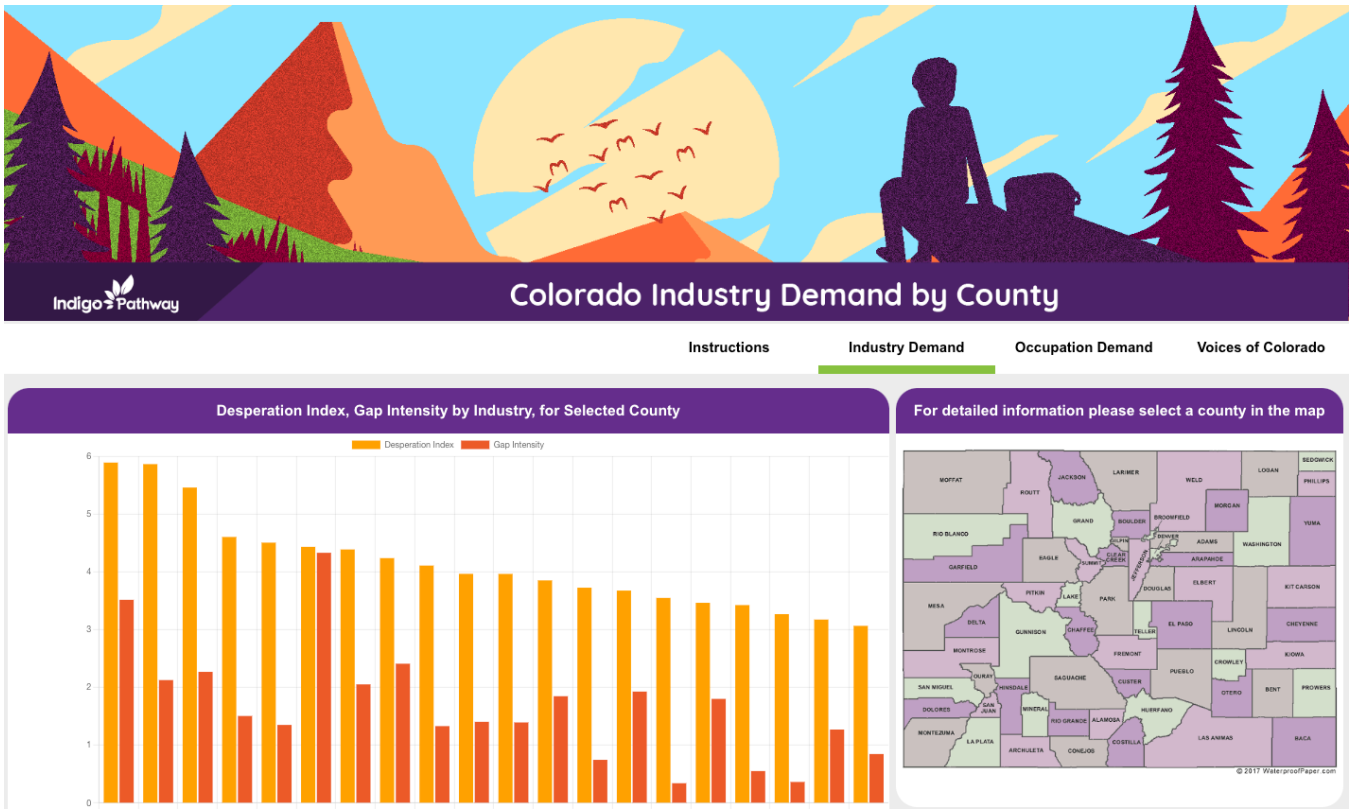
“Industry Demand by County” Webpage Narrative

