 0.37 | * | * | * | * |
| 31-0000 | Healthcare Support Occupations | 34,760 | 0.98 | 23,420 | 28,870 | 36,070 | 30,740 |
| 31-1120 | Home Health and Personal Care Aides | 17,630 | 0.97 | 22,720 | 23,910 | 28,880 | 27,130 |
| 31-1131 | Nursing Assistants | 6,850 | 0.97 | 28,150 | 29,450 | 30,410 | 30,380 |
| 31-1132 | Orderlies | 220 | 0.92 | 28,350 | 28,850 | 37,090 | 34,750 |
| 31-2011 | Occupational Therapy Assistants | 120 | 0.55 | 30,740 | 60,110 | 63,060 | 52,740 |
| 31-2021 | Physical Therapist Assistants | 600 | 1.19 | 25,460 | 47,780 | 61,090 | 46,860 |
| 31-2022 | Physical Therapist Aides | 330 | 1.43 | 22,630 | 28,730 | 34,720 | 30,080 |
| 31-9011 | Massage Therapists | 390 | 0.89 | 36,750 | 47,980 | 60,550 | 56,770 |
| 31-9091 | Dental Assistants | 2,510 | 1.35 | 30,060 | 37,100 | 37,950 | 36,250 |
| 31-9092 | Medical Assistants | 3,950 | 1.01 | 30,160 | 37,120 | 38,990 | 37,650 |
| 31-9093 | Medical Equipment Preparers | 320 | 0.96 | 29,400 | 36,360 | 37,660 | 35,510 |
| 31-9094 | Medical Transcriptionists | 280 | 0.93 | 27,880 | 27,890 | 30,540 | 30,670 |
| 31-9095 | Pharmacy Aides | 200 | 0.84 | 23,360 | 28,900 | 37,090 | 29,930 |
| 31-9096 | Veterinary Assistants and Laboratory Animal Caretakers | 500 | 0.93 | 22,950 | 27,610 | 29,960 | 26,650 |
| 31-9097 | Phlebotomists | 490 | 0.69 | 29,940 | 36,020 | 37,660 | 35,120 |
| 31-9099 | Healthcare Support Workers, All Other | 370 | 0.63 | 28,820 | 28,820 | 31,070 | 31,470 |

**Source**: May 2021 Occupational Employment and Wage Statistics Survey, U.S. Bureau of Labor Statistics.

**Notes**: * indicates a wage estimate is not available; ** indicates an employment estimate is not available; # indicates a wage greater than or equal to $100 per hour or $208,000 per year.

## Figure 10: Employment vs. average wage growth by occupation, Idaho 2019-2021




**Source**: May 2019 and May 2021 Occupational Employment and Wage Statistics Surveys, U.S. Bureau of Labor Statistics.

## Table 7: Annual job postings for health care-related occupations, Idaho 2019 and 2021

| | | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| O*Net Code | Occupation Title | 2019 | 2021 | % Change | 2019 | 2021 |
| 29-1011.00 | Chiropractors | 14 | 50 | 257.1 | 0.7 | 1 |
| 29-1021.00 | Dentists, General | 66 | 174 | 163.6 | 0.6 | 0.6 |
| 29-1022.00 | Oral and Maxillofacial Surgeons | 3 | 19 | 533.3 | 0.3 | 0.8 |
| 29-1023.00 | Orthodontists | 2 | 2 | 0.0 | 0.3 | 0.1 |
| 29-1029.00 | Dentists, All Other Specialists | 5 | 1 | -80.0 | 0.7 | 0 |
| 29-1031.00 | Dietitians and Nutritionists | 259 | 540 | 108.5 | 1.4 | 1.1 |
| 29-1041.00 | Optometrists | 32 | 87 | 171.9 | 0.6 | 0.7 |
| 29-1051.00 | Pharmacists | 357 | 755 | 111.5 | 1.4 | 1.3 |
| 29-1061.00 | Anesthesiologists | 18 | 50 | 177.8 | 0.4 | 0.6 |
| 29-1062.00 | Family and General Practitioners | 181 | 339 | 87.3 | 0.8 | 1 |
| 29-1063.00 | Internists, General | 196 | 465 | 137.2 | 0.6 | 0.9 |
| 29-1064.00 | Obstetricians and Gynecologists | 120 | 268 | 123.3 | 1.3 | 1.5 |
| 29-1065.00 | Pediatricians, General | 60 | 38 | -36.7 | 1.3 | 0.7 |
| 29-1066.00 | Psychiatrists | 62 | 147 | 137.1 | 0.4 | 0.7 |
| 29-1067.00 | Surgeons | 38 | 166 | 336.8 | 0.4 | 1 |
| 29-1069.00 | Physicians and Surgeons, All Other | 289 | 510 | 76.5 | 0.8 | 0.9 |
| 29-1069.02 | Dermatologists | 34 | 41 | 20.6 | 0.9 | 0.7 |
| 29-1069.03 | Hospitalists | 53 | 157 | 196.2 | 0.5 | 1.2 |
| 29-1069.04 | Neurologists | 56 | 64 | 14.3 | 1 | 0.7 |
| 29-1069.06 | Ophthalmologists | 7 | 17 | 142.9 | 0.8 | 0.9 |
| 29-1069.07 | Pathologists | 21 | 6 | -71.4 | 3.8 | 0.4 |
| 29-1069.08 | Physical Medicine and Rehabilitation Physicians | 1 | 3 | 200.0 | 0 | 0.3 |
| 29-1069.09 | Preventive Medicine Physicians | 16 | 1 | -93.8 | 2.1 | 0 |
| 29-1069.10 | Radiologists | 6 | 19 | 216.7 | 0.2 | 0.5 |
| 29-1069.11 | Sports Medicine Physicians | 5 | 30 | 500.0 | 0.3 | 1.1 |
| 29-1069.12 | Urologists | 12 | 69 | 475.0 | 0.4 | 1.1 |
| 29-1071.00 | Physician Assistants | 131 | 206 | 57.3 | 0.8 | 0.7 |
| 29-1071.01 | Anesthesiologist Assistants | 11 | 27 | 145.5 | 0.5 | 0.6 |
| 29-1122.00 | Occupational Therapists | 399 | 491 | 23.1 | 1.3 | 1.2 |
| 29-1122.01 | Low Vision Therapists, Orientation and Mobility Specialists, and Vision Rehabilitation Therapists | 2 | 3 | 50.0 | 0.5 | 0.4 |
| 29-1123.00 | Physical Therapists | 471 | 787 | 67.1 | 0.8 | 1 |
| 29-1124.00 | Radiation Therapists | 51 | 71 | 39.2 | 2.4 | 2.1 |
| 29-1125.00 | Recreational Therapists | 25 | 70 | 180.0 | 0.9 | 1.5 |
| 29-1125.02 | Music Therapists | 1 | 5 | 400.0 | 0 | 3.7 |
| 29-1126.00 | Respiratory Therapists | 168 | 625 | 272.0 | 1.1 | 1.5 |
| 29-1127.00 | Speech-Language Pathologists | 524 | 1021 | 94.8 | 1.3 | 1 |

| O*Net Code | Occupation Title | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| | | 2019 | 2021 | % Change | 2019 | 2021 |
| 29-1128.00 | Exercise Physiologists | 15 | 45 | 200.0 | 1.4 | 2.1 |
| 29-1131.00 | Veterinarians | 55 | 335 | 509.1 | 0.7 | 1.1 |
| 29-1141.00 | Registered Nurses | 5391 | 14529 | 169.5 | 1.1 | 1.2 |
| 29-1141.01 | Acute Care Nurses | 1 | 2 | 100.0 | 0 | 0.8 |
| 29-1141.02 | Advanced Practice Psychiatric Nurses | 2 | 13 | 550.0 | 0.2 | 0.6 |
| 29-1141.03 | Critical Care Nurses | 909 | 1999 | 119.9 | 1.3 | 1.3 |
| 29-1141.04 | Clinical Nurse Specialists | 12 | 19 | 58.3 | 1.2 | 1.2 |
| 29-1151.00 | Nurse Anesthetists | 5 | 83 | 1560.0 | 0.1 | 1 |
| 29-1161.00 | Nurse Midwives | 6 | 21 | 250.0 | 0.9 | 1.8 |
| 29-1171.00 | Nurse Practitioners | 468 | 902 | 92.7 | 1 | 1 |
| 29-1181.00 | Audiologists | 20 | 40 | 100.0 | 1.2 | 1.1 |
| 29-1199.00 | Health Diagnosing and Treating Practitioners, All Other | 74 | 89 | 20.3 | 1.2 | 0.8 |
| 29-1199.01 | Acupuncturists | 3 | 5 | 66.7 | 0.7 | 0.5 |
| 29-2011.00 | Medical and Clinical Laboratory Technologists | 156 | 372 | 138.5 | 1.2 | 1.3 |
| 29-2011.01 | Cytogenetic Technologists | 2 | 4 | 100.0 | 0.4 | 0.4 |
| 29-2011.02 | Cytotechnologists | 2 | 22 | 1000.0 | 0.3 | 1.1 |
| 29-2011.03 | Histotechnologists and Histologic Technicians | 15 | 88 | 486.7 | 0.6 | 1.6 |
| 29-2012.00 | Medical and Clinical Laboratory Technicians | 391 | 929 | 137.6 | 0.9 | 0.8 |
| 29-2021.00 | Dental Hygienists | 48 | 174 | 262.5 | 0.8 | 0.8 |
| 29-2031.00 | Cardiovascular Technologists and Technicians | 210 | 465 | 121.4 | 1.2 | 1.1 |
| 29-2032.00 | Diagnostic Medical Sonographers | 147 | 320 | 117.7 | 1.1 | 1 |
| 29-2033.00 | Nuclear Medicine Technologists | 15 | 44 | 193.3 | 1.1 | 1.4 |
| 29-2034.00 | Radiologic Technologists | 229 | 473 | 106.6 | 1.2 | 1.2 |
| 29-2035.00 | Magnetic Resonance Imaging Technologists | 126 | 420 | 233.3 | 1.1 | 1.6 |
| 29-2041.00 | Emergency Medical Technicians and Paramedics | 96 | 195 | 103.1 | 0.7 | 0.6 |
| 29-2051.00 | Dietetic Technicians | 36 | 26 | -27.8 | 1.4 | 0.6 |
| 29-2052.00 | Pharmacy Technicians | 552 | 950 | 72.1 | 1.2 | 1 |
| 29-2053.00 | Psychiatric Technicians | 94 | 219 | 133.0 | 1.4 | 1.2 |
| 29-2054.00 | Respiratory Therapy Technicians | 1 | 17 | 1600.0 | 0 | 1.8 |
| 29-2055.00 | Surgical Technologists | 300 | 573 | 91.0 | 1.4 | 1.3 |
| 29-2056.00 | Veterinary Technologists and Technicians | 38 | 199 | 423.7 | 0.8 | 0.8 |
| 29-2057.00 | Ophthalmic Medical Technicians | 28 | 137 | 389.3 | 1 | 1 |
| 29-2061.00 | Licensed Practical and Licensed Vocational Nurses | 971 | 2381 | 145.2 | 1.1 | 0.9 |
| 29-2071.00 | Medical Records and Health Information Technicians | 513 | 1205 | 134.9 | 0.8 | 1.1 |
| 29-2081.00 | Opticians, Dispensing | 18 | 100 | 455.6 | 0.7 | 1 |
| 29-2091.00 | Orthotists and Prosthetists | 9 | 6 | -33.3 | 1.6 | 0.5 |
| 29-2092.00 | Hearing Aid Specialists | 7 | 20 | 185.7 | 0.9 | 1.3 |
| 29-2099.00 | Health Technologists and Technicians, All Other | 532 | 967 | 81.8 | 1.1 | 0.9 |
| 29-2099.01 | Neurodiagnostic Technologists | 19 | 77 | 305.3 | 1 | 1.6 |

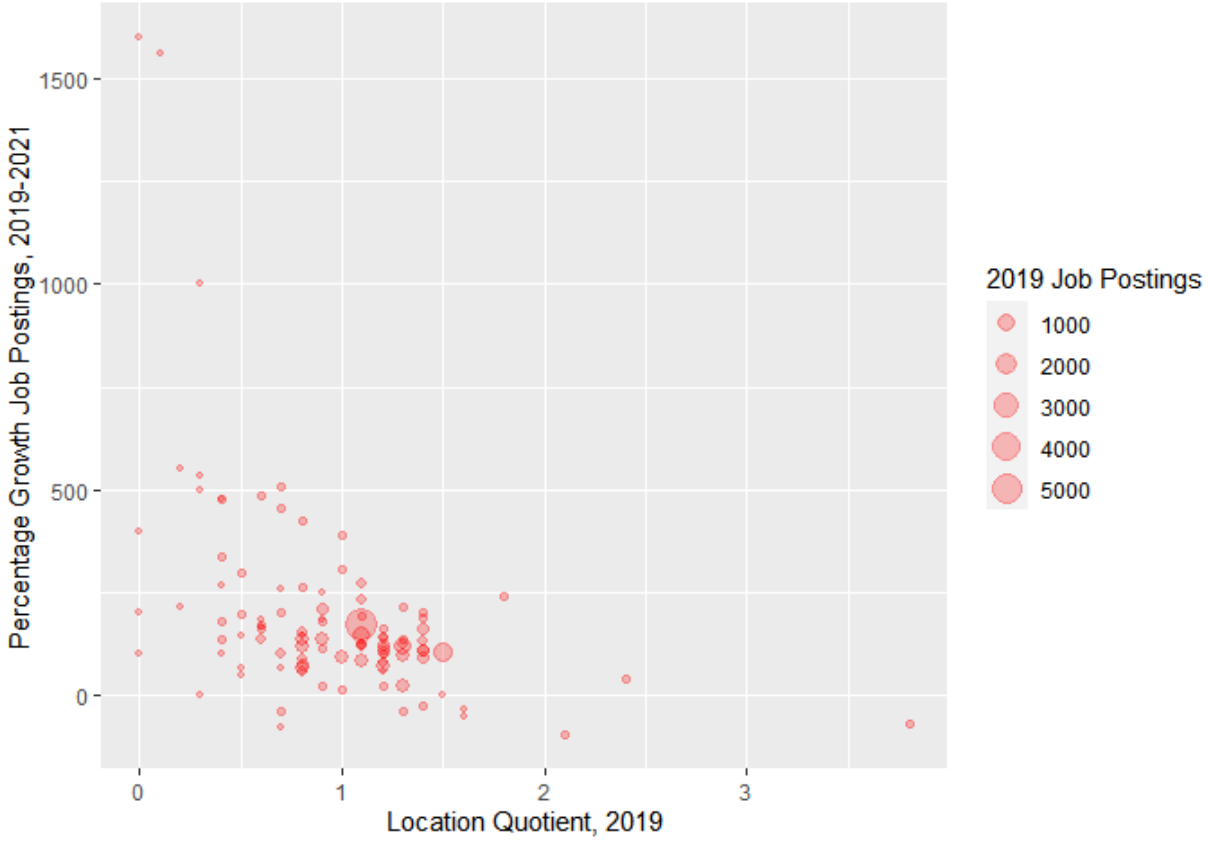
| | | Job Postings | | | Location Quotient | |
|---|---|---|---|---|---|---|
| O*Net Code | Occupation Title | 2019 | 2021 | % Change | 2019 | 2021 |
| 29-2099.06 | Radiologic Technicians | 32 | 97 | 203.1 | 0.7 | 1 |
| 29-2099.07 | Surgical Assistants | 9 | 33 | 266.7 | 0.4 | 0.6 |
| 29-9011.00 | Occupational Health and Safety Specialists | 162 | 290 | 79.0 | 1.2 | 1 |
| 29-9012.00 | Occupational Health and Safety Technicians | 56 | 161 | 187.5 | 1.4 | 1.9 |
| 29-9091.00 | Athletic Trainers | 43 | 101 | 134.9 | 1.3 | 1.3 |
| 29-9092.00 | Genetic Counselors | 6 | 17 | 183.3 | 0.6 | 1.1 |
| 29-9099.00 | Healthcare Practitioners and Technical Workers, All Other | 3 | 8 | 166.7 | 0.6 | 1 |
| 29-9099.01 | Midwives | 2 | 1 | -50.0 | 1.6 | 0 |
| | Total, Healthcare Practitioners and Technical Occupations | 15,525 | 36,497 | 135.1 | | |
| 31-1011.00 | Home Health Aides | 317 | 978 | 208.5 | 0.9 | 0.8 |
| 31-1013.00 | Psychiatric Aides | 12 | 12 | 0.0 | 1.5 | 0.7 |
| 31-1014.00 | Nursing Assistants | 1453 | 2970 | 104.4 | 1.5 | 1.1 |
| 31-1015.00 | Orderlies | 73 | 174 | 138.4 | 1.2 | 1.4 |
| 31-2011.00 | Occupational Therapy Assistants | 73 | 155 | 112.3 | 0.9 | 0.9 |
| 31-2012.00 | Occupational Therapy Aides | 24 | 96 | 300.0 | 0.5 | 1.1 |
| 31-2021.00 | Physical Therapist Assistants | 104 | 266 | 155.8 | 0.8 | 1 |
| 31-2022.00 | Physical Therapist Aides | 40 | 137 | 242.5 | 1.8 | 1.9 |
| 31-9011.00 | Massage Therapists | 113 | 253 | 123.9 | 1.1 | 0.9 |
| 31-9091.00 | Dental Assistants | 213 | 563 | 164.3 | 1.4 | 0.7 |
| 31-9092.00 | Medical Assistants | 585 | 1288 | 120.2 | 0.8 | 0.7 |
| 31-9093.00 | Medical Equipment Preparers | 115 | 256 | 122.6 | 1.1 | 1.1 |
| 31-9094.00 | Medical Transcriptionists | 24 | 15 | -37.5 | 0.7 | 0.9 |
| 31-9095.00 | Pharmacy Aides | 14 | 23 | 64.3 | 0.5 | 0.4 |
| 31-9096.00 | Veterinary Assistants and Laboratory Animal Caretakers | 19 | 110 | 478.9 | 0.4 | 0.8 |
| 31-9097.00 | Phlebotomists | 197 | 423 | 114.7 | 1.2 | 0.8 |
| 31-9099.00 | Healthcare Support Workers, All Other | 41 | 108 | 163.4 | 1.2 | 1.4 |
| 31-9099.02 | Endoscopy Technicians | 18 | 57 | 216.7 | 1.3 | 1.5 |
| | Total, Healthcare Support Occupations | 3,435 | 7,884 | 129.5 | | |
| | Total | 18,960 | 44,381 | 134.1 | | |

**Source**: The Conference Board via Lightcast (formerly Emsi-Burning Glass).

## Figure 11: Monthly job postings for healthcare practitioners and technical and healthcare support occupations, Idaho


**Source**: The Conference Board via Lightcast (formerly Emsi-Burning Glass).
**Note**: This graph extends the data from Figure 7 to August 2022.

