



# Quantifying Supply Gaps and Return on Investment in South Carolina

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# Acknowledgments

- These projects involved the work of many people, but the lead authors and their supervisors should be recognized:
- Daniel Lyons, Labor Supply Analyst
- Sophia Casler, Longitudinal Data Analyst
- Faith Kithome, Strategic Initiatives Manager
- Brandon Wilkerson, Labor Market Analytics Director

# Legislative Mandate

- These reports are products required to be produced by the Statewide Education and Workforce Development Act, signed into law last year.
- SC Code of Laws Section 41-30-540 states: “The [Unified State Plan] should include ... (6) development and implementation of an annual statewide workforce and education supply gap analysis ... [and] (10) development of a reliable and replicable model for measuring returns on public investment in individual education and workforce programs.”
- The Labor Market Information Division within DEW was tasked with the creation of these deliverables and received appropriations to hire staff.

# What is a Supply Gap Analysis?

- Fundamentally, this supply gap analysis is intended to determine how well the incoming labor pool aligns with employers' needs right now.
- We know how many people have completed certain degrees/credentials from our state's colleges and universities (via the US Dept. of Education). These are parsed by classification of instructional programs (CIP) codes.
- We can also quantify employer need by aggregating data from job boards on open positions by standard occupational classification (SOC) codes.
- So ... we just need to line the two numbers up and compare. Easy, right?

# No, It's Not Easy

- First, we need to account for the fact that not everyone who graduates from a South Carolina higher education institution will stay in the state.
  - A prior report details how likely someone with a particular degree or credential is to appear in unemployment insurance wage records. Those data were incorporated.
- More crucially, while some credentials map neatly onto a particular job, most do not - some degrees could lead to dozens of possible occupations.
  - It was necessary to build a model that estimates how likely a given completer would be to pursue a particular career.
  - This is why we are only able to account for people with a postsecondary credential.

# Warning: Math

These three components— openings (O), wages (W), and specialization (S)—are multiplied together to calculate a CIP to SOC weighted preference unique to each program and SOC code. That CIP to SOC weighted preference is finally compared against other SOC code weighted preferences that are associated with the respective CIP code in the CIP to SOC crosswalk. The CIP to SOC distribution modifier (CSDM) makes this comparison by summing the CIP to SOC weighted preferences within the respective CIP code as the denominator for the modifier, while the numerators are the individual SOC code's CIP to SOC weighted preferences. Because the numerator is always one of the values being summed in the denominator, the CIP to SOC distribution modifier is always ranged from zero to one. In mathematic notation the CIP to SOC distribution modifier for SOC code  $j$  and CIP code  $CIP$  is represented as:

$$CSDM_j = (O_j * W_j^2 * S_j) / \left( \sum_{SOC \in CIP} O_{SOC} * W_{SOC}^2 * S_{SOC} \right)$$



# The Big Reveal

- **South Carolina is only producing half as many graduates as it needs.**
  - There are over 53,000 job openings each year in South Carolina that require a postsecondary credential (but no experience), yet only about 26,000 students receive such credentials and stay here, leaving a supply gap of nearly 27,000.
- Ultimately, businesses address this gap by poaching from competitors, hiring people who move to South Carolina - or staying understaffed.
- Three quarters of this gap is in occupations that require a four-year degree or more. These students are far less likely to remain in state.

# Supply Gap by Career Cluster

| Career Cluster                                 | Supply Gap    | D-S Ratio   | Graduates     | Openings      |
|--|---------------|-------------|---------------|---------------|
| Health Science                                 | 6,539         | 1.96        | 6,825         | 13,364        |
| Education & Training                           | 3,654         | 1.81        | 4,537         | 8,191         |
| Business Management & Administration           | 2,918         | 2.04        | 2,809         | 5,727         |
| Finance  | 2,480         | 3.82        | 880           | 3,360         |
| Information Technology                         | 2,359         | 2.57        | 1,502         | 3,861         |
| Transportation, Distribution & Logistics       | 1,597         | 8.95        | 201           | 1,798         |
| Marketing                                      | 1,542         | 2.14        | 1,350         | 2,892         |
| Human Services                                 | 1,487         | 1.60        | 2,487         | 3,974         |
| Law, Public Safety, Corrections & Security     | 1,205         | 2.98        | 608           | 1,813         |
| Architecture & Construction                    | 1,138         | 2.47        | 775           | 1,913         |
| Manufacturing                                  | 766           | 3.17        | 353           | 1,119         |
| Science, Technology, Engineering & Mathematics | 522           | 1.23        | 2,243         | 2,765         |
| Arts, Audio/Video Technology & Communications  | 296           | 1.37        | 801           | 1,097         |
| Government & Public Administration             | 279           | 1.58        | 482           | 761           |
| Agriculture, Food & Natural Resources          | 114           | 1.38        | 301           | 415           |
| <b>Total</b>                                   | <b>26,898</b> | <b>2.03</b> | <b>26,154</b> | <b>53,052</b> |



# Largest Supply Gaps by Occupation

| Occupation   | Supply Gap |
|--|------------|
| Accountants and Auditors                             | 1,255      |
| Software Developers                                  | 1,061      |
| Nursing Assistants                                   | 988        |
| Market Research Analysts & Marketing Specialists     | 983        |
| Human Resources Specialists                          | 964        |
| Medical Assistants                                   | 916        |
| Elementary School Teachers, Except Special Education | 879        |
| Substitute Teachers, Short-Term*                     | 663        |
| Paralegals and Legal Assistants                      | 621        |
| Medical and Health Services Managers                 | 565        |
| Automotive Service Technicians & Mechanics*          | 559        |
| Registered Nurses                                    | 537        |

# Supply Gap Analysis - Next Steps

- This work took a very limited view of labor supply and demand. Ideally, things will become more holistic going forward, but data are hard to get.
  - Enhanced wage records (SOC codes and hours worked required starting this year) will help build a better picture of the workforce over time.
  - Information on training providers outside of the postsecondary education system and entities participating in WIOA programs, including high school CTE programs, may be inaccessible or incomplete.
- The analysis will be done annually, so we welcome ideas for refinement.
- The full report is now available at <https://dew.sc.gov/ccwd/>.

# Return on Investment

- Beyond the supply gap analysis, the LMI Division has been working with our partners at CHE and TCS to assemble data on program graduates.
- This information is combined with unemployment insurance wage records housed at DEW to determine the wage trajectories of these graduates.
- As presented to the CCWD previously, we have developed one-page flyers that summarize results in several fields, e.g., welding and mechatronics.
- Our first two full reports build out knowledge of nursing graduates.

# Nursing ROI Analyses

- Our reports look at two groups of nursing program completers:
  - 21,715 associate degree holders from SCTCS two-year institutions, CY 2004-2021
  - 12,901 bachelor's degree holders from CHE four-year institutions, FY 2012-2021
- Administrative data provide basic demographic data about these groups.
- For individuals in DEW wage records, we were able to identify their total earnings one, five, and ten years after graduation.
  - Records do not include students who work outside of the state, are self-employed, serve as independent contractors, or work for the federal government or military.

# Demographics of Associate Nursing Graduates

| Category                  | Number | Share | Wage Record Retention Rate |            |           |
|---------------------------|--------|-------|----------------------------|------------|-----------|
|                           |        |       | One Year                   | Five Years | Ten Years |
| Total                     | 21,715 | 100%  | 87.2%                      | 77.9%      | 71.9%     |
| Female                    | 19,554 | 90.0% | 87.1%                      | 78.2%      | 72.7%     |
| Male                      | 2,161  | 10.0% | 87.3%                      | 74.2%      | 64.7%     |
| White                     | 16,182 | 74.5% | 87.8%                      | 79.2%      | 73.1%     |
| Black or African American | 3,796  | 17.5% | 87.2%                      | 75.9%      | 70.6%     |
| Hispanic or Latino        | 519    | 2.4%  | 75.3%                      | 63.9%      | 54.6%     |
| Asian                     | 333    | 1.5%  | 79.6%                      | 63.4%      | 61.0%     |
| Two or more races         | 249    | 1.1%  | 85.5%                      | 72.0%      | 59.3%     |
| In-State                  | 20,106 | 92.6% | 89.7%                      | 80.7%      | 74.3%     |
| Out-of-State              | 1,609  | 7.4%  | 55.1%                      | 40.6%      | 35.8%     |

# Median Earnings of Associate Nursing Graduates

| Category                  | One Year | Five Years | Ten Years |
|---------------------------|----------|------------|-----------|
| Total                     | \$60,637 | \$70,956   | \$77,132  |
| Female                    | \$60,215 | \$70,377   | \$76,372  |
| Male                      | \$64,482 | \$77,417   | \$86,730  |
| White                     | \$60,310 | \$70,351   | \$77,132  |
| Black or African American | \$62,435 | \$73,992   | \$79,672  |
| Hispanic or Latino        | \$58,558 | \$70,852   | \$74,542  |
| Asian                     | \$59,756 | \$77,262   | \$82,218  |
| Two or more races         | \$62,945 | \$78,630   | \$83,098  |

Note: Calculation excludes part-time workers (salaries below \$14,500).



# Return on Investment - Associate Nursing Graduates

- The average sticker price for a two-year nursing degree across TCS institutions (i.e., not including aid or scholarships) is roughly \$10,000.
- The “wage premium” - the amount a typical graduate earned above the median high school graduate after completion - is \$23,000 per year.
- This means that a typical graduate from an associate nursing program recoups their investment in approximately five months, not including opportunity costs. This is reasonably consistent across all demographics.

# Return on Investment - Next Steps

- We plan to continue building out this analysis until we achieve the comprehensive ROI analysis contemplated in the Act 67 legislation.
- There is a need to improve the quantity and quality of data available.
  - For example, we did not have access to data on enrollment or time to completion, so we had to assume that everyone was a full-time student in ROI calculations.
  - Ongoing efforts by DEW to validate SOC codes and hours worked data in UI records will allow for a greater ability to describe employment outcomes for completers.
  - BLS' Wage Record Program will allow for limited access to out-of-state records. Improved data on 1099 earners and others exempt from UI would help as well.
  - South Carolina's Revenue and Fiscal Affairs Office has an Integrated Data System, but it is not being fully utilized by the state agencies essential to this effort.