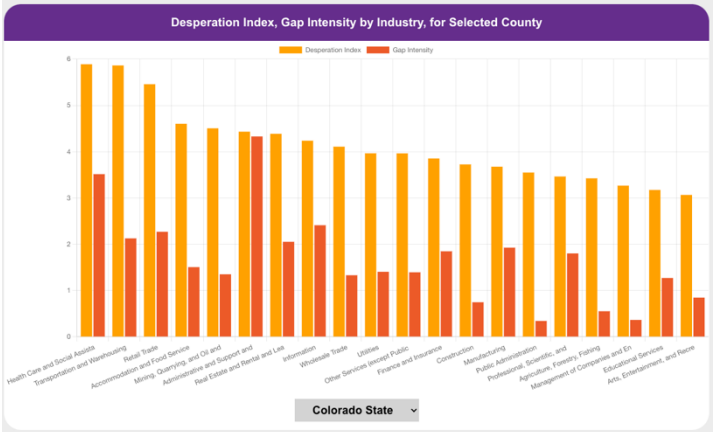
– from https://coloradodataprogram.azurewebsites.net/#/graphs.



The “Colorado Industry Demand by County” data page was created to answer the questions surrounding which industries are most in demand in Colorado and in each county. To answer these questions, we decided to use 2-digit and 6-digit NAICS Industry Codes and used 2021 data to have the most recent information. Number of jobs data is sourced from the Bureau of Labor and Statistics (BLS) and the rest of the data is sourced from EMSI. Over 2,000 spreadsheets are included in this page’s display.

First Graph - Desperation Index, Gap Intensity by Industry, for selected County:

The first graph provides a heat map of Desperation Index and Gap Intensity by industry. The graph can be changed to view all the counties in Colorado. By clicking on each industry, you can drill down to the 6-digit industry information for each industry in each county.



We created the Desperation Index to get a quick view of which jobs employers were having to post multiple times to hire.

Desperation Index: We developed this index as an easy way to quickly discern how difficult it is to fill positions by industry and within different counties. The value displayed is the ratio of the total number of job postings divided by the number of unique jobs posted. In other words, if there are 4 unique jobs that are posted, and a total of 12 postings, then on average each job had to be posted 3 times. The "Desperation Index" in this case would be "3", i.e., 12 total postings divided by 4 unique postings.

Because we also wanted to account for how many jobs are needed overall in each industry, we also created the Gap Intensity indicator.

Gap Intensity: Gap Intensity modifies the Desperation Index based upon the ratio between the total number of jobs and the unique postings in an industry. If there are a lot of postings in a particular industry, for example, the Gap Intensity will be greater. But if the industry only has a few postings compared to the number of existing jobs, the Gap Intensity will be lower. In other words, the Gap Intensity is a measure of the relative magnitude of the total hiring challenge.

Please NOTE - for all graphs on the project website:

- Scroll over any of the keys, bars, or lines in any of the graphs to show a tooltip that provides more detail on that bar and what it represents.
- Click on the white section of the graph to revert to 2-digit NAICS codes.

Second Graph - Jobs and Postings for Selected County and Industry:

The second graph displays all the relevant industry data in one place. It shows the Desperation Index, Gap Intensity, Total Jobs, and Unique Postings.

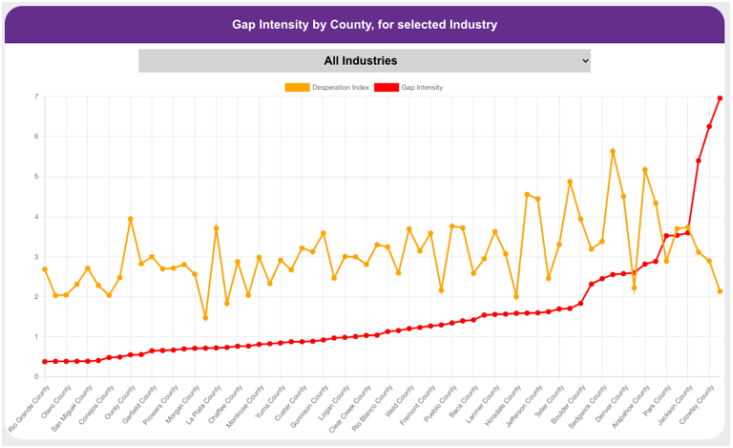
A few features to note about this graph:

- Select the county to view either from the dropdown menu in the middle of the page or by clicking on the county name from the map on the upper right side of the page.
- You can sort the graph to rank highest to lowest in each category by selecting the radio button next to "Order by".
- If the graph seems too crowded, or hard to read, show just the top and bottom sections of the graph from the drop-down menu to the right of the "Order by" radio button.
- Remove an indicator by clicking on the colored key underneath the graph title.

- By clicking on any of the 2-digit bars, you can drill down to the data for that county broken down by 6-digit codes. This helps you to get a better view of data collected in each county and how the various sub-industries are impacting the Desperation Index and Gap Intensity for the county.

Third Graph - Gap Intensity by County, for selected Industry:

The third graph is a quick way to see each county's Desperation Index and Gap Intensity by 2-digit industry category. In this way you have a quick overview of which counties are the most impacted in each industry.



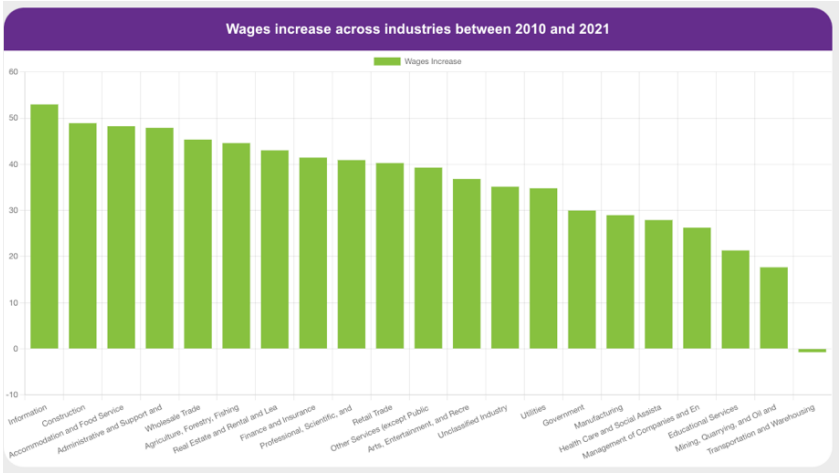
Please NOTE:

- Some of the data in small counties is too limited to provide accurate comparison values. This problem is further explained below.

- If the graph is too crowded with data, not all county names will appear in the bottom key. By scrolling over any unnamed data points, a tooltip will appear that enables you to identify the county the data is representing.

Fourth Graph – Wages Increase by Industry:

The fourth graph provides an overview of how wages have shifted in the past decade per industry. This is not meant to be a comprehensive wage analysis but will help shed light on why some industries are struggling more than others.



For example, transportation wages have actually *decreased* over the past ten years. This is a contributing factor to the shortage of drivers. The data on wages is affected by the rise of gig economy workers in the transportation industry, including Uber drivers and privately contracted Amazon delivery drivers. More analysis is needed to develop a clearer understanding of the impact of gig workers as discussed later in this report.

A Note about Data from Smaller Counties:

Many smaller counties are missing information compared to larger counties, and therefore not all industries are accounted for in every county. Missing industry data is due to a lack of data from the BLS and from EMSI, such as when a county or industry does not use online job postings to hire positions.

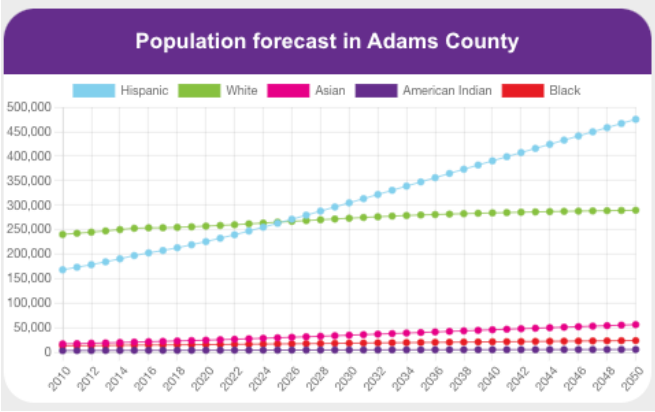
I suggest contacting smaller counties to see if there are ways to collect data on these counties apart from national job boards. As someone who grew up in a rural place, I could see many of the companies, especially smaller rural businesses, never posting job openings online. Rural employers will often hire the people they know, or the friends of people they know, before advertising a position. Thus, the data for small companies in small counties cannot be accurately portrayed on our graphs. From personal experience, over a nine-year period at Indigo I have hired about fifty people, both for part and full-time positions. In those nine years, I have only advertised a job position a total of three times.

The following counties have *all* possible 6-digit NAICS data for all existing 2-digit NAICS industries:

1. Adams County
2. Boulder County
3. Denver County
4. El Paso County
5. Jefferson County
6. Larimer County

Population forecast by County (right table)

The "Population forecast by County" graph highlights our state's rapidly change ethnicity landscape using data from the state demographer's office. In many counties, residents of Hispanic heritage will outnumber Colorado's traditionally White population by 2030. Understanding and preparing members of the Hispanic community is critical to supporting workforce needs.



Note: The CO Health Foundation Pulse Survey on the Voices of Colorado webpage was answered by 70% Caucasian individuals. I suspect, many of the concerns highlighted would be even more exacerbated by those of Hispanic heritage.

Industry Page "Buttons" (right table)

On the right-hand side of the "Colorado Industry Demand by County" page, you will see six buttons that pop up *when you select a county*. Please note these buttons are not available at the state level, just the county level. The information contained in these buttons is useful for deeper analysis on how to support each county, as well as each industry within a county.

Top Occupations Button

The occupations button reveals what EMSI ranks as the top 50 occupations posted in that county within a given industry. The default is for all the industries combined but will change automatically when a specific industry is selected. Drilling down into 6-digit sub-industries allows you to see which jobs are more frequently posted in specific categories. You can also see jobs that appear across multiple industries – we termed these as "cross-industry occupations".


Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Occupations in Denver County
All Industries

#	Occupation	Total Postings	Unique
1	Registered Nurses	83959	11940
2	Laborers and Freight, Stock, and Material Mov...	42217	3941
3	Sales Representatives, Wholesale and Manufact...	41107	10415
4	Software Developers and Software Quality Assu...	39475	12882
5	Customer Service Representatives	25390	4747
6	Heavy and Tractor-Trailer Truck Drivers	23739	3341
7	Personal Service Managers, All Other; Enterta...	20307	6217
8	Retail Salespersons	19999	3667

Cross-industry occupation example in Denver County – Registered Nurses:

- There are a total of 83,929 postings for Registered Nurses across "All Industries", and thus it is the #1 occupation listed.
- As you drill down in "Healthcare" you will find 61,862 postings for Registered Nurses. The sub-industry with the most listings for Registered Nurses is "General Medical and Surgical Hospitals".
- Registered nurses show up in other industry lists, too. For example, there are 2,836 postings for Registered Nurses under "Professional, Scientific and Technical Services".
- Surprisingly, there are postings for RNs in many other industries.

Cross-industry occupation implications:

It would be interesting to do a deeper analysis on the occupations per industry to identify where there are a lot of cross-industry occupations. This analysis can help to shed light on the type of jobs that can more readily cross industry boundaries to meet urgent needs.

It would be interesting to study which industries are landing the bulk of "in demand" occupations like software programmers, for example. Since programming is necessary in many industries, it could be helpful to multiple verticals to support education for programming.

As an anecdotal example of the cross-industry challenge of hiring programmers, an experienced software developer I know elected to work for a dental insurance company because the wages they offered were even higher than with his tech industry job. This company struggles so much to find US based programmers, that most of their IT workforce is now based overseas.

Top Companies Button

The "Companies" button is useful to find who the biggest employers in each county are, and which industries they represent. For example, Vail Resorts is the #1 company in Eagle County, which is what you would expect. The data we have compiled can be used to understand the benefit packages and training the top employers offer, as well as to determine which


Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Companies in Eagle County
All Industries

#	Company	Total Postings	Unique
1	Vail Resorts	4249	1706
2	Marriott International	2524	729
3	Hyatt	1546	481
4	Vail Health	1379	584
5	Aspen Valley Hospital	1345	261
6	Whole Foods	910	213

employers are the most successful in recruiting and retaining employers. The data can also identify the counties that are most vulnerable if an employer goes out of business or is unable to hire enough workers. Critical state and county level partnerships should be forged with the top regional employers.

Qualifications Button


Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Qualifications in Boulder County
All Industries

#	Qualification	Postings
1	Security Clearance	1366
2	Commercial Driver's License (CDL)	1281
3	Certified Nursing Assistant	1192
4	Top Secret-Sensitive Compartmented Information (TS/SCI Clear...	1063
5	Licensed Practical Nurse	1033

The qualifications tab is my favorite button on the list. It's a quick way to understand what employers are looking for when they post jobs in each industry and county. I recommend cross referencing those qualifications with the ETPL programs and other credentialing programs in Colorado. We would do well to ensure that the programs being offered are the programs that employers are searching for, especially for critical jobs and industries. The state needs to be sure it is spending money where it is needed, and toward industry level credentials that are focused on obtaining local high-need jobs.

Specialized Skills Button

The Specialized Skills Tab provides data on Colorado's educational programming. This is a good section to explore to see if we are teaching things that really matter for each industry.

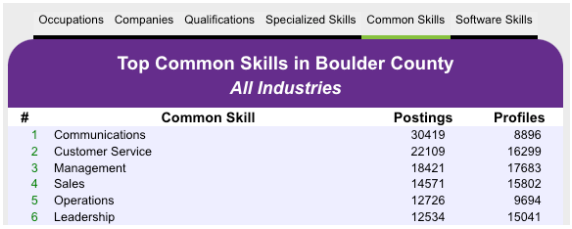

Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Specialized Skills in Denver County
Professional, Scientific, and Technical Services

#	Specialized Skill	Postings	Profiles
1	Marketing	6329	16047
2	Agile Methodology	5461	4060
3	Computer Science	4584	508
4	Automation	4054	2709
5	Accounting	3992	6846
6	SQL (Programming Language)	3723	4553
7	Finance	3686	5385
8	Amazon Web Services	3545	1402
9	Python (Programming Language)	3326	2862
10	Salesforce	3285	4685

Common Skills Button

The data gathered and displayed under the "Common Skills Button" is quite generic. I do believe further analysis could be done to better characterize the common skills that employers need. This information, along with O*NET skills data should help drive general secondary school educational programs and help facilitate individuals to be more readily move from one occupation to another.

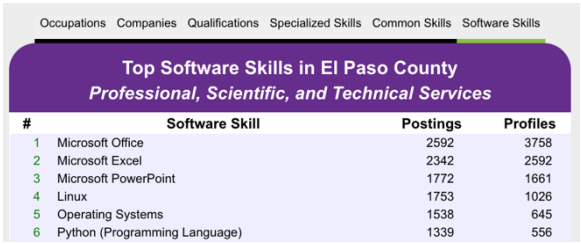

Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Common Skills in Boulder County
All Industries

#	Common Skill	Postings	Profiles
1	Communications	30419	8896
2	Customer Service	22109	16299
3	Management	18421	17683
4	Sales	14571	15802
5	Operations	12726	9694
6	Leadership	12534	15041

Software Skills Button

"Software Skills" are critically important for higher wage jobs and cross all industry verticals. Even in the most advanced industries, like "Professional, Scientific and Technical Services", Microsoft Office skills like Excel and PowerPoint consistently appear as skills necessary for jobs.


Occupations Companies Qualifications Specialized Skills Common Skills Software Skills

Top Software Skills in El Paso County
Professional, Scientific, and Technical Services

#	Software Skill	Postings	Profiles
1	Microsoft Office	2592	3758
2	Microsoft Excel	2342	2592
3	Microsoft PowerPoint	1772	1661
4	Linux	1753	1026
5	Operating Systems	1538	645
6	Python (Programming Language)	1339	556