## Figure 12: Job posting growth vs. initial posting concentration by occupation, Idaho




**Source**: The Conference Board via Lightcast (formerly Emsi-Burning Glass).

## 2.3 Discussions with health care education program administrators

Unlike the previous sections where more current data was available, data on health care program completions and enrollments comes at a considerable lag. As such, information provided in this section relies on discussions with education administrators from several public universities including WWAMI, University of Idaho, Idaho State University and Boise State University. While not a complete picture of health care education in the state, these discussions provided qualitative information corroborated by other stakeholders.

Among the most salient pieces of information from these discussions was a common recognition that the primary constraints programs face are due to the limited capacity to expand. (Pharmacists was one notable exception where the current pool of qualified applicants had been declining and was just enough to fill available spots.) The most cited capacity constraints were (1) difficulty hiring and retaining teaching faculty, (2) insufficient training resources and (3) insufficient opportunities for students to obtain the clinical portion of their training within Idaho.

For nursing and pharmacy, WWAMI medical, occupational and physical therapy, and physician assistant programs, a lack of available instructors topped the list of capacity constraints. WWAMI additionally mentioned a 30% turnover rate over the past two years for its faculty. Simply put, the opportunity costs for teaching considerably outweigh the benefits. Chief among the issues mentioned were workloads, including classroom demands or concurrent requirements to ensure an instructor license remains active by continuing their practice; job satisfaction; and, above all else, compensation. Teaching positions typically pay less than what practitioners would otherwise earn in practice. Dovetailing with the job satisfaction factor, a few stakeholders also mentioned the increasing politicization of education in Idaho as a further deterrent, with some specifically citing public hostility towards institutions of higher education and increased scrutiny of educators for alleged political bias.

Beyond faculty-related constraints, the second and third most-cited limitations mentioned during these discussions were insufficient training resources and in-state clinical opportunities. Whether these constraints are binding vary by program. In the case of nursing, the training resource issue was less widespread. Many administrators cited increased investment in classroom technology including simulator-based learning, but growing difficulties placing nursing students for their clinicals meant many Idaho students were completing this portion of their training out of state. Discussions with hospital administrators confirmed this. Some even mentioned a growing acceptance of a future where students/programs will need to reserve paid clinical spots. This is particularly important to the “health care talent pipeline” discussion as it points to one source of “leakage.” Where students perform their clinicals correlates with where they land their first job after graduating. More Idaho students going across state lines to complete their training will mean an even poorer measure of the pipeline’s output for program completions. Among the issues cited on the hospital/clinic side of this problem are the administrative, logistical, and physical difficulties of hosting additional students. Students have a strong preference to do their clinicals near their university or home, meaning that some more remote clinical sites may have spare, underutilized capacity.

Another issue is the ongoing shift toward students paying for their own education costs as opposed to public support through state or federal programs. For many students, paying for a college degree requires incurring debt in the form of student loans. Depending on the student’s circumstances and the

amounts owed, choosing to practice in Idaho may seem unattractive — if not financially unsustainable when monthly loan payments are high and better paying opportunities can be found elsewhere.[14] While the debate over private-vs-public financing of higher education is ongoing and beyond this study, it is worth mentioning one lesser-appreciated consequence of rising education costs may be a greater outflow of Idaho graduates who must chase jobs in better-paying states to cover the costs of paying off student loans. Student loan debt was also mentioned in discussions as a contributing factor to increased anxiety, depression, and suicide among health care professions. Debts were also cited as a reason students increasingly go into higher-paying specialized fields as opposed to primary care or general practice, despite the still-strong demand for the latter. If the cost of a degree is roughly equivalent for a general practitioner and a specialist, higher pay creates an incentive for more students to take a specialist degree path and pay off student loan debts faster.

## 2.4 Discussions with Idaho Hospital Association staff and survey results

Another set of stakeholders interviewed were in-state providers including the Idaho Hospital Association (IHA). As previously mentioned, points brought up in discussions with individuals from the education-side were corroborated or closely aligned. Additionally, IHA provided the department an opportunity to collaborate on its annual survey of members by including workforce-related questions.

The discussions with IHA could be summarized in one paraphrased sentence: "The health care workforce will either be the enabler or barrier for health care in the state." As with services generally, quality staff are indispensable to the smooth functioning of the health care sector, and as a result, labor costs make up a significant share of provider costs. However, pre-pandemic trends best described as a comparatively manageable shortage for some critical occupations worsened due to the pandemic and its consequences. This series of events made the situation considerably more difficult for Idaho providers to manage, despite COVID-19 cases and hospitalizations falling from their peaks set between late summer 2021 and the end of winter 2022.[15]

Workers typically consider a host of factors when deciding between jobs — compensation and benefits, work environment, scope of work, opportunities for advancement and quality of life. COVID-19 appeared to affect nearly all those factors. For some workers, particularly those already at or nearing retirement age, concerns for their own health and safety appeared to lead to an acceleration of retirements. While many providers already saw this "silver tsunami" coming years in advance, COVID-19 effectively moved up many individual timeframes. Whereas a nurse might have expected to retire in 2025, for instance, they instead decided to call it quits sometime in 2020 or 2021 because of pandemic conditions. This first wave of exits during this health care crisis meant staffing shortages, which increased the hours and days health care workers labored without a break and further contributed to burnout from an increasingly difficult work environment. This almost certainly led to subsequent market

[14] Take for example registered nurses. The 10th percentile of annual wages for Idahoan RNs is in many ways a proxy for their entry-level salary. In 2021 this was $59,640. By comparison, the 10th percentiles in neighboring Oregon and Washington were $76,180 and $74,070, respectively. Source: May 2021 Occupational Employment and Wage Statistics Survey, U.S. Bureau of Labor Statistics.

[15] As of Sept. 6, 2022, the seven-day average of new reported cases of COVID-19 in Idaho was 277 while the number of COVID-related hospitalizations was 126. By comparison, the seven-day case average peaked at 2,833 in January of 2022 while hospitalizations had peaked at 775 in late September of 2021. Source: Federal and state health agencies via New York Times.

exits from career switchers who no longer found their original occupation attractive enough to continue. Due to the crisis standards of care imposed at times during the pandemic, many health care professionals saw an adverse change in the scope of their work as some procedures and operations were put on hold while hospitals were inundated by COVID patients. Finally, workforce gaps filled by workers contracted through traveling agencies or compact agreements made working out of state a relatively easy affair, with many health care workers taking the pandemic as an opportunity to earn more pay elsewhere.

From discussions with the IHA and its survey, recruitment is a top ongoing issue facing providers when it comes to their workforce needs. Rising housing costs as a barrier to entry was among the most mentioned issues in discussions with IHA and other stakeholders, education program administrators and licensing boards. It should come as no surprise that housing prices have been growing faster than wages,[16] driven in part by an influx of new residents and a declining housing inventory[17] from the dearth of new housing construction that followed the late-2000s housing crash and subsequent Great Recession.[18] Several providers in major metropolitan areas — especially the Treasure Valley and some particularly remote communities —cited housing costs as one of the largest deterrents to recruitment with initial acceptance offers turned down after candidates were unable to find affordable housing. Other recruitment-related issues included cumbersome processes for licensing workers, particularly those locating to Idaho from states without license compact agreements.

Nurses and nursing aides/assistants were among the occupations hospitals were most concerned with filling now and in the future — 15 out of 19 respondents mentioned those among other occupations. Physicians were cited by three respondents, lab technicians by four, radiation and imaging technicians by three and housekeepers by two respondents.

Retention also became more difficult for Idaho providers. In the survey of IHA members, most reported an increase in employee turnover. The median turnover rate for all employees during the pre-pandemic period was 16.5%, but in the past year this rate has gone up to 24%. Nurses were among the types of workers cited as having a high turnover rate since the start of COVID-19, with 16 of the 18 respondents mentioning nurses or nursing aides/assistants as having the highest turnover. One respondent said prior to the pandemic the turnover for RNs was 7.75% but now stands at 28.7%.

The IHA is aware of the limitations on in-state clinical sites and how these limitations contributed to many Idaho graduates leaving the state, corroborating the views of education program administrators. Providers cite additional resources and staff as necessary before more in-state clinical opportunities could be offered. Urban hospitals would more likely meet this challenge given their proximity to dense populations, accompanying economies of scale and higher education institutions with students requiring such clinical opportunities. Rural hospitals, on the other hand, would be far less capable of meeting this challenge given their greater staffing difficulties and fiscal constraints. The association also cited growing

[16] Sources: All-Transaction House Price Index for Idaho, U.S. Federal Housing Finance Agency; Average Weekly Earnings of All Employees: Total Private in Idaho, U.S. Bureau of Labor Statistics. A graph of both time series indexed to Jan. 1, 2010, compliments of the St. Louis Federal Reserve's FRED can be found here.
[17] See, for instance, the recent IDOL housing report.
[18] Source: New Private Housing Units Authorized by Building Permits for Idaho, U.S. Census Bureau. A time series plot compliments of the St. Louis Federal Reserve's FRED can be found here.

recognition that at some point in the future health care programs and/or their students may need to move to a model that compensates providers who offer clinical training sites, contributing to rising education costs that only further reduce the supply of new entrants.

Discussions about health care investment, profitability and market consolidation were also mentioned. As previously cited, Idaho has been experiencing a high population growth rate for several years running, due largely to net in-migration. Along a balanced growth path, investments in health care infrastructure — like hospitals and clinical sites — would follow similar trends. However, for the past year and a half the pandemic has forced many providers to curtail these investments as they use available cash flows to meet immediate needs. These needs include maintaining critical staffing levels amidst a labor shortage, balancing rising costs, and operating at a loss due to federal relief funds now running out or insurance reimbursements lagging. The current situation for these providers might be characterized as an investment deficit that would need to be paid back, so-to-speak, as expected continual growth will place greater needs on scarcer infrastructure. This deficit is expected to be particularly acute for rural hospitals that were hit from both sides by greater recruitment difficulties and slimmer operating margins. According to the IHA, solutions predicated on market consolidation to eliminate redundancies and reduce overhead costs did not seem all too practical as past waves of mergers have left little room for further consolidation.

## 3.0 Occupational license survey results and analysis

To make up for some of the data limitations, health care professionals were surveyed in cooperation with the Idaho Division of Occupational and Professional Licenses. The primary objectives were to estimate the anticipated occupational turnover rate and estimate what salary would be necessary to retain these workers (i.e., their willingness-to-accept wages for staying as opposed to exiting). For occupations where many workers licensed in Idaho may not practice in Idaho — either due to license compact agreements or working out of state in a travelling capacity — a similar willingness-to-accept (WTA) wage estimate was made to understand how much they need to be offered to relocate to Idaho. Further details on the survey can be found in Appendix A.1.

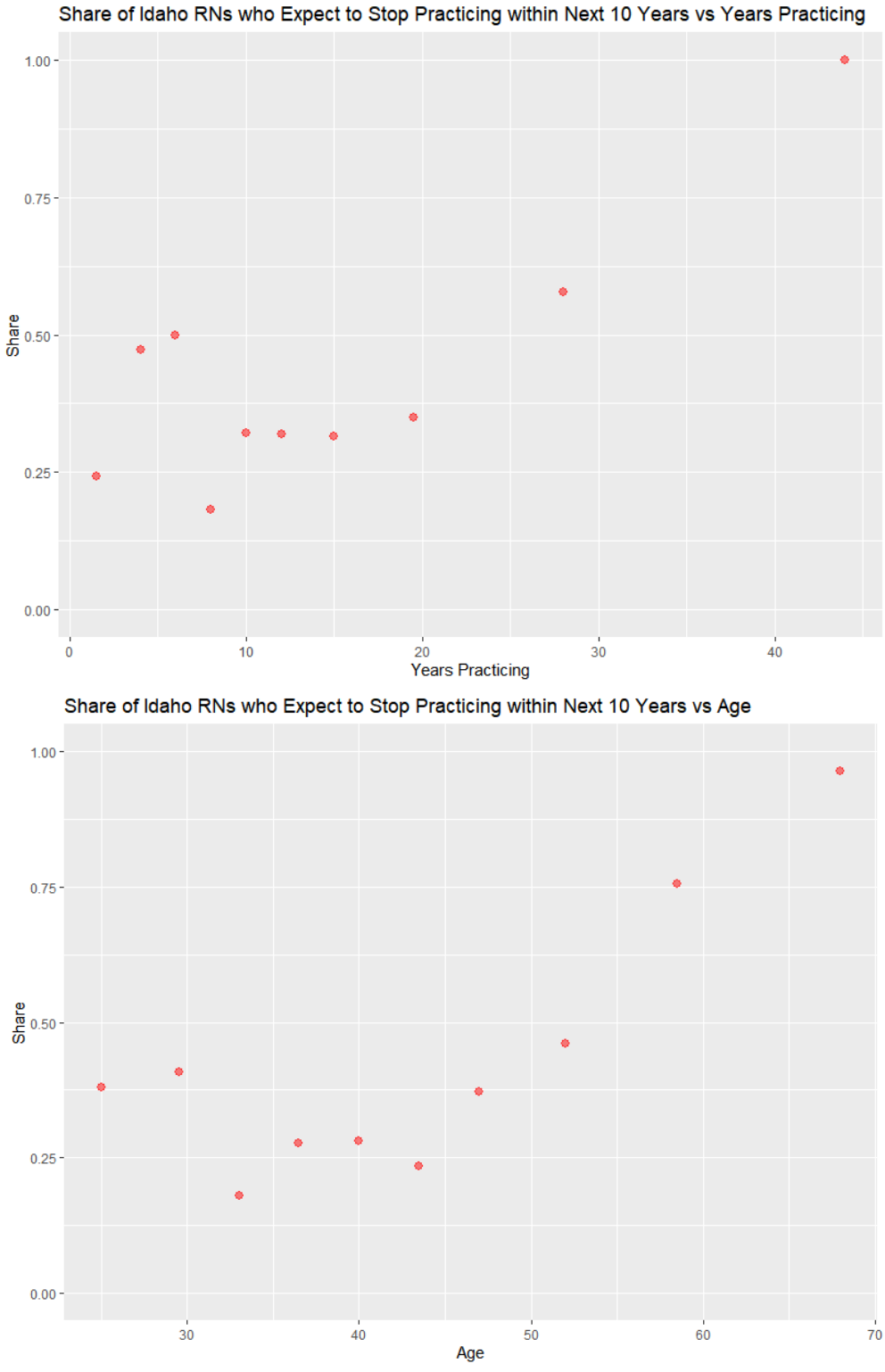
To summarize the survey results, the anticipated one-year-forward occupational turnover rates for registered nurses, licensed practical nurses, registered pharmacists, physicians and surgeons were well above the department's projections, implying greater demand growth over supply than previously expected. The types of turnover (market exits from retirement or moving out of state or occupational transfers) and reasons given varied by occupation. Among those leaving for non-retirement reasons, issues mentioned most often included burnout and workloads, compensation and rising costs of living, and issues related to the culture and state politics. Nurses (RNs and LPNs) were more likely to cite work-related stresses and compensation while physicians and surgeons frequently mentioned the changing cultural and political environment. For both groups of nurses, the estimated WTA wage to stay for those considering an occupational exit was typically in the highest quartile of their respective occupation's 2021 annual wage distribution. The estimated WTA wage for out-of-state RNs was above the 90th percentile. This estimate was not necessarily an increasing function of age or experience. Some particularly young workers have decided to leave their field and would ostensibly require a large increase in compensation to stay. In the case of RNs, however, employers may be able to attract workers from neighboring Utah and Wyoming at a lower cost.

## 3.1 Survey results, registered nurses (RNs)

Registered nurses are by far the largest occupational license group and therefore had the largest number of survey responses. This was beneficial to the study insofar as it provides more robust estimates because of the larger sample size (total survey size equaled 665; survey size for RNs currently practicing in Idaho equaled 503) as well as nurses cited in the IHA survey as the most difficult occupation for employers to recruit. Owing to the nursing compact agreement, many nurses not practicing in Idaho were solicited in this survey and enough participated to allow some cross-state comparisons (out-of-state survey size was 84), particularly when it came to estimating the average WTA wage to work in Idaho for out-of-state RNs.

Figures 13a and 13b plot the share of RNs currently practicing in Idaho who anticipate they will stop practicing within the next 10 years by age and years of practice, respectively. Not included in the definition of "expecting to stop practicing" was the decision to locate out of state, which will be covered in the next pair of graphs. Age and years practiced were binned by decile, meaning these data points were sorted in 10 equal subsections by percentile, with each data point corresponding to the decile average. This sorting method provides insight into how the share of expected stoppages varies by age and experience.

## Figure 13: Share of Idaho RNs who expect to stop practicing by experience (a) and age (b)

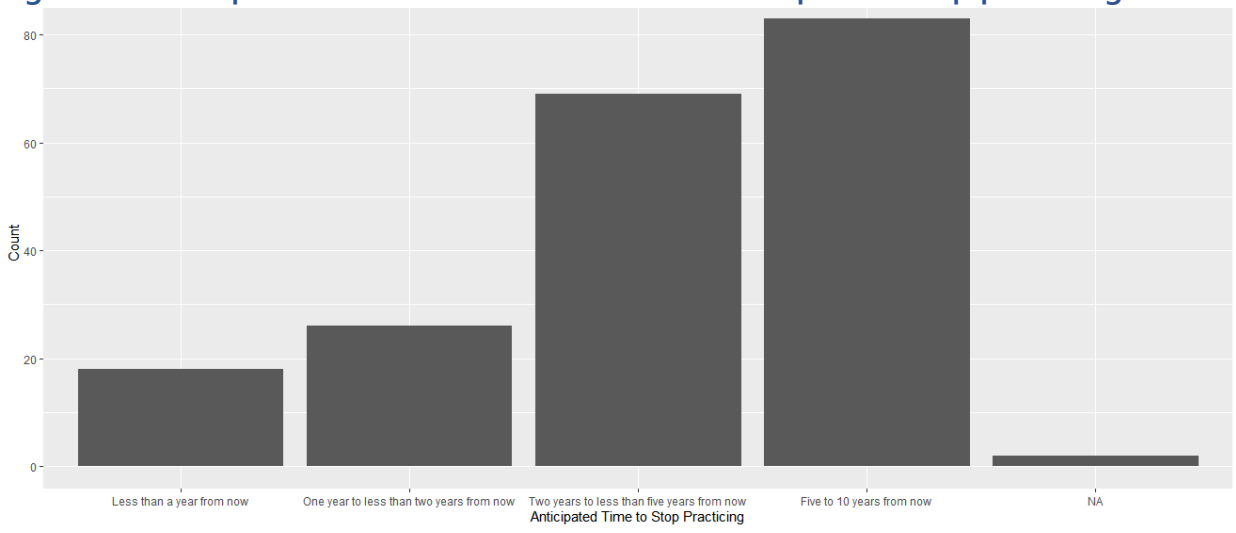



**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 503 for both figures.

Among more unexpected survey results was the noticeable increase in anticipated stoppages among the youngest nurses, as seen in both graphs. Roughly half of RNs in the second and third decile bin of years practicing — those with three to seven years of experience — said they anticipate they will stop practicing as an RN in the next decade, roughly in line with nurses with 20 more years of experience. Looking at age, roughly four out of 10 RNs in the first two age decile bins (those between the ages of 22 and 31) stated they expect to stop working as a nurse in the next decade, a proportion on par with RNs two-to-three decades older. Whether or not this is a consequence of the pandemic or a long-run phenomenon is unclear, but it does indicate many RNs early in their careers are considering leaving nursing entirely. This could pose a challenge for hospitals and clinics who might presume the current cohort of young RNs can be counted on to be around for a decade or more. Paired with older RNs who expect to leave their practice due to retirement, an estimated 39.3% expect to stop practicing in the next decade (95% confidence interval: 35.1% to 43.6%). When asked when they expect to stop practicing, the majority gave a timeframe between two and 10 years, as shown in Figure 14, and an overwhelming majority said this stoppage would be permanent as opposed to temporary (170 of 198).

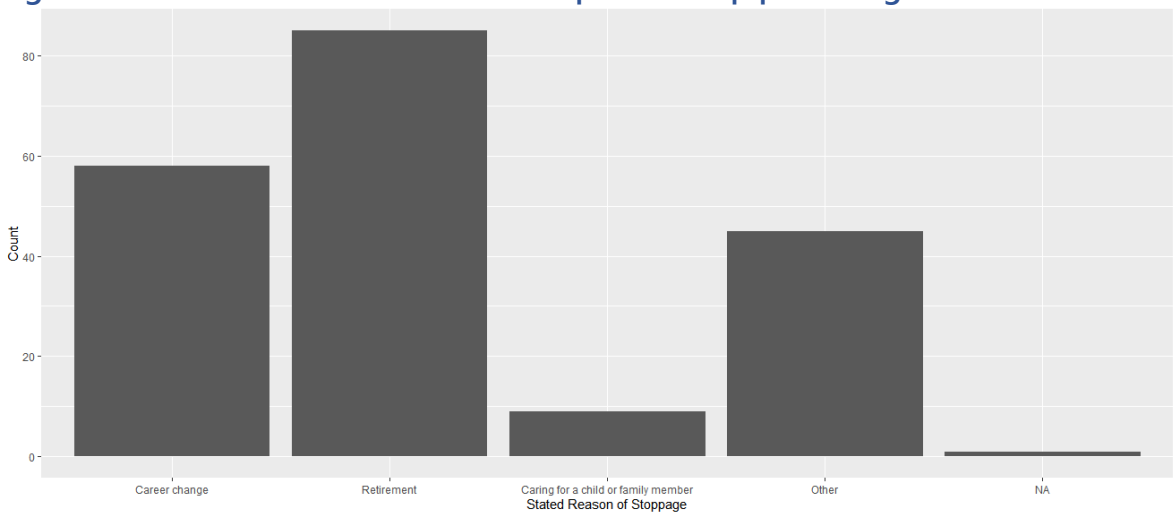
Retirements were the largest single reason for all Idaho RNs who said they expect to stop practicing within the next decade, followed by career changes (see Figure 15). A comparatively small number stated caring for a child or family member or did not report their reason. However, a considerable number listed "other," and among these a majority mentioned professional dissatisfaction or stress/burnout (36 of 45) in their open-ended response. Many also cited inadequate compensation (16 of 45). Among career changers, a similar share cited professional dissatisfaction or stress/burnout (38 of 58) and inadequate compensation (22 of 58). Given these similarities, adding career changers and "others" together outnumber retirements as the largest pair of reasons for anticipated exits from nursing in the next 10 years.

## Figure 14: Anticipated timeframe for Idaho RNs who expect to stop practicing




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 198.

## Figure 15: Reason for Idaho RNs who expect to stop practicing

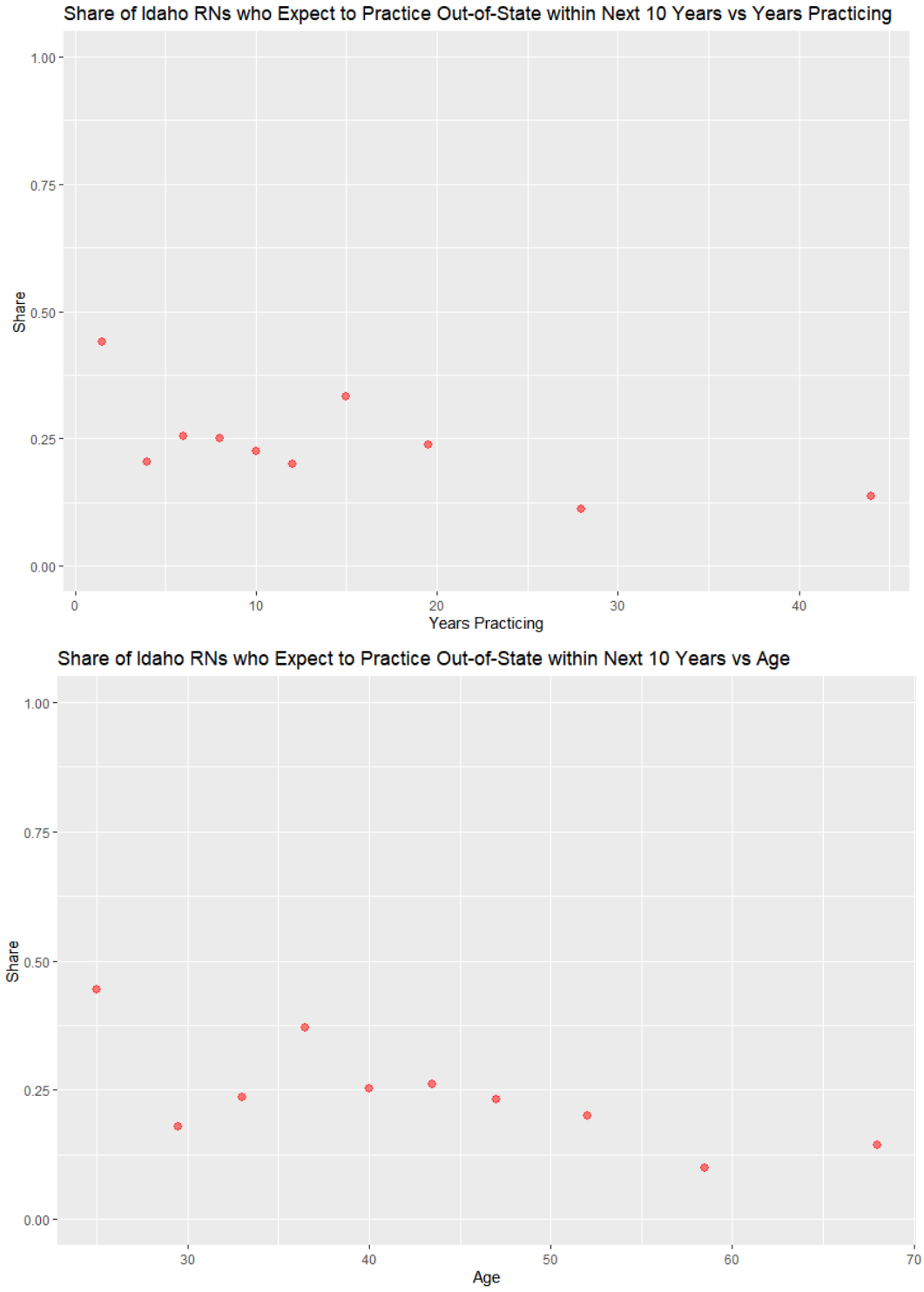



**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 198.

In addition to labor market exits from occupational transfers and retirements, relocating out of state is another source of occupational turnover among nurses. As mentioned earlier, the opportunities afforded by travel nursing gigs significantly increased over the course of the pandemic. Areas hit hardest by caseloads and hospitalizations had to scramble to meet these challenges, effectively pulling in staff from other parts of the country where the virus was less severe. Some RNs might have looked at salaries offered in other states and, after weighing them against their current position, decided they preferred a permanent relocation. As with the other forms of market exits, how many of these relocations reflect long-run trends and how many are attributable to COVID-19 is uncertain, but the magnitude of these anticipated exits is nonetheless informative.

Figures 16a and 16b plot the share of Idaho RNs who anticipate they will practice out of state within the next 10 years by years practicing and age binned by decile, respectively. Unlike the share of RNs who expect to stop practicing, which generally increased with age, the general trend for the likelihood of relocation is negatively related to age. Among the groups most likely to relocate are the youngest nurses by age and experience; roughly nine out of 20 nurses between the ages of 22 and 28 and nurses with less than three years of experience were anticipating an exit. Additionally, there was a bump in the share of Idaho RNs expecting relocation around the seventh decile by experience and fourth decile by age, with roughly four out of 10 RNs with 13 to 17 years of experience and between the ages of 35 and 38 also expecting to relocate. In all, an estimated 25.4% of Idaho RNs expected to relocate out of state within the next decade (95% confidence interval: 21.6% to 29.3%).

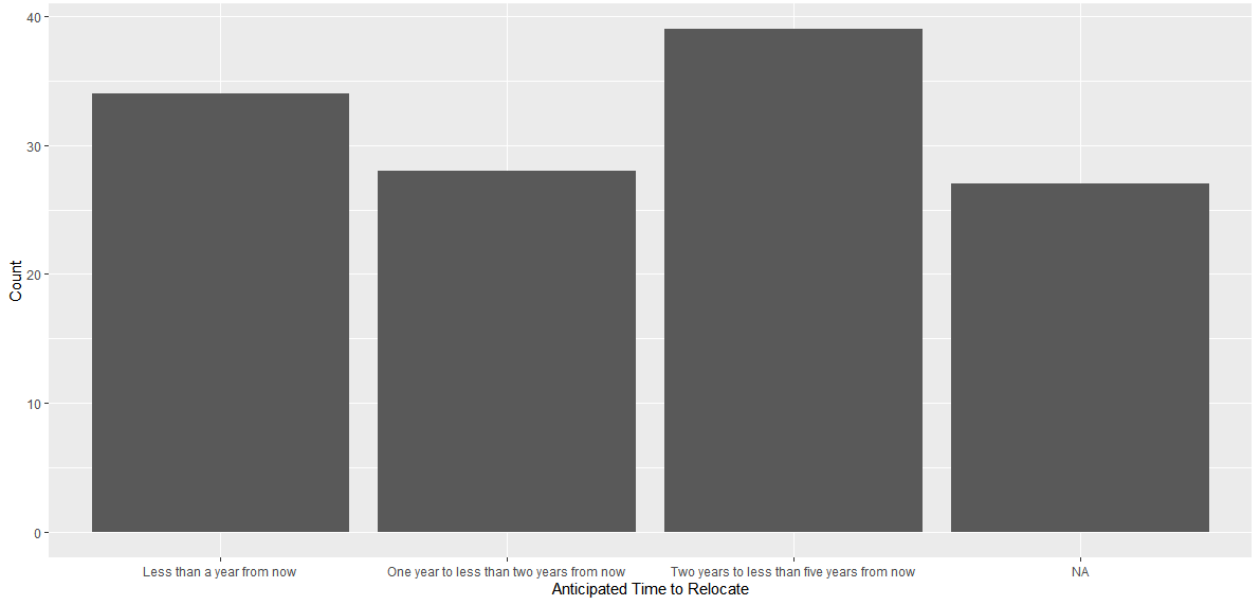
## Figure 16: Share of Idaho RNs who expect to practice out of state by experience (a) and age (b)




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 503 for both figures.

Unlike what was seen in Figure 14 for RNs who expect to stop practicing, Idaho RNs choosing to relocate out of state have a much shorter anticipated timeframe for this decision (Figure 17). Almost half stated they will move within the next two years (62 of 128), and more than three-quarters stated this will occur within the next five years (101 of 128). None reported an intention to move between five and 10 years from now. A plurality stated their relocation would be permanent (55 of 128), whereas just over a quarter anticipated their exits to be a temporary duration of five years or less (37 of 128).

## Figure 17: Anticipated timeframe for Idaho RNs who expect to relocate out of state within the next 10 years



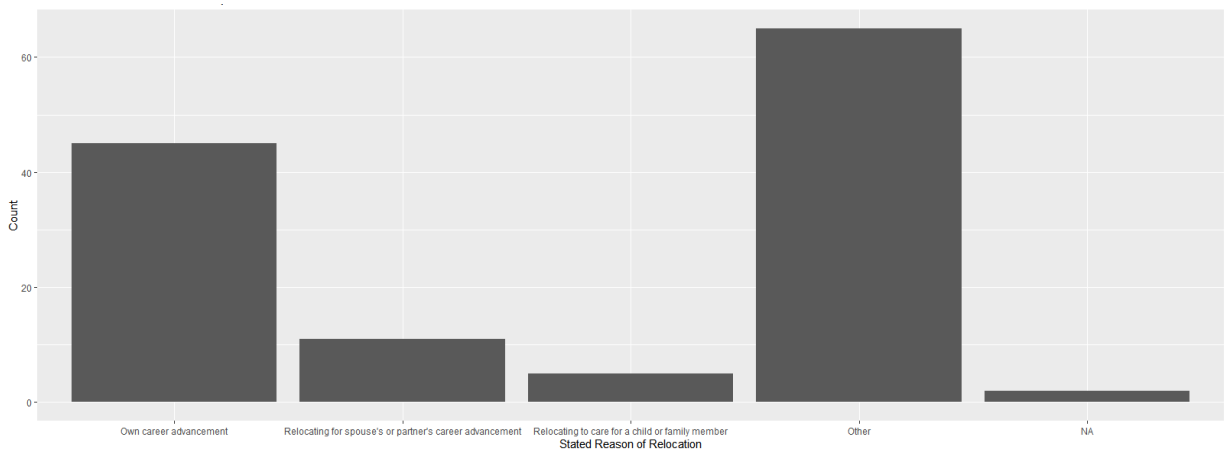

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 128.

When it came to survey respondents' stated reason for their anticipated relocation, an overwhelming majority fell under advancing one's own career (45 of 128) or "other" (65 of 128). The total breakdown is presented in Figure 18. Among "others," about half mention inadequate compensation or the cost of living as their reason (33 of 65). Some specifically mention neighboring Washington as their likely destination. Almost a quarter cited Idaho's current cultural and political environment as a factor in their reason (15 of 65) with mentions of bigotry, hostility to health care workers and public health initiatives (e.g., vaccinations, mask-wearing), and lack of support for working parents.

Combining all labor market exits and occupational transfers together, the estimated percentage of RNs currently practicing in Idaho who expect to leave in some form over the next 10 years was 56.7% (95% confidence interval: 52.3% to 60.1%). Looking at just Idaho RNs who expect to leave within the next year, the expected turnover rate is 10.3% (95% confidence interval: 7.7% to 13.0%). In other words, an estimated one out of every 10 Idaho RNs is expecting to no longer practice in the state one year from now. This is more than double the implied turnover rate for this occupation based on the Idaho Department of Labor's 2020-2030 projections. Assuming the entrant rate of new RNs in the state continues its pre-pandemic trend, employment growth for RNs may turn negative, and further excess demand will continue to put upward pressure on wages. Whether or not IHA members were aware of

this coming out-flow of registered nurses, their high frequency of references to RN hiring difficulties certainly appears to be a justified concern.

## Figure 18: Reason for Idaho RNs anticipating a relocation




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 128.

Concluding this section on RNs are the results of a regression-based estimation of RNs' willingness-to-accept (WTA) wage for practicing in Idaho. Three samples were considered for this analysis: RNs currently practicing in Idaho who expect to stop practicing, RNs currently practicing in Idaho who expect to relocate out of state, and finally RNs licensed in Idaho but currently practicing out of state. Different models were estimated for each sample, ranging from the simplest estimated WTA wage for the entire sample to more flexible models that allowed variability by certain worker characteristics, such as years of experience, stated reason for exiting, rural/urban county status and state of residence. Note also that the WTA wage is estimated in current dollars and salary, i.e., it answers the question "What salary would an RN need to earn *today* if they are to remain practicing in or locate to Idaho?" The results and a brief discussion are included here, whereas a more thorough explanation of the econometric method behind these estimates can be found in Appendix A.2.

Table 8 presents the estimates from each double-bounded dichotomous choice model (defined in Appendix A.2) and corresponding WTA wage for Idaho RNs who expect to stop practicing. For the sake of brevity this focuses on the estimates for a WTA wage, which are found in the highlighted right column for each model in the table.

Model 1 simply looked at all Idaho nurses who expect to stop practicing and estimated what the average WTA wage is for them to continue practicing. This turned out to be $88,137. For a point of comparison, this was above the 75th percentile of annual wages reported in the 2021 OEWS survey. This should not be surprising given a considerable share of these nurses reported they were leaving due to retirement and would likely require substantial compensation to convince them to work beyond that.

Model 2 broke this estimate down by the stated reason for leaving. Unsurprisingly, those exiting for retirement reasons — the single largest group in the sample — had the largest WTA wage estimate at

$104,944. This was followed by the "others" at $88,798; career changers at $74,089; and finally, those leaving to care for a child or family member at $66,138. The discrepancy between career changers and "others" was unexpected, given an initial hypothesis of their similarity based on open-ended survey responses.

## Table 8: Estimated willingness-to-accept (WTA) wage for Idaho RNs expecting to stop practicing

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) |
| Intercept | 31.781 | 88,137 | | | | | | |
| | (1.547) | (4,072) | | | | | | |
| Career change | | | 32.501 | 74,089 | | | | |
| | | | (1.041) | (5,744) | | | | |
| Retirement | | | 33.510 | 104,944 | | | | |
| | | | (1.062) | (5,377) | | | | |
| Care for child/family | | | 32.172 | 66,138 | | | | |
| | | | (1.152) | (13,841) | | | | |
| Other | | | 33.026 | 88,798 | | | | |
| | | | (1.041) | (6,531) | | | | |
| Experience (<6) | | | | | 32.829 | 80,584 | | |
| | | | | | (1.687) | (6,898) | | |
| Experience (6-12) | | | | | 32.389 | 69,249 | | |
| | | | | | (1.691) | (5,813) | | |
| Experience (12-24.25) | | | | | 33.641 | 106,546 | | |
| | | | | | (1.709) | (9,702) | | |
| Experience (>=24.25) | | | | | 33.651 | 106,924 | | |
| | | | | | (1.746) | (10,384) | | |
| Urban | | | | | | | 31.353 | 89,198 |
| | | | | | | | (2.299) | (4,575) |
| Rural | | | | | | | 31.150 | 82,857 |
| | | | | | | | (2.358) | (9,827) |
| ln(Salary) | 2.791 | | 2.899 | | 2.906 | | 2.751 | |
| | (0.137) | | (0.091) | | (0.149) | | (0.203) | |
| Sample Size | 188 | | 188 | | 188 | | 188 | |
| Log Likelihood | -467.2 | | -460.8 | | -458.5 | | -467.0 | |
| Akaike Inf. Criterion | 938.4 | | 931.7 | | 926.9 | | 940.0 | |
| BFGS iterations | 21 | | 28 | | 58 | | 40 | |

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Optimization method was the Broyden-Fletcher-Goldbarb-Shanno (BFGS) algorithm without box constraints. Number of iterations until convergence are reported in the final row of the table.

Model 3 looked at WTA wages by years of experience binned by quartile, meaning these data points were sorted and grouped together into four equivalent groups by percentile so that their WTA wages could be estimated as a group. While it seems more experienced workers have a larger WTA wage due to their proximity to retirement age, the discrepancy between first and second quartile bins was surprising. The youngest RNs in terms of experience were estimated to have larger wage expectations than slightly more experienced RNs, though this was not a statistically significant difference. However, this parallels what was seen in Figure 13; a large share of these nurses expected to stop practicing, more so than those slightly older or more experienced. This could point to a troubling trend ahead: many RNs who otherwise might be counted on to remain practicing in the state for many years may be looking for

a career change, while the compensation necessary to keep them in nursing is high in comparison to that of Idaho RNs overall.

Model 4 looks at the difference in WTA wages based upon the county where RNs practice. Counties considered to be urban include Ada, Bannock, Bonneville, Canyon, Kootenai, Nez Perce and Twin Falls; all remaining counties were classified as rural. Surprisingly, there did not appear to be a significant difference in WTA wages between Idaho RNs working in urban and rural areas. While mentions of affordability were more common among urban nurses, this did not appear to factor much into the wages they were willing to accept. In short, both urban and rural Idaho RNs who expect to stop practicing would seem to require similar compensation to convince them to continue practicing.

Next, Table 9 provides the estimates from each model and corresponding WTA wages for RNs currently practicing in Idaho who expect to relocate out of state. Again, for the sake of brevity the focus is on the estimates in the highlighted right columns for each model.

Model 1 presents the simplest approach, pooling together all RNs practicing in Idaho anticipating a relocation and estimating the aggregate WTA wage for remaining in the state. This estimate came in at $86,403, not far off from the Model 1 estimate in Table 8. Put another way, $86,000 to $88,000 was the average salary range all Idaho registered nurses who expect a labor force exit or occupational transfer would accept to remain in Idaho. This is well above the 75th percentile annual wage for Idaho RNs in 2021.

Breaking this estimate down first by respondents' stated reason for leaving Idaho (Model 2 in Table 9), those classified as "others" as well as those seeking their own career advancement would appear to demand the highest compensation if they are to remain in the state. "Others" require an estimated salary of $91,587, whereas career advancers would require $87,592. This could support the view made earlier that own career advancers and "others" are similar groups when it comes to relocation decisions. At the other extreme were those relocating to care for a child or family member, whose estimated required wage was $63,699, and those leaving for their spouse's career advancement, which was estimated at $71,099.

Model 3 looked at preferred wages based on a nurse's experience and generally shows the compensation necessary to dissuade them from relocating is increasing with experience. The two quartile bins of Idaho nurses with the least experience that were anticipating an out-of-state move had an estimated WTA salary of $74,790 and $82,679, respectively. The third and fourth quartiles, on the other hand, appear to require much more compensation if they are to remain in Idaho: $110,043 and $95,338, respectively. Except for the differences in the third and fourth quarters of the distribution, WTA estimates increase with experience. This positive relationship should not be surprising, given that salaries generally increase with experience.

Finally, urban vs. rural differences among Idaho RNs expecting to relocate were significant (see Model 4). Those nurses currently working in Idaho's urban counties would require an estimated $90,634 on average if they are to continue practicing in Idaho; those in rural counties, on the other hand, would require an estimated $67,503 on average. Contrast this with what was seen in Table 8, and urban RNs who are looking to relocate have a much larger opportunity cost of employment than their rural counterparts. Perhaps these salary differences between urban and rural areas are based in costs of living and workloads (i.e., compensating differentials) or greater diffusion of information on outside

employment opportunities in densely populated areas (e.g., working in Lewiston or Coeur D'Alene makes it easier to learn of job openings in neighboring Washington).

## Table 9: Estimated willingness-to-accept (WTA) wages of Idaho RNs expecting to relocate

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) |
| Intercept | 32.440 (0.848) | 86,403 (4,785) | | | | | | |
| Own career adv. | | | 33.050 (0.860) | 87,592 (7,877) | | | | |
| Spouse career adv. | | | 32.444 (0.951) | 71,099 (15,578) | | | | |
| Care for child/family | | | 32.125 (1.003) | 63,699 (20,059) | | | | |
| Other | | | 33.179 (0.804) | 91,587 (6,810) | | | | |
| Experience (<6) | | | | | 33.967 (1.006) | 74,790 (6,045) | | |
| Experience (6-12) | | | | | 34.271 (1.031) | 82,679 (8,144) | | |
| Experience (12-24.25) | | | | | 35.136 (0.967) | 110,043 (11,442) | | |
| Experience (>=24.25) | | | | | 34.702 (1.235) | 95,338 (20,931) | | |
| Urban | | | | | | | 33.222 (2.109) | 90.634 (5,421) |
| Rural | | | | | | | 32.365 (2.106) | 67,503 (8,956) |
| ln(Salary) | 2.854 (0.076) | | 2.904 (0.072) | | 3.027 (0.087) | | 2.911 (0.186) | |
| Sample Size | 123 | | 123 | | 123 | | 123 | |
| Log Likelihood | -309.6 | | -307.9 | | -305.2 | | -307.6 | |
| Akaike Inf. Criterion | 623.2 | | 625.7 | | 620.4 | | 621.1 | |
| BFGS iterations | 26 | | 48 | | 42 | | 36 | |

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Optimization method was the Broyden-Fletcher-Goldbarb-Shanno (BFGS) algorithm without box constraints. Number of iterations until convergence are reported in the final row of the table.

The last sample of RNs considered were those licensed to practice in Idaho but who are currently practicing in another state. Due to the smaller sample size and correspondingly larger standard errors, the results presented here should be taken with a grain of salt. As before, attention will be made to the computed WTA wage estimates in the highlighted right columns for each model in Table 10.

The Model 1 estimate for this sample of RNs was considerably high at $105,896, placing it above the 90th percentile of annual salaries for Idaho RNs in 2021.[19] Taking even the lower bound of the 95% confidence interval for this estimate ($84,048), this would still be in the upper quarter of the earnings distribution. In other words, the compensation necessary to attract out-of-state RNs to Idaho appears to be high relative to the compensation of current Idaho RNs. Given this cost and the potential morale

[19] From the May 2021 OEWS Survey, the 90th percentile annual wage for Idaho RNs was $98,030.

problems associated with wide pay discrepancies — several survey respondents cited such discrepancies in regard to traveling nurses — it would seem the solutions to the RN shortage based on attracting out-of-state talent will come at considerable costs (direct and indirect) unless they are targeted.

Model 2 estimated nurses' WTA wage to relocate to Idaho by the state where RNs are currently practicing. The large standard errors made the estimates statistically indistinguishable from one another. However, if one takes the point estimates at face value, it would appear Washington and Oregon RNs require significant compensation to move to Idaho, whereas Utah and Wyoming RNs could be convinced at salaries comparable to their Idaho colleagues. There may be several reasons for this. First and foremost, RNs can expect to earn higher salaries in neighboring Oregon and Washington and comparable salaries in Utah and Wyoming.[20] Another factor workers consider in their location decisions is the value they place on local amenities, including community relations and cultural and political ways of life. For workers to leave these amenities behind for a job elsewhere, they would either require the same amenities in their new location or to be compensated for their loss. This explanation could be corroborated in part by several mentions of the cultural and political environment as a deciding factor among Idaho nurses expecting to move. Individuals may have different preference for locations, of course, and given the similarities of Utah and Wyoming to Idaho, this might help to explain the comparatively lower WTA estimates for those states.

Last among the models considered WTA wages by years of experience binned by quartile (Model 3). Again, the large standard errors in the model meant that each bin's estimate was statistically indistinguishable from another. Taking the point estimates at face value would paint a picture similar to what was shown in Model 3 of Table 9: The more experienced the RN, the more they would need to be compensated to relocate to Idaho. This again should not be surprising, as wages generally increase with experience. Where this might be informative is in policies or programs aimed at attracting younger and less experienced nurses from out of state as a less expensive proposition versus attracting an older and more experienced nurse.

[20] Average annual salaries for registered nurses in Idaho and adjacent states were as follows:

- Idaho: $73,640
- Montana: $73,610
- Nevada: $88,800
- Oregon: $98,630
- Utah: $72,790
- Washington: $95,350
- Wyoming: $73,130

Source: May 2021 Occupational Employment and Wage Statistics (OEWS) Survey, U.S. Bureau of Labor Statistics.

## Table 10: Estimated willingness-to-accept (WTA) for RNs practicing outside Idaho

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) |
| Intercept | 21.022 | 105,896 | | | | |
| | (2.171) | (11,147) | | | | |
| Nevada | | | 20.977 | 87,356 | | |
| | | | (1.706) | (49,388) | | |
| Oregon | | | 21.442 | 112,437 | | |
| | | | (1.587) | (32,981) | | |
| Utah | | | 20.342 | 61,914 | | |
| | | | (1.725) | (29,391) | | |
| Washington | | | 21.583 | 121,410 | | |
| | | | (1.555) | (21,455) | | |
| Wyoming | | | 20.640 | 72,770 | | |
| | | | (2.015) | (65,761) | | |
| Other | | | 21.281 | 103,064 | | |
| | | | (1.542) | (16,585) | | |
| Experience (<7) | | | | | 21.193 | 92,159 |
| | | | | | (7.531) | (22,020) |
| Experience (7-13) | | | | | 21.285 | 96,821 |
| | | | | | (7.555) | (17,295) |
| Experience (13-26) | | | | | 21.713 | 121,985 |
| | | | | | (7.637) | (25,201) |
| Experience (>=26) | | | | | 21.640 | 117,268 |
| | | | | | (7.629) | (25,893) |
| ln(Salary) | 1.817 | | 1.844 | | 1.854 | |
| | (0.188) | | (0.132) | | (0.652) | |
| Sample Size | 84 | | 84 | | 84 | |
| Log Likelihood | -215.9 | | -214.6 | | -215.2 | |
| Akaike Inf. Criterion | 435.7 | | 443.3 | | 440.5 | |
| BFGS iterations | 27 | | 27 | | 26 | |

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Optimization method was the Broyden-Fletcher-Goldbarb-Shanno (BFGS) algorithm without box constraints. Number of iterations until convergence are reported in the final row of the table.

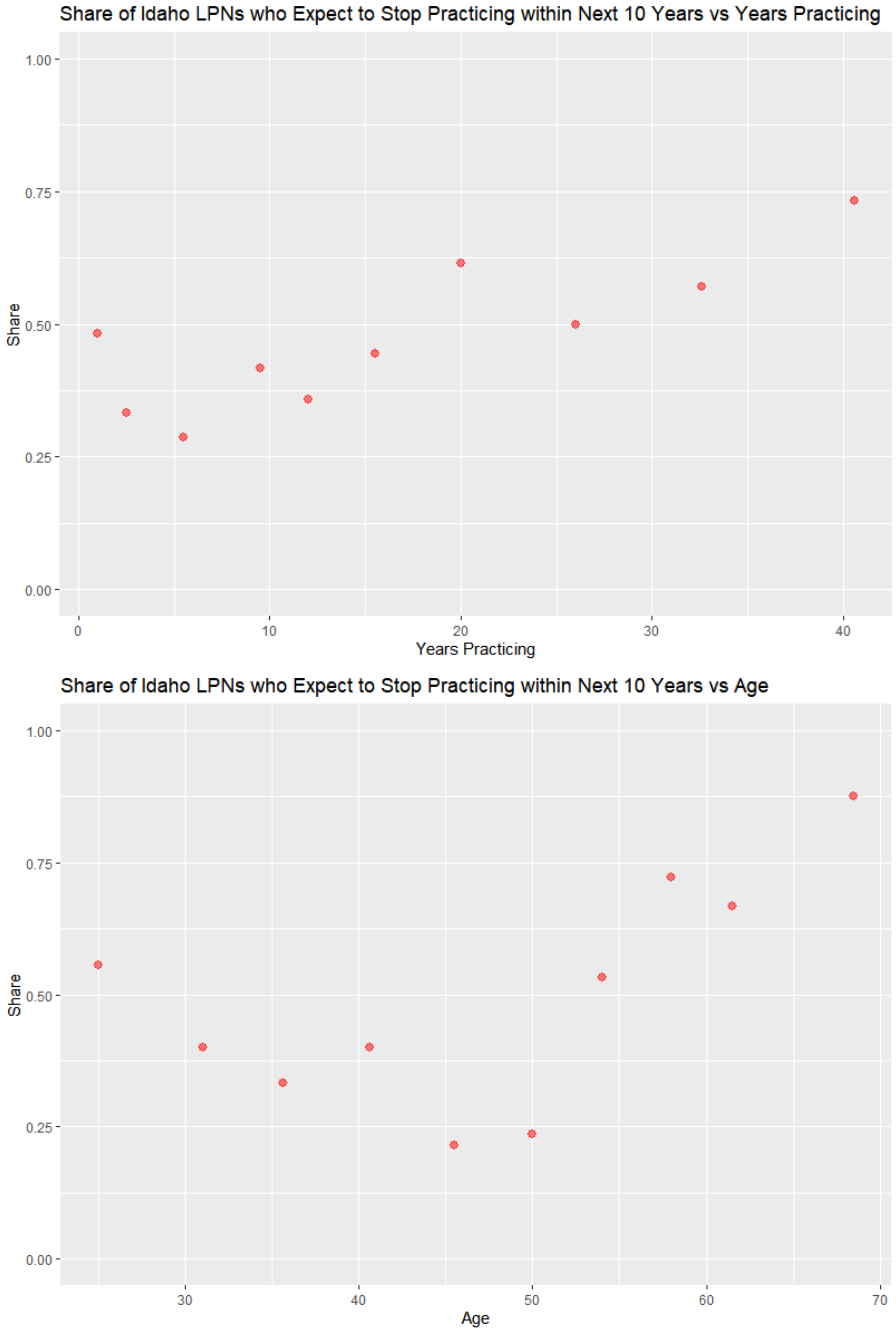
### 3.2 Survey results, licensed practical nurses (LPNs)

Given the large number of mentions of licensed practical nurses (LPNs) in the IHA survey, the results of the LPN occupational survey were considered next. The occupation's smaller employment level relative to RNs (2,160 from the May 2021 OEWS Survey vs. 14,400 for RNs) meant a smaller number of survey respondents (176), smaller still for those currently practicing in Idaho (147). Given that expected occupational turnover for LPNs was by and large not due to relocations out of state, the only regression-based analysis in this section will be for Idaho LPNs who are expecting to stop practicing as an LPN.

Figures 19a and 19b provide plots of the share of Idaho LPNs who expect to stop practicing within the next 10 years by years of experience and age, both binned by decile. The pattern is similar to what was presented in Figures 13a and 13b, i.e., an initially higher share of expected stoppages for the youngest decile bin which drops and eventually begins rising again as workers near retirement age. It would seem the youngest and least experienced LPNs are like RNs, with many considering career changes. Whether this is a consequence of the pandemic or a long-term trend is unknown, but as with RNs, it should

caution employers and policymakers who might otherwise count on these workers to remain in their occupation for a decade or more. In all, an estimated 47.6% of Idaho LPNs expect to stop practicing within the next 10 years (95% confidence interval: 39.5% to 55.7%).

## Figure 19: Share of Idaho LPNs who expect to stop practicing by experience (a) and age (b)

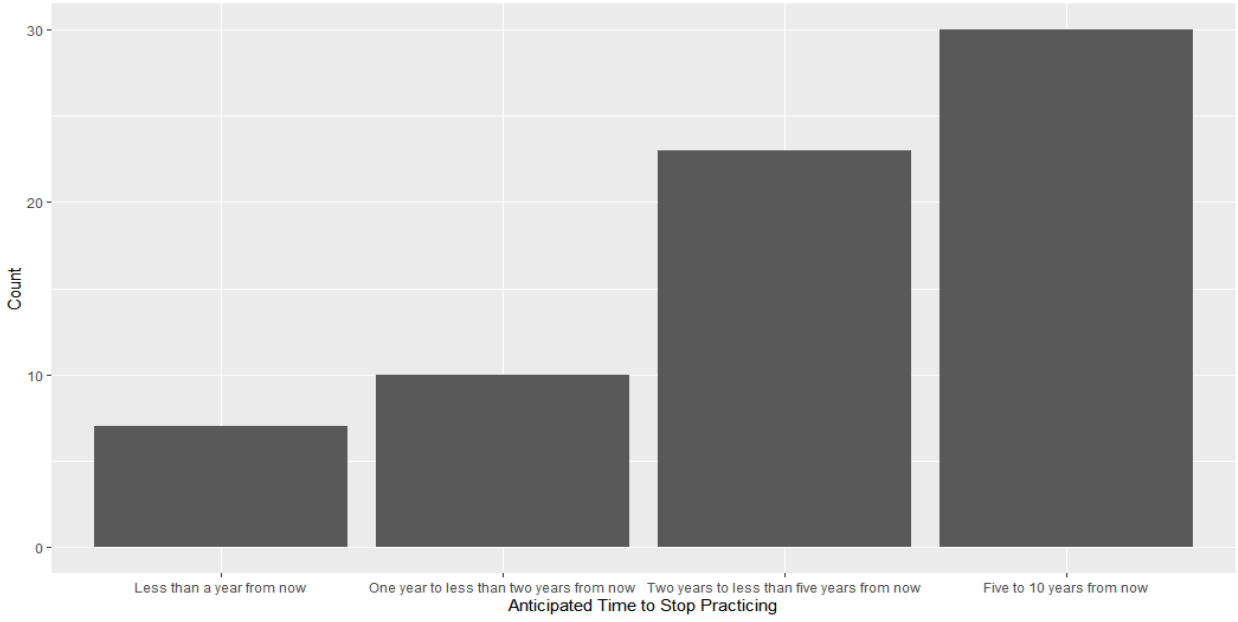



**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size 147 for both figures.

A majority of Idaho LPNs who expect to stop practicing indicate they will do so anywhere between two and 10 years from now, with the largest group between five and 10 years from now (see Figure 20). An overwhelming majority of those stating they will stop practicing at any point in the next decade indicated a permanent stop rather than a temporary one (53 of 70 respondents). Retirements represented a majority (40 of 70) of the reasons for ending their practice, followed by career changes (16 of 70) as a distant second. For a complete breakdown, see Figure 21 below. Among "others," the most common reason stated in their open-ended response was completion of their RN or other more advanced degree (seven of 11).

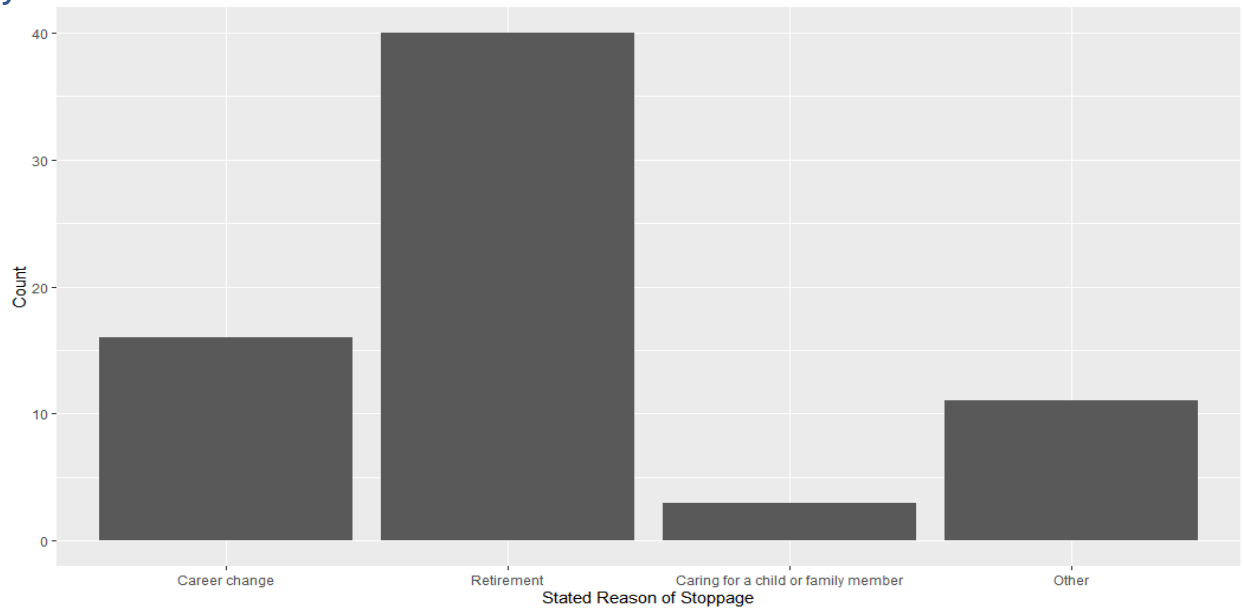
Looking at all anticipated occupational exits for LPNs, an estimated 54.4% expect to stop practicing or move out of state within the next decade (95% confidence interval: 46.4% to 62.5%), similar to the rate for RNs. The estimated occupational turnover rate for LPNs over the next year was 8.8% (95% confidence interval: 4.3% to 13.4%), which is not far off from the implied turnover rate of 6.9% based on Idaho Department of Labor projections, though slightly higher. Still, this turnover rate is larger than the estimated entrant rate of 6% based on program completions. This points to expected continued constraints on the supply of LPNs in the state and, therefore, upward pressure on wages as demand outpaces supply.

## Figure 20: Anticipated stoppage timeframe for Idaho licensed practical nurses LPNs




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 70.

## Figure 21: Reason for Idaho LPNs who expect to stop practicing within the next 10 years




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 70.

Table 11 provides the regression-based estimates for WTA wages among Idaho LPNs expecting to stop practicing within the next year. Quickly summarizing these results, the estimated WTA wage for all LPNs surveyed was $60,856 (highlighted column under Model 1), which was above the 75th percentile of annual wages for LPNs/LVNs in the May 2021 OEWS survey. Among the stated reasons, "other" and retirements had the largest estimated WTA wages — $66,813 and $63,418, respectively — while caring for a child or family member was the lowest at $40,771. However, these estimates were statistically indistinguishable given their large standard errors. By years of experience (Model 3), there appeared to be a hump shape with the least- and most-experienced requiring the least compensation to keep practicing; however, given their large standard errors, these estimates were also not statistically distinguishable from one another. Last, those in counties classified as urban appeared to have a slightly smaller WTA compared to their rural counterparts (Model 4), in contrast to what was seen in the previous RN analyses, but large standard errors again meant they were statistically identical.

## Table 11: Estimated willingness-to-accept (WTA) wage for Idaho LPNs expecting to stop practicing

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) | Estimate (Std. Err.) | WTA (Std. Err.) |
| Intercept | 54.789 (6.678) | 60,856 (2,858) | | | | | | |
| Career change | | | 56.675 (6.890) | 56,803 (4,617) | | | | |
| Retirement | | | 57.245 (6.988) | 63,418 (3,595) | | | | |
| Care for child/family | | | 54.958 (6.567) | 40,771 (13,986) | | | | |
| Other | | | 57.515 (7.034) | 66,813 (6,978) | | | | |
| Experience (<4) | | | | | 57.584 (6.976) | 55,755 (4,731) | | |
| Experience (4-17) | | | | | 58.762 (7.091) | 69,719 (5,956) | | |
| Experience (17-29) | | | | | 58.126 (7.034) | 61,796 (5,231) | | |
| Experience (>=29) | | | | | 57.523 (6.975) | 55,113 (5,516) | | |
| Urban | | | | | | | 54.790 (4.205) | 60,624 (3,166) |
| Rural | | | | | | | 54.887 (4.190) | 61,828 (6,629) |
| ln (Salary) | 4.974 (0.607) | | 5.177 (0.631) | | 5.269 (0.637) | | 4.975 (0.382) | |
| Sample Size | 65 | | 65 | | 65 | | 65 | |
| Log Likelihood | -126.9 | | -124.6 | | -124.7 | | -126.8 | |
| Akaike Inf. Criterion | 257.7 | | 259.2 | | 259.3 | | 259.7 | |
| BFGS iterations | 27 | | 54 | | 52 | | 41 | |

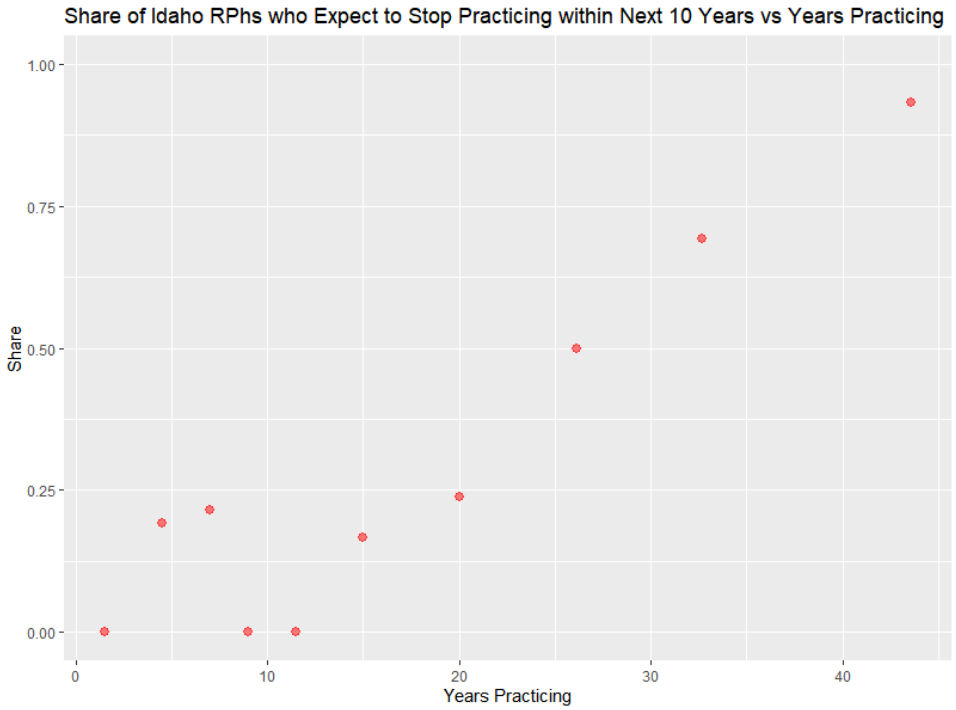
**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Optimization method was the Broyden-Fletcher-Goldbarb-Shanno (BFGS) algorithm without box constraints. Number of iterations until convergence are reported in the final row of the table.

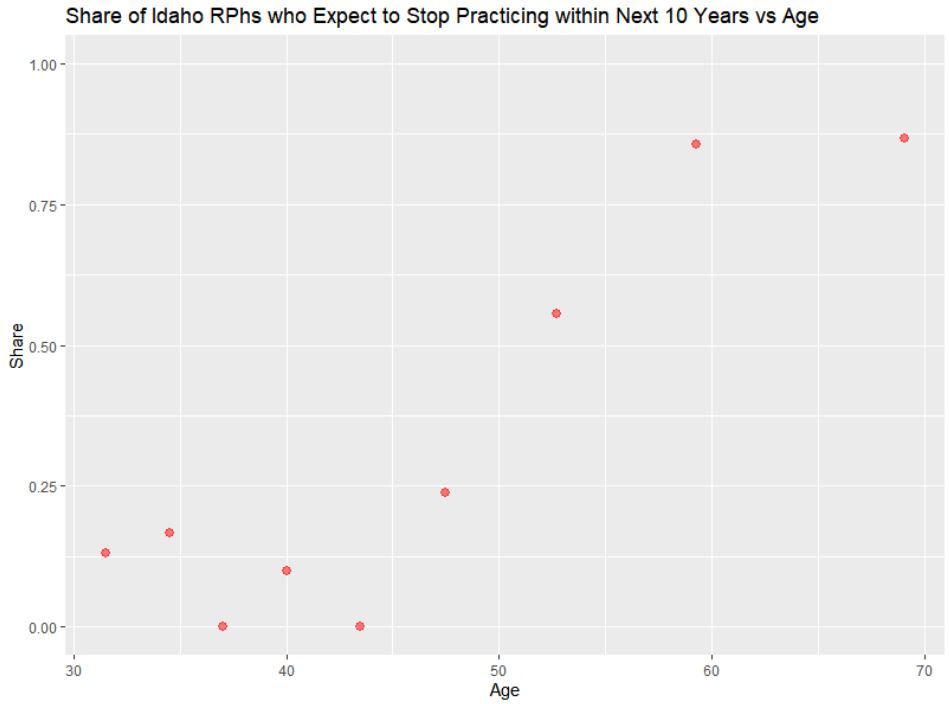
### 3.3 Survey results, registered pharmacists

The next occupation considered was registered pharmacists. While not mentioned in the Idaho Hospital Association discussions and survey, this occupation was brought up in discussions with both education program administrators as well as the Idaho Division of Professional Licensing. To recap, estimates of occupational entrant and turnover rates for pharmacists based on Idaho Department of Labor projections and program completions pointed to balanced supply growth of registered pharmacists relative to demand during the pre-pandemic period. Since 2019, however, their employment has declined. The pipeline of qualified applicants for pharmacy programs in the state is now roughly equal with the number of available slots, pointing to the possibility that demand may outstrip supply. Total survey responses for registered pharmacists were a bit larger than LPNs though considerably less than RNs at 242, as was the sample size for those currently practicing in Idaho (177).

Figures 22a and 22b plot the share of Idaho registered pharmacists who expect to stop practicing within the next 10 years against years of experience and age, binned by decile. Generally, the share of registered pharmacists who expect to stop practicing increases with experience and age as those nearing retirement are more likely to stop. However, like nurses, there is a notable elevation in this share among some of the least experienced and youngest pharmacists. Those in the second and third experience decile bins and first two age decile bins had an elevated share of respondents who said they will stop practicing relative to more experienced and older pharmacists. While these shares were not as high for registered pharmacists as they were for RNs and LPNs, they do perhaps point to a similar, though less severe, turnover problem going forward. In all, an estimated 27.1% of registered pharmacists currently practicing in Idaho expect to stop practicing within the next decade (95% confidence interval: 20.6% to 33.7%). Since a majority of occupational exits are due to retirements (38 of 48), the majority of these exits will occur over a medium- to long-term horizon between two and 10 years (see Figure 23).

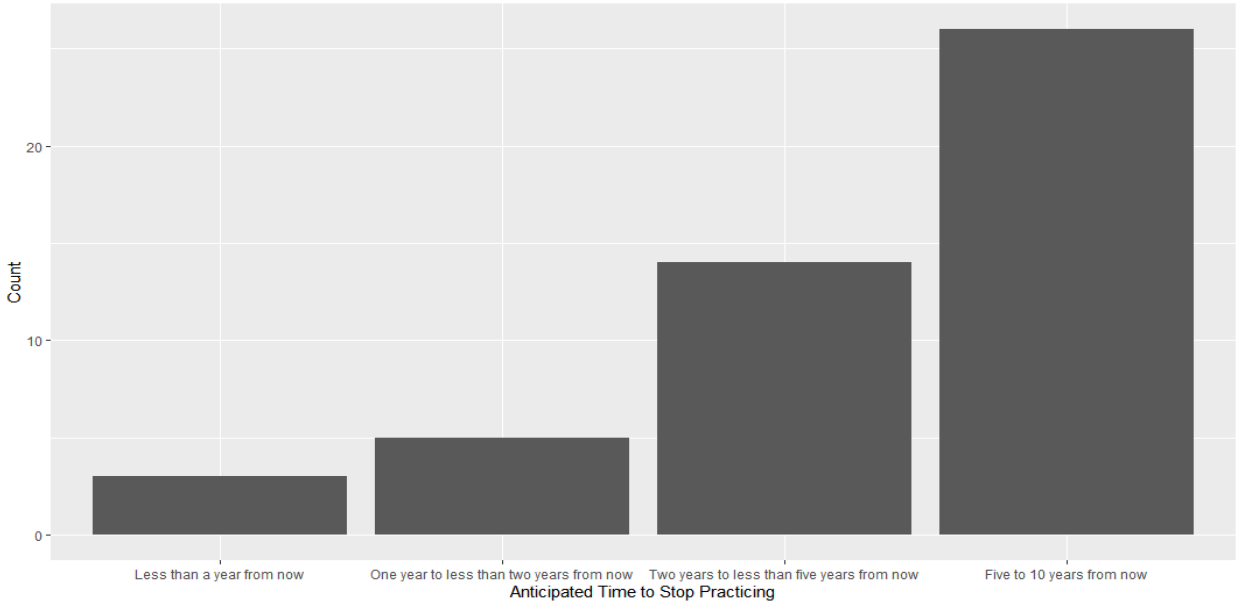
## Figure 22: Share of registered pharmacists who expect to stop practicing in Idaho by experience (a) and age (b)






**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 177 for both figures.

## Figure 23: Anticipated timeframe for registered pharmacists to stop working in Idaho within 10 years



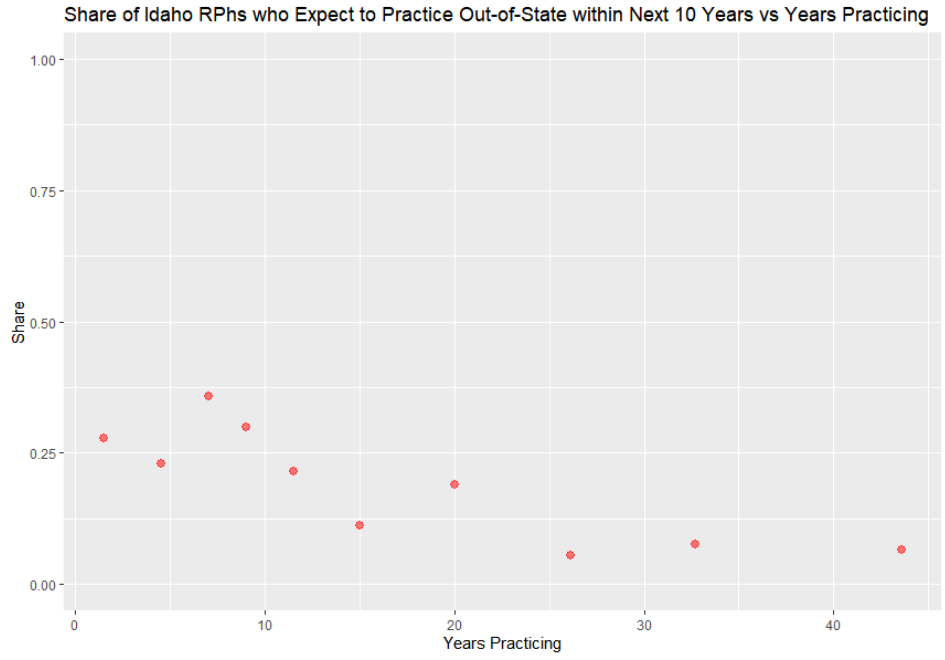

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 48.

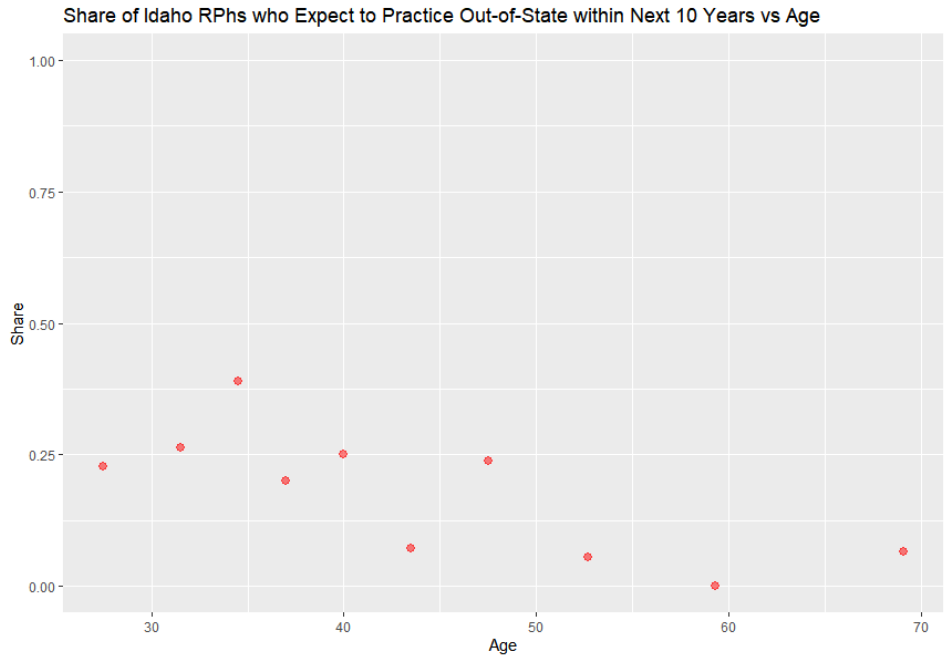
Of those expecting to move out of state, the least experienced and youngest pharmacists represent a larger share (see Figures 24a and 24b) — a similar pattern as seen with nurses. Somewhat like RNs,

those expecting to relocate plan on doing so in the near-to-medium term of five years or less. Unlike RNs, there was a U-shaped distribution with an equal number of pharmacist respondents (each 12 of 34) reporting they would relocate within the next year and between two and five years. Among the reasons given, the overwhelming majority listed their own career advancement (11 of 34) or "other" (18 of 34) as the primary reason. Looking at the open-ended responses provided under "other," the most common reasons mentioned were being licensed in multiple states and the ability to be a traveling pharmacist (five of 18). Idaho's cultural and political environment were also mentioned (four of 18). In all, an estimated 19.2% of registered pharmacists in Idaho anticipate they will move out of state within the next 10 years (95% confidence interval: 13.4% to 25.0%).

Pooling all labor market exits and occupational transfers together, 43.5% of registered pharmacists expect an exit over the next decade (95% confidence interval: 36.2% to 50.8%), whereas the expected turnover rate over the coming year is 8.5% (95% confidence interval: 4.4% to 12.6%). This turnover rate is significantly larger than the 3.9% implied by Idaho Department of Labor projections. Additionally, it is larger than the implied entrant rate of around 5% based on both program completion and the projections. Assuming the occupational entrant rate stays at this level, this would imply future expected declines in the supply of registered pharmacists in Idaho; worse still, if the pool of qualified program applicants were to fall further, this would only constrict the pipeline of entrants and further exacerbate this supply problem. It would appear, then, that pharmacists will continue to be in relatively short supply in the near term. Given expected demand growth from the department's occupational projections, this will translate into continued upward wage pressures for registered pharmacists.

## Figure 24: Share of registered Idaho pharmacists who expect to relocate by experience (a) and age (b)





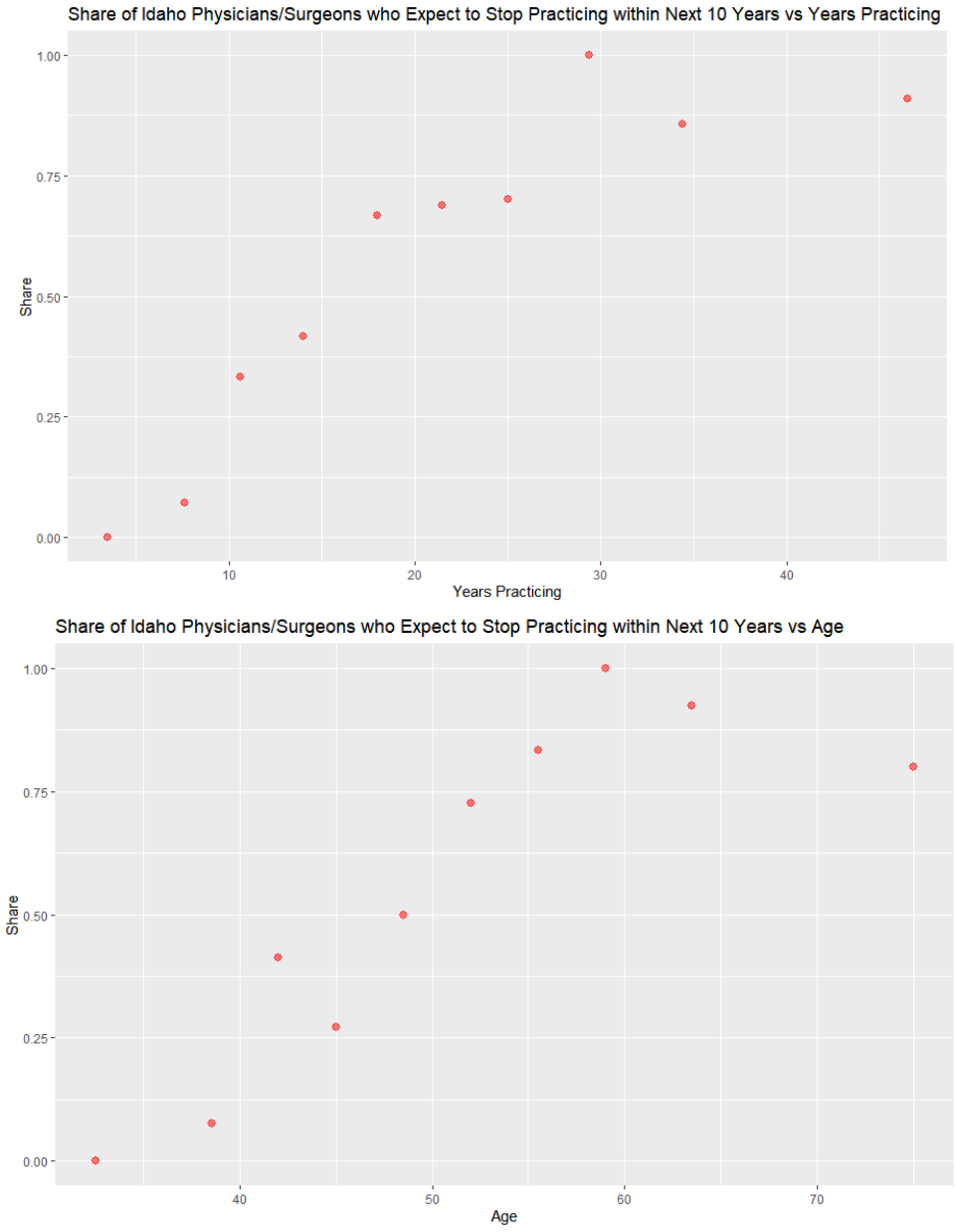

**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 177 for both figures.

## 3.4 Survey results, physicians and surgeons

Last among the occupational groups whose survey results will be discussed are physicians and surgeons taken as a single group. Treating this cohort as a single group does have its limitations; their degree of specialization makes apples-to-apples comparisons difficult. Given the sample size (full sample, 265; those currently practicing in Idaho, 190), it was hard to match many respondents to others of comparable specialty. As a result, no regression-based estimates of WTA wages for those anticipating a labor market exit or occupational transfer were performed. The descriptive analysis to follow will mirror the approach with pharmacists in only focusing on anticipated exits, respondents' timeframe and reason for such exits, and the aggregate estimated occupational turnover rate.

Turning first to the share of physicians and surgeons who expect to stop practicing within the next 10 years, there is an expected positive relationship between this proportion and experience as well as age, as shown in Figures 25a and 25b. Notably, however, the seventh decile bin by experience and age both appear to have elevated shares anticipating they will stop practicing relative to more experienced and older colleagues. The cause of this pattern is not apparent, but one possible explanation is a division at this career stage between those who place greater value on a non-employment option later in life (and who would therefore be more likely to retire from medicine early) and those who place comparatively less value on such an option (and who would therefore work much longer into old age before deciding to retire).

## Figure 25: Share of Idaho physicians and surgeons who expect to stop practicing by experience (a) and age (b)

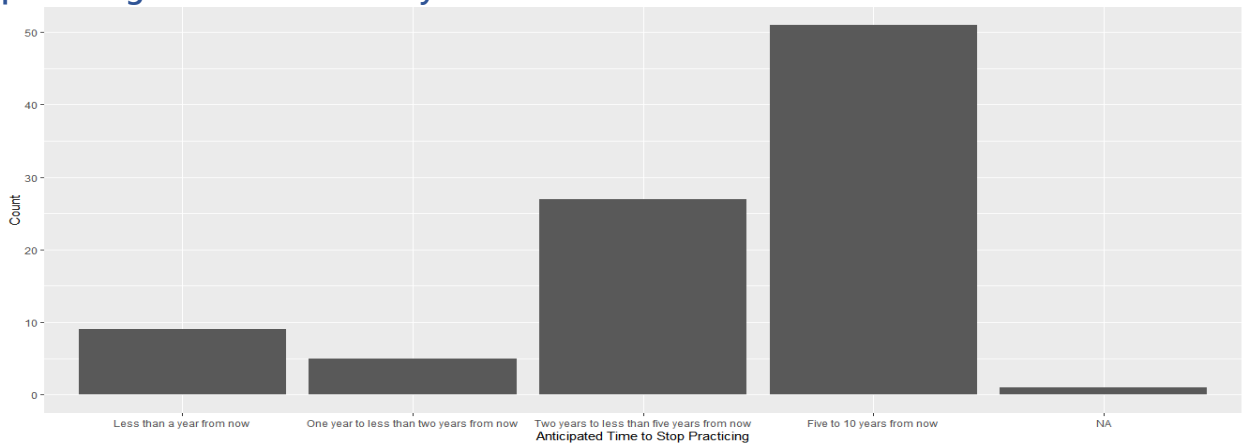



**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 190 for both figures.

Among the reasons given for no longer practicing, retirements were by far the largest (70 of 93) whereas career changers and those who gave responses under "other" were equal in size (11 of 93 each). The open-ended responses tagged as "other" were varied, with a few mentioning bureaucratic and administrative/management grievances (four of 11) as well as the cultural and political environment of Idaho (three of 11). A majority of physicians and surgeons say they will stop practicing in the medium-to-long term, between two and 10 years from now (see Figure 26). However, there is a notable discrepancy

between individuals planning to stop less than a year from now and those planning to stop one and two years from now. In all, an estimated 48.9% of physicians and surgeons currently practicing in Idaho expect to stop practicing within the next decade (95% confidence interval: 41.8% to 56.1%).

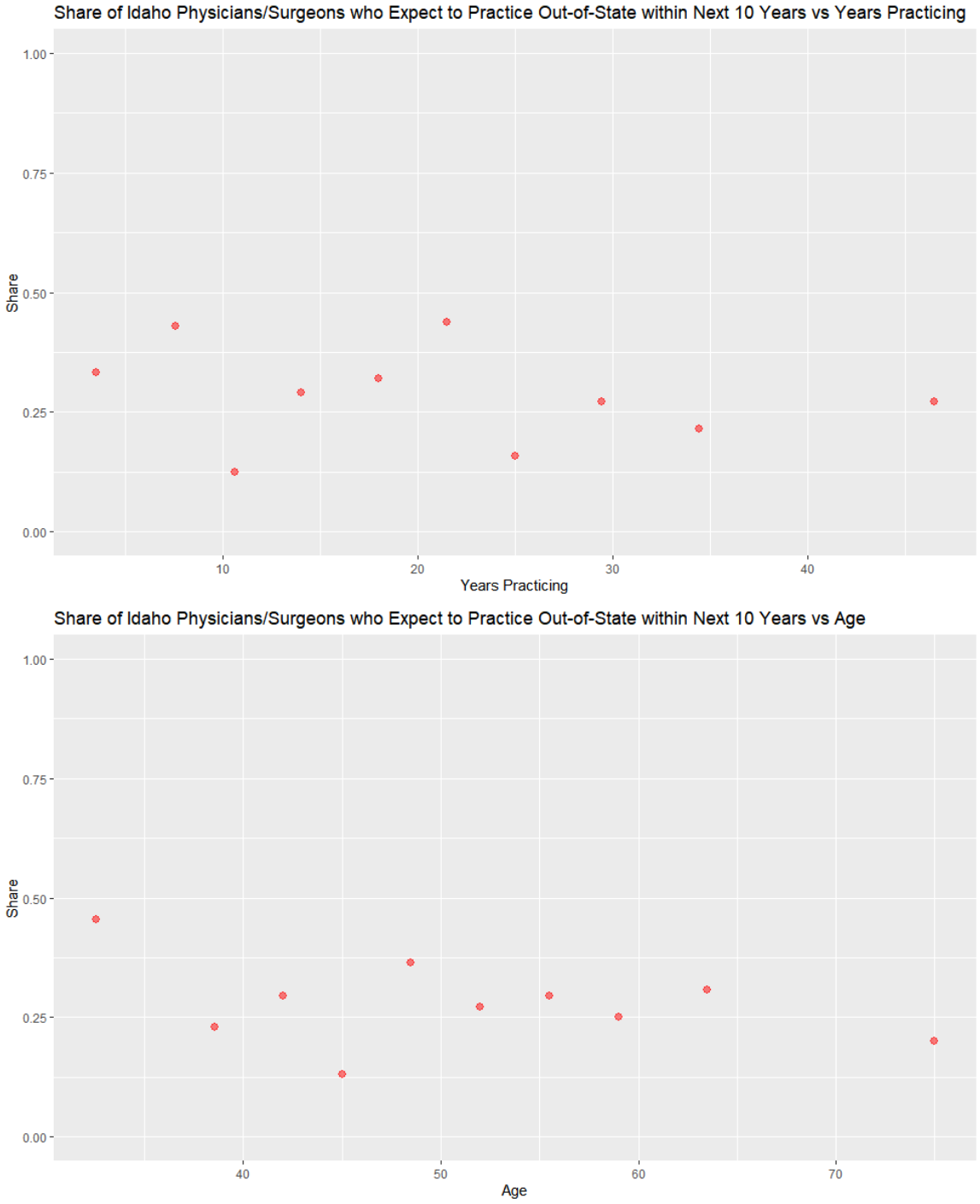
## Figure 26: Anticipated timeframe for Idaho physicians/surgeons who expect to stop practicing within the next 10 years




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 93.

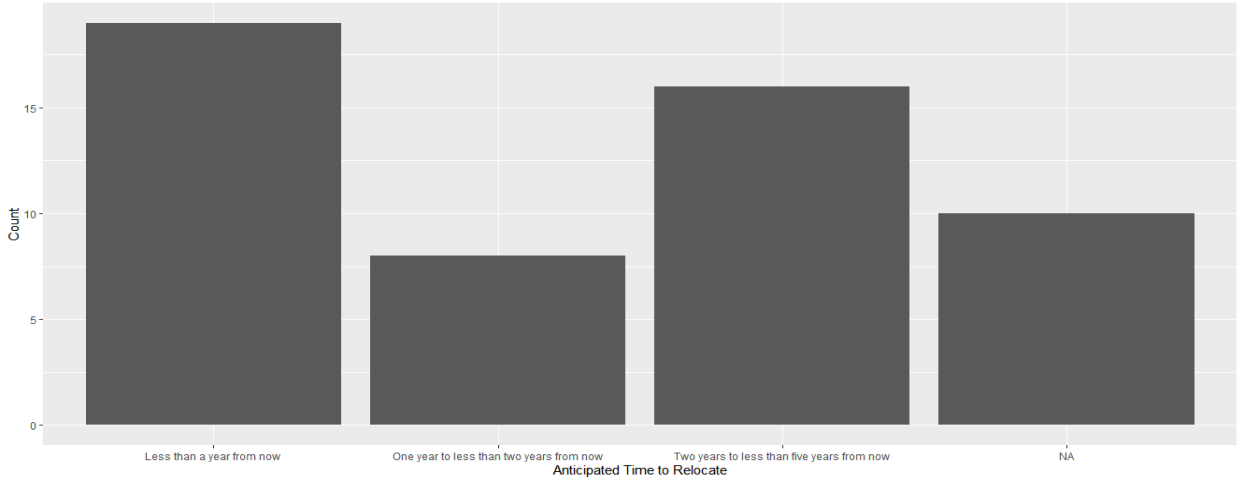
Turning to relocation decisions, an estimated 27.9% of Idaho physicians and surgeons are considering moving to another state in the next 10 years (95% confidence interval: 21.5% to 34.3%). While there is a general negative relationship between the share expecting a move and their experience as well as age, this relationship is weaker and somewhat noisy (see Figures 27a and 27b). Moreover, the timeframe these physicians and surgeons identify for their anticipated relocation falls largely between less than one year and five years (see Figure 28). Furthermore, a majority stated this relocation would be permanent as opposed to temporary (33 of 53).

## Figure 27: Share of Idaho physicians and surgeons who expect to relocate by experience (a) and age (b)




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 177 for both figures.

## Figure 28: Anticipated relocation timeframe for Idaho physicians and surgeons




**Source**: Survey of Health Care Professionals, Idaho Department of Labor, 2022.
**Note**: Sample size equals 53.

Of Idaho physicians and surgeons considering moving to another state, most gave reasons falling under "other" (41 of 53). Those seeking to advance their own careers came in at a distant second (7 of 53). Looking at the open-ended responses provided under "other," the majority spoke to Idaho's cultural and political environment (26 of 41). Among the specific issues raised were the embrace of misinformation and disregard for evidence-based standards of care, often cited together with abortion restrictions and hostility to mask and vaccine policies; lack of support for education; as well as bigotry and threats of violence. Considering all anticipated relocations and not just the "other" category, a majority cited the current cultural and political environment in their open-ended responses (29 of 53).

Taking all labor market exits and occupational transfers together, an estimated 63.2% of Idaho physicians and surgeons do not expect to be practicing in Idaho within the next 10 years (95% confidence interval: 56.3% to 70.0%). Looking at the near term of one year or less, the estimated turnover rate was 14.7% (95% confidence interval: 9.7% to 20.0%), over five times larger than the 2.7% occupational turnover rate implied by the Idaho Department of Labor projections and more than three times larger than the 4.6% occupational entrant rate implied by those same forecasts. Using the 1.6% entrant rate implied by WWAMI program completions and retention rate of graduates who stay in Idaho, this difference grows even larger, with nine exits for every new entrant over the next year. Given the expected growth in demand, this will almost certainly translate into upward wage pressures as employers are forced to pay dearly to retain these practitioners and/or attract others to relocate to the state. Moreover, this supply shock might come as a surprise to Idaho hospitals and clinics, given its magnitude and the comparatively fewer mentions of physicians and surgeons in IHA's survey.

# 4.0 Outlook and recommendations

The consequences of the COVID-19 pandemic have been strong, persistent and pervasive. In the two years since the first set of public health orders were given — measures many expected would only be a temporary and mild disruption to life — almost every corner of the Idaho economy has felt the impact of COVID-19, with many still feeling its aftershocks. Health care is one of those areas most affected.

However, as these shocks and aftershocks subside, affairs are likely to begin returning to something closer to pre-pandemic times. People will always need medical care and assistance, but fewer will be needing it for COVID-related reasons. Similarly, people will continue to go into health care fields based upon the compensation afforded as well as individuals' own intrinsic motivations. In that regard the outlook for the remainder of the decade will probably be similar to, though not the same as, the Idaho Department of Labor projections for 2020-2030, albeit with adjustments as some aftershocks persist. In the long-term, the pandemic's effects will become distant, their size measured more by the number of peer-reviewed articles in scientific journals than people's day-to-day experiences.

For the present and immediate future, however, these consequences will still be felt by health care workers who have lived, worked and — above all else — survived this public health crisis; by hospitals and clinics with far fewer resources available to them as they try to fill vacancies created by retirements and career changes due to increased stress and work-related hazards; and by patients who will continue to require care from specialized staff and resources, the former less available from the ongoing staffing shortages and the latter becoming harder to acquire due to financial constraints. Against those who might take solace in the long-term view that COVID-19 and its consequences will fade away, one might retort the now-century-old quote by John Maynard Keynes: "In the long run we are all dead." Like a sailor whose ship is navigating through a tempest, the present-day problems will generally outweigh the hopeful expectations of eventual safe arrival to port.

Going forward, Idaho policymakers and stakeholders interested in tackling the health care worker shortage would benefit from looking at these issues as interrelated rather than trying to tackle them in isolation.

On the education pipeline, a common refrain has been to promote these career paths to young Idahoans, thereby creating interest and increasing enrollment in training programs. Depending on how this is effort is conducted, it may be the least expensive prescription, but taken by itself it will also likely have a small impact. Except for pharmacy programs whose admissions are roughly matched with the pool of qualified candidates, most programs already have excess applicants relative to capacity. Additionally, the expansion capacity for many health care programs is either limited or becoming increasingly expensive for several reasons: Teaching faculty are becoming harder to recruit and retain; expansion will require investments in brick-and-mortar classrooms as well as learning technology; and for many programs, there already is a dearth of clinical training sites within the state. If these additional issues are not tackled, the "leakage" in this supply pipeline will likely increase as Idahoans trained in-state leave to find work elsewhere for any number of reasons — e.g., they perform their clinical training at an out-of-state hospital only to be hired by the hospital upon graduating, or they find pay within the state not commensurate with the costs of servicing their student loans.

Another set of prescriptions include attracting out-of-state workers to Idaho. Idaho has a fast-growing population owing to what had been its relative affordability and many local amenities. These are selling points for many Americans, though they are by no means the only factors individuals consider in choosing where to live and work. As found in the occupational surveys, many Idaho health care professionals were either leaving their field or the state altogether as a result of inadequate pay in comparison to costs of living. A number of hospitals surveyed by the IHA specifically cited housing costs as a barrier to entry for many would-be candidates, with some workers having to turn down job offers after an unsuccessful search for affordable housing. Paired with wages in Idaho trailing some of its

nearby neighbors like Nevada, Oregon and Washington — in addition to increasing ease to transfer professional licenses across state lines — this strategy may prove to be expensive unless it is targeted at certain workers. As seen in the willingness-to-accept wage estimates for RNs, such a strategy may work best if focused on the youngest health care workers and workers from states with similar prevailing wages. However, if targeted at neighboring states like Wyoming and Utah, this could lead to a "beggar thy neighbor" situation that becomes a cross-state bidding war.

Last among the set of policy prescriptions would be those aimed at increasing retention and reducing labor market exits or occupational transfers. Some of these prescriptions were mentioned in discussions with stakeholders including IHA survey responses: increasing the availability of affordable housing in many areas, offering some form of student loan forgiveness for those who remain practicing in the state, etc. These issues, while related to health care, are often framed within a wider economic policy discussion. As such, the potential for a consensus perhaps already exists. These ideas are a comparatively blunt tool for tackling the health care worker shortage as they are much more general in their impact and, consequently, will be hard to measure their success in alleviating this specific issue. Alternatively, more precise prescriptions may be to address specific occupational exits, provide greater work flexibility, reduce workloads, increase pay and provide more opportunities for career advancement.

However, some factors in health care professionals' exit decisions seem much more insurmountable, most especially those relating to the current cultural and political climate in Idaho as evidenced by their disproportionate mention among physicians and surgeons. The many mentions among survey respondents of the proliferation of misinformation, growing acceptance of non-evidence-based standards of care, bigotry and violence, and the potential of legal jeopardy from new health care restrictions being passed into law are hard to overlook. If turnover rates pan out as estimated, this human capital flight could prove to be a much longer-term challenge as such ideological shifts tend to occur over generations as opposed to a comparatively fleeting pandemic.

# A.0 Appendix - Methodology

## A.1 Occupational license survey overview

Surveys of Idaho occupational license holders were conducted online using a set of occupational-specific Snap Surveys between July 8, 2022, and 17 Aug. 17, 2022. Active license holder rolls were provided under a joint agreement between the Idaho Department of Labor and the Idaho Division of Occupational and Professional Licenses. License holders were contacted via email and provided a brief explanation of the survey purpose and a confidentiality guarantee, together with a link that would take them to the survey. Additionally, the survey allowed partial completions if the respondent did not wish to disclose specific information such as their salary.

The general survey format used by each occupational license survey included a panel of demographic and socioeconomic variables in addition to occupational-specific questions. These include the respondent's current practicing status, where they are practicing, job title, number of years practicing, current and future expected salary, expectations of a possible market exit (e.g., stopping practicing entirely or practicing out of state), and a series of hypothetical questions concerning their willingness to practice in Idaho if they anticipated a market exit or are currently practicing out of state (more on that later).

To minimize each participant's time spent completing the survey and thereby maximize the survey response rate, redundant questions were removed by making the survey structure conditional. The complete survey would have been 50 questions otherwise, with the respondent having to skip over many questions and thereby increasing the chance they fail to complete the survey. Depending on how certain questions were answered earlier in the survey, subsequent panels of questions were changed or omitted entirely. For example, if the respondent answered "No" to "Are you currently practicing in Idaho?", they were subsequently asked where they are practicing. Had they responded "Yes"; they were asked which Idaho county they are primarily practicing in. As a result, the average survey completion time across occupations was less than 10 minutes, well within the goal of keeping the average completion time to 15 minutes or less.

Additionally, the conditional structure of the survey served as a basis for the estimation of workers' average WTA wage for continuing to practice in or relocating to Idaho. This worked as follows. If the respondent responded "Yes" to either anticipating a market exit or are currently practicing out of state, they were asked a series of hypothetical questions to gauge if they might choose to stay on or relocate to the state, respectively. Survey participants would first be asked if a 20% raise would convince them to continue practicing/relocate to practice in Idaho. Depending on whether they answer "Yes" or "No," they would be asked a second hypothetical question. If they answered "Yes," the same question was posed but with a 10% raise. Had they answered "No," the same question was posed but with a 30% raise.

## A.2 Estimating average willingness-to-accept (WTA) wage using a double-bounded dichotomous choice model

The problem: for health care workers of a specific occupation who anticipate they will stop practicing in Idaho within the next several years (e.g., looking to relocate to a new state, switch careers or retire), how high of a salary in current dollar terms would they need to be offered to convince them to stay?

### The economic theory behind the model

Assume a random utility model of discrete choice[21] with utility from salary weighted by $\beta > 0$ and additively separable disutility from continuing to practice in Idaho denoted by $\alpha > 0$. Denote the currently observed salary by $w > 0$ and percentage raise offered by $x \geq 0$. Utility is further assumed to be increasing logarithmically in salary to better account for outliers owing to the right-skewness in the observed salaries distribution. Finally, each worker has a set of idiosyncratic preference shocks over their options, $\varepsilon \equiv (\varepsilon_0, \varepsilon_1) \in \mathbb{R}^2$, with shocks assumed to be continuous as well as independent and identically distributed (i.i.d.). Preference shocks are the private information of the worker and capture variability in the value workers place on practicing in Idaho as well as their outside option and therefore affect their opportunity cost of employment. According to the model, the utility from each option the worker can choose between is given by

- Utility from outside option: $u_0(\varepsilon) = \varepsilon_0$
- Utility from practicing in Idaho: $u_1(x, w, \varepsilon) = -\alpha + \beta \ln\big((1 + x)w\big) + \varepsilon_1$

Since this utility model aims to represent an individual's preference ordering over these options (i.e., *ordinal* as opposed to *cardinal* utility), the utility from a worker's outside option less their preference shock is an arbitrary number and so is normalized to zero by convention.

Workers observe $(w, x, \varepsilon)$ and their preference ordering between options $u_0(\varepsilon)$ and $u_1(x, w; \varepsilon)$ follows. For example, a worker with current salary $w$ will prefer continuing to practice in Idaho with percentage raise $x$ provided that their utility from continuing working is greater than that from their outside option:

$$u_1(x, w, \varepsilon) > u_0(\varepsilon) \Leftrightarrow -\alpha + \beta \ln\big((1 + x)w\big) > \varepsilon_0 - \varepsilon_1.$$

We as the econometricians, on the other hand, only observe $(w, x)$ and the worker's preference ordering, and therefore must make inferences about $(\alpha, \beta)$ based upon this information together with distributional assumptions about $\varepsilon$, but for now assume $(\alpha, \beta)$ are known values.

Since $\varepsilon_0$ and $\varepsilon_1$ are i.i.d. and therefore $\mathbb{E}[\varepsilon_0 - \varepsilon_1] = 0$, the average WTA salary is obtained from identifying the wage that leaves the average Idahoan expecting a market exit indifferent between staying on and leaving:

$$WTA = \{W \in \mathbb{R}_+ : -\alpha + \beta \ln W = 0\} = \exp\left(\frac{\alpha}{\beta}\right).$$

Note this estimate is in current dollars and salary and is therefore a *static* model of discrete choice. In other words, estimates answer the question, "How much would you need to be paid *today* to continue

[21] The general class of qualitative choice models considered here follows McFadden (1974) with Chapter 2 in Train (2009) providing a more contemporary overview of the subject.

working in Idaho as opposed to leaving or stop practicing?". This does not factor in future salary expectations and expected changes in working conditions, features that unfortunately require a *dynamic* discrete choice (DDC) model.[22]

The next issue is to estimate the parameters $\alpha$ and $\beta$ to compute an estimate and appropriate sampling distribution for WTA. This is achieved using a specific type of survey design and estimation method known as the *double-bounded dichotomous choice method*.

### Survey design

Health care workers with active Idaho licenses were surveyed between July 8, 2022, and August 17, 2022. In addition to a panel of demographic and socioeconomic questions, they were asked a series of occupation-related questions including current practicing status, county/state where they practiced, current and future expected salary, and whether they anticipated a market exit (e.g., relocation out of state or quitting their profession entirely) within the next 10 years. Survey respondents who said they anticipated a market exit were presented with two series of offers, the second depending on their response to the first:

1. Continue practicing in Idaho with a raise of $R = 20\%$
2. If respondent replied no to (1), offer $R^u = 30\%$ raise; if respondent replied yes to (1), offer $R^d = 10\%$ raise.

This choice of survey design is the crux of the double-bounded dichotomous choice method. Unlike self-reported reservation salaries, this model-based econometric method is based upon individuals' stated preferences, i.e., which of the options they prefer. The first benefit is that by restricting respondents' choice to a simple "Accept/Reject" answer to an offer (the "dichotomous choice" part of the definition), the model mitigates the potential bias of having respondents report their own reservation salary. By asking a follow-up question to the respondent with an amount based upon their response to the first offer (the "double-bounded" part of the definition), the statistical efficiency is further improved (Hanemann et al., 1991), helping to mitigate small sample issues.

### Estimating willingness-to-accept (WTA) wage via maximum likelihood

Denote by $d \equiv (d^{yy}, d^{yn}, d^{ny}, d^{nn}) \in \{0,1\} \times \{0,1\} \times \{0,1\} \times \{0,1\}$ the observed response to the offers made where

$$d^{yn} = \begin{cases} 1, & \text{Yes to offer 1, No to offer 2} \\ 0, & \text{otherwise} \end{cases}$$

and so on and so forth. The probability that the respondent answered $d^{yy}$ is then

$$\Pr(d^{yy}) = \Pr\Big(u_1(R, w, \varepsilon) > u_0(\varepsilon) \;\&\; u_1\big(R^d, w, \varepsilon\big) > u_0(\varepsilon)\Big).$$

After a bit of algebra and exploiting the fact that $R > R^d$ and $-\alpha + \beta \ln\Big(\big(1 + R^d\big)w\Big) > \varepsilon_0 - \varepsilon_1$ imply $-\alpha + \beta \ln\big((1 + R)w\big) > \varepsilon_0 - \varepsilon_1$, this reduces to simply

[22] While not considered in this report due to the data requirements, a DDC model of occupational entry/exit would make for an interesting follow-up study.

$$\Pr(d^{yy}) = \Pr\left(-\alpha + \beta \ln\left(\left(1 + R^d\right)w\right) > \varepsilon_0 - \varepsilon_1\right).$$

Similarly for the other choice probabilities, we have

$$\Pr(d^{yn}) = \Pr\left(-\alpha + \beta \ln\big((1 + R)w\big) > \varepsilon_0 - \varepsilon_1 > -\alpha + \beta \ln\left(\left(1 + R^d\right)w\right)\right),$$

$$\Pr(d^{ny}) = \Pr\big(-\alpha + \beta \ln\big((1 + R^u)w\big) > \varepsilon_0 - \varepsilon_1 > -\alpha + \beta \ln\big((1 + R)w\big)\big),$$

$$\Pr(d^{nn}) = \Pr\big(\varepsilon_0 - \varepsilon_1 > -\alpha + \beta \ln\big((1 + R^u)w\big)\big).$$

To close the model, the distribution of $\varepsilon_0 - \varepsilon_1$ would need to be specified. Preference shocks are assumed to follow a Type-I extreme value (Gumbel) distribution with standardized location 0 and scale 1:

$$\Pr(\varepsilon_0 < y) = \Pr(\varepsilon_1 < y) = \exp(-\exp(-y))$$

Given the assumptions of the utility function and distribution of preference shocks as well as reported salary and offer responses, the log likelihood function for a single observation $(d, w)$ given the parameter $\theta \equiv (\alpha, \beta) \in \mathbb{R}^2_+$ takes the form

$$\begin{aligned}\ln \mathcal{L}\,(\theta) = {} & d^{yy} \ln\left(F\left(R^d, w; \theta\right)\right) + d^{yn} \ln\left(F(R, w; \theta) - F\left(R^d, w; \theta\right)\right) \\ & + d^{ny} \ln\big(F(R^u, w; \theta) - F(R, w; \theta)\big) + d^{nn} \ln\big(1 - F(R^u, w; \theta)\big)\end{aligned}$$

where

$$F(x, w; \theta) \equiv \left[1 + \exp\big(\alpha - \beta \ln\big((1 + x)w\big)\big)\right]^{-1}.$$

Note that the difference of two i.i.d. Type-I extreme value random variables with location 0 and scale 1 is distributed as logistic with location 0 and scale 1, and the model is essentially a variation of a logit regression. This distribution choice is motivated by the fact that the logistic distribution is the maximum entropy distribution for a binary outcome model like "accept/reject" a wage offer. Maximum entropy distributions are to be preferred insofar as they minimize the amount of prior information contained in the distribution — i.e., more prior information makes the distribution and corresponding statistical model more restrictive. Additionally, the logistic distribution has fatter tails compared to, say, the normal distribution and corresponding probit regression (i.e., it exhibits greater excess kurtosis), making model estimates less sensitive to outliers in the data. Lastly, the logistic cumulative distribution function has a convenient closed-form expression that doesn't require integration.

Indexing respondents now by $i = 1, \ldots, N$ the log likelihood function for the observed sample is

$$\begin{aligned}\ln \mathcal{L}_N\,(\theta) = \sum_{i=1}^{N} \Big[ & d_i^{yy} \ln\left(F\left(R^d, w_i; \theta\right)\right) + d_i^{yn} \ln\left(F(R, w_i; \theta) - F\left(R^d, w_i; \theta\right)\right) \\ & + d_i^{ny} \ln\big(F(R^u, w_i; \theta) - F(R, w_i; \theta)\big) + d_i^{nn} \ln\big(1 - F(R^u, w_i; \theta)\big)\Big]\end{aligned}$$

where

$$F(x, w_i; \theta) \equiv \left[1 + \exp\big(\alpha - \beta \ln\big((1 + x)w_i\big)\big)\right]^{-1}.$$

Since $\theta$ is unknown, we estimate it by maximizing the log likelihood function with respect to the argument $\tilde{\theta} \in \mathbb{R}^2_+$ to produce the maximum likelihood estimate

$$\hat{\theta} \equiv \arg\max_{\tilde{\theta} \in \mathbb{R}^2} \{\ln \mathcal{L}_N(\tilde{\theta})\}.$$

Stated another way, we choose a $\tilde{\theta}$ in the parameter space $\mathbb{R}^2_+$ so that the probability we observe the sample $\{d_i, w_i\}_{i=1}^N$ as a function of $\tilde{\theta}$ is greatest.[23] (While the model restricts parameters to $\mathbb{R}^2_+$, in practice the maximum likelihood estimator did not require this nonnegativity constraint to be imposed on the parameter space; all model estimates $\hat{\theta}$ were positive and statistically distinguishable from zero at conventional significance level.) Provided the model is correctly specified, the maximum likelihood estimator is consistent as well as efficient, and the asymptotic covariance of $\hat{\theta}$ is obtained from the Cramer-Rao lower bound:

$$V(\hat{\theta}) = \mathcal{I}(\theta)^{-1}$$

where

$$\mathcal{I}(\theta) \equiv -\mathbb{E}\left[\frac{\partial^2 \ln \mathcal{L}(\theta)}{\partial\theta\partial\theta'}\right]$$

is the Fisher information matrix. Since $\mathcal{I}(\theta)$ is a population moment and therefore unobserved, we estimate the asymptotic covariance using the sample analogue based on the inverted negative Hessian matrix of the maximized log likelihood function:[24]

$$\hat{V}(\hat{\theta}) = \left[-\frac{\partial^2 \ln \mathcal{L}_N(\hat{\theta})}{\partial\theta\partial\theta'}\right]^{-1}.$$

The estimate and corresponding sampling distribution for the average WTA wage is mainly its consistency, efficiency and asymptotic normality. Taken together, these properties imply the limiting distribution of $\hat{\theta}$ is

$$\sqrt{N}(\hat{\theta} - \theta) \xrightarrow{d} N(0, \mathcal{I}(\theta)^{-1}).$$

Provided the sample size $N$ is large enough, the approximated sampling distribution for $\hat{\theta}$ is normal with

$$\hat{\theta} \sim N\left(\theta, \hat{V}(\hat{\theta})\right).$$

Denote by $g(\tilde{\theta})$ the formula for $WTP$ as a function of $\tilde{\theta}$:

$$g(\tilde{\theta}) \equiv \exp\left(\frac{\tilde{\alpha}}{\tilde{\beta}}\right).$$

[23] Note the distinction between $\theta$, the parameter value to be estimated; $\tilde{\theta}$ with a tilde, which is an arbitrary value in the parameter space, any value of which is a potential estimate for $\theta$; and $\hat{\theta}$ with a hat, that value in the parameter space which is the preferred estimate of $\theta$ based on some optimality criterion (maximizing the likelihood function in this case).

[24] Provided the Hessian matrix of $\ln \mathcal{L}_N(\tilde{\theta})$ is negative definite at $\hat{\theta}$, its negative is invertible and $\hat{V}(\hat{\theta})$ exists. If $\hat{\theta}$ is reached using the standard first-order necessary conditions based on the score (gradient) of $\ln \mathcal{L}_n(\tilde{\theta})$, negative definiteness of the Hessian matrix at $\hat{\theta}$ distinguishes $\hat{\theta}$ as an isolated local maximum as opposed to an isolated local minimum.

We have via the delta method that

$$\sqrt{N}\left(g(\hat{\theta}) - g(\theta)\right) \xrightarrow{d} N\left(0, \nabla g(\theta)' \mathcal{I}(\theta)^{-1} \nabla g(\theta)\right)$$

where $\nabla g(\tilde{\theta})$ is the gradient of $g(\tilde{\theta})$:

$$\nabla g(\tilde{\theta}) \equiv \begin{pmatrix} \frac{\partial}{\partial \tilde{\alpha}} g(\tilde{\theta}) \\ \frac{\partial}{\partial \tilde{\beta}} g(\tilde{\theta}) \end{pmatrix} = \begin{pmatrix} \frac{1}{\tilde{\beta}} \\ -\frac{\tilde{\alpha}}{\tilde{\beta}^2} \end{pmatrix} g(\tilde{\theta}).$$

Provided the sample size $N$ is large enough, the approximated sampling distribution for the estimated WTA wage is similarly normal:

$$\widehat{WTA} \sim N\left(g(\hat{\theta}), \nabla g(\hat{\theta})' \hat{V}(\hat{\theta}) \nabla g(\hat{\theta})\right).^{25}$$

Since this is a normal approximation, the distribution will take values across the entire number line (positive as well as negative). In most of the models considered, the 95% confidence interval was nonetheless positive, but in a few models with heterogeneity in willingness-to-accept (see below) the estimated variance of $\widehat{WTA}$ was large enough for certain groups to generate confidence intervals that extended into the negatives. This may reflect potential bias and large variance of $\hat{\theta}$ in finite samples, making approximations based on the asymptotic properties of $\hat{\theta}$ unsuitable. With larger survey response rates and correspondingly larger survey samples, however, one might alleviate this issue.

### Heterogeneity in willingness to pay (WTP) by extending the model with covariates

Consider the above model, only now there are a vector of covariates $Z \in \mathbb{R}^m$ to be included in the intercept term. This vector could include years of experience, stated reason for leaving, urban/rural county status of the county they primarily work in, etc. Including different panels of covariates allow us to see how the estimated mean WTA wage varies across groups. The model largely remains as before only now with the intercept term consisting of the dot product of $Z$ and a vector of parameters $\alpha \in \mathbb{R}^m$.

- Utility from outside option: $u_0(\varepsilon) = \varepsilon_0$
- Utility from Idaho option: $u_1(x, w, Z, \varepsilon) = -\alpha' Z + \beta \ln\big((1 + x)w\big) + \varepsilon_1$

The parameter vector to be estimated by maximum likelihood is $\theta \equiv (\alpha, \beta) \in \mathbb{R}^m \times \mathbb{R}_+$ and the estimation procedure remains more-or-less the same provided that the design matrix of regressors is not rank deficient. The WTA estimate is now evaluated at a specific $Z$

$$\widehat{WTA}(Z) \sim N\left(g(\hat{\theta}; Z), \nabla g(\hat{\theta}; Z)' \hat{V}(\hat{\theta}) \nabla g(\hat{\theta}; Z)\right)$$

where

[25] Note that the standard error of $\widehat{WTA}$, which is the square root of the variance of its sampling distribution, is proportional to the point estimate of $\widehat{WTA}$. This may be a desirable consequence of treating salary in logs insofar as it shrinks confidence intervals when the point estimate approaches zero but may be undesirable for large values of the point estimate when the covariance matrix $\hat{V}(\hat{\theta})$ is already large.

$$g(\tilde{\theta}; Z) = \exp\left(\frac{\tilde{\alpha}' Z}{\tilde{\beta}}\right),$$

$$\nabla g(\tilde{\theta}; Z) = \begin{pmatrix} \frac{Z}{\tilde{\beta}} \\ -\frac{\tilde{\alpha}' Z}{\tilde{\beta}^2} \end{pmatrix} g(\tilde{\theta}).$$

By varying $Z$, different sampling distributions for the estimated WTA wage for workers anticipating a market exit can be generated and compared.

In the models with covariates considered, continuously distributed variables such as years of experience were binned by quartile as opposed to, say, imposing a particular polynomial order on them (e.g., a linear or quadratic relationship). This decision was motivated by a desire for model flexibility as well as easier interpretation of the fitted model and corresponding estimate for WTA since $Z$ would simply be a vector of exhaustive and mutually exclusive dummy variables.

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