

The State of the San Bernardino County Economy 2017 Annual Report



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Executive Summary

Conclusions

Based on the analyses described in this report, Chmura believes the San Bernardino County Workforce Development Board (“SBCWDB” or “WDB”) has several actionable opportunities on which to capitalize. These opportunities could help “move the needle” towards broader economic advancement in the County. The opportunities described were largely informed by consistent patterns expressed in the interviews and focus groups, communication with the WDB’s project team, and backed by analysis of the secondary data. When possible, the report provides references to existing models or resources that the WDB could research further and potentially replicate in the County.

Focus groups strongly indicated the need for more collaboration between businesses and education providers. One of the most pressing challenges for the workforce system to address was reported as bridging the gap between businesses and education. Overall, there was clear demand expressed for a reliable and guiding source of labor market information (LMI) in the County. This is the first major opportunity for the WDB to pursue, and from this more opportunities stem: *become the County’s recognized authority for providing labor market information (LMI)*.

The SBCWDB is in a unique position relative to receiving LMI in the County. Their direct relationships with hundreds of employers, and hundreds more, through their business survey outreach, coupled with access to secondary data provide an opportunity to synthesize these data into actionable intelligence that provides an informational backbone to the workforce system. For example, business surveys could be redesigned to capture details on specific skill shortfalls. Surveys could be administered to specific sectors on a regular basis and findings could provide an impetus for more research or give rise to new ideas and collaborations. Staff could make public presentations of LMI, and current conditions could be communicated on a regular basis via newsletter, web page, or blog. In short, the SBCWDB could actively become the County’s “go-to resource” for gathering and disseminating LMI to help ensure that stakeholders coordinate better and move forward based on shared information and mutual understanding.

Become the County’s recognized authority for providing labor market information

While the County’s employment growth is forecast to be widespread, it’s likely to be led by a handful of sectors, notably healthcare, logistics, professional, scientific and technical services, and construction. Each of these sectors employs a different mix of workers with specific knowledge and skills; each faces its own set of challenges, including impending retirements, skill shortages, and technological advancements. Given the rapid rate at which work environments are changing, efforts to enhance the County’s collective skill level should be made in partnership with local employers. Again, the SBCWDB is uniquely positioned to influence such efforts.

Leveraging its position as the region’s LMI authority and its experience from SlingShot, the WDB has an opportunity to *bolster sector partnerships*. The mission of these partnerships must be oriented towards workforce “transformation” rather than business service “transaction.” In other words, these partnerships are not simply about placing workers in open positions to meet employers’ needs. They are about cultivating an approach to workforce development that draws upon the resources and expertise of multiple and diverse stakeholders. A natural place to start, to secure buy-in and generate forward momentum across stakeholders, could be through a comprehensive, sector-specific skills needs assessment. Findings from this type of project could provide a robust foundation from which to engage partners and establish workforce priorities related to a specific sector.

Bolster sector partnerships

Another opportunity could be to form sector partnerships that aim to revitalize distressed parts of the County while also training workers to develop critical skills. Important themes that emerged from the focus groups included incentivizing neighborhood revitalization; developing affordable housing options for lower wage workers; leveraging old, abandoned buildings for new business formation and housing; increasing the talent pipeline for skilled trades; and teaching soft and customer service skills to workers. Deconstruction/reconstruction models inspired by organizations like the [Rebuilding Center](#) in Portland, Oregon, could pair well with YouthBuild Inland Empire and other stakeholders to potentially address all the themes mentioned above.

Expand career services

With a strong employment growth forecast across many industries, there are wide-ranging career opportunities for the County's workers. At the same time, the region's relatively low rates of educational attainment and participation in the labor force could become a drag on the County's economic growth if they remain unchanged. Further, more than 135,000 workers, or approximately 20% of those currently employed in the County, are age 55 years or older, and many are likely near retirement. These conditions point to the need for the WDB to *expand career services*.

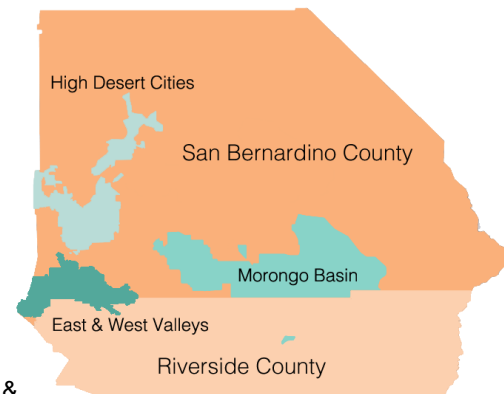
One of the most active topics communicated in focus groups and interviews was the importance of preparing future workers with relevant, in-demand skills. The SBCWDB's recent commitment to place students completing local pathways programs into internships with pathways-related businesses is an important step in facilitating knowledge transfer and exposing students to the real world of work. According to one focus group participant, one of the WDB's greatest opportunities is to "work in collaboration with employers to engage the labor force that will be entering the field. Specifically, employers need to engage the younger generations such as middle and high school students." This observation, echoed by others, speaks not just to the importance of internships, but also to on-the-job training, apprenticeships, and pre-apprenticeship programming. It also reiterates the importance of bridging the information gap between education and businesses and forming sector partnerships by region and industry.

In sum, there is an abundance of actionable opportunities for the SBCWDB to consider. The County's prospects for employment growth and the youth of its population distinguish it from much of the nation. Its industry strengths provide better opportunities for economic advancement to a broad range of workers. The keys for the WDB will be to commit on a deeper level to specific sectors of the region's economy and to invigorate the County's labor force to fuel the economy's expansion.

Methodology

The methodology used in this report combines secondary data analysis with primary data collection to capture and verify key trends in San Bernardino County (the County). Analysis and findings of this report are grounded in data such as economic and labor market statistics, as well as focus groups with key regional stakeholders and interviews with major employers in the County.

The regions analyzed in this report include the County of San Bernardino, the neighboring Riverside County, and the combined San Bernardino County and Riverside County metro area commonly referred to as the Inland Empire. As the largest county in the nation by area, there are also key differences between three sub-regions of San Bernardino County, classified in this report as the East & West Valleys, High Desert Cities, and Morongo Basin.



Employment Forecasts

The employment outlook for San Bernardino County is bright. Employment in the Inland Empire has grown faster on a year-over-year basis than in California or the nation since the first quarter of 2013, and the region is forecast to outperform the state and the nation over the next two years. The San Bernardino County economy is supported by a strong mix of businesses poised to expand over the next ten years, and employment is expected to expand by 73,097 jobs over this period. By sub-region, most of the projected job growth is in the East & West Valleys (+60,080 jobs), followed by the High Desert Cities (+7,618) and Morongo Basin (+1,397).

Demographics

The demographic profile of San Bernardino County reveals both opportunities and challenges. The County has a relatively young population that can be foundational in bolstering the region's long-run prospects for economic growth. The importance of engaging and preparing younger workers for future careers was a prevailing theme that emerged in the focus groups. Participants spoke to the importance of promoting diverse career pathways and access to local training and education opportunities. However, the poverty level in San Bernardino County is higher than the state and national averages, and access to transportation is a prominent barrier to employment in San Bernardino County. This barrier can be especially cumbersome considering the significant distances that must be traversed between different parts of the County.

The region is forecast to outperform the state and the nation over the next two years

Recent trends indicate a strong in-migration pattern of young adults and households to San Bernardino County, and there is a significant opportunity to attract new businesses to the region given the supply of labor residing in the County but commuting out. The majority of the in-migration originates from San Bernardino's west, in Los Angeles County, likely spurred by San Bernardino County's substantially lower cost of living and median house value relative to the rest of California. While the East & West Valleys sub-region pushes the County's median house value upwards, the High Desert Cities and Morongo Basin sub-regions' median house values are closer to more affordable values in peer regions outside the state.

Real Estate

The residential, industrial, and commercial real estate markets in San Bernardino have displayed several positive trends in 2017. Housing inventory is tight in the region, suggesting high demand; but it is not stretched as tight as the rest of California. The median home sales price continues to rise, while San Bernardino remains one of the most affordable counties in terms of housing in California. However, housing is a challenge for some residents given the high poverty rates; revitalization or rehabilitation of distressed areas could generate more affordable housing options for lower wage earners.

In a good sign for demand from growing businesses in San Bernardino, industrial and commercial capacity is expanding, with vacancy rates consistent with or below the national average. One theme that emerged from the focus groups was the opportunity to incentivize revitalization and leverage old, abandoned buildings for new business formation and housing.

Industry

The largest sector by employment in the County is health care and social assistance with 119,219 workers. The transportation and warehousing sector accounts for another large portion of the County's economy, employing 79,058 workers.

A vast majority of the growth in the General Warehousing and Storage industry can be attributed to Amazon's expanding fulfillment centers in the County, as they employ "over 10,000 full-time employees in San Bernardino County," according to an Amazon operations employee. Other major contributors to recent growth include a Walmart distribution center and a new QVC distribution center.

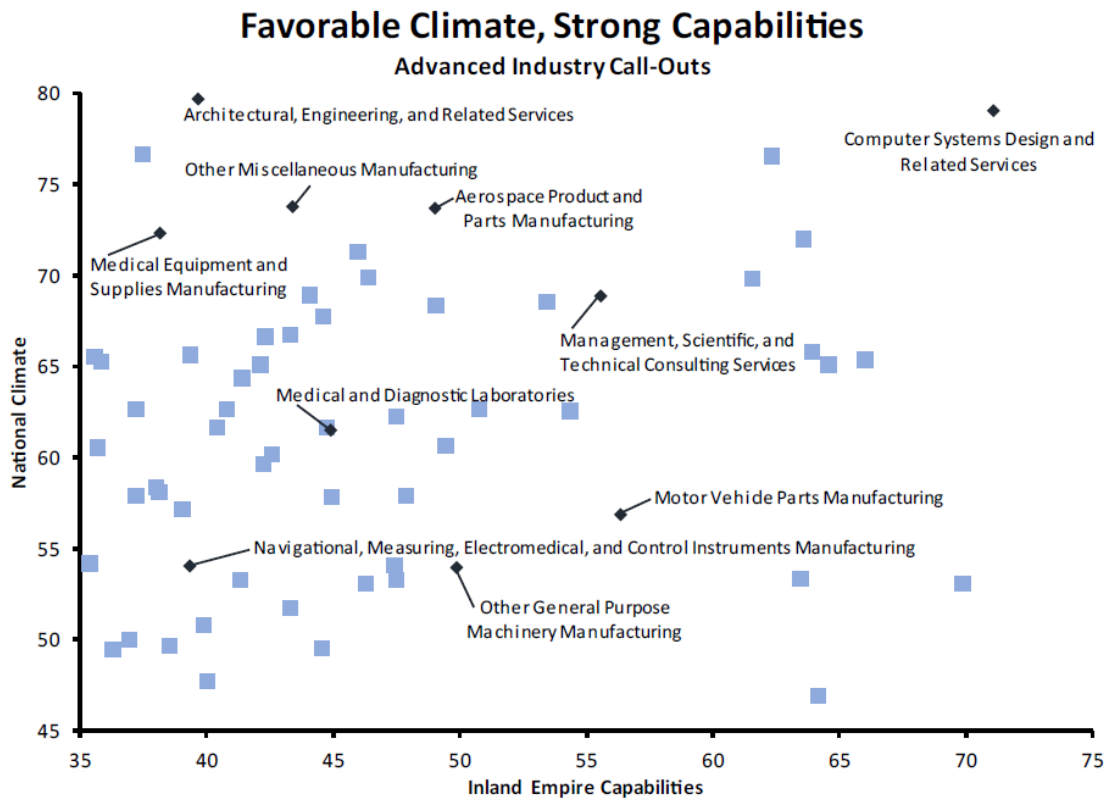
Each sub-region within San Bernardino County is characterized by a unique mix of industries that form a basis for developing each sub-region's economy and generating more local opportunities for employment. The health care and social assistance sector is the largest industry in Morongo Basin and the East & West Valleys, while transportation and warehousing has a much higher concentration in the East & West Valleys and High Desert than it does in Morongo Basin.

The SBCWDB may consider prioritizing workforce development efforts that align with each sub-region's key industries rather than the County as a whole. This approach could be especially pertinent to current and future workers located in the High Desert Cities, which is a substantial distance from the County's other employment centers.

The Climate-Capabilities model developed by Chmura helps predict what industries are well-positioned to thrive, and what industries may be more vulnerable due to prevailing trends and conditions during the next ten years. Top industries in the matrix emerged from several different sectors, including from the health care, manufacturing, education, professional services, construction, and transportation and warehousing sectors.

Vulnerable regional industries highlighted in the matrix were especially concentrated in wholesale and retail trade. The SBCWDB has an opportunity to prepare early for potential employment contractions in many of these vulnerable occupations.

Employment is expected to expand by more than 73,000 jobs over the next 10 years



Industry and Workforce Themes: Automation, Advanced Technology, and Robotics

Technology was a recurring theme across industry and workforce stakeholders. As technology becomes more integrated across all industries and job requirements, companies, regions, and training providers must embrace and adapt to the continuously changing market demands.

The climate-capabilities matrix revealed a number of advanced technologies industries with a favorable national climate and local capabilities. Several of these industries represent opportunities to capitalize on the increasingly prevalent use of automation across industries, particularly manufacturing.

For advanced technologies industries to thrive in San Bernardino County, the workforce must be prepared to meet employer demands. Feedback from focus groups and interviews support the need to enhance training for these industries, including improved computer and general technological competency, computer programming, and mechanical engineering training to troubleshoot breakdowns in robotic processes.

Workforce

As the San Bernardino unemployment rate continues to fall, there are indications that employers feel the labor market tightening. Tapping underemployed individuals is an opportunity to ease workforce shortages and potentially boost average wages in the County. For the 2016 calendar year, an estimated 52,780 workers in San Bernardino were underemployed—graduates with a bachelor's degree or higher working in a job that typically does not require a college degree.

Transportation and material moving occupations have the largest projected job growth in San Bernardino County, expected to add more than 9,800 jobs over the next ten years. In terms of the forecasted annual growth rate, the fastest-growing occupations include personal care aides; registered nurses; combined food preparation and serving workers, including fast food; and laborers and freight, stock, and material movers.

Jobs in San Bernardino County are expected to grow faster than in the state at every level of typical education and training. Jobs are currently skewed to lower educational attainment--currently, more than two-thirds of jobs in San Bernardino County typically require a high school diploma or less to enter. This trend in skills and education required may shift over the next ten years due to growth in target industries and the changing nature of jobs adapting to automation and other technological advancements. In terms of current demand for skills, secondary data and focus group participants agreed advanced nursing certifications and CDLs are important technical skills currently needed in the region.

Chmura developed an index tool to help identify occupations that may be particularly appealing from a workforce development perspective. This group of occupations could help form a basis from which to prioritize training investments, review gaps in the eligible training providers list, and ensure that available career pathways are aligned. Three of the top 25 occupations are related to healthcare, and another three (electricians, plumbers, and carpenters) are eligible for conventional apprenticeships.

The outlook in San Bernardino is promising, with strong employment growth forecasts, favorable comparisons with peer regions in California, several encouraging demographic trends, and strong growth in key industries. At the same time, the region's relatively low rates of educational attainment and participation in the labor force could become a drag on the County's economic growth if they remain unchanged. The data and findings of this report present several strengths on which to capitalize and opportunities for possible strategic workforce initiatives to assist the SBCWDB in anticipating and addressing workforce needs.

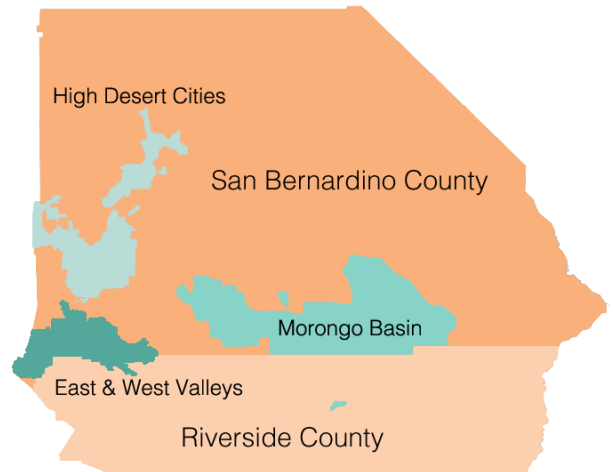
Jobs in San Bernardino County are expected to grow faster than in the state at every level of education and training

I. Introduction

There is a burgeoning sense of optimism in San Bernardino County regarding its prospects for sustained economic growth. As this report makes clear, the Inland Empire economy is expected to continue its trajectory of growth that began in 2013, when its employment growth outpaced growth for both California and the nation. This outlook is supported by the October 2017 Purchasing Managers' Index report, which indicated that the region's economy remains "comfortably in growth mode."¹ Riverside County is forecast to continue to outperform the state and nation, while San Bernardino County is forecast to mirror growth in the state and outperform the nation.

To the extent possible, this report focuses on the economy of San Bernardino County and draws comparisons to the state, nation, and other peer regions. Several analyses further subdivide the County into its three major sub-regions: 1) East and West Valleys, 2) High Desert Cities, and 3) Morongo Basin. Despite a unique mix of industries and demographics, each of these sub-regions has grown more rapidly than the nation; East and West Valleys have also expanded at a faster rate than California.

Figure 1.1: Map of Sub-Regions



In the face of this widespread growth, the San Bernardino County Workforce Development Board ("SBCWDB" or "WDB") is charged with working to advance the region's economy by educating and training local workers and supporting local businesses. Specifically, the SBCWDB ensures that the County's residents have the skills, training, and education necessary to achieve their career goals and that local businesses are able to hire, develop, and retain skilled workers.² In a region so geographically vast and economically diverse, this can be a daunting task, particularly at a time when workforce demands are increasingly dynamic due to rapid technological advancements.

This report was designed to provide timely and relevant guidance—embedded in sound data and informed by local input—to the WDB that supports their local policy formulation,

¹ Source: <http://iar.csusb.edu/reports/documents/ROBOct2017final.pdf>

² Source: <http://wp.sbcounty.gov/workforce/>

planning and investment strategies. The findings from this report will help to identify, anticipate, and proactively address issues facing the WDB and its workforce system partners that include businesses, training and education providers, economic development, community-based organizations, and policymakers.

The secondary data that underpin this report were gathered using Chmura's proprietary JobsEQ®.³ Additional data were obtained from county, state, federal, and private sector sources.

Primary data were gathered through focus group sessions and interviews with leaders from industry, postsecondary education, community based organizations, and workforce and economic development. Two focus groups were held in early November 2017 within the East & West Valleys and High Desert regions of the County. Approximately 60 stakeholders participated in these focus groups.

The following broad topics are emphasized in the remainder of this analysis after a brief national and regional economic outlook:

- Demographics: population; economic and social characteristics
- Real estate: residential and commercial trends
- Industry: trends and forecast, indexed rankings, key occupations, and key clusters
- Workforce: trends and forecast, growth by training required, indexed rankings, key clusters, and in-demand training and certifications
- Conclusions: potential opportunities for the WDB, stemming from the findings in this analysis

³ JobsEQ is Chmura's proprietary technology platform for labor market analytics and economic research, located at: <http://chmuraecon.com/jobseq/>

National & Regional Economic Outlook

The pace of economic growth in the nation has picked up since the second quarter of 2017 and is expected to improve further in 2018. Real gross domestic product (GDP), the broadest indicator of economic activity, expanded at a 3.3% annualized pace in the third quarter of 2017, compared with 3.1% annualized growth in the second quarter and is much improved over 1.2% annualized growth in the first quarter. U.S. employers added 428,000 nonfarm jobs over the third quarter following an increase of 484,000 in the previous quarter, while the unemployment rate decreased from 4.4% to 4.3% over the same period. Major U.S. stock market indexes have risen to record levels on strong earnings and growing confidence that the recently enacted tax cuts and reform will spur further growth.

The economies of both the Inland Empire and the State of California have also continued to improve; the recent pace of growth in the region has been faster than growth in the state and in the nation.

National Outlook, 2017 - 2018⁴

The tax cuts and reform passed by Congress and signed into law by President Trump at year end increase the probability that this expansion will enter the record books. The national expansion is currently more than 8 years old as of December 2017—only 18 months short of the record 120-month expansion that occurred from March 1991 to March 2001.

Real gross domestic product (GDP) is expected to expand by 2.2% in 2017 according to our forecasts after growing just 1.5% in the prior year.

Next year is stacking up to produce the fastest growth of this recovery. We expect real GDP to advance 3.0% in 2018 and 3.3% in 2019.

Table 1.1: National Macro Forecast, 2017-2018

	Forecast		
	2016	2017	2018
Real GDP	1.5%	2.2%	3.0%
Unemployment Rate	4.9%	4.4%	4.2%
Real Non-Residential Investment	-0.6%	4.5%	6.2%
Real Consumer Spending	2.7%	2.7%	2.8%
Financial Market			
Oil Prices	\$43	\$50	\$49
Federal Funds Rate	0.4%	1.0%	1.8%
10-Year Treasury	1.8%	2.3%	3.0%

Source: Chmura Economics & Analytics

⁴ Chmura's national forecast is based on policy changes from the administration of President Trump. The proposed changes include lower corporate and individual taxes, reduced regulations, and a reformed energy policy.

Most economists have increased their outlook for growth over the next two years, in large part due to the tax cuts and reform; but the expectations vary based on their assumptions about how businesses and consumers will react to the tax cuts.

We expect the reduction in the corporate tax rate will enable businesses to invest more in computers and equipment which will enhance productivity. This will initially increase employment for businesses making these goods. It will also eventually lead to wage gains for workers who are now more productive.

The increased wages, employment, and individual tax cuts will all lead to more consumer spending. With consumer spending making up about two-thirds of GDP, consumers are an important factor in economic growth.

Given the continued GDP growth, labor markets will tighten further in 2018. Labor force participation (62.7%, December 2017) currently hovers near recent historic lows (62.4%, September 2015) but is expected to increase in 2018 as higher wages draw more people into the labor force.

The housing market continues to recover. Home sales, although above severely depressed levels, remain low by historical standards. Even so, the Federal Housing Finance Agency's House Price Index for the third quarter 2017 shows home prices have increased on a year-over-year basis in all 50 states. Following the pattern of 2016, the housing sector was a strong contributor to GDP growth in the first quarter of 2017 and then a drag on growth in the second and third quarters. Chmura expects housing to be a net positive contributor to growth in 2018.

In an environment of moderate growth and inflation, the Federal Reserve's pace of monetary policy normalization is expected to remain steady and gradual.

Our forecast assumptions reflect dampened growth from Hurricanes Harvey, Irma, and Maria as well as policy changes from the Trump administration. Devastation from the hurricane season is expected to continue to dampen growth in the fourth quarter of 2017, while rebuilding will add to growth in the first half of 2018. The forecast assumes the price of oil decreases to an average of \$49 per barrel in 2018.

Regional Outlook, 2017 - 2018⁵

Employment in the state and Inland Empire regions are expected to continue their climb, and wages are expected to grow faster than they did in 2016, through 2018.

When compared to the nation, California lost a larger share of its employment during and following the last recession. Since the beginning of 2012, however, employment in California has increased faster than U.S. employment on a year-over-year basis. In 2016, California's employment increased 2.6%, faster than the 2.2% increase in the nation. Chmura forecasts employment in California to increase by 2.2% in 2017 and by an additional 2.3% in 2018, while wages and salaries are forecast to increase 6.1% in both 2017 and 2018.

Employment in the Inland Empire has grown faster on a year-over-year basis than in California or the nation since the first quarter of 2013, and the region is forecast to outperform both the state and the nation over the next two years. In 2016, employment in the Inland Empire grew 5.1%, following a 10.0% jump in 2015 (Table 1.2). Chmura forecasts employment in the Inland Empire to increase by 3.5% in 2017 followed by 3.2% in 2018. Wages and salaries are expected to grow 6.5% in 2017 and 6.3% in 2018, and building permits are forecast to jump nearly 30% in 2017 before more modest growth of 6.1% in 2018.

Table 1.2: California and Inland Empire Summary Forecasts

	California			Inland Empire		
	2016*	2017	2018	2016*	2017	2018
Employment**	2.6%	2.2%	2.3%	3.7%	3.5%	3.2%
Wages and Salaries***	4.8%	6.1%	6.1%	5.1%	6.5%	6.3%
Real Retail Sales	1.4%	1.3%	1.9%	2.4%	2.2%	2.8%
Building Permits	4.0%	7.5%	4.1%	6.6%	29.3%	6.1%

Source: Chmura Economics & Analytics

*Actual

**Employment refers to nonagricultural employment.

*** Wages and salaries include some options that were exercised

Actual data are through the 2nd quarter of 2017, while retail sales are through Q3-2016.

⁵ The national forecast is based on assumptions about policy changes under President Trump's administration, which, in turn, impact the state and local forecasts.

II. Demographic Analysis

Demographic Profile

Unlike most of the nation, San Bernardino County's largest age cohort from 2010–2030 is expected to be persons 0–19 years of age, a welcome condition for sustaining long-term economic growth. The County is home to more than two million people and represents about 5.5% of California's total population. Over the past ten years, the region has grown an average 0.8% per year—on par with the state and national annual averages of 0.9% and 0.8%, respectively. Chmura projects population growth in San Bernardino County will lag the state but outpace the nation over the coming decade.

Table 2.1: Population Growth Statistics

Region	Average Yearly Population Growth 2006-2016	Working-Age Population Growth 2016-2026 ⁶	Ratio of Working- Age Population to Retirees in 2026 ⁷
San Bernardino County	0.8%	+3.2%	4.26
California	0.9%	+3.4%	3.62
USA	0.8%	+2.8%	3.18

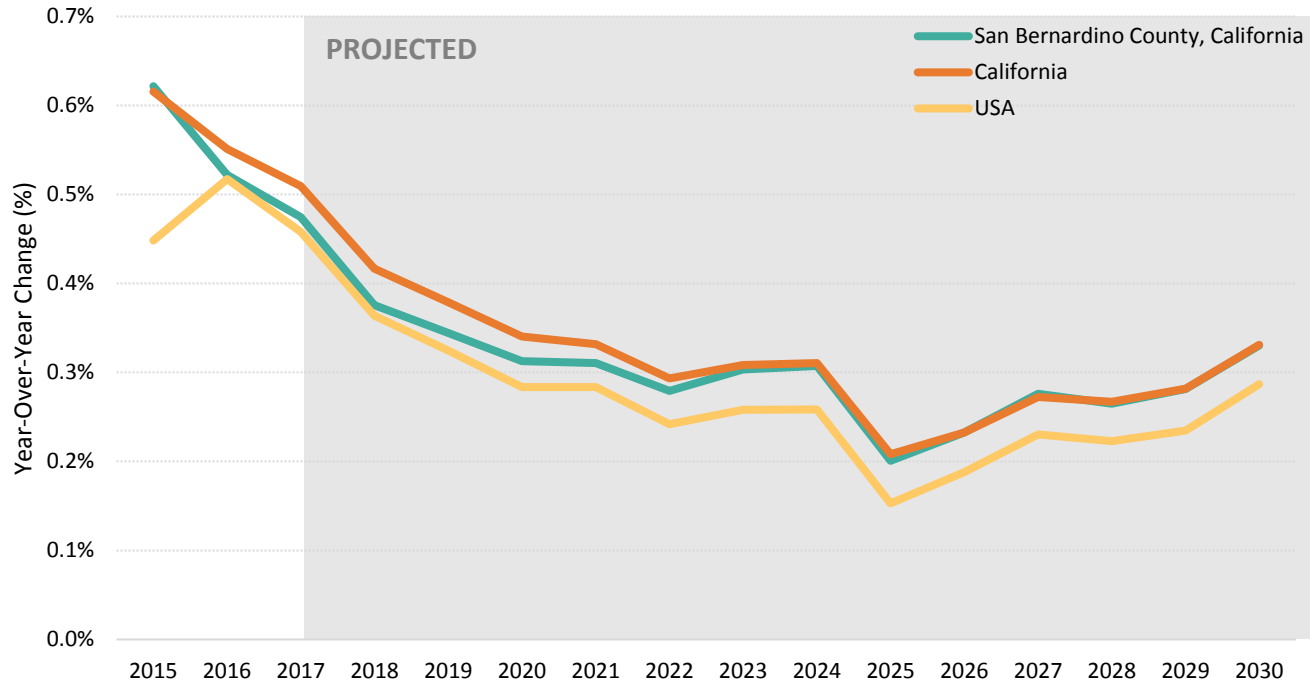
Source: Chmura Economics & Analytics

The working-age population in San Bernardino County grew 0.5% in 2016 after growing 0.6% in 2015. Based on projections from Chmura, working-age population growth is expected to decelerate with annual growth between 0.2% and 0.3% from 2020 to 2030, on par with the state and slightly faster than the nation. The County is forecast to have 4.26 working-age residents for every retiree in 2026, higher than the state and national ratios of 3.62 and 3.18, respectively.

⁶ For the purposes of this report, the working-age population is defined as those 16 to 64 years old.

⁷ For the purposes of this report, the retired population is defined as those over 64 years old.

Figure 2.1: Working-Age Population Projections



Source: JobsEQ

San Bernardino County has a relatively young population, with a median age of 31.7, compared to 35.2 in the state and 37.2 in the nation. Further, over 29% of the region's population is under the age of 18, compared to 25.0% statewide and 24.0% nationally. While the populations in the East & West Valleys and High Desert sub-regions have median ages on par with the County, Morongo Basin's median age of 34.9 is closer to par with the state.

Relative to the rest of California, the County has a substantially lower median house value. San Bernardino County's median house value of \$236,700 is almost 40% cheaper than the state average house value of \$385,500. While the East & West Valleys sub-region pulls the County's median house value upward, the High Desert Cities and Morongo Basin sub-regions' median house values are closer to more affordable values in peer regions outside the state.⁸

⁸ Peer regions in this statement include the Reno, NV, Phoenix, AZ, Houston, TX, and Dallas, TX metropolitan statistical areas (MSAs). Per communication with the WDB, these MSAs were included because of their perception as competitive peers to San Bernardino County/Inland Empire.

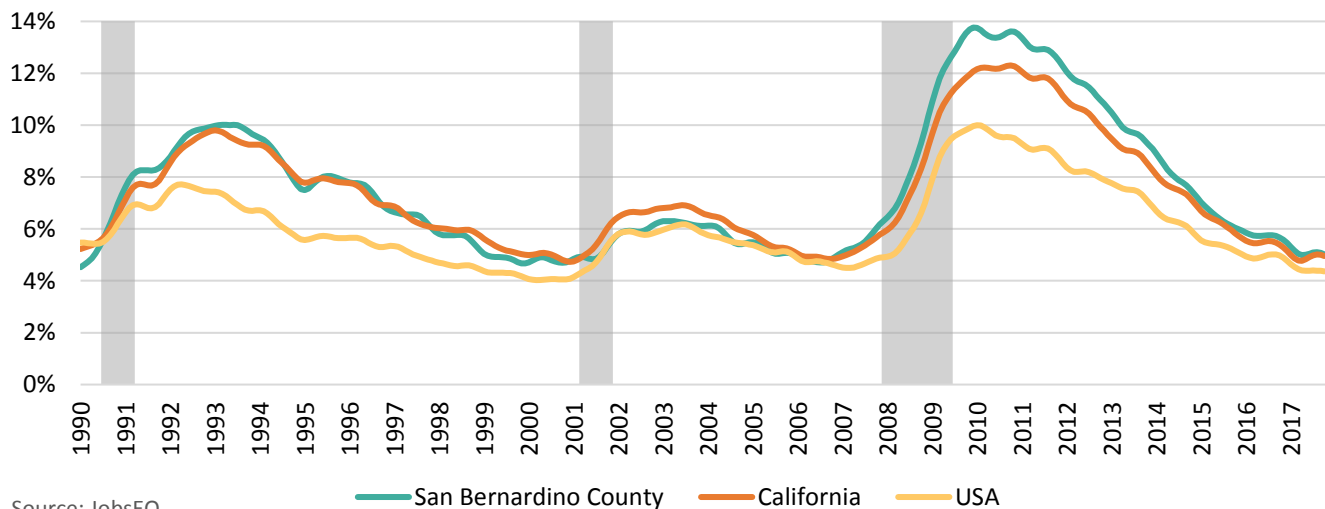
Table 2.2: Median House Values

Region	Median House Value
East & West Valleys	\$293,643
High Desert Cities	\$156,898
Morongo Basin	\$120,679
San Bernardino County	\$236,700
California	\$385,500
Reno, NV MSA	\$212,600
Phoenix-Mesa-Scottsdale, AZ MSA	\$179,100
Houston-The Woodlands-Sugar Land, TX MSA	\$149,300
Dallas-Fort Worth-Arlington, TX MSA	\$156,500
USA	\$178,600

Source: JobsEQ

The Great Recession hit San Bernardino particularly hard, but the County's unemployment rate has been trending steeply downwards since peaking at 13.8% in December 2009.⁹ After exceeding the state's unemployment rate by 1.7 percentage points in November 2009 and being 4.1 percentage points above the nation in December 2010, the County's unemployment rate has declined to equal the state's rate and was within 0.6 percentage points of the national rate. As of October 2017, the

Figure 2.2: Unemployment Rate
Seasonally Adjusted



⁹ Source: JobsEQ, seasonally adjusted

County's seasonally adjusted unemployment rate is at 5.0% compared to 5.0% in the state and 4.4% in the nation.

The three sub-regions of San Bernardino County have a wide range of labor force participation rates. These rates are indicative of the percentage of the population that is actively engaged in the labor force, i.e., either working or looking for work. While the County's 60.1% participation rate lags the state and national rates of 63.3% and 63.1%, respectively, the East & West Valleys 62.8% participation rate is close to the national average.¹⁰ The High Desert Cities and Morongo Basin sub-regions have lower participation rates at 53.4% and 44.5%, respectively.

Given San Bernardino County's relatively young population, the low labor force participation rate among residents age 16 to 34 provides an opportunity to grow the labor force. For this age cohort, San Bernardino County's labor force participation rate is 64.7%, lower than the state and national rates of 69.0% and 71.3%, respectively. The labor force participation gap among residents over age 34 is much smaller. The County's participation rate is 57.3% for these residents compared to 60.3% in the state and 71.3% in the nation. Raising the labor force participation rate in San Bernardino County to the state average would increase the County's labor force by over 26,600 workers age 16 to 34 and by more than 30,000 workers over age 34.

One of the most pressing long-term challenges the region will face is filling positions with skilled and qualified workers.

Data suggest that the County's relative youth is one of its greatest economic assets. At the same time, the region struggles with relatively high rates of unemployment and low rates of labor force participation amongst its younger workers. In 2012-2016, 34.8% of the County's workers age 16 to 19 were unemployed, compared to 29.6% and 22.9% in the state and nation, respectively. For workers age 20 to 24, 18.5% were unemployed, compared to 14.7% in the state and 12.9% in the nation. The labor force participation rate was 28.1% for persons 16 to 19 years of age, which is about the same as the state (29.3%) but well behind the nation (37.6%). An encouraging sign is that 71.0% of individuals 20 to 24 years of age participated in the labor force, which again, is about the same as the state (71.2%) and only trailing the nation (74.2%) by a few percentage points.

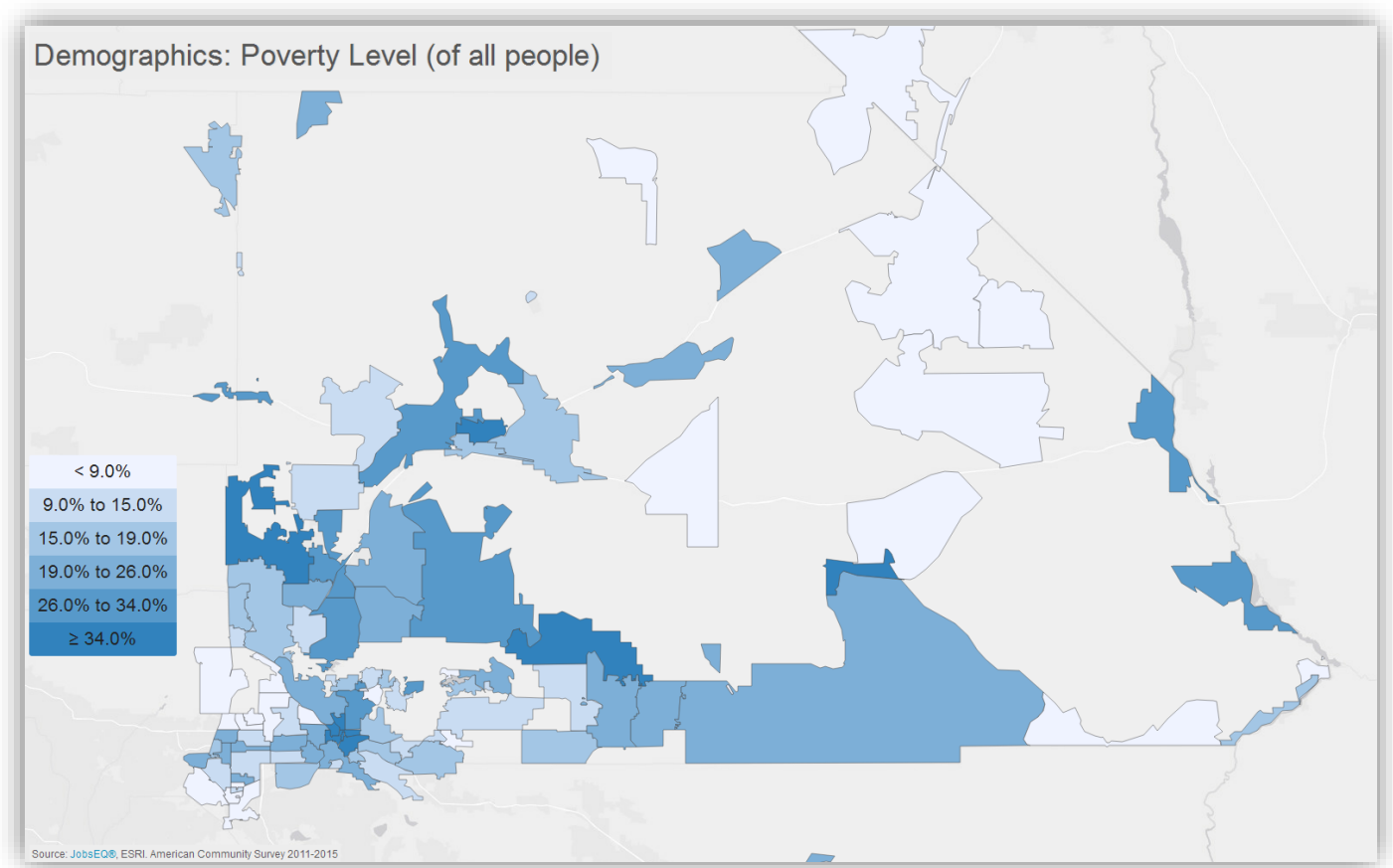
The unemployment rate and labor force participation data suggest one of the most pressing long-term challenges the region will face is filling positions with skilled and qualified workers. The importance of engaging and preparing the County's younger workers for future careers was a prevailing theme in the focus groups. Participants spoke to the importance of promoting diverse career pathways and access to local

¹⁰ Source: American Community Survey (ACS) 2016 1-year estimates. ACS 2011-2015 5-year estimates were used for the sub-regions for lower margins of error.

training and education opportunities. Focus group participants specifically mentioned scaling up programs like the [Industrial Technical Learning Center](#) (InTech), the San Bernardino City Unified School District's [Linked Learning Academies](#) and Bing Wong Elementary School's [Bing Wong Industries](#) to stimulate interest and participation in career development.

The poverty level in San Bernardino County is higher than the state and national averages. In the County, 19.5% of individuals live at or below the poverty line compared to 16.3% in the state and 15.5% in the nation.¹¹ As the following figure shows, poverty is widespread throughout the County and not confined to any one area.

Figure 2.3: Percentage of the Population at or Below Poverty, San Bernardino County



¹¹ Source: ACS 2011-2015

Continuing the economic development of the county's sub-regions could become one way to mitigate barriers to transportation by easing access to training and employment opportunities.

Access to transportation is a prominent barrier to employment in San Bernardino County. Only 1.7% of residents commute via public transportation in the County, compared to 5.2% in the state.¹² While there is a corresponding lower rate of occupied housing units with no vehicle available in the County (5.7%) relative to the state (7.7%), this figure still highlights 35,226 occupied housing units in the County without an available vehicle. This barrier can be especially cumbersome considering the significant distances that must be traversed between parts of the County. Continuing the economic development of the County's sub-regions could become one way to mitigate this barrier as it could make training and employment opportunities more accessible.

English-speaking skills represent another significant employment barrier in the County. Of all the residents over five years old, 15.7% speak English less than very well. This rate is lower than that of the state (18.8%), but almost twice the national rate (8.6%).

The average educational attainment in San Bernardino County is lower than both state and national averages. The share of the population in San Bernardino County with no high school diploma is 20.6% compared with 17.4% for California and 11.8% for the nation.¹³ Similarly, the share of the County's population with a bachelor's degree is only 12.6% compared with 20.6% in the state and 19.9% in the nation. Overall postsecondary attainment—share of the population with an associate degree or higher—is about 12.6 percentage points lower than the California average of 40.0%, and 12.7 percentage points below the national norm of 40.1%. As one recent report notes, for the County to generate jobs in high wage sectors like “professional business services and technology” it must stem the gap of highly skilled workers available to support these industries: “Overall, San Bernardino has trailed behind in such critical human assets as engineers. The area has also lagged in technical degrees such as are produced by community colleges and trade schools.”¹⁴ This observation was echoed by focus groups, who commented that regional skilled labor supply shortages—especially in health care, skilled trades, and jobs requiring higher education—are one of the County's most pressing workforce challenges within the next few years.

¹² Source: ACS 2011-2015 estimates

¹³ Ibid.

¹⁴ Source: <http://wp.sbcounty.gov/workforce/wp-content/uploads/sites/5/2016/11/County-of-San-Bernardin-County-Pivotal-Moment-final.pdf>

Correlation Analysis

Correlations between several demographic and socioeconomic indicators present the WDB with major opportunities to advance the County's economy. Chmura performed a correlation analysis to highlight key relationships between several demographic variables within the Inland Empire at the ZIP code tabulation area (ZCTA) level.¹⁵ Although correlation does not necessarily mean causation, the relationships are useful to review for potential policy and strategy changes. Table 2.3 below shows correlations among these variables. Any shading indicates statistical significance at a 95% confidence level. Green shading indicates a statistically significant, positive correlation (variables move in the same direction); red shading indicates a statistically significant, negative correlation (variables move in opposite directions). Darker green shading indicates a strong correlation, defined as magnitude above 0.50. Significant, strong, positive correlations are shown between:

- Percentage of poverty/percentage with no high school diploma
- Percentage of poverty/percentage of unemployed
- Percentage who speak English less than very well/percentage with no high school diploma
- Percentage with bachelor's degree or higher/median house value

While it is well-documented that poverty is associated with low educational attainment and high unemployment, focus group participants suggested these relationships could likely continue—and possibly even grown stronger—in the wake of technology advancements, as persons living in poverty may face more limited access to technology and lack basic computer skills. In many cases, persons living in poverty also tend to be the ones competing for certain lower-skilled, entry level jobs that are more vulnerable to automation. For the WDB, such conditions reinforce the importance of educational attainment and basic skills training.

The relationship between less-proficient English-speaking skills and educational attainment highlights English-speaking skills as a significant barrier to improving educational attainment in the region. Due to the importance of educational attainment in getting people into employment and lifting them out of poverty, the SBCWDB may wish to invest in improving access to educational attainment and higher-skilled training that could lead to higher wages for non-native English speakers. According to one local economic and workforce development expert, one of the region's greatest opportunities for workforce development is to support adults living in poverty who lack a high school

“Create a program where they can work and earn a living while getting a high school diploma and real world/occupation training to improve job prospects.”

– Focus Group Participant

¹⁵ The metro area was used instead of the County to obtain a larger sample size.

diploma and have lower English-speaking skills. According to this expert, “Education is the best opportunity to overcome these barriers and make a huge impact. Create a program where they can work and earn a living while getting a high school diploma and real world/occupation training to improve job prospects.”¹⁶ Children of these workers who attend local schools and grow up as first-generation native English speakers may experience more economic mobility than their parents have, historically.

Table 2.3: Demographic Correlations

	Labor Force Participation Rate	Poverty Level	Median House Value	Disconnected Youth	Speak English Less Than Very Well	Unemployed
Labor Force Participation Rate	1					
Poverty Level	-0.01	1				
Median House Value	0.31	-0.43	1			
Disconnected Youth	-0.02	0.21	-0.12	1		
Speak English Less Than Very Well	0.35	0.45	-0.11	0.01	1	
Unemployed	-0.14	0.52	-0.23	0.22	0.05	1
No High School Diploma	0.25	0.66	-0.31	0.17	0.85	0.23
High School Graduate	0.09	0.22	-0.30	0.07	0.02	0.24
Some College, No Degree	-0.07	-0.10	0.20	0.08	-0.47	0.30
Associate's Degree	0.24	-0.22	0.03	-0.05	-0.21	-0.12
Bachelor's Degree	0.10	-0.41	0.65	-0.15	-0.30	-0.27
Postgraduate Degree	0.11	-0.44	0.67	-0.18	-0.31	-0.26

Source: Chmura

Intraregional Comparison

In addition to the previously discussed differences in median age, median house value, and labor force participation rate, the three sub-regions within San Bernardino County have unique demographic mixes that present their own challenges and opportunities for growth. Morongo Basin in the eastern portion of San Bernardino County has a population of 65,705. The High Desert Cities population base is over five times larger at 328,525, and the East and West Valley’s population is nearly four times the size of the High Desert Cities. Hispanic or Latino residents make up over half of the population in the East and West Valleys, while only consisting of 18.3% in the Morongo Basin. There

¹⁶ Source: Chmura interview, 2017

is a large presence of both armed forces and veterans in the Morongo Basin sub-region due to the 29 Palms Marine Corps base in the western region. Of the 15.9% of residents age 18 to 64 with a disability in the Morongo Basin, only 28.0% participate in the labor force compared to 40.3% in the state and 41.0% in the nation. While the percentage and labor force participation rate of residents with a disability are both lower in the East & West Valleys sub-region, the proportion of the population that speak English less than very well is much higher. These different barriers to educational attainment and employment require solutions unique to each sub-region's population.

Table 2.4: Sub-Region Demographic Mix

	East & West Valleys	High Desert Cities	Morongo Basin	San Bernardino County	California	USA
Population ²	1,474,363	372,065	65,705	2,140,096	39,250,017	323,127,513
Median Age ^{1,2}	31.5	31.8	34.9	31.7	35.2	37.2
Race: White ²	53.5%	58.1%	79.4%	56.7%	57.6%	72.4%
Hispanic or Latino (of any race) ²	54.1%	43.3%	18.3%	49.2%	37.6%	16.3%
Labor Force Participation Rate (civilian population 16 years and over)	62.8%	53.4%	44.5%	59.9%	63.1%	63.3%
Armed Forces Labor Force	0.0%	0.2%	13.2%	0.7%	0.4%	0.4%
Veterans, Age 18-64	3.5%	6.0%	13.5%	4.4%	3.7%	5.5%
Median Household Income ¹	\$60,668	\$46,727	\$38,305	\$53,433	\$61,818	\$53,889
Median House Value (of owner-occupied units) ¹	\$293,643	\$156,898	\$120,679	\$236,700	\$385,500	\$178,600
Poverty Level (of all people)	18.1%	25.4%	21.6%	19.5%	16.3%	15.5%
With a Disability, Age 18-64	8.5%	11.7%	15.9%	9.5%	8.1%	10.3%
With a Disability, Age 18-64, Labor Force Participation Rate and Size	40.5%	33.4%	28.0%	37.8%	40.3%	41.0%
Foreign Born	24.5%	14.4%	6.2%	21.3%	27.0%	13.2%
Speak English Less Than Very Well (population 5 yrs and over)	18.3%	10.5%	3.1%	15.7%	18.8%	8.6%

Source: JobsEQ, ACS 2011-2015, unless noted otherwise

1. Median values for certain aggregate regions (such as MSAs) may be estimated as the weighted averages of the median values from the composing counties

2. Census 2010

Each sub-region also varies in levels of educational attainment. Overall postsecondary attainment is low in the High Desert Cities (21.4%) relative to the Morongo Basin (26.4%) and the East & West Valleys (28.7%). Morongo Basin has a much lower proportion of residents age 25 to 64 without a high school diploma (12.3%) compared to the High Desert Cities (19.6%) and the East and West Valleys (21.7%).

Table 2.5: Sub-Region Educational Attainment Levels

	East & West Valleys	High Desert Cities	Morongo Basin	San Bernardino County	California	USA
Educational Attainment, Age 25-64						
No High School Diploma	21.7%	19.6%	12.3%	20.6%	17.4%	11.8%
High School Graduate	25.0%	30.4%	32.0%	26.2%	20.3%	26.4%
Some College, No Degree	24.6%	28.7%	29.3%	25.8%	22.2%	21.7%
Associate's Degree	7.8%	9.6%	9.8%	8.3%	8.0%	8.8%
Bachelor's Degree	13.9%	7.1%	11.7%	12.6%	20.6%	19.9%
Postgraduate Degree	7.0%	4.7%	4.9%	6.5%	11.4%	11.4%

Source: JobsEQ, ACS 2011-2015

Cost of Living Comparison

The County's cost of living is favorable compared to many places in the state, but significantly more expensive than most of the nation. The cost of living in the County is 35.0% more expensive than the U.S. average, making it more affordable than Los Angeles County (46.2% more expensive than the national average), Orange County (46.2%), and Riverside County (35.9%). When the County's median household income of \$53,433 is adjusted for cost of living, its purchasing power is \$39,580 relative to the nation. This is higher than neighboring Los Angeles County (\$38,438) but slightly trails Riverside County (\$41,650).

Based on median household income differences, U.S. purchasing power varies substantially within the County. With a high household income, the East & West Valleys sub-region has a U.S. purchasing power of \$44,939, compared to \$34,613 and \$28,374 in the High Desert Cities and Morongo Basin, respectively.

Table 2.6: Cost of Living Comparisons

	Median Household Income (place of residence)	Annual Average Salary (place of work)	Cost-of-Living Index (Base US)	U.S. Purchasing Power (place of residence)
East & West Valleys	\$60,668	\$45,698	135.0*	\$44,939
High Desert Cities	\$46,727	\$45,974	135.0*	\$34,613
Morongo Basin	\$38,305	\$45,171	135.0*	\$28,374
San Bernardino County	\$53,433	\$45,701	135.0	\$39,580
Los Angeles County	\$56,196	\$61,147	146.2	\$38,438
Orange County	\$76,509	\$61,696	152.3	\$50,236
Riverside County	\$56,603	\$44,181	135.9	\$41,650
California	\$61,818	\$64,631	142.7	\$43,320
Reno, NV MSA	\$53,030	\$48,764	106.5	\$49,793
Phoenix-Mesa-Scottsdale, AZ MSA	\$53,723	\$52,444	97.3	\$55,214
Houston-The Woodlands- Sugar Land, TX MSA	\$59,649	\$64,025	97.2	\$61,367
Dallas-Fort Worth- Arlington, TX MSA	\$59,946	\$59,655	102.0	\$58,771
USA	\$53,889	\$54,666	100.0	\$53,889

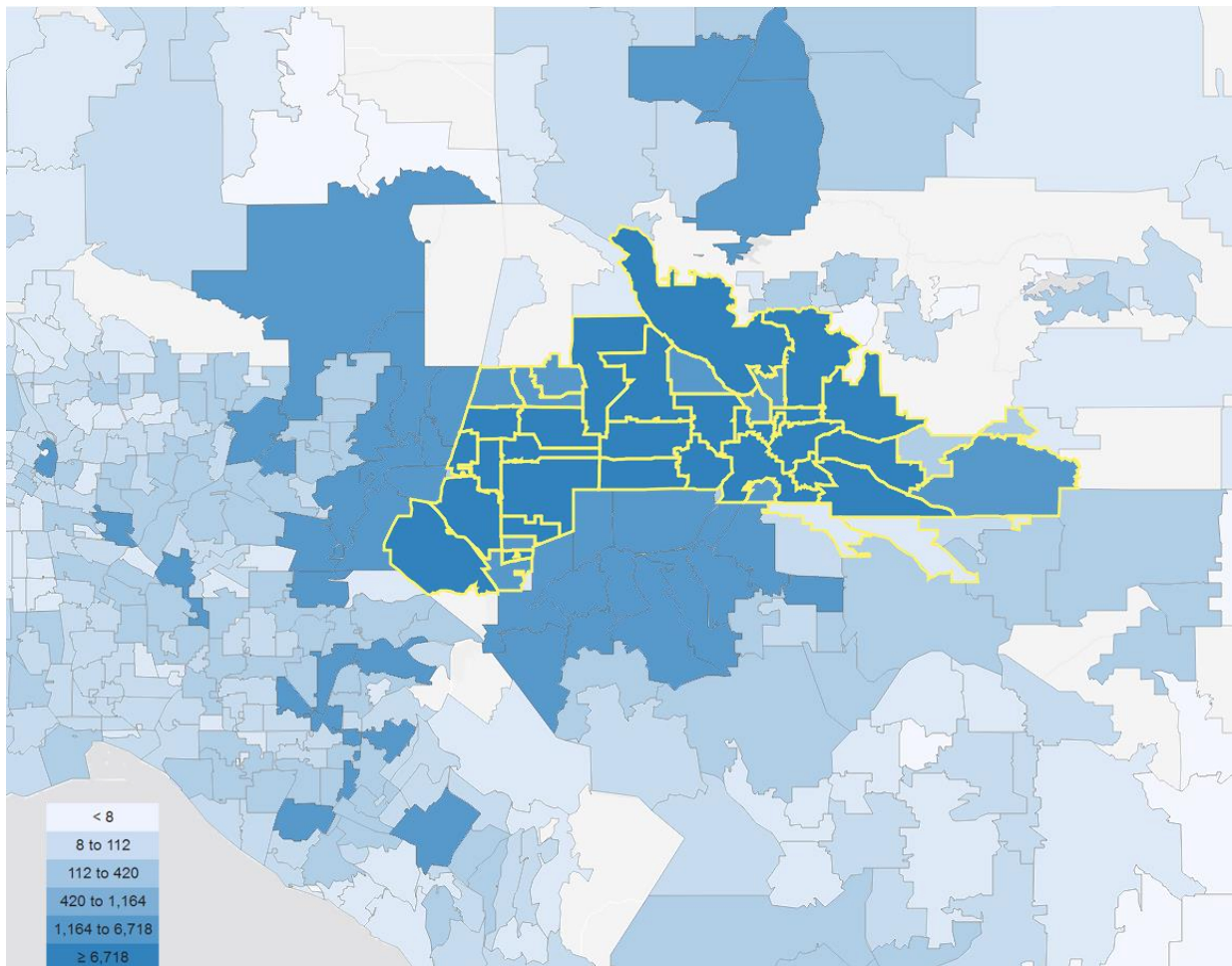
*Cost of Living is calculated at a county level

Cost of Living as of 2017Q2; annual average salary as of 2017Q3; median household income as of ACS 2011-2015

[Source: JobsEQ®](#)

The difference between median household income (measured at place of residence) and annual average salary (measured at place of work) is particularly striking in the East and West Valleys sub-region. As the following figure (Figure 2.5) shows, this difference is due to residents in this sub-region commuting south and west to Los Angeles, Orange, and Riverside Counties, likely to higher-paying jobs.

**Figure 2.5: Residents of East & West Valleys Sub-Region and Where They Work
2017Q3**



According to a 2017 survey conducted by the Institute of Applied Research,¹⁷ while 70% of San Bernardino County residents work in the County, another 16% commute to Los Angeles County. This study reports that the vast majority of these commuters are residents of the West Valley region in San Bernardino. Another 6% of San Bernardino residents commute to Riverside County and 4% commute to Orange County. These figures represent nearly 74,000 employed San Bernardino County residents working outside the County.¹⁸

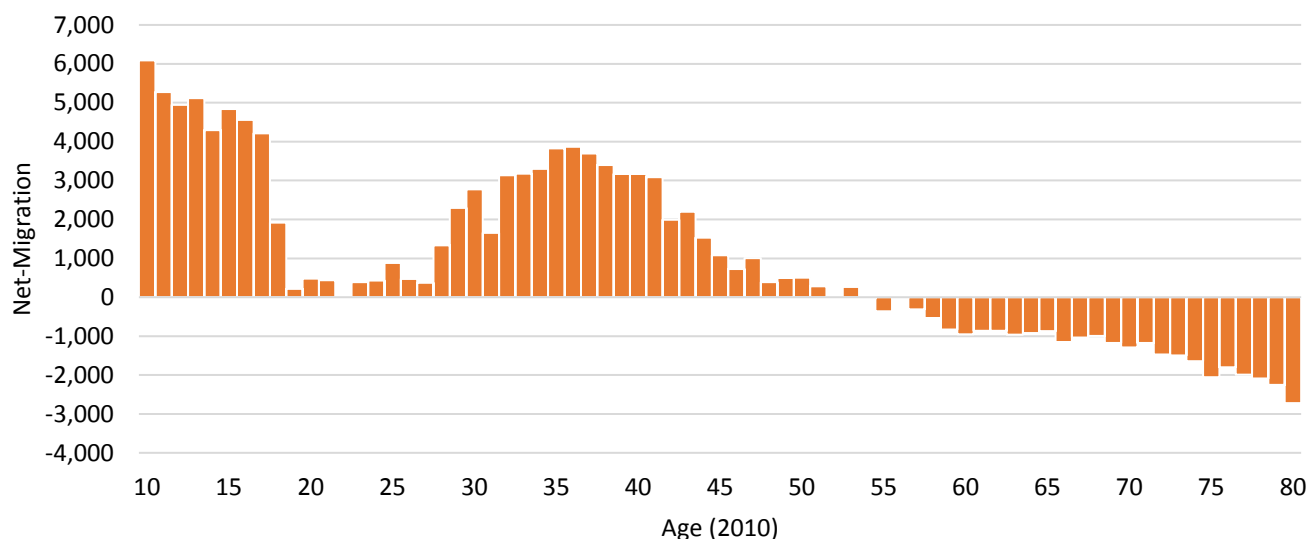
¹⁷ Source: <http://iar.csusb.edu/reports/documents/AnnualReportSept15.pdf>

¹⁸ This is based on Chmura's 2017 population projections

Net Migration

Recent trends indicate that San Bernardino County has attracted an influx of young adults and new households, mainly from neighboring Los Angeles County. Figure 2.6 below shows County net migration by age and displays a strong trend of young adults moving into the County at their prime working age. The lower end of this age range also tends to be the age at which individuals start families,¹⁹ which can be a boon to economic growth, so long as the County can retain those families over time.

**Figure 2.6: Net-Migration by Age for San Bernardino County
2000-2010**



Source: State of California, Department of Finance, Race/Ethnic Population with Age and Sex Detail, 2000–2010. Sacramento, California, September 2012

Most of the in-migration originates from San Bernardino's west, in Los Angeles County. Since 2010, high housing costs nearer to California's coast have been pushing middle-class families and well-educated workers towards the interior where housing is more affordable.²⁰ Commuting data and this migration trend provide evidence of residents moving from Los Angeles to San Bernardino while still working in Los Angeles. As the following map shows, there is moderate net out-migration to Kern, Tulare, and Riverside

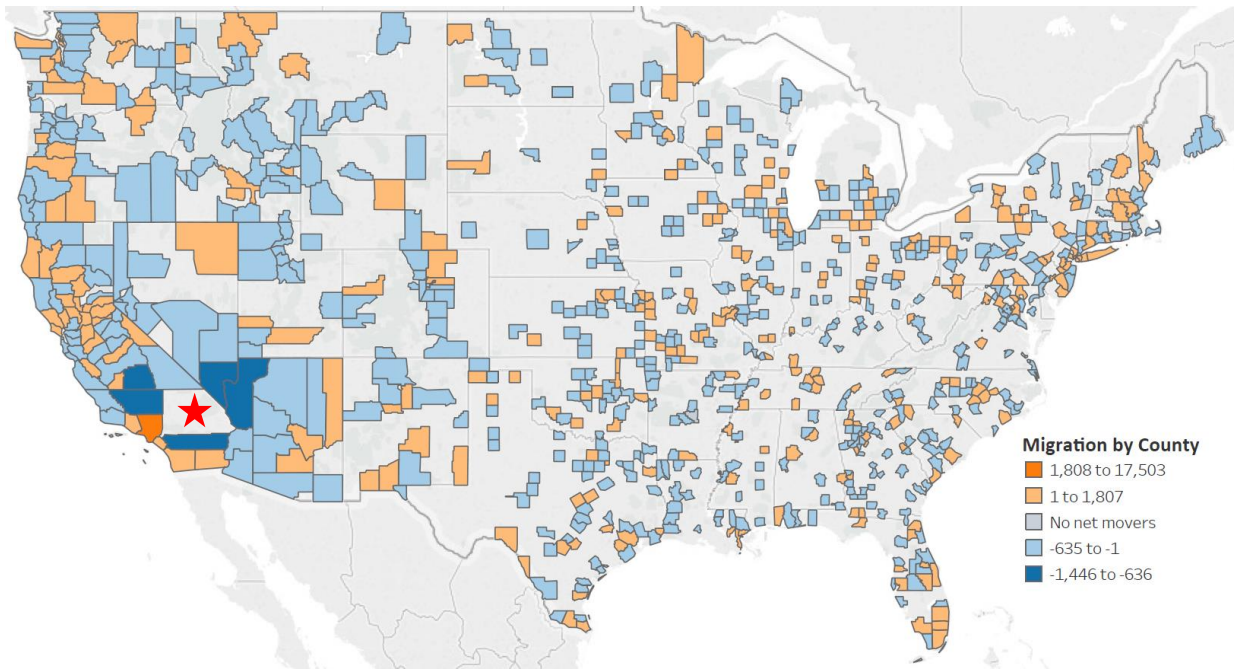
¹⁹ *The Changing Economics and Demographics of Young Adulthood: 1975-2016*, US Census Bureau, available online at <https://www.census.gov/content/dam/Census/library/publications/2017/demo/p20-579.pdf>

²⁰ Source: <http://wp.sbcounty.gov/workforce/wp-content/uploads/sites/5/2016/11/County-of-San-Bernardinos-Pivotal-Moment-final.pdf>

Counties in California; and there is moderate net out-migration out of state to Clark County, Nevada and Mohave County, Arizona.²¹

Assuming workers generally desire to decrease their commute, and since cost of living is relatively low, there could be an opportunity to attract new businesses to the region given the supply of labor residing in the County but commuting out. Additional research into commuters' skills and occupations may support targeted business recruitment or new business development within the County.

Figure 2.7: Total Net Migration Flows for San Bernardino County, California



Source: U.S. Census Bureau, 2011-2015 5-year American Community Survey

²¹ Net migration data represent total movers between 2011 and 2015, from the U.S. Census Bureau American Community Survey (ACS). Migration is measured by asking respondents whether they lived in the same residence 1 year ago, and if not, the location of their previous residence.

III. Real Estate Market Analysis

Similar to the nation, real estate in the County has not fully recovered to pre-recession levels, but trends continue to move in a favorable direction. Commercial real estate activity has been lively, highlighted by nearly 3 million new square feet of logistics-related development in the second quarter of 2017 alone.

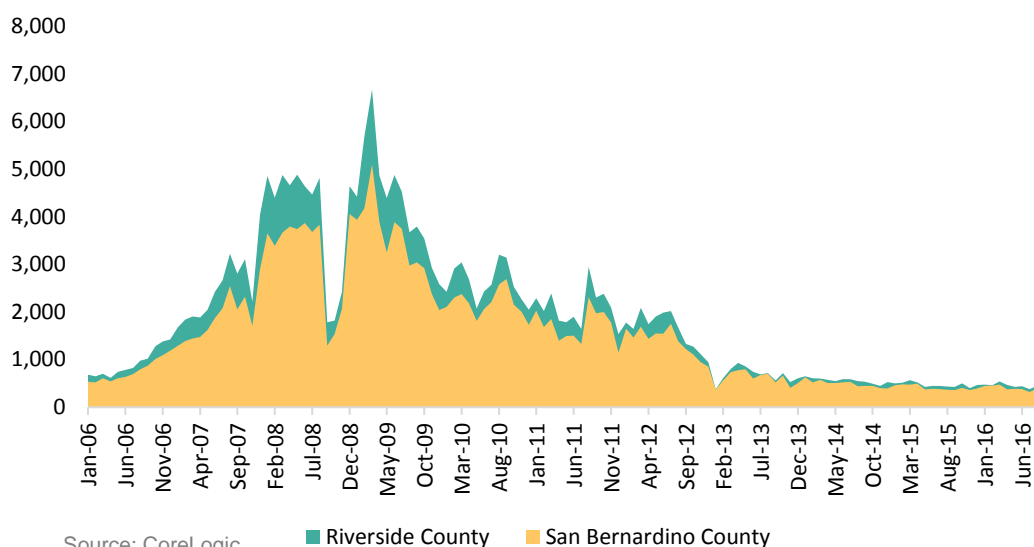
The construction sector (as a whole) and the residential building construction industries played a major role in the Inland Empire's experience of the Great Recession. From peak employment in 2006Q3 to its trough in 2011Q1, the construction sector declined by more than 70,000 jobs, or approximately 55% of its workforce. The residential building construction industries' workforce contracted by approximately 65%.

The residential, industrial, and commercial real estate markets in San Bernardino have displayed several positive trends through September 2017. In a positive sign of continued recovery, distressed home sales have fallen in San Bernardino well below pre-recession levels. Housing inventory is tight in the region, suggesting high demand, but not stretched as tight as the rest of California. The median home sales price continues to rise, while San Bernardino remains one of the most affordable counties (in terms of housing) in California. In a good sign for demand from growing and expanding businesses in San Bernardino, industrial and commercial capacity is expanding with vacancy rates consistent with or below the national average.

Residential Overview

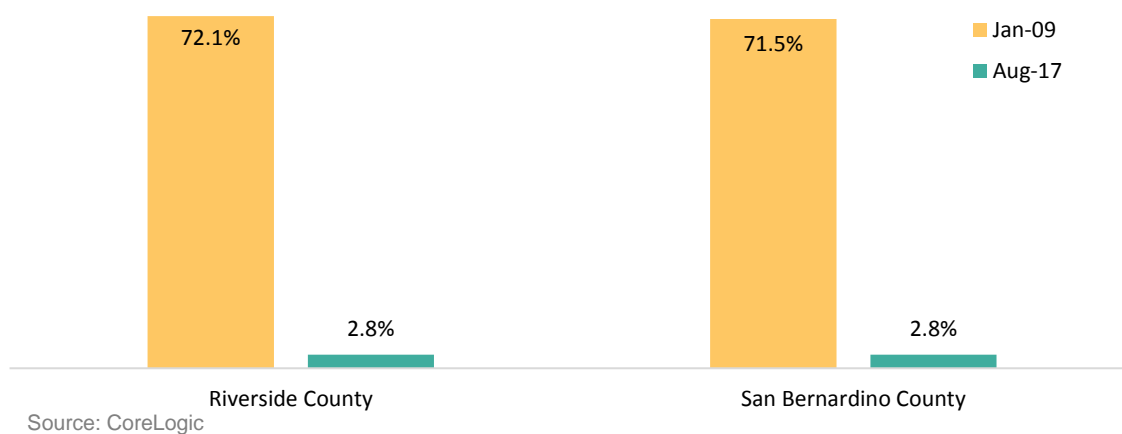
Mortgage loan defaults in San Bernardino continue to drop below pre-recession levels. Mortgages in default were tied closely to the recession of 2007-2009, and steady declines are a positive signal of recovery in the region. Over the year prior to the recession (January to December 2006), monthly defaults on mortgage loans averaged 759 in San Bernardino and 924 in Riverside. Defaults rose to a peak in March 2009 of 5,096 and 6,672 for San Bernardino and Riverside, respectively. Over the twelve months ending August 2017, mortgage loan defaults have fallen to an average of 340 per month in San Bernardino and 356 in Riverside.

Figure 3.1 Monthly Mortgage Loan Defaults



Distressed sales of homes have also sharply declined. The lower prices of distressed home sales, which include real estate-owned (REO) sales²² and short sales,²³ can bring down prices when they make up a high percentage of total home sales. At the height of the recession's effects in January 2009, distressed sales accounted for 71.5% in San Bernardino—more than twice as high as the national average of 32.4% at that time. As of August 2017, the share of distressed sales has dropped to 2.8% in both San Bernardino and Riverside.

Figure 3.2 Distressed Sales as Percent of Total Home Sales



²² REO properties describe homes where the bank has foreclosed on a home with an unpaid mortgage, but failed to sell the property at foreclosure auctions.

²³ Short sales in real estate occur when the sale of real estate falls short of the loans against the property, and the property owner cannot afford to repay the loan amount(s).

San Bernardino's current REO sales rate of 2.0% is the lowest monthly rate since March 2007, while the share of short sales has declined to 0.7% as of August 2017. This is the lowest rate since December 2005. August saw the second-highest monthly home sales in San Bernardino since 2010, up 9.8% year-over-year.

Figure 3.3A: San Bernardino County Residential Home Sales by Type

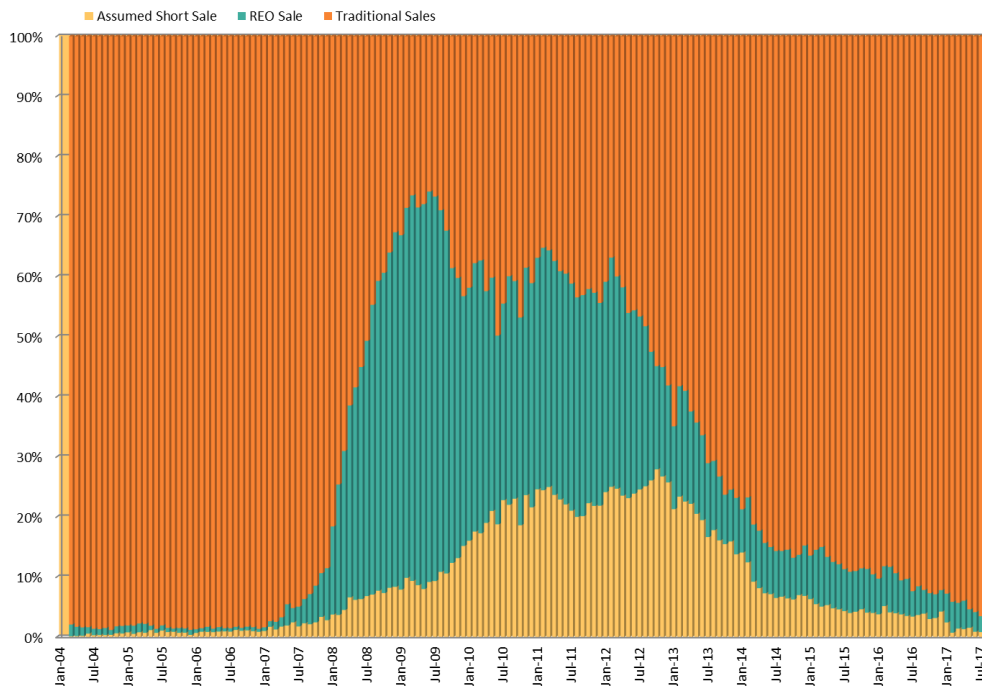
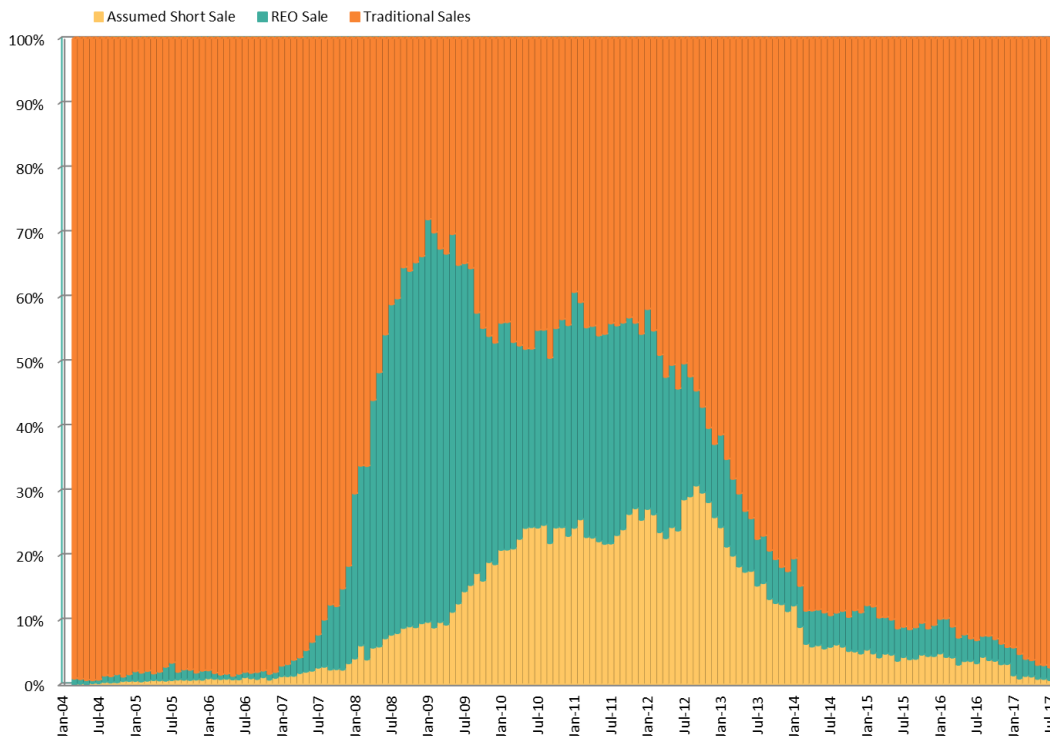


Figure 3.3B: Riverside County Residential Home Sales by Type



Traditional sales as a share of total home sales in Riverside County rose above 90% in June 2015 for the first time since 2007 and have been above 90% for 18 consecutive months as of August 2017.

The available housing inventory remains somewhat tight in the Inland Empire, but compares favorably with inventory across California (Figure 3.4). There is an estimated 3.3 months of supply in the Inland Empire as of August 2017, compared with 2.9 months' supply in California. Six months' supply is generally considered a balance between supply and demand. Inventory is slightly tighter in Riverside with 3.2 months' supply than in San Bernardino at 3.4 months' supply. As another indicator of demand for housing in San Bernardino, median time on the market for single family homes has declined to 24 days, down 36.8% over the year.

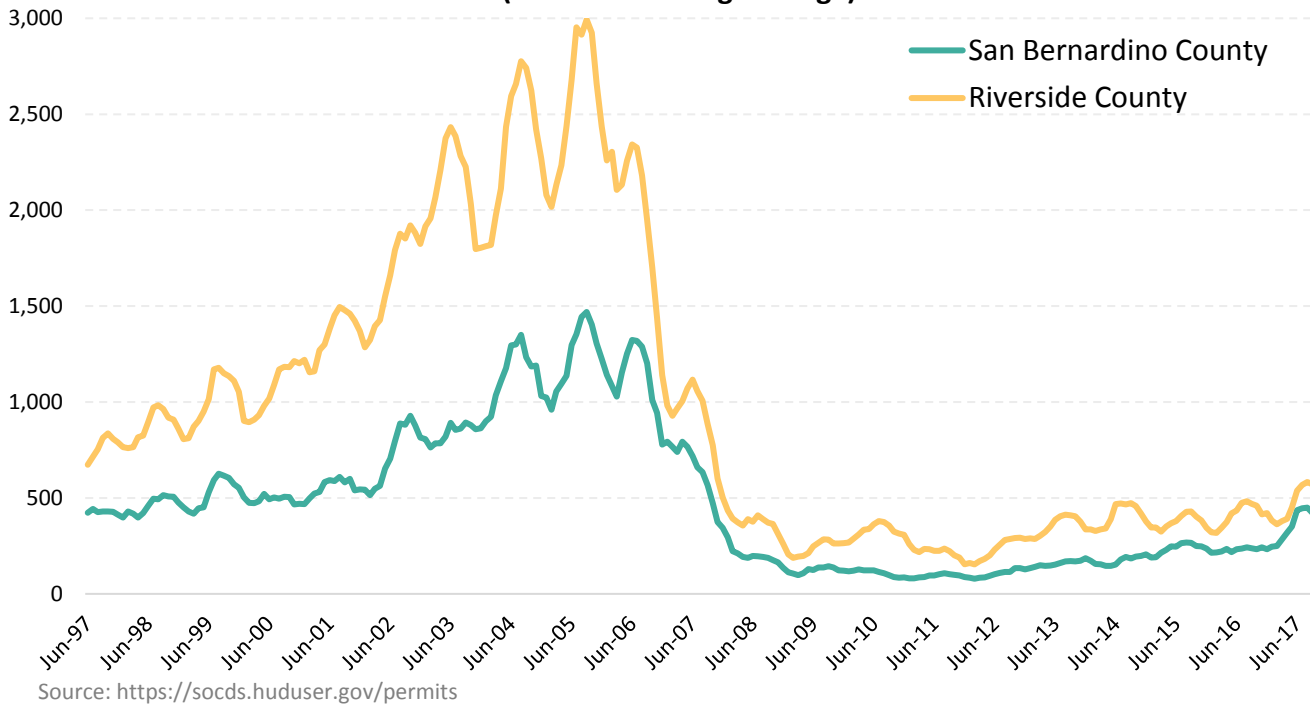
Figure 3.4: Unsold Inventory Index



Source: California Association of Realtors

Single-family building permits jumped 27.9% in San Bernardino County over the year ending September 2017, compared with 5.2% growth in Riverside County over the same period. While permits remain relatively low compared to the peak before the recession, they continue to rise. In September, the six-month moving average of building permits in San Bernardino County was 423 per month, an increase of 437% from the trough in February 2012.

Figure 3.5: Single Family Building Permits
(6 Month Moving Average)



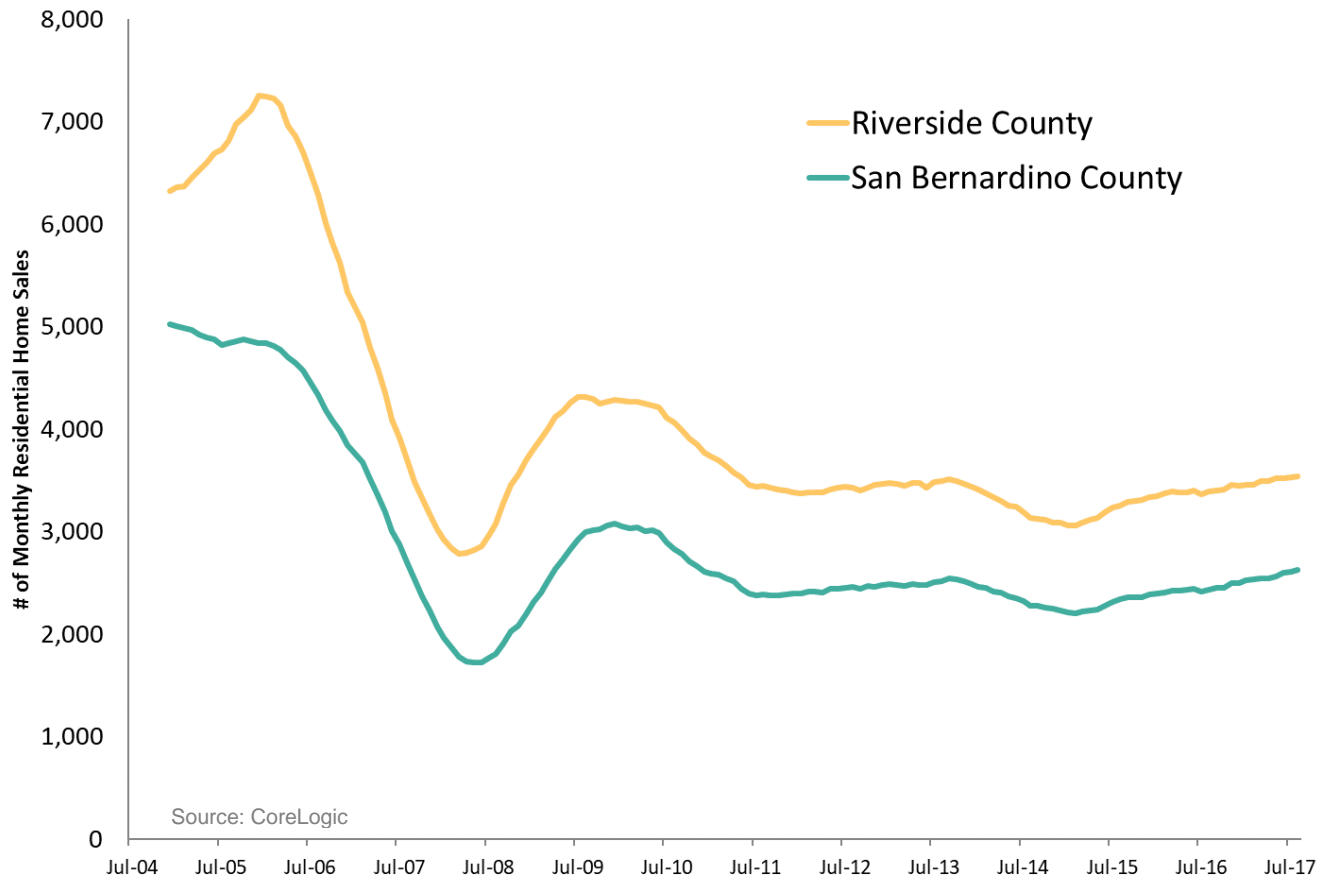
While San Bernardino remains one of the most affordable counties for housing in California, home sale prices are also regaining lost ground. As of the second quarter of 2017, an estimated 51% of residents in the County were able to purchase a median-priced home, compared with just 29% of residents in California.²⁴ Over the year ending August 2017, the median home sales price in San Bernardino County rose 12.5% to \$315,000 (Figure 3.7). In Riverside, the median sales price was up a slower 7.7% to \$365,000. During the recession, the median home sales price in Riverside and San Bernardino counties bottomed out at \$180,000 and \$138,000, respectively. Sales price in both counties has risen on a year-over-year basis for all months since February 2012.

The 12-month moving average of home sales in San Bernardino County improved 7.1% over the year ending September 2017, higher than the 3.9% increase in Riverside County over the same period. Sales were up 5.8% across the Inland Empire year-over-year. However, home sales remain well below pre-recession levels. The twelve-month moving average of home sales was 2,631 in San Bernardino County in August 2017, compared with a peak of 5,027 in December 2004. Similarly, sales in Riverside County

²⁴ Source: California Association of Realtors

averaged 3,541 over the 12 months ending September 2016, compared with a peak of 7,253 sales in December 2005.

Figure 3.6: 12 Month Moving Average Home Sales



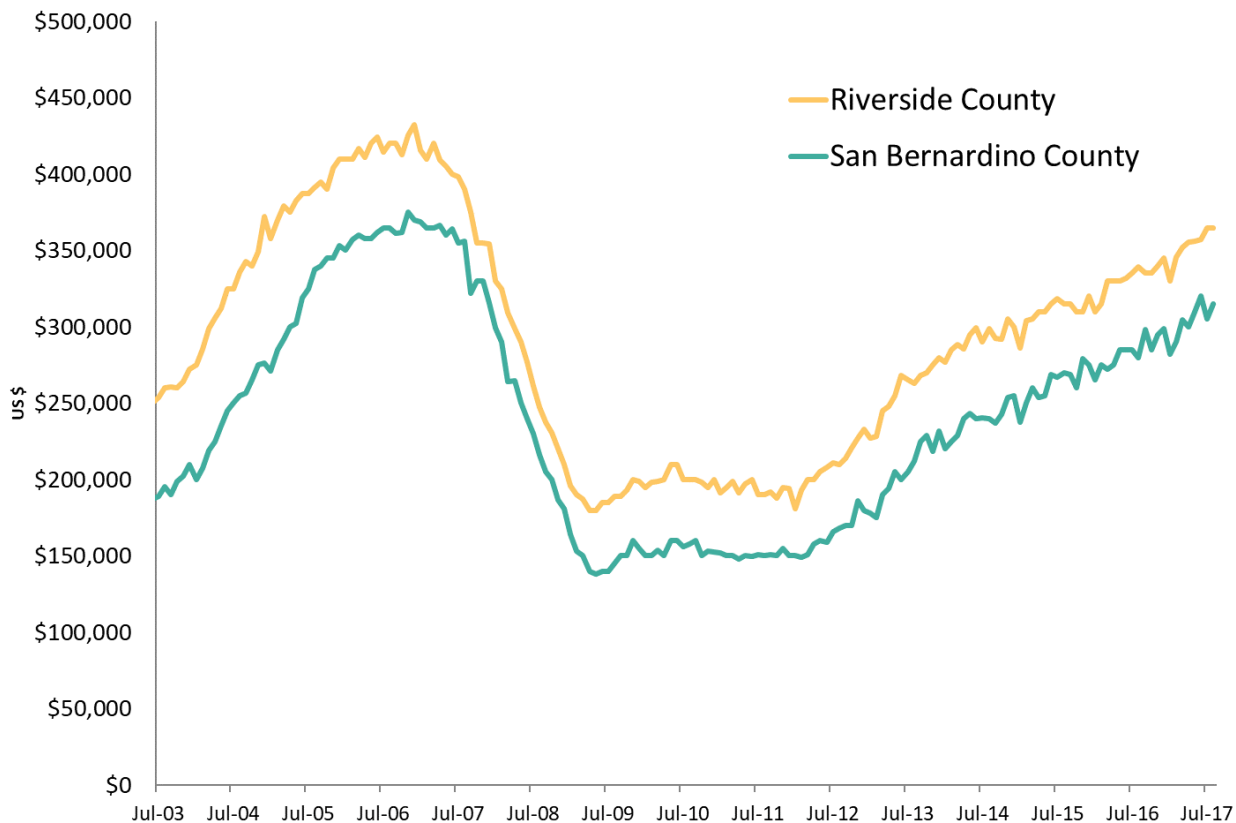
In focus groups and interviews many residents confirmed the higher cost of living in neighboring counties and more affordable housing make San Bernardino County more attractive. However, given the higher poverty rates in the County and number of low-wage jobs, affordable housing was also described as a pressing workforce challenge.

Revitalization or rehabilitation of distressed areas could generate more affordable housing options for lower wage earners. The County could consider completing a housing target market analysis (if one has not recently been completed) to gather input, secure buy-in from local communities, and inform planning efforts that support

development of affordable housing.²⁵ Similarly, a recurring theme in the focus groups was a need to incentivize starting new businesses in old or abandoned buildings in the County as an engine of revitalization, new business growth, and fostering community pride.

Revitalization or rehabilitation of distressed areas could generate more affordable housing options for lower wage earners

Figure 3.7: Median Single Family Home Prices



Source: CoreLogic

²⁵ Kinexus, a nonprofit organization located in Michigan that focuses on workforce, economic, and community development, recently completed several target market analyses to support their community development efforts. An example can be accessed online at <http://kinexus.org/wp-content/uploads/2017/03/08-SWM-TMA-BERRIEN-07-14-16.pdf>

Industrial and Office Overview

The region's industrial and office markets show several positive trends. As one focus group participant summarized, the County is starting to get recognized for what it has to offer besides cheaper housing—including cheaper square footage and distribution convenience. Another envisioned the County becoming a cornerstone of “the” national hub for logistics and supply chain activities. The area's relatively affordable land, proximity to two of the nation's busiest ports and more than 23 million regional consumers are proving attractive for warehouses and logistics centers.²⁶

Newer facilities are home to automated technologies like robotic forklifts, pickers and sorters. Rather than train workers to drive forklifts, these businesses need workers to operate the program that drives the forklift.

Two major logistics centers were completed in the region in the second quarter of 2017. Crossroads Logistics Center and Perris Logistics Center together account for more than 2.7 million square feet delivered in this period—and both are 100% occupied. Some of the largest projects underway at the end of the second quarter 2017 include a 1.1 million square-foot building on Perris Boulevard and a 1 million square foot Monster Energy facility that is 100% pre-leased. In total, there were 23,145,124 square feet of industrial space under construction at the end of the second quarter.²⁷ Focus groups noted that these facilities are unlike the warehouses built as recently as 10 years ago. Newer facilities are home to automated technologies like robotic forklifts, pickers, and sorters. Rather than training workers to drive forklifts, these businesses need workers to operate the program that drives the forklift; instead of a manual sorter, businesses need workers to fix robotic sorters.

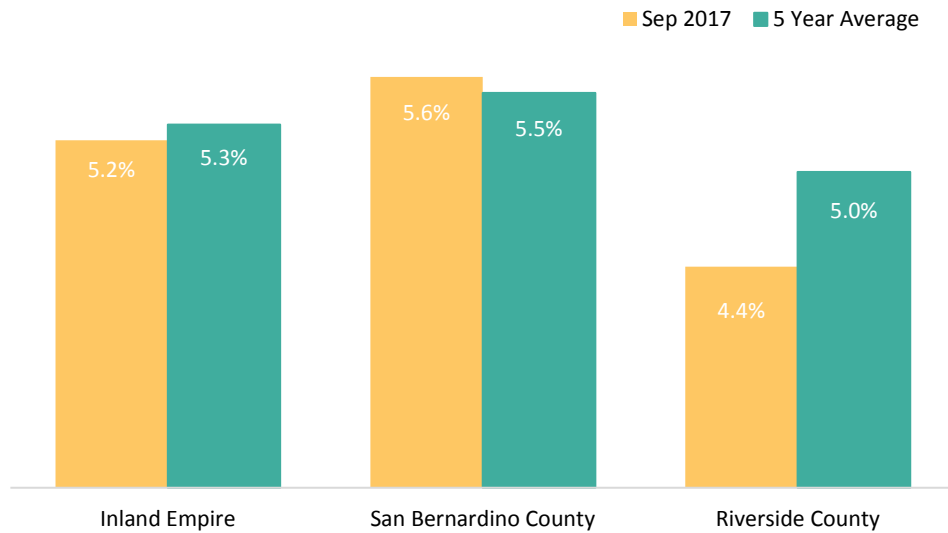
Coinciding with these sites under construction, industrial vacancy rates in San Bernardino County are slightly above the 5-year average. The vacancy rate was at 5.6% in September 2017, just above the 5.5% average rate over the last 5 years. In comparison, industrial vacancy rates in neighboring Los Angeles and Orange Counties are typically between 2% and 3%, with tighter supply and higher rental rates per square foot. Rental rates per square foot were \$6.61 in the Inland Empire in the second quarter of 2017, compared with rates of \$9.99 and \$10.82 in Los Angeles and Orange, respectively.²⁸

²⁶ Source: <https://www.nytimes.com/2015/08/05/realestate/commercial/an-economic-recovery-brimming-with-industrial-complexes-in-southern-california.html>

²⁷ Source: <http://www.costar.com/News/Article/Market-Trend-Inland-Empires-Mid-Year-Industrial-Deliveries-Construction-and-Inventory/194216>

²⁸ Source: CoStar Group

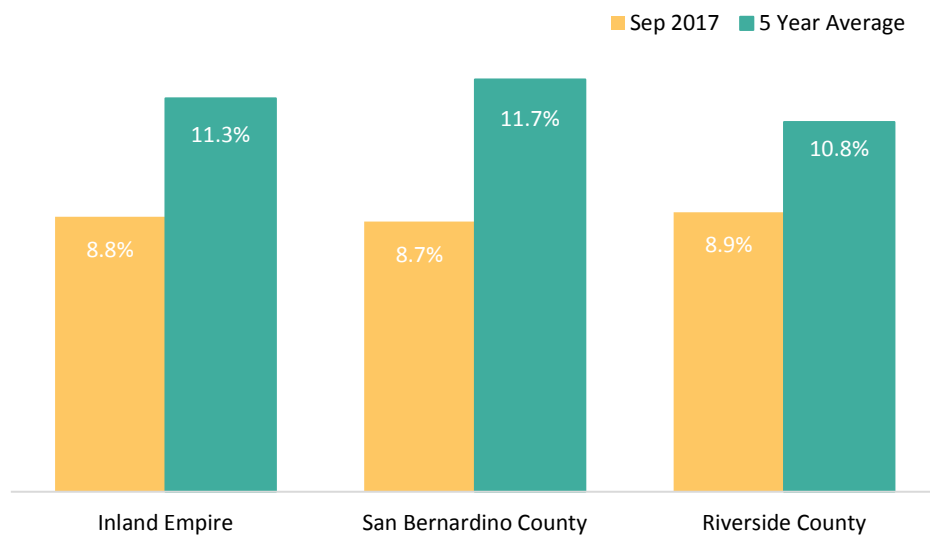
Figure 3.8: Industrial Vacancy Rates



Source: CoStar Group

Office vacancies, meanwhile, were well below the five-year average in San Bernardino County, indicating tighter supply and greater demand for this space in the region. As of September 2017, the County's office vacancy rate was 8.7%, compared with an average 11.7% over the past 5 years. There was an estimated 38,500 square feet under construction. San Bernardino County has approximately 39.5 million square feet of existing office buildings, and about 3.4 million square feet vacant. In the second quarter of 2017, rental rates in the Inland Empire were \$20.56 per square foot, compared with \$34.15 in Los Angeles and \$29.17 in Orange.

Figure 3.9: Office Vacancy Rates



Source: CoStar Group

IV. Industry Analysis

Employment Growth Forecast

The San Bernardino County economy is anchored by a strong mix of industries that are forecast to continue expanding over the next ten years. One of the most pressing challenges reported in focus groups included meeting demands for a skilled workforce to fuel this expansion. The largest sector by employment in the County is health care and social assistance with 119,219 employed workers. These workers earn an annual average salary of \$50,655, which is more than 10% higher than the County's average of \$45,701.

Since October 2012, Amazon has added more than 10,000 workers to its San Bernardino County-based facilities.

The transportation and warehousing sector, commonly referred to as logistics, accounts for another large portion of the County's economy. It employs 79,058 workers earning an above-average salary of \$46,330 per worker. Transportation and warehousing has grown an average 8.4% per year over the past five years and is forecast to expand another 1.1% per year over the next ten years. Within this sector, the general warehousing and storage industry (NAICS²⁹ 493110) has expanded by nearly 20,000 employees over the past five years, or approximately three-quarters of the net growth in the logistics sector over this period. A majority of the growth in the general warehousing and storage industry can be traced to Amazon's expanding fulfillment centers. Since October 2012, the e-commerce giant has added more than 10,000 workers to its San Bernardino County-based facilities. Other major contributors to recent growth include a Walmart distribution center and a new QVC distribution center.

The manufacturing and construction sectors are also major components of San Bernardino County's economy. Manufacturing firms employ 57,099 workers in the County while construction firms employ 41,350. Both sectors pay an above-average annual wage, with manufacturing firms paying an average of \$55,610 and construction companies paying \$53,863. Employment in the construction sector is forecast to grow at 1.2% per year, above the region's forecasted 0.9% average growth rate. While employment in the manufacturing sector is forecast to decline 0.5% per year, mostly due to national trends, there are several manufacturing industries projected to expand employment, including:

- Agriculture, construction, and mining machinery manufacturing (San Bernardino County employment of 321; forecast average annual growth percent of 0.9%),
- Other food manufacturing (2,032; 0.6%),

²⁹ North American Industry Classification System

- Beverage manufacturing (1,493; 0.6%), and
- Medical equipment and supplies manufacturing (1,205; 0.4%).

Aerospace product and parts manufacturers have added more than 950 jobs in the past three years. With average annual wages of \$78,197, this has been a welcome development for the County. Another sign of encouragement is the undeveloped land surrounding the Ontario airport. Per Federal Aviation Administration (FAA) regulations, businesses contiguous to airport runways must be aviation related. Aside from logistics prospects, one local expert expressed potential for a new, “niche aircraft manufacturer.”

Another source of potential manufacturing growth could emerge from Loma Linda University’s n³EIGHT (pronounced “incubate”) center, which supports startup companies in commercializing innovations stemming from medical and biotechnology research and development. Much of the current work being performed by n³EIGHT companies is related to medical device innovations. One successful commercialization, or a string of successes, could harbor substantial potential for local job creation were production to occur in the County.

Professional, scientific, and technical services is another expanding sector in San Bernardino County. With current county employment at 24,553, firms paying an average wage of \$61,863, and a forecast average growth rate of 1.2% over the next ten years, professional service firms are ideal targets for San Bernardino County.

Aside from logistics prospects, one local expert expressed potential for a new, “niche aircraft manufacturer.”

Table 4.1: Industry Snapshot in San Bernardino County, California

		Current			Historical				Forecast		
		Four Quarters Ending with 2017Q3			Total Change (over the last 5 years)	Average Annual % Change in Employment, 2012Q3-2017Q3			Over the Next 10 Years		
NAICS	Industry	Employment	Avg. Annual Wages	Location Quotient	Employment	San Bernardino County, California	California	USA	Total Approx. Separation Demand	Total Growth Demand	Avg. Annual Growth Percent
62	Health Care and Social Assistance	119,219	\$50,655	1.08	31,692	6.4%	6.8%	2.5%	123,459	26,907	2.1%
44	Retail Trade	93,738	\$32,127	1.12	7,001	1.6%	1.5%	1.3%	126,628	2,360	0.2%
48	Transportation and Warehousing	79,058	\$46,330	2.43	26,129	8.4%	4.6%	2.6%	88,288	9,252	1.1%
61	Educational Services	67,121	\$46,969	1.05	7,387	2.4%	1.6%	0.7%	64,518	5,839	0.8%
72	Accommodation and Food Services	66,266	\$19,725	0.95	14,666	5.1%	4.2%	3.0%	111,853	6,106	0.9%
56	Administrative and Support Services	57,968	\$32,866	1.15	3,006	1.1%	3.3%	2.5%	70,579	7,021	1.1%
31	Manufacturing	57,099	\$55,610	0.89	8,240	3.2%	0.9%	0.8%	58,116	-2,578	-0.5%
23	Construction	41,350	\$53,863	0.96	7,467	4.1%	5.2%	3.4%	43,002	5,218	1.2%
42	Wholesale Trade	40,003	\$57,417	1.32	8,779	5.1%	1.3%	0.9%	42,714	1,501	0.4%
92	Public Administration	36,310	\$66,428	0.98	2,394	1.4%	0.5%	0.1%	33,979	1,493	0.4%
81	Other Services (except Public Administration)	31,858	\$30,713	0.93	-9,390	-5.0%	-5.5%	-0.2%	37,613	2,764	0.8%
54	Professional, Scientific, and Technical Services	24,553	\$61,863	0.48	-59	0.0%	1.8%	2.3%	22,261	3,202	1.2%
52	Finance and Insurance	15,240	\$65,479	0.49	-358	-0.5%	1.0%	1.1%	14,944	1,418	0.9%
71	Arts, Entertainment, and Recreation	13,291	\$29,464	0.86	1,291	2.1%	2.1%	2.3%	19,350	1,136	0.8%
53	Real Estate and Rental and Leasing	10,318	\$48,049	0.78	1,307	2.7%	2.0%	2.0%	10,774	618	0.6%
51	Information	6,179	\$54,964	0.40	55	0.2%	4.1%	0.9%	5,894	-218	-0.4%
55	Management of Companies and Enterprises	6,142	\$80,241	0.54	511	1.8%	2.8%	2.7%	5,728	436	0.7%

22 Utilities	5,229	\$95,658	1.27	-347	-1.3%	0.4%	0.2%	4,805	200	0.4%
11 Agriculture, Forestry, Fishing and Hunting	2,764	\$42,420	0.25	-362	-2.4%	1.1%	0.7%	2,997	72	0.3%
21 Mining, Quarrying, and Oil and Gas Extraction	578	\$76,244	0.19	-195	-5.6%	-7.0%	-5.3%	577	-15	-0.3%
99 Unclassified	3,931	\$33,043	2.05	2,484	22.1%	19.1%	17.1%	4,625	369	0.9%
Total - All Industries	778,217	\$45,701	1.00	111,699	3.1%	2.5%	1.7%	885,966	73,097	0.9%

Source: JobsEQ

Data as of 2017Q3

Note: Figures may not sum due to rounding

The top industries by growth forecast in San Bernardino County are predominantly from the health care and social assistance sector. The following table (Table 4.2) highlights the County's industries that are forecast to grow more than twice the County average over the next ten years, for industries with current employment of at least 778 workers.³⁰

Of these 21 industries, eight are in the health care and social assistance sector, including four of the top five fastest growing industries. Outside health care, the County's fastest growing industries are diverse. The transportation and warehousing; professional, scientific, and technical services; administrative and support services; and retail trade sectors each claim two industries anticipated to grow more than twice the County's average.

³⁰ This figure represents 0.1% of the total employment in San Bernardino County.

Table 4.2: Top Growth Industries in San Bernardino County, California

		Current			Historical	Forecast		
		Four Quarters Ending with 2017Q3			Total Change (over the last 5 years)	Over the Next 10 Years		
NAICS	Industry	Employment	Avg. Annual Wages	Location Quotient	Employment	Total Approx. Separation Demand	Total Growth Demand	Avg. Annual Growth Percent
6216	Home Health Care Services	5,534	\$33,039	0.71	1,405	7,037	3,064	4.5%
6241	Individual and Family Services	25,043	\$16,122	1.96	20,507	35,867	10,954	3.7%
6214	Outpatient Care Centers	9,589	\$92,573	2.01	7,106	9,362	3,578	3.2%
2371	Utility System Construction	2,346	\$79,136	0.92	256	2,703	835	3.1%
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	3,025	\$26,017	0.65	511	4,209	1,090	3.1%
4859	Other Transit and Ground Passenger Transportation	858	\$28,065	1.38	183	1,093	268	2.8%
6213	Offices of Other Health Practitioners	3,203	\$43,058	0.61	474	3,031	1,003	2.8%
6215	Medical and Diagnostic Laboratories	800	\$37,232	0.58	70	746	228	2.5%
6219	Other Ambulatory Health Care Services	2,069	\$44,541	1.23	255	1,825	575	2.5%
8129	Other Personal Services	3,104	\$22,014	0.89	215	4,266	844	2.4%
4511	Sporting Goods, Hobby, and Musical Instrument Stores	3,081	\$21,908	1.13	379	4,617	784	2.3%
4541	Electronic Shopping and Mail-Order Houses	1,686	\$55,115	0.77	574	2,020	421	2.3%
5313	Activities Related to Real Estate	3,019	\$46,948	0.72	586	3,242	784	2.3%
6116	Other Schools and Instruction	1,517	\$22,065	0.54	2	1,885	392	2.3%
5223	Activities Related to Credit Intermediation	1,630	\$72,629	1.03	829	1,782	400	2.2%
5416	Management, Scientific, and Technical Consulting Services	4,975	\$55,087	0.61	-370	4,969	1,211	2.2%
5611	Office Administrative Services	5,338	\$57,215	1.74	1,464	5,565	1,281	2.2%
5629	Remediation and Other Waste Management Services	1,011	\$65,359	1.37	504	1,222	233	2.1%
6211	Offices of Physicians	11,823	\$81,635	0.87	-3,955	10,386	2,686	2.1%
4931	Warehousing and Storage	32,018	\$37,202	6.45	20,240	41,912	7,170	2.0%
5415	Computer Systems Design and Related Services	4,072	\$94,294	0.38	-105	3,410	916	2.0%

Source: JobsEQ
Data as of 2017Q3

Intraregional Comparisons

The industry mix of each County sub-region is unique. Similar to population differences between these areas, total employment in the East & West Valleys (652,177) is over eight times the total employment in the High Desert Cities (80,947), which has over six times the total employment of Morongo Basin (12,247).

While industry average wages and forecast growth rates do not vary significantly between sub-regions, employment concentrations do. The health care and social assistance sector is the largest industry in Morongo Basin and the East & West Valleys, composing 27.0% and 15.0% of the total employment in each sub-region, respectively. Comparatively, health care composes 16.1% of total employment in the High Desert Cities, following retail trade's 18.3% share of total employment in the sub-region.

Transportation and warehousing (logistics) has a much higher concentration in the East & West Valleys (10.8% of total employment) and High Desert (8.5%) than it does in Morongo Basin (3.0%).

Both the education and accommodation and food services industries represent about 14% of total employment in the Morongo Basin, 12% in the High Desert Cities, and 8% in the East & West Valleys.

The manufacturing sector, in contrast, contributes 7.9% of the employment share in the East & West Valleys, 4.5% in the High Desert Cities, and 0.6% in the Morongo Basin.

Of the large industry sectors, construction has the most uniform distribution across San Bernardino County. Construction accounts for 5.3% of the employment share in the East & West Valleys, 4.2% in Morongo Basin, and 3.8% in the High Desert Cities.

Table 4.3: Sub-Region Industry Mix Comparison

		Current – Four Quarters Ending with 2017Q3								
		Employment			Percent of Total Employment			Location Quotient		
NAICS	Industry	East & West Valleys	High Desert Cities	Morongo Basin	East & West Valleys	High Desert Cities	Morongo Basin	East & West Valleys	High Desert Cities	Morongo Basin
62	Health Care and Social Assistance	97,651	13,030	3,307	15.0%	16.1%	27.0%	1.05	1.13	1.90
44	Retail Trade	73,155	14,826	1,790	11.2%	18.3%	14.6%	1.04	1.70	1.36
48	Transportation and Warehousing	70,644	6,869	366	10.8%	8.5%	3.0%	2.59	2.03	0.72
56	Administrative and Support Services	52,725	3,326	521	8.1%	4.1%	4.3%	1.25	0.63	0.66
31	Manufacturing	51,745	3,663	74	7.9%	4.5%	0.6%	0.96	0.55	0.07
61	Educational Services	51,707	9,985	1,766	7.9%	12.3%	14.4%	0.96	1.50	1.75
72	Accommodation and Food Services	50,296	9,774	1,717	7.7%	12.1%	14.0%	0.86	1.34	1.56
42	Wholesale Trade	37,806	1,788	66	5.8%	2.2%	0.5%	1.49	0.57	0.14
23	Construction	34,371	3,076	512	5.3%	3.8%	4.2%	0.95	0.68	0.75
92	Public Administration	34,232	1,579	195	5.2%	2.0%	1.6%	1.11	0.41	0.34
81	Other Services (except Public Administration)	26,115	3,377	643	4.0%	4.2%	5.3%	0.91	0.94	1.19
54	Professional, Scientific, and Technical Services	19,764	3,212	379	3.0%	4.0%	3.1%	0.46	0.61	0.47
52	Finance and Insurance	13,166	1,544	162	2.0%	1.9%	1.3%	0.51	0.48	0.33
71	Arts, Entertainment, and Recreation	10,536	1,122	88	1.6%	1.4%	0.7%	0.82	0.70	0.36
53	Real Estate and Rental and Leasing	7,833	1,274	243	1.2%	1.6%	2.0%	0.71	0.93	1.17
55	Management of Companies and Enterprises	5,858	150	9	0.9%	0.2%	0.1%	0.61	0.13	0.05
51	Information	4,919	1,043	136	0.8%	1.3%	1.1%	0.38	0.65	0.56
22	Utilities	3,964	522	150	0.6%	0.6%	1.2%	1.15	1.22	2.30
99	Unclassified	3,109	571	86	0.5%	0.7%	0.7%	1.93	2.86	2.83
11	Agriculture, Forestry, Fishing and Hunting	2,432	189	33	0.4%	0.2%	0.3%	0.26	0.16	0.19
21	Mining, Quarrying, and Oil and Gas Extraction	150	27	4	0.0%	0.0%	0.0%	0.06	0.08	0.09
Total - All Industries		652,177	80,947	12,247	100.0%	100.0%	100.0%	1.00	1.00	1.00

Source: JobsEQ

Data as of 2017Q3

Note: Figures may not sum due to rounding

All three sub-regions boast competitive advantages in different sectors.

Similar to each region's unique industry mix, all three sub-regions boast competitive advantages in different sectors that could form a basis for developing each sub-region's economy and generating more immediately local employment opportunities. The location quotient (LQ) for an industry identifies the degree to which the industry specializes in or is concentrated in a region relative to the nation. With an LQ of 1.25 or higher, a region is considered to possess a competitive advantage in that industry.³¹ The East and West Valleys sub-region holds competitive advantages in transportation and warehousing (location quotient of 2.59), wholesale trade (1.49), and administrative and support services (1.25). The High Desert Cities sub-region has competitive advantages in transportation and warehousing (2.03), retail trade (1.70), educational services (1.50), and accommodation and food services (1.34). Morongo Basin owns competitive advantages in utilities (2.30), health care and social assistance (1.90), educational services (1.75), accommodation and food services (1.56), and retail trade (1.36). The WDB could prioritize workforce development efforts to align with each sub-region's key industries rather than the County as a whole. This approach could be especially beneficial to current and future workers located in the High Desert Cities, which is a significant distance from the County's other employment centers.

Unique Regional Strengths

Chmura applied its Climate-Capabilities model to help predict what industries are well-positioned to thrive, and what industries may be more vulnerable due to prevailing trends and conditions during the next ten years. Understanding the national climate and the region's capabilities provides the SBCWDB with a clearer sense of what drives the region's economy. This matrix provides a relative ranking of industries, highlighting those that are in the best position for growth because of strong capabilities in the Inland Empire as well as a favorable national and international climate. Each industry is assessed on factors including economic performance, innovation potential, and value-added contribution.

As there are over 300 industries at the four-digit NAICS level, Chmura filtered these to 152 industries that have at least 0.1% of the region's total employment share.³²

³¹ The location quotient is a measure of the relative size of an industry in a region compared to the average size in the nation. An LQ of 1.0 indicates an industry is the same size in the region as is average in the nation; an LQ of 2.0 means the industry is twice as large in the region compared to average; and an LQ of 1/2 indicates the industry is half as large regionally as average in the nation.

³² Data collection notes are included as an appendix

Index Methodology

An index is created for both the external climate and the regional capabilities based on data compiled at the four-digit NAICS level. Both the external climate index and regional capability index are calculated by first rank ordering each individual component of those indexes. A weight is assigned to each component and a weighted average of the composite index is calculated.³³ The index is standardized to be between 1 and 100, with the higher number indicating a more favorable external climate or higher regional capabilities. Intersecting those two indexes identifies industries that are in the best position to expand because of strong capabilities in the region as well as a favorable national and international climate for future growth.

External Climate, United States

The national and global climate for industries provides a good indicator of the potential market for an industry's goods or services. The export growth trend indicates the market potential from global markets. Data on research and development (R&D) spending shows the innovation potential of current industries, while data on value added and industry multipliers indicate how effective investment in those industries will be in supporting other industries.

Specifically, the External Climate Index includes:

- Export growth (2004 to 2015)
- Projected national output growth (2014 to 2024)
- Research and development spending as a percentage of sales (2013)
- Industry output multiplier (2017)

Internal Capabilities, Inland Empire³⁴

The Inland Empire's industries differ in their positioning to take advantage of a favorable external climate or, conversely, they differ in their ability to compensate for an unfavorable external climate. The relative strengths and weaknesses of the region's industries are referred to as "capabilities." As with the external climate indicators, regional capabilities provide measures to evaluate potential industries in terms of economic performance, innovative potential, and value added.

³³ Weights were assigned to each input to create a forward-looking model while maintaining a balance among major input categories. Albeit somewhat subjective, the subcategory weights were based on their importance to the economy.

³⁴ Due to data availability constraints, the matrix was built at the MSA-level and thus represents industries in both San Bernardino and Riverside County.

Economic performance considers the industry's competitiveness relative to the nation and its recent growth based on the assumption that regional industries already performing well are in the best position for continued growth if the external environment is positive. Innovation potential is comprised of leading indicators that point to future development such as research contracts. The value added by an industry, or its multiplier, identifies the extent to which the industry will create additional income and jobs for other industries in the region.

Specifically, the Inland Empire's Capabilities Index includes:

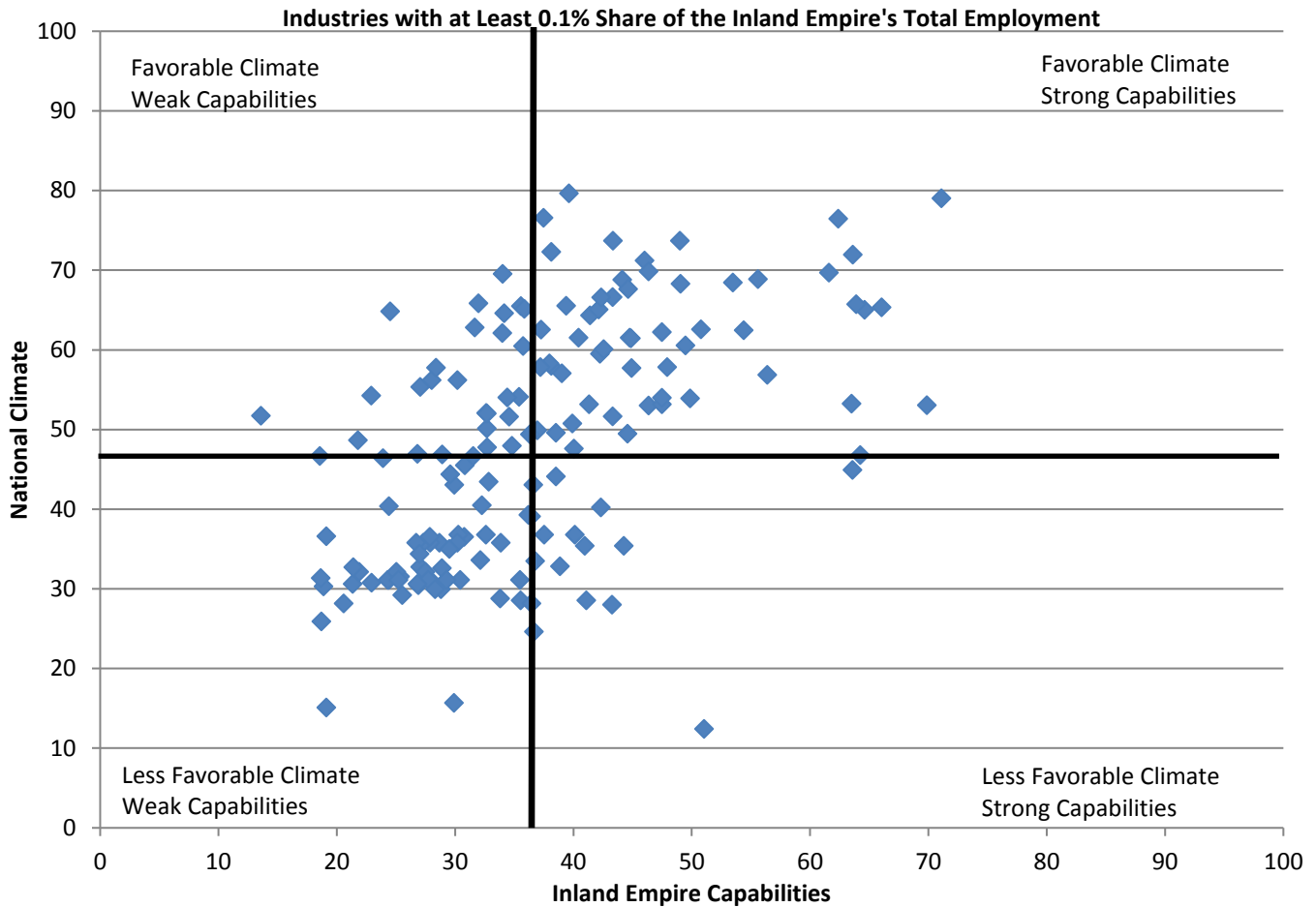
- Location quotient (2017)—a measure of industry competitiveness in the region³⁵
- Change in location quotient (2007 to 2017)
- Annual average employment growth (2007 to 2017)
- Relative wages—the region's average annual wages as a share of U.S. average annual wages (2017)
- Average annual wage growth (2007 to 2017)
- Federal R&D contract awards to Inland Empire firms (FY 2016)
- Patents assigned to regional firms (2011 to 2015)
- Inland Empire industry multipliers (2017)
- Local supply chain employment capacity (FY 2017)

Results

The climate-capabilities matrix highlights several key industries that are expected to grow nationwide as well as being well suited for growth in the Inland Empire region. After filtering out industries with less than 0.1% of the region's total employment (1,544 workers), the matrix for the remaining 152 industries is shown below. Data points in the top right quadrant of the chart represent industries with a favorable national climate for growth and strong regional capabilities.

³⁵ The location quotient measures the degree to which an industry is concentrated or specialized in a region relative to the nation, by computing the ratio of the share of an industry's employment in a region to the same industry's share of employment in the nation.

Figure 4.1: Climate-Capabilities Matrix



Top industries emerged from several different sectors in the matrix, including health care, manufacturing, education, professional services, construction, and transportation and warehousing. The index score is determined by distance from the matrix's midpoint (average climate and average capability). For example, the computer systems design and related services industry is the industry in the top right quadrant of the matrix furthest away from where the axes meet.³⁶ Top industries from the climate-capabilities matrix are shown in Table 5.4 below. A full list of all 152 industries can be found in the appendix.

In Chmura's focus groups and interview, the San Bernardino International Airport was suggested as a potential marketing opportunity for San Bernardino County. The strong regional capabilities in support activities for air transportation and strong national climate for aircraft part manufacturing reinforces focus group and interview feedback about the airport's ability to fuel growth in logistics companies, and potentially in niche-market

³⁶ Though current regional employment in this industry is relatively small, its position in the matrix is largely driven by patent and R&D activity.

aircraft manufacturing. Chmura received positive feedback about the airport's ability to handle increased capacity as well as the attractiveness of undeveloped land surrounding the airport.

Table 4.4: Top Industries from the Climate-Capabilities Matrix

NAICS	Industry	Inland Empire Capability Index	National Climate Index	San Bernardino County Employment (2017Q3)
5415	Computer Systems Design and Related Services	71.1	79.0	4,072
6221	General Medical and Surgical Hospitals	62.4	76.5	31,520
6211	Offices of Physicians	63.6	72.0	11,823
5611	Office Administrative Services	66.0	65.3	5,338
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	69.9	53.1	2,159
6113	Colleges, Universities, and Professional Schools	61.6	69.7	6,035
5419	Other Professional, Scientific, and Technical Services	64.6	65.0	3,326
2362	Nonresidential Building Construction	63.9	65.7	2,636
5413	Architectural, Engineering, and Related Services	39.6	79.6	4,432
6222	Psychiatric and Substance Abuse Hospitals	37.5	76.6	3,268
3364	Aerospace Product and Parts Manufacturing	49.0	73.7	1,837
5416	Management, Scientific, and Technical Consulting Services	55.6	68.9	4,975
4881	Support Activities for Air Transportation	63.5	53.3	2,181
3399	Other Miscellaneous Manufacturing	43.3	73.7	1,652

Source: Chmura

Vulnerable Industries

The climate-capabilities matrix also highlights vulnerable industries in the region that possess both an unfavorable national climate and weak regional capabilities for future growth (industries in the bottom left quadrant of the matrix). Table 4.5 highlights some of these industries, sorted by highest employment in San Bernardino County. Wholesale and retail trade industries appear significantly more at-risk than other industries.

Table 4.5: Potentially Vulnerable Regional Industries

NAICS	Industry	San Bernardino County Employment (2017Q3)
9221	Justice, Public Order, and Safety Activities	14,016
5617	Services to Buildings and Dwellings	11,038
4521	Department Stores	9,962
4481	Clothing Stores	7,900
8111	Automotive Repair and Maintenance	7,248
4441	Building Material and Supplies Dealers	5,949
4244	Grocery and Related Product Merchant Wholesalers	5,903
8121	Personal Care Services	5,768
9231	Administration of Human Resource Programs	5,356
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	4,452
5221	Depository Credit Intermediation	4,433
4413	Automotive Parts, Accessories, and Tire Stores	3,932
5242	Agencies, Brokerages, and Other Insurance Related Activities	3,654
4251	Wholesale Electronic Markets and Agents and Brokers	3,420
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	3,293
4239	Miscellaneous Durable Goods Merchant Wholesalers	3,213

Source: Chmura

As workers in these industries may be vulnerable to job loss, other training opportunities should be examined. To determine what other jobs these workers are best suited for, Chmura developed an occupation mix based on the 56 identified vulnerable industries. Retail salespersons represent the occupation with the highest employment in at-risk industries. Other top at-risk occupations include sales representatives, stock clerks, laborers, retail supervisors, and cashiers. The following top 12 occupations (Table 4.6) comprise 39% of the total employment in at-risk occupations. A more complete list of vulnerable occupations can be found in the appendix. It is important to note that the employment figures for each occupation only include the workers employed by firms in the vulnerable industries. While these jobs may be vulnerable due to the industries they are in, the same occupations may be strengths in other industries.

The SBCWDB can take steps to prepare for potential employment contractions in many of these vulnerable occupations. Focus groups spoke to the risk of lower-skilled workers being replaced by advanced technologies and automation, emphasizing the importance of skilling up these workers—particularly in basic computer skills.

Table 4.6: Occupation Mix for Vulnerable Industries in San Bernardino County

SOC	Title	San Bernardino County Employment 2017Q3
41-2031	Retail Salespersons	18,822
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	6,339
43-5081	Stock Clerks and Order Fillers	5,656
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	5,226
41-1011	First-Line Supervisors of Retail Sales Workers	4,960
41-2011	Cashiers	4,906
37-3011	Landscaping and Groundskeeping Workers	4,273
43-4051	Customer Service Representatives	3,361
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	3,239
39-5012	Hairdressers, Hairstylists, and Cosmetologists	3,212
43-9061	Office Clerks, General	3,159
11-1021	General and Operations Managers	3,008

Source: Chmura

Advanced Technologies Industries

As technology becomes more integrated across all industries and job requirements, companies, regions, and training providers must embrace and adapt to continuously changing market demands. This reality presents an opportunity for San Bernardino County to lead the development of some of these technologies where they have natural advantages. The following graphic shows the fifty industries included in the advanced industries sector.³⁷ These industries pay an annual average wage of \$68,766, or more than 50 percent higher than the regional average of \$45,701 for all industries.

³⁷ Source: Brookings Institute: *America's Advanced Industries*, 2015

Figure 4.2: The 50 Industries That Constitute the Advanced Industries Sector

MANUFACTURING		ENERGY
Aerospace Products and Parts	Motor Vehicles	Electric Power Generation, Trans., and Distribution
Agr., Construction, and Mining Machinery	Navigation, Measurement, and Control Instruments	Metal Ore Mining
Aluminum Production and Processing	Other Chemical Products	Oil and Gas Extraction
Audio and Video Equipment	Other Electrical Equipment and Components	SERVICES
Basic Chemicals	Other General Purpose Machinery	Architecture and Engineering
Clay Products	Other Miscellaneous Manufacturing	Cable and Other Subscription Programming
Commercial and Service Industry Machinery	Other Nonmetallic Mineral Products	Computer Systems Design
Communications Equipment	Other Transportation Equipment	Data Processing and Hosting
Computers and Peripheral Equipment	Pesticides, Fertilizers, and Other Agr. Chemicals	Medical and Diagnostic Laboratories
Electric Lighting Equipment	Petroleum and Coal Products	Mgmt., Scientific, and Technical Consulting
Electrical Equipment	Pharmaceuticals and Medicine	Other Information Services
Engines, Turbines, and Power Trans. Equipment	Railroad Rolling Stock	Other Telecommunications
Foundries	Resins and Synthetic Rubbers, Fibers, and Filaments	Satellite Telecommunications
Household Appliances	Semiconductors and Other Electronic Components	Scientific Research and Development
Industrial Machinery	Ship and Boat Building	Software Publishers
Iron, Steel, and Ferroalloys	Medical Equipment and Supplies	Wireless Telecommunications Carriers
Motor Vehicle Bodies and Trailers	Reproducing Magnetic and Optical Media	
Motor Vehicle Parts		

The County is well-positioned to benefit from growth in many of these advanced industries. Half of these advanced industries place in the top-right quadrant of the climate-capabilities matrix. Figure 4.3 presents a snap-shot of this favorable climate and strong capabilities quadrant. Advanced technology industries that employ at least 500 workers in San Bernardino County are highlighted.

Several of these industries represent opportunities to capitalize on the increasingly prevalent use of automation across many industries, particularly manufacturing. Table 4.7 shows these top advanced industries for San Bernardino County to consider targeting—there is a potential opportunity for the SBCWDB to support training for the autonomous processes and machinery at these companies. Feedback from focus groups and interviews support the need to enhance training in these industries, including improved computer and general technological competency, computer programming, and mechanical engineering training to troubleshoot breakdowns in robotic processes.

Figure 4.3: Favorable Climate, Strong Capabilities

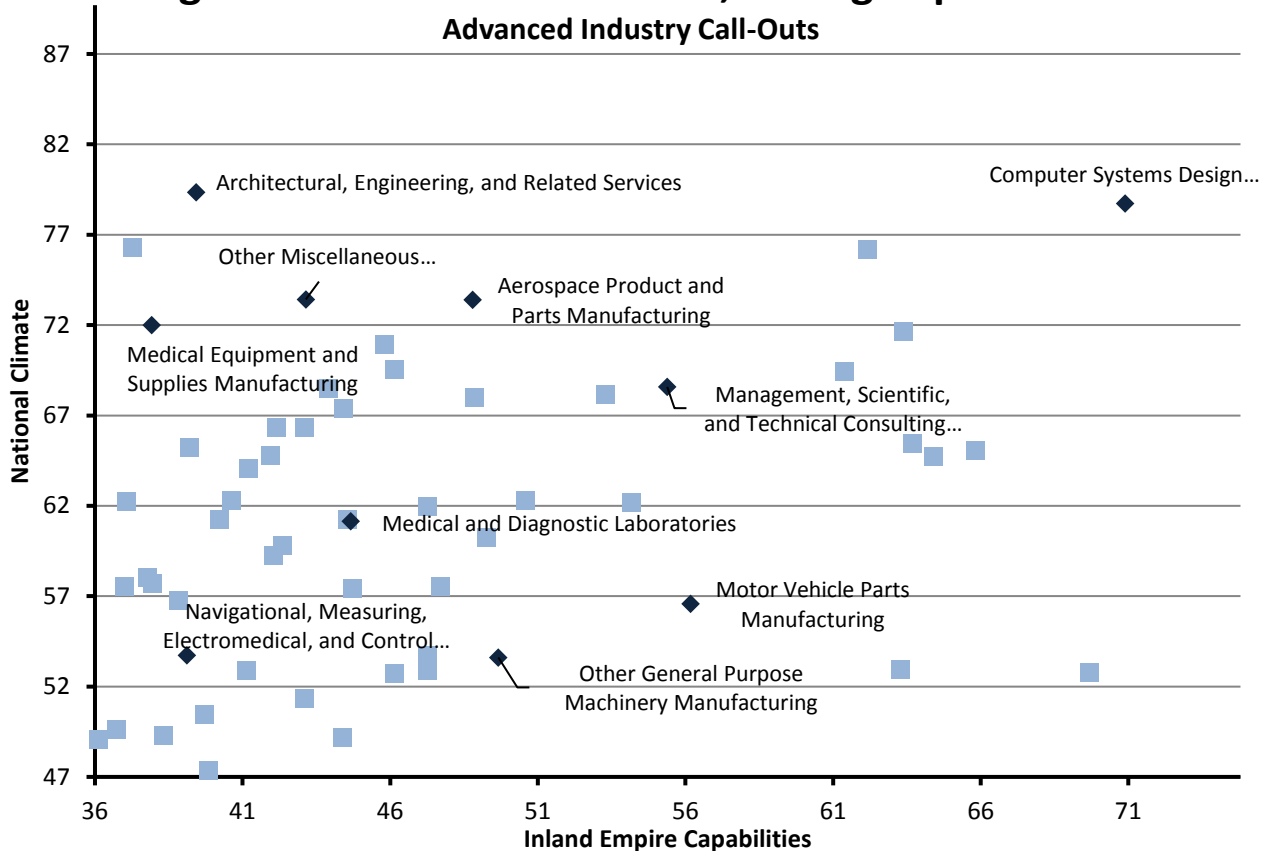


Table 4.7: Top Advanced Industries for San Bernardino County

NAICS	Industry	Current – Four Quarters Ending with 2017Q3		Forecast – Next Ten Years
		Employment	Average Annual Wages	Avg. Annual Growth Percent
5416	Management, Scientific, and Technical Consulting Services	4,975	\$55,087	2.2%
5413	Architectural, Engineering, and Related Services	4,432	\$75,175	1.1%
5415	Computer Systems Design and Related Services	4,072	\$94,294	2.0%
3364	Aerospace Product and Parts Manufacturing	1,837	\$78,197	-0.1%
3399	Other Miscellaneous Manufacturing	1,652	\$52,553	-1.0%
3391	Medical Equipment and Supplies Manufacturing	1,205	\$56,327	0.4%
3363	Motor Vehicle Parts Manufacturing	1,115	\$62,036	-0.1%
6215	Medical and Diagnostic Laboratories	800	\$37,232	2.5%
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	763	\$63,313	-0.8%
3339	Other General Purpose Machinery Manufacturing	683	\$59,098	-0.5%

Source: Chmura

Industry-Occupation Mix

For advanced technologies industries to thrive in San Bernardino County, the workforce must be prepared to meet employer demands. The most prevalent occupations currently in advanced technology industries are shown in Table 4.8. These occupations, particularly ones with high forecast growth demand, will be key to sustaining a viable workforce for advanced technology industries. The sixteen occupations in this table represent 32% of the workers in San Bernardino County currently working in advanced technology firms. A complete table is available in the appendix.

Table 4.8: Industry-Occupation Mix for Advanced Industries in San Bernardino County

SOC	Title	Current Employment	Regional Average Wage	10-Year Separation Demand	10-Year Growth Demand	10-Year Total Demand	Typical Entry-Level Education	Typical On-the-Job Training
51-2092	Team Assemblers	1,739	\$29,400	1,866	-247	1,619	High school diploma or equivalent	Moderate-term OJT
13-1111	Management Analysts	1,170	\$80,800	1,084	270	1,354	Bachelor's degree	None
15-1132	Software Developers, Applications	1,010	\$98,100	735	369	1,104	Bachelor's degree	None
11-1021	General and Operations Managers	852	\$116,500	714	95	809	Bachelor's degree	None
43-4051	Customer Service Representatives	845	\$37,300	1,054	-11	1,042	High school diploma or equivalent	Short-term OJT
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	839	\$52,700	820	-106	714	Postsecondary non-degree award	Moderate-term OJT
11-9199	Managers, All Other	799	\$113,500	585	110	695	Bachelor's degree	None
51-1011	First-Line Supervisors of Production and Operating Workers	772	\$60,700	735	-12	723	High school diploma or equivalent	None
41-3099	Sales Representatives, Services, All Other	690	\$54,500	853	78	931	High school diploma or equivalent	Moderate-term OJT
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	677	\$39,600	742	-100	642	High school diploma or equivalent	Moderate-term OJT
43-9061	Office Clerks, General	577	\$34,400	670	1	671	High school diploma or equivalent	Short-term OJT
17-2051	Civil Engineers	568	\$104,600	429	81	510	Bachelor's degree	None
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	565	\$29,100	770	14	784	None	Short-term OJT
15-1151	Computer User Support Specialists	524	\$52,100	403	82	485	Some college, no degree	None
51-2022	Electrical and Electronic Equipment Assemblers	521	\$33,000	549	-103	447	High school diploma or equivalent	Moderate-term OJT
15-1121	Computer Systems Analysts	521	\$78,500	351	82	433	Bachelor's degree	None

Source: Chmura

Data as of 2017Q3, except for occupation wages which are as of 2016 and represent the average for all covered employment across all industries

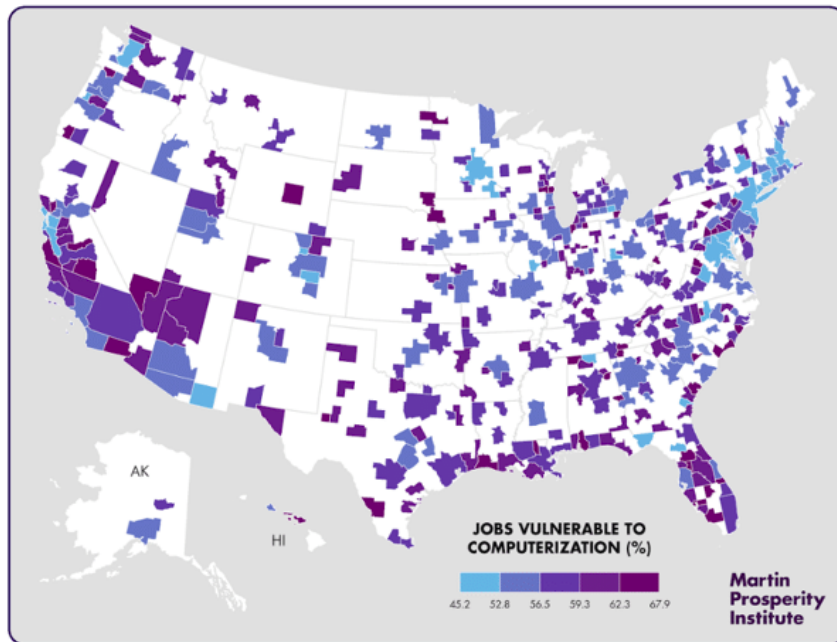
More than half of these occupations pay an average annual wage higher than the regional average of \$45,701. Only six of these sixteen occupations require a bachelor's degree, and 45% of all advanced technology occupations by employment only require a high school diploma or equivalent. This combination of high wages, high forecast demand, and lower educational requirements make training for occupations in advanced technology industries an attractive opportunity for workforce system investments

Industry and Workforce Themes: Automation, Advanced Technology, and Robotics

One of the key recurring themes of the focus groups and stakeholder interviews was a fear of automation replacing workers in the near future. According to the Martin Prosperity Institute, the Inland Empire has an average proportion of jobs vulnerable to computerization relative to other metro areas in the country.

Research suggests lower-wage and lower-skill jobs are the most vulnerable to automation.³⁸ However, there is a growing consensus that few jobs are 100% automatable—instead, as in the case of autopilot and pilots, it seems most likely the nature of work and skills will change to work alongside artificial intelligence and robotics, ultimately increasing the productivity of workers.³⁹ As mentioned in the industry section of this report, San Bernardino has an opportunity to work with leading employers in this field to prepare a workforce ready to succeed. However, in a field changing as quickly as robotics and advanced technologies, it will require a high level of coordination between workforce development, economic development, higher education, and industry to understand and prepare for the changing needs of regional employers.

This collaborative, consortium-based approach is well represented by Virginia's [Commonwealth Center for Advanced Logistics Systems \(CCALS\)](#). CCALS' goal is "to accelerate the transition of technologies from fundamental developments through proof of concept and on to commercialization," helping to sustain the region's competitive edge and leadership position in the logistics industry. One large employer in San Bernardino County, who is actively engaged with the SBCWDB and the education providers, spoke to the possibility of marketing logistics and "supply chain" as an attractive career option for younger workers, and even suggested the possibility of creating a postsecondary program of study focused on logistics and supply chain. This level of commitment by the region's colleges and/or universities could help to anchor a CCALS-like partnership.



³⁸ Source: *Artificial Intelligence, Automation, and the Economy*, Executive Office of the President, December 2016.

³⁹ For example, <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>

V. Workforce Analysis

Workforce Overview

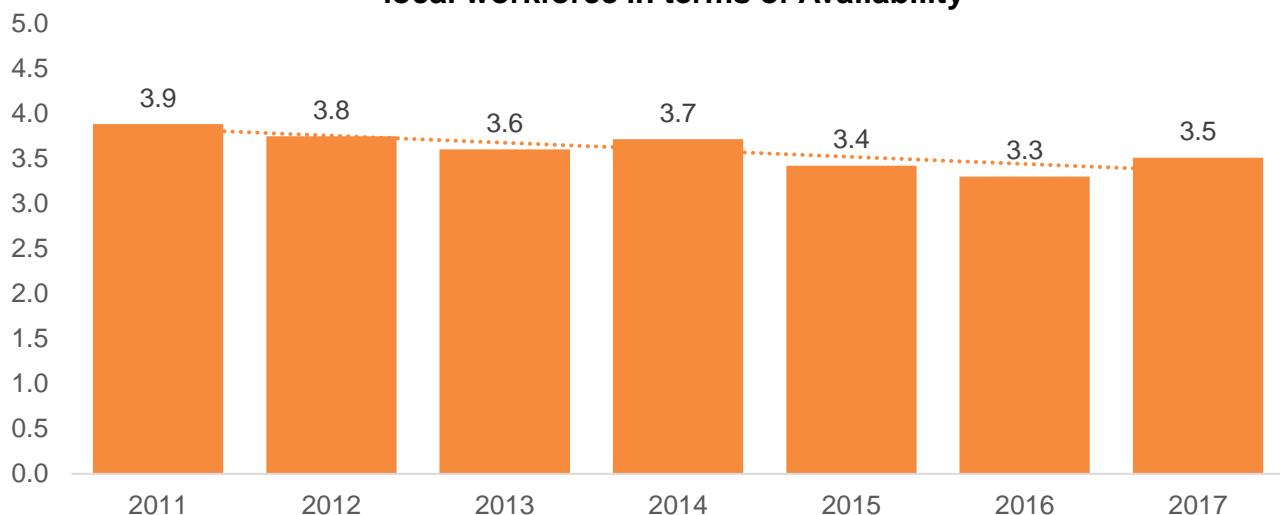
Focus groups emphasized the need for continued regular contact between businesses, education providers (school districts, high schools, and colleges) and the WDB.

Technology skills are increasingly relevant across all industries. Given the County's demographic trends and employment growth forecast, the workforce system must embrace the opportunity to prepare workers with not only technology skills, but basic math, language, and computer literacy skills that are foundational to developing technology skills.

As the San Bernardino unemployment rate falls below pre-recession levels, anecdotal information suggests the labor market is tightening. The SBCWDB's Business Services Team regularly surveys local employers, with more than 1,000 responses each year. Respondent perceptions of workforce availability (shown below in Figure 5.1) have generally declined since 2011. As one focus group participant confirmed, the "skilled labor force is exhausted."

As the labor market continues to tighten, it reinforces the importance of ensuring available workers have the right mix of skills to meet employers' demands. Focus group participants emphasized the need for regular communication between businesses, education providers (school districts, high schools, and colleges), and the WDB to be aware of new technologies and ensure curriculum and training programs are relevant to employers' needs.

Figure 5.1: On a scale of 1-5 (5 being best), how would you rank the local workforce in terms of Availability

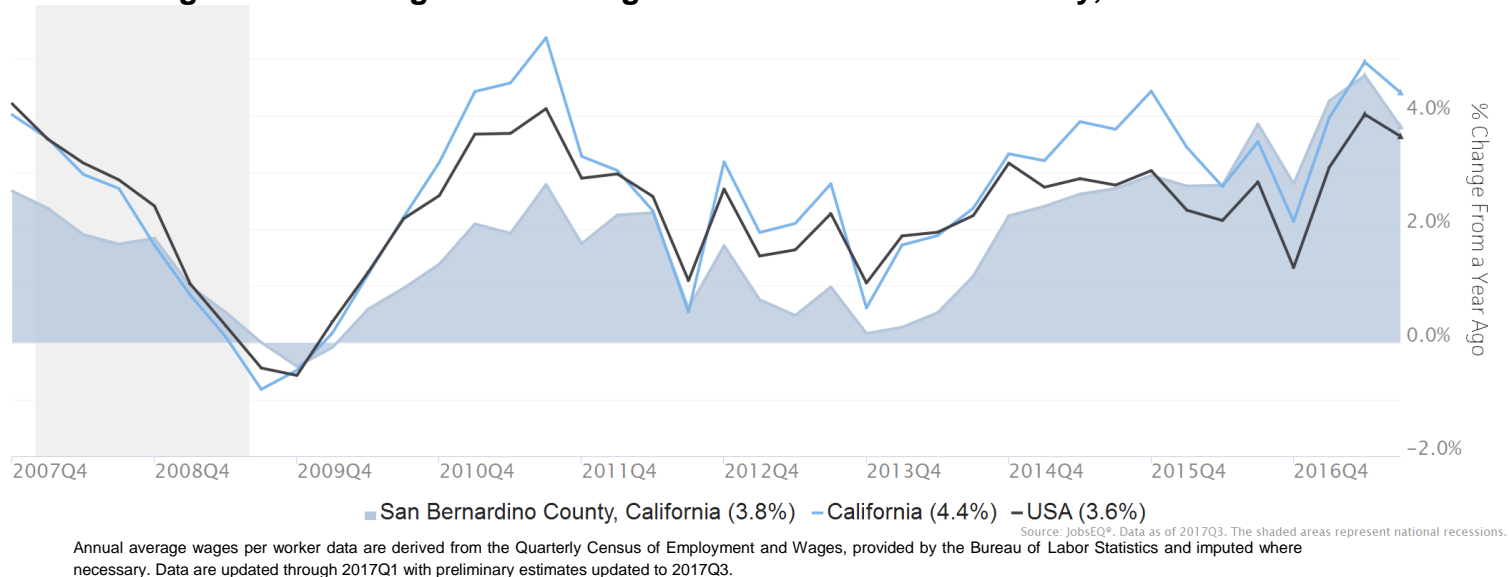


Source: San Bernardino Workforce Development Board.

Note: 2017 data are through August

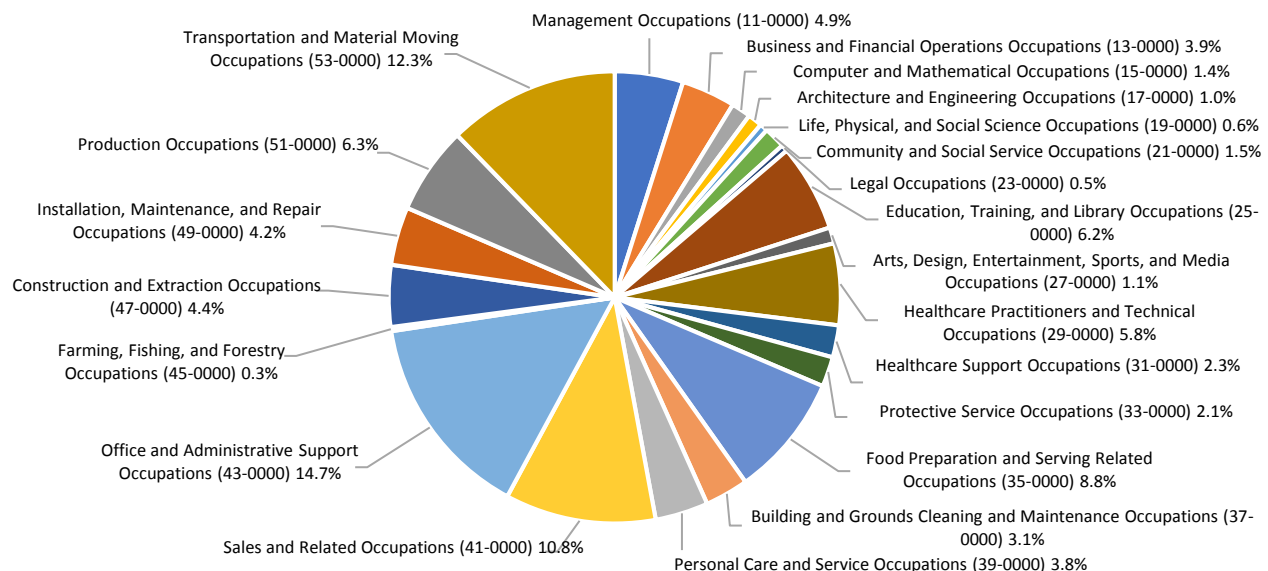
The average worker in San Bernardino County earned annual wages of \$45,701 as of 2017Q3. Average annual wages per worker increased 3.8% in the region during the preceding four quarters, faster than the 3.6% growth in the nation over this period, which may further indicate a tighter labor market.

Figure 5.2: Average Annual Wages for San Bernardino County, 2017Q3



Office and administrative support is the largest occupation group in San Bernardino County, accounting for 14.7% of employment. The next largest occupation groups are transportation and material moving occupations (12.3%), supporting the transportation and logistics industries in the region, and sales and related occupations (10.8%).

Figure 5.3: Employment by Major Occupation Group in San Bernardino County



Source: JobsEQ. Employment data as of 2017Q3. Data reflect place-of-work employment.

Employment Growth Forecast

Over the next 10 years, employment in San Bernardino County is expected to expand by 73,097 jobs. By sub-region, most of the projected job growth is in the East & West Valleys (+60,080 jobs), followed by the High Desert Cities (+7,618) and Morongo Basin (+1,397).

The occupation group with the largest projected growth in terms of the number of jobs expected to be added over the next 10 years in San Bernardino County is transportation and material moving occupations, adding more than 9,800 jobs over this period.⁴⁰ Healthcare practitioners and technical (+8,093 jobs); personal care and service (+7,343); and food preparation and serving occupations (6,859) are also expected to add a high number of jobs in the County over the next ten years.

“Training and retraining are a must”, not just for new jobs being created, but for existing jobs in changing environments.

In terms of separations, as workers exit the labor force and change occupations, the office and administrative support occupation group has the highest projected demand over the next year. Note that these separation estimates are not direct estimates of training needs, as not all the workers who will fill openings require training. However, they may suggest a general prioritization of occupations that will need workers replaced, and as work environments continue to change, workers must be capable of adapting. Focus group participants reported that “training and retraining are a must,” not just for new jobs being created, but for existing jobs in changing environments. Other occupation groups with a large number of openings include transportation and material moving; food preparation and service related; and sales and related—these are also projected to have high demand due to separations. Production occupations, the majority of which are in the manufacturing sector, and personal care and service occupations are projected to have a moderate level of demand due to separations.

⁴⁰ As noted in the estimate for industry employment in transportation and warehousing, these numbers are consistent with estimates from the Bureau of Labor Statistics; however, interviews with Amazon suggest that the company currently employs more than 10,000 workers in the county. In light of that additional information, data in this sector and related occupations may be considered conservative estimates.

Table 5.1: Current Employment and Forecast Demand

Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Total Emp	10 Yr Growth Demand	Total Emp	10 Yr Growth Demand	Total Emp	10 Yr Growth Demand	Total Emp	10 Yr Growth Demand
Office and Administrative Support Occupations	114,647	4,584	98,096	370	11,048	53	1,548	7
Transportation and Material Moving Occupations	95,435	9,848	84,545	859	8,073	64	643	5
Food Preparation and Serving Related Occupations	68,283	6,859	52,915	507	9,648	93	1,628	16
Sales and Related Occupations	83,952	2,611	68,182	217	10,980	30	1,333	2
Production Occupations	48,664	-735	43,894	-66	3,263	-7	204	1
Personal Care and Service Occupations	29,537	7,343	23,411	507	2,818	54	881	26
Education, Training, and Library Occupations	48,605	5,230	37,553	385	7,063	71	1,291	13
Construction and Extraction Occupations	34,353	4,082	28,710	324	2,630	29	412	5
Installation, Maintenance, and Repair Occupations	32,418	2,641	27,095	213	3,431	22	404	3
Building and Grounds Cleaning and Maintenance Occupations	24,195	2,765	19,184	208	2,588	28	639	7
Management Occupations	38,087	4,801	32,068	375	3,687	46	565	8
Business and Financial Operations Occupations	30,018	3,389	26,066	270	2,563	32	349	5
Healthcare Practitioners and Technical Occupations	45,403	8,093	38,226	633	5,339	92	949	10
Healthcare Support Occupations	17,843	4,404	14,819	327	2,070	46	423	8
Protective Service Occupations	16,669	1,047	15,108	92	1,096	8	137	0
Community and Social Service Occupations	11,934	2,470	9,506	171	1,204	26	373	9
Arts, Design, Entertainment, Sports, and Media Occupations	8,927	444	7,420	36	913	4	151	1
Computer and Mathematical Occupations	10,811	1,516	9,211	118	1,091	16	116	2
Architecture and Engineering Occupations	8,037	702	7,036	57	647	6	75	1
Life, Physical, and Social Science Occupations	4,417	502	3,830	40	360	5	64	1
Farming, Fishing, and Forestry Occupations	2,262	52	2,001	4	151	1	22	0
Legal Occupations	3,721	450	3,301	37	286	3	39	1
Total - All Occupations	778,217	73,097	652,177	5,773	80,947	731	12,247	133

Source: JobsEQ®

The largest 25 detailed occupations account for more than 40% of total employment in San Bernardino. Of these 25 largest occupations (shown in Table 5.2), laborers and freight, stock, and material movers have gained the most new jobs over the past five years (adding almost 9,500). That occupation also has the highest projected growth demand over the next ten years. Personal care aides (+4,152 jobs); combined food preparation and serving workers, including fast food (+3,583); registered nurses (+2,976); and heavy and tractor-trailer truck drivers (+1,442) also have high growth forecasts over the next ten years.

In terms of the annual growth rate, the fastest-growing of the top 25 occupations are forecast to include personal care aides (+4.4%); registered nurses (1.7%); combined food preparation and serving workers, including fast food (1.5%); and laborers and freight, stock, and material movers (1.3%).

Table 5.2: Top 25 Largest Detailed Occupations, San Bernardino County

Occupation	Current					Total Change over the Last 5 Years	Historical			Forecast			
	Four Quarters Ending with 2017Q3						Avg Ann % Chg in Empl 2012Q3-2017Q3			Over the Next 10 Years			
	Empl	Avg. Annual Wages	LQ	Unempl	Unempl Rate		Empl	San Bernardino County, California	CA	USA	Current Online Job Ads	Total Sep Demand	Total Growth Demand
Laborers and Freight, Stock, and Material Movers, Hand	31,923	\$29,100	2.38	3,787	10.9%	9,442	7.3%	3.9%	2.6%	612	45,770	4,351	1.3%
Retail Salespersons	25,948	\$29,300	1.11	1,618	5.5%	1,184	0.9%	1.2%	0.9%	1,373	37,547	670	0.3%
Combined Food Preparation and Serving Workers, Including Fast Food	21,961	\$23,400	1.25	2,646	9.8%	5,356	5.8%	4.9%	3.5%	887	42,580	3,583	1.5%
Cashiers	20,803	\$25,400	1.16	2,028	8.2%	2,691	2.8%	2.1%	1.6%	227	38,594	-123	-0.1%
Heavy and Tractor-Trailer Truck Drivers	20,243	\$48,100	2.14	897	4.6%	2,403	2.6%	2.5%	1.8%	395	21,937	1,442	0.7%
Registered Nurses	16,587	\$96,400	1.11	236	1.5%	3,289	4.5%	3.7%	1.7%	512	8,952	2,976	1.7%
Stock Clerks and Order Fillers	16,006	\$27,700	1.57	1,293	7.2%	2,724	3.8%	1.9%	1.4%	704	20,769	1,052	0.6%
Office Clerks, General	14,666	\$34,400	0.95	1,167	6.5%	2,639	4.0%	3.5%	2.0%	140	17,211	340	0.2%
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	11,070	\$38,500	0.90	616	4.7%	1,898	3.8%	3.3%	1.7%	363	11,567	-380	-0.3%
General and Operations Managers	10,585	\$116,500	0.92	331	2.8%	1,950	4.2%	3.1%	2.0%	98	8,915	1,245	1.1%
Waiters and Waitresses	10,377	\$28,200	0.79	889	6.4%	1,706	3.7%	3.6%	2.8%	181	20,161	899	0.8%

Source: [JobsEQ®](#)

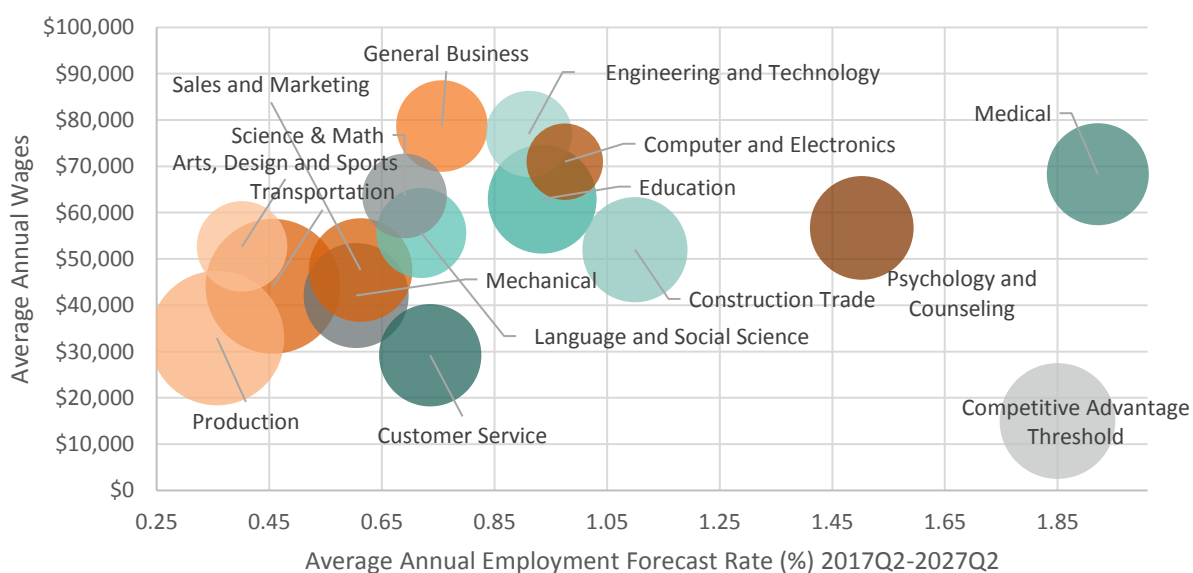
Customer Service Representatives	9,933	\$37,300	0.71	769	6.4%	1,273	2.8%	2.5%	2.0%	482	12,842	576	0.6%
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	9,719	\$30,600	0.82	788	6.3%	774	1.7%	2.4%	1.6%	309	13,044	1,061	1.0%
First-Line Supervisors of Retail Sales Workers	8,898	\$43,600	1.15	172	1.8%	705	1.7%	1.4%	1.0%	936	9,389	297	0.3%
Elementary School Teachers, Except Special Education	8,815	\$80,200	1.31	472	5.6%	962	2.3%	1.9%	0.6%	30	6,432	829	0.9%
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	8,710	\$68,900	1.13	319	3.4%	1,712	4.5%	1.4%	1.2%	16	8,941	516	0.6%
Light Truck or Delivery Services Drivers	8,171	\$40,400	1.70	374	4.3%	2,079	6.0%	4.1%	2.3%	30	8,959	798	0.9%
Teacher Assistants	8,108	\$32,600	1.31	849	9.0%	1,167	3.2%	2.8%	0.9%	41	8,600	905	1.1%
Bookkeeping, Accounting, and Auditing Clerks	7,970	\$41,800	0.93	334	3.4%	1,229	3.4%	2.7%	1.8%	194	8,816	81	0.1%
Personal Care Aides	7,771	\$23,700	0.90	690	7.2%	3,481	12.6%	12.7%	5.2%	58	13,341	4,152	4.4%
Industrial Truck and Tractor Operators	7,436	\$33,300	2.64	406	5.5%	3,158	11.7%	4.6%	3.2%	249	8,575	790	1.0%
First-Line Supervisors of Office and Administrative Support Workers	7,398	\$57,300	0.98	288	3.3%	1,208	3.6%	2.6%	1.7%	76	7,394	486	0.6%
Substitute Teachers	6,802	\$39,800	2.31	585	8.5%	684	2.1%	2.5%	0.9%	19	7,644	630	0.9%
Packers and Packers, Hand	6,742	\$26,800	1.86	930	11.7%	2,015	7.4%	3.6%	2.6%	55	10,499	644	0.9%
Childcare Workers	6,468	\$26,300	1.22	414	5.6%	-3,783	-8.8%	-10.3%	-1.9%	167	9,835	791	1.2%

Source: JobsEQ®

Occupation Clusters

In Chmura's long-run growth model, all occupation clusters in the County are projected to grow over the next decade. The medical; psychology and counseling; and construction trade clusters are projected to grow more than 1.0% per year over this period, and all pay above the regional average wage. Some of the clusters employing the largest number of people (shown by bubble size), including production, transportation, and mechanical, are also projected to grow but at a relatively slower rate.

Figure 5.4: Occupation Clusters for San Bernardino County as of 2017Q2

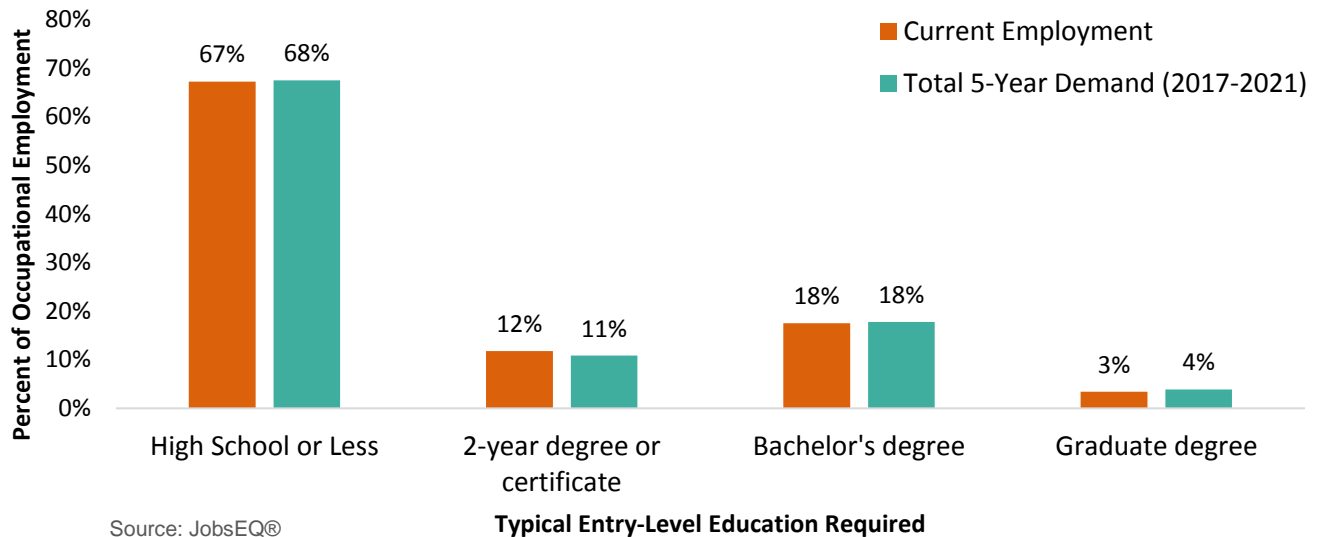


Source: JobsEQ®

In-Demand Skills, Education, and Training

More than two-thirds (67%) of current jobs in San Bernardino County typically require a high school diploma or less to enter, and the share of those jobs is projected to grow over the next five years (Figure 5.5). An estimated 18% require a bachelor's degree, while 12% typically require a 2-year degree or certificate. This trend could shift over the

Figure 5.5: Two-thirds of Jobs Require High School or Less



next few years due to growth in target industries and changing requirements as the nature of jobs adapt to automation and other technological advancements affecting work environments.

The fastest growth is expected for jobs requiring a postgraduate degree (e.g. physicians and surgeons) followed by jobs requiring a 2-year degree or certificate (e.g. truck drivers). Jobs requiring a bachelor's degree are expected to grow at the same rate as those requiring a 2-year degree or certificate at 1.2% (Table 5.3). Jobs in the County are expected to grow faster than those in the state at every level of typical education and training required, though wages by training required are below the state average. Detailed tables listing the top 25 occupations by forecast annual demand and by educational attainment are provided as an appendix to this report.

Table 5.3: Employment and Wages by Typical Entry-Level Education

	San Bernardino County Employment Q3 2017	Average Annual Salary 2016	Average Annual Growth Rate Next 10 Years
Postgraduate degree	26,194	\$112,300	1.6%
2-year degree or certificate	74,729	\$46,900	1.2%
Bachelor's degree	135,858	\$82,900	1.2%
Short-term OJT, no exp, no	343,621	\$30,200	0.9%
Previous work experience,	57,201	\$52,500	0.8%
Long-term training, no exp.	34,253	\$49,700	0.7%
Moderate-term OJT, no exp,	106,360	\$44,900	0.4%

Source: JobsEQ®

For the 2016 calendar year, an estimated 52,780 workers in San Bernardino were underemployed—graduates with a bachelor's degree or higher working in a job that typically does not require a college degree. These high-skilled underemployed workers account for 30.5% of employed individuals age 22 to 65 with a bachelor's degree or higher in San Bernardino, below both the national underemployment rate of 34.1% and the California underemployment rate of 33.2%. For workers with an associate's degree, an estimated 41,922 workers were underemployed in San Bernardino, working in jobs that typically require less than an associate's degree, certificate, or some college and no degree (but may require an apprenticeship). This compares to approximately 54.9% of these workers in California.⁴¹

Table 5.4: Estimated Underemployment 2016

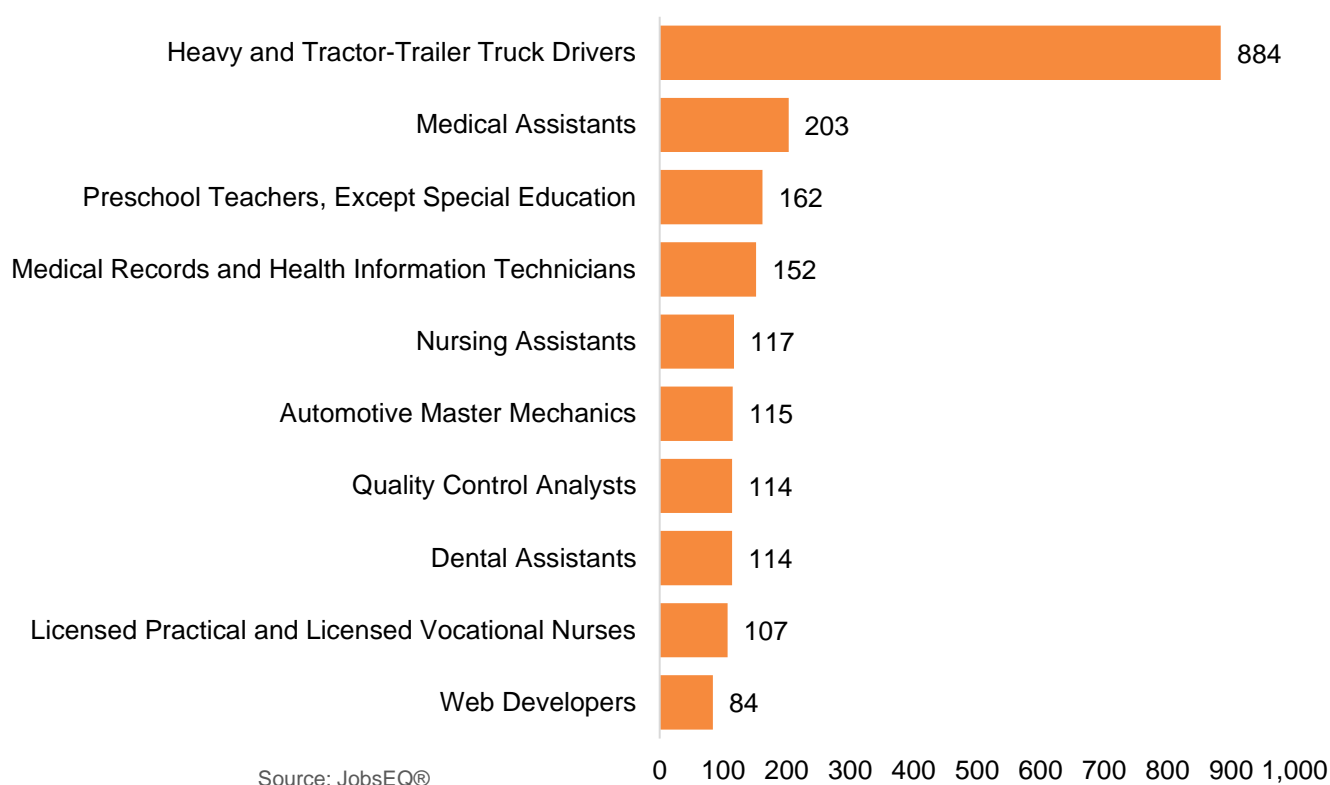
Working in a Job with Typically Lower Educational Requirements:	San Bernardino County		California	
	Number	Percent	Number	Percent
With a Bachelor's or Higher	52,780	30.5	2,109,319	33.2
With an Associate's	41,922	52.5	951,352	54.9

Source: Chmura Economics & Analytics

⁴¹ The New York Federal Reserve Bank developed a methodology to describe underemployment among individuals aged 22 to 65 with a bachelor's degree or higher (where underemployment is defined as a graduate working in a job that typically doesn't require a college degree). Using this process along with region-specific source data, Chmura Economics & Analytics calculates the difference between a region and the rest of the nation.

Job openings identify an immediate skills gap for employers and opportunities for job seekers. Large numbers of job postings for individual occupations suggest an apparent skills gap as many businesses need the same skills. As shown in the chart below (Figure 5.6), among occupations that typically require a 2-year degree or certificate, heavy and tractor-trailer truck drivers and medical assistants top the list of jobs posted online in San Bernardino County.⁴² Half the top 10 online job postings are in healthcare, while quality control analysts are primarily employed in manufacturing.

Figure 5.6: Online Job Postings, Occupations that Typically Require an Associate's or Postsecondary Non-Degree Award, 2017Q3

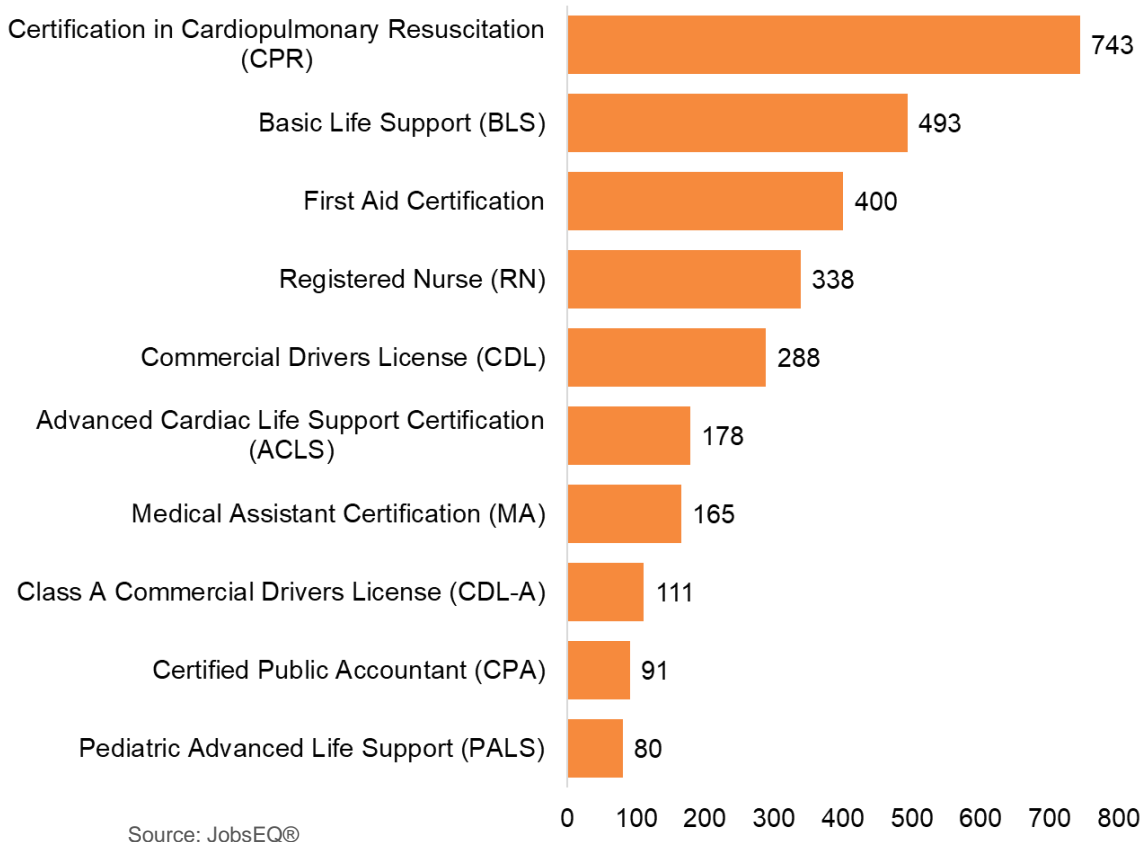


⁴² Counts of unique job postings may not equate with actual job demand. For example, job postings may be placed in anticipation of possible openings that do not materialize. Moreover, slight variations of ads may be placed such that the number of ads exceeds the actual number of openings.

Cardiopulmonary Resuscitation (CPR), basic life support, and first aid certification top the list of the top 25 certifications requested in job ads in the third quarter of 2017. Overall, 8 of the top 10 certifications are related to healthcare, though CPR and First Aid cross multiple occupations including teachers, social workers, and security guards. Supporting the logistics, warehousing, and distribution cluster, Commercial Driver's License (CDL) was the 5th most requested certification (288 postings), and Class A CDL appeared in 111 posts. Certified public accountant (CPA) appeared in 91 postings over this period.

Secondary data and focus group participants agreed advanced nursing certifications and CDLs are important technical skills needed in the region.

Figure 5.7: Certifications in Online Job Postings in San Bernardino County, 2017Q3



The technical skills most often mentioned in focus groups included CAD, artificial intelligence and robotics, coding, electronics, 3D printing, industrial electrical, HVAC, and Excel. Excel is the basis for many logistics-related tasks.

Focus group participants spoke to shortages of skilled labor, especially in healthcare, technical trades, and jobs requiring higher education. The most often-mentioned technical skills included advanced nursing certifications, CAD, CDL, artificial intelligence and robotics, coding, electronics, 3D printing, industrial electrical, HVAC, and Excel. Excel is the basis for many logistics-related tasks. More generally, several focus groups communicated the importance of basic computer skills, especially among older workers.

According to an Amazon representative, some of the most necessary hard skills that logistics workers need include knowing lean management practices (5S, Six Sigma, etc.) from a supply chain point-of-view. Moreover, the representative said all people working in their firm need to command Microsoft Excel.

Occupations Index

Chmura developed an index tool to help identify occupations that may be particularly appealing from a workforce development perspective. The intent of this tool is to highlight occupations that pay wages above the local “target” wage (\$14 per hour), have a strong employment growth forecast, require less than an associate degree for typical entry, and are employed by a broad range of industries.⁴³ Data were compiled at the six-digit standard occupational classification (SOC) level and the index was calculated by rank ordering each individual component. A weight was assigned to each component, in consultation with the WDB, and a weighted average of the composite index was calculated.⁴⁴ The index is standardized to be between 1 and 100, with the higher number indicating a more favorable ranking.

Specifically, the index includes:

- Occupations ranked based on average annual pay, providing a perspective on whether an occupation generally provides family-sustaining wages
- Occupations that were grouped into one of four categories (less than an associate’s degree, associate’s degree, bachelor’s degree, and more than a bachelor’s degree) with higher scores being given to occupations which require less education
- Projected job openings which show the expected number of positions to be filled in each occupation over the next decade

⁴³ Broadly distributed employment is considered important as an indicator of occupational mobility, or the ability for a worker to more easily move from a declining industry into one that may be growing.

⁴⁴ The category weights were 15% for wages, 40% for education, 40% for projected openings, and 5% for mobility.

- Mobility which indicates the potential ease of switching industries based on an occupation's employment share across industries; this measure is important in the event of industry decline or a dislocation event

The top 25 occupations based on index score are shown below (Table 5.5). The highest ranked occupation in San Bernardino is police and sheriff's patrol officers, followed by correctional officers and jailers, electricians, and dental hygienists. Three of the top 25 occupations are related to healthcare, and another three (electricians, plumbers, and carpenters) are accessible through conventional apprenticeship.

Table 5.5: Occupation Index

Occupation	Average Annual Wages	Typical Entry-Level Education	Total Projected Openings Over the Next 10 Years	Mobility Index	Index Score
Police and Sheriff's Patrol Officers	\$90,200	High school diploma or equivalent	2,556	4.1	66.4
Correctional Officers and Jailers	\$71,500	High school diploma or equivalent	1,697	1.8	65.4
Electricians	\$58,800	High school diploma or equivalent	2,796	1.6	64.5
Dental Hygienists	\$91,900	Associate's degree	762	1.1	63.7
Insurance Sales Agents	\$61,100	High school diploma or equivalent	1,399	1.3	63.0
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$68,800	High school diploma or equivalent	4,193	26.0	63.0
Heavy and Tractor-Trailer Truck Drivers	\$48,100	Postsecondary non-degree award	9,060	3.7	62.8
Supervisors of Construction and Extraction Workers	\$74,600	High school diploma or equivalent	1,718	9.9	62.7
Farmers, Ranchers, and Other Agricultural Managers	\$70,700	High school diploma or equivalent	1,683	6.7	62.6
Electrical Power-Line Installers and Repairers	\$79,200	High school diploma or equivalent	1,032	3.1	62.6
Property, Real Estate, and Community Association Managers	\$62,000	High school diploma or equivalent	1,411	2.5	62.1
Plumbers, Pipefitters, and Steamfitters	\$49,600	High school diploma or equivalent	1,749	1.6	62.0
Carpenters	\$48,300	High school diploma or equivalent	4,652	4.6	61.6
Operating Engineers and Other Construction Equipment Operators	\$68,300	High school diploma or equivalent	1,422	6.9	61.5
Automotive Service Technicians and Mechanics	\$47,200	Postsecondary non-degree award	3,536	3.4	61.1
Firefighters	\$67,800	Postsecondary non-degree award	1,095	4.1	61.0
Elementary School Teachers, Except Special Education	\$80,100	Bachelor's degree	5,839	1.0	61.0
Registered Nurses	\$96,300	Bachelor's degree	13,031	3.3	60.8
First-Line Supervisors of Mechanics, Installers, and Repairers	\$71,500	High school diploma or equivalent	1,462	31.0	60.7

This group of occupations could help form a basis from which to prioritize training investments, review gaps in the eligible training providers list, and make sure that available career pathways are aligned.

First-Line Supervisors of Office and Administrative Support Workers	\$57,200	High school diploma or equivalent	4,177	49.3	60.7
Painters, Construction and Maintenance	\$43,800	Less than high school	1,939	1.7	60.6
Food Service Managers	\$48,100	High school diploma or equivalent	1,676	2.4	60.4
Teacher Assistants	\$32,600	Some college, no degree	5,939	1.4	60.1
Transportation, Storage, and Distribution Managers	\$96,700	High school diploma or equivalent	683	7.4	60.1
Licensed Practical and Licensed Vocational Nurses	\$48,900	Postsecondary non-degree award	3,747	8.0	60.1

Source: [JobsEQ®](#)

VI. Conclusions

Based on the data, interviews, and focus group findings, Chmura believes the SBCWDB has a few actionable opportunities on which to capitalize. These opportunities could help “move the needle” towards broader economic advancement in the County. The opportunities described were largely informed by consistent patterns expressed in the interviews and focus groups, communication with the WDB’s project team, and backed by analysis of the secondary data. In some cases, the opportunities described may already be underway as workforce initiatives. In such cases, the emergence of these opportunities from Chmura’s research reinforces the value of such initiatives to the broader community. In other cases, these opportunities may inspire the development of new initiatives or complement and inform the refinement of current ones. Based on Chmura’s experience, some opportunities include reference to an existing model or resource that the WDB could research further and potentially adopt in the County.

Become the County’s recognized authority for providing labor market information (LMI)

Focus groups strongly indicated the need for more collaboration between businesses and education providers. They emphasized the importance of training and education programs keeping pace with changing work environments and the need for current and future workers to be proficient using technology. One large employer spoke to the importance of having a single point of contact into the workforce system, rather than collaborating separately with the SBCWDB and multiple education providers. Others echoed this sentiment and reinforced the importance of improved collaborations across workforce system stakeholders.⁴⁵ One of the most pressing challenges for the workforce system to address was reported as bridging the gap between businesses and education.

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⁴⁵ Workforce system “stakeholders” in this context include but are not limited to jobseekers, businesses, training and education providers, community based organizations, public agencies, and economic development organizations.

Overall, there was clear demand expressed for a reliable and guiding source of LMI in the County.

The SBCWDB is in a unique position relative to receiving LMI in the County. Their direct relationships with hundreds of employers through their business services team, and hundreds more, through their business survey outreach, coupled with access to secondary employment and economic data provide an opportunity to synthesize this information into actionable intelligence that could provide an informational backbone for the County's workforce system. Recognizing the vast geography of the County and its unique mix of industries by sub-region, it would be useful to gather, consolidate, and report information at the County and sub-region levels. This approach would help to ensure that the LMI provided to stakeholders in different regions reflects conditions in each respective area, rather than generalizing to Countywide conditions. With this approach, stakeholders could design and implement programs and initiatives that align with the unique needs of their local employers and workers.

Although the SBCWDB is already playing this role, there is room for improvement. For example, business surveys could be redesigned to capture details on specific skill shortfalls. Surveys could be administered to specific sectors on a regular basis and findings could provide an impetus for more research or give rise to new ideas and collaborations. Public release of survey findings could help build deeper relationships with stakeholders and provide useful trend analysis over time.

Using LMI, the SBCWDB could highlight and profile high-demand occupations that pay self-sufficient wages in the County. These jobs could be promoted through marketing campaigns and featured in career pathway programs. Moreover, they could help to prioritize the allocation of training resources and provide a basis for regularly reviewing and updating the eligible training providers list (ETPL).

Staff could make public presentations of LMI, and current conditions could be communicated on a regular basis via newsletter, web page, or blog. In short, the SBCWDB could become the County's "go-to resource" for gathering and disseminating LMI, potentially reducing duplication of work effort across stakeholders and enhancing collaborative partnerships. This could also help to ensure that stakeholders coordinate better and move forward based on shared information and mutual understanding.

Bolster sector partnerships

While the County's employment growth is forecast to be widespread, it's likely to be led by a handful of sectors, notably healthcare, logistics, professional, scientific and technical services, and construction. Each of these sectors employs a different mix of workers with specific knowledge and skills; each faces its own set of challenges,

Business surveys could be redesigned to capture details on specific skill shortfalls. Surveys could be administered to specific sectors on a regular basis and findings could provide an impetus for further research and/or inform new collaborations.

The greatest opportunity for workforce development in the County is teaming with employers in the region on a regular basis.

including impending retirements, skill shortages, and technological advancements. Focus group participants spoke to the importance of both upskilling current workers and training future workers for the County's growing industries. At the same time, as discussed in this report, stakeholders spoke to the disconnect between employers and training and education providers.

One of the most pressing challenges reported was a shortage of skilled labor, especially in health care, skilled trades, and jobs requiring higher education. As noted in a recent report, "to move beyond its current trajectory, and take advantage of favorable trends [economic growth], the County needs to greatly enhance the skill level of its workforce."⁴⁶ Given the rapid rate at which work environments are changing, efforts to enhance the County's collective skill level should be made in partnership with local employers. The SBCWDB is uniquely positioned to influence such efforts.

According to one employer, the greatest opportunity for workforce development in the County is teaming with employers in the region on a regular basis to set current and future workers up for success through education and training that is based on the precise skills and other needs that the County's companies value most. By design, sector partnerships "can help facilitate the advancement of workers at all skill levels, including the least skilled."⁴⁷ Forming and sustaining these partnerships requires an intensified level of effort and provides the SBCWDB an opportunity to buttress its place as the County's LMI authority. While it's critical for employers to champion these partnerships, it's equally important that all stakeholders play major roles. The SBCWDB could leverage its experience from SlingShot⁴⁸ to replicate facets of the project and apply lessons learned to build new partnerships with key industries like logistics, healthcare, or construction. One approach would be to gradually launch partnerships, focusing on one or two sectors—perhaps in different sub-regions, and scale up over time.

The mission of these partnerships must be aimed towards workforce "transformation" rather than business service "transaction."

The mission of these partnerships must be oriented towards workforce "transformation" rather than business service "transaction." In other words, these partnerships are not simply about placing workers in open positions to meet employer's needs. They are about cultivating a collaborative approach to workforce development that draws upon the resources and expertise of multiple and diverse stakeholders. A natural place to start, to secure buy-in and generate forward

⁴⁶ Source: <http://wp.sbcounty.gov/workforce/wp-content/uploads/sites/5/2016/11/County-of-San-Bernardinus-Pivotal-Moment-final.pdf>

⁴⁷ Source: <https://www.nationalskillscoalition.org/state-policy/sector-partnerships>

⁴⁸ Source: <https://cwdb.ca.gov/initiatives/slingshot/>

momentum across stakeholders, could be through a comprehensive, sector-specific skills needs assessment. An example of this type of project was recently published by the Oakland County Workforce Development Board: [Advanced Manufacturing Skills Needs Assessment Project](#). Findings from this type of project could provide a robust foundation from which to engage partners and establish workforce priorities related to a specific sector, occupation (e.g. “skilled trades”) or socioeconomic group (e.g. “disconnected youth”).

Another opportunity could be to form sector partnerships that aim to revitalize distressed parts of the County while also training workers to develop important skills. Themes that emerged from the focus groups included incentivizing neighborhood revitalization; developing affordable housing options for lower wage workers; leveraging old, abandoned buildings for new business formation and housing; increasing the talent pipeline for skilled trades; and teaching soft and customer service skills to workers. A model to consider emulating is the [ReBuilding Center](#) in Portland, Oregon. Rather than demolish a structure, the ReBuilding Center promotes deconstruction and salvaging of useful materials that are then sold in a retail storefront. The deconstruction experience could become a vehicle for workforce development, potentially supporting pre-apprenticeships and apprenticeships and providing a steady flow of projects for programs like [YouthBuild Inland Empire](#). In some cases, deconstruction projects might become reconstruction or “rehabilitation” type projects, supporting revitalization that generates both affordable housing and office space. Aside from developing technical and trade skills through the de/reconstruction process, workers could hone important customer service and sales skills in the retail environment. This type of program could have an additional effect of fostering community pride in distressed areas, which was another theme raised during focus group sessions.

Five themes that emerged from the focus group data support revitalizing distressed parts of the County while training workers.

Expand Career Services

Characteristics of the region point toward a need to expand career services. With a strong employment growth forecast across many industries, there are wide-ranging career opportunities for the County’s workers. At the same time, the region’s relatively low rates of educational attainment and participation in the labor force could become a drag on the County’s economic growth if they remain unchanged. Further, more than 135,000 workers, or approximately 20% of those currently employed in the County, are age 55 years or older, and many are likely near retirement.

The need for expanded career services were evident in three prevalent and interconnected themes that emerged from focus groups in terms of the importance of:

- 1) Upskilling incumbent workers to adapt to new technologies,
- 2) Transferring knowledge from soon-to-retire workers to new and future workers, and
- 3) Developing the right mix of skills in younger workers to support the County’s growing industries.

One countywide initiative that was suggested by focus groups was publicly funded training programs to upgrade skills as needed in existing workforce, allowing incumbent workers to be retrained as needed.

These are challenges experienced by workforce systems across the nation, and sector partnerships can be a plausible vehicle for addressing them. For example, technological advancements like 3D printing do not typically affect a single manufacturing business, they affect an entire industry. When this type of advancement becomes integrated into the production process, workers need to command new skills such as Computer-Aided Design (CAD) software or new programming languages. Through an effective sector partnership, businesses may communicate these training needs and co-invest, along with the workforce board and other stakeholders, in supporting the development of a new training program to be delivered by local training providers to upskill existing workers or train future workers. Naturally, resources may be a constraint as taking time to retrain workers can impede productivity and impose hard costs associated with the development and delivery of training programs.

Sector partnerships could provide a forum for businesses and other stakeholders to explore best practices, exchange ideas, and pilot approaches to things such as flexible work schedules. One countywide initiative that was suggested by focus group participants was publicly funded training programs to upgrade skills as needed in the existing workforce, allowing incumbent workers to be retrained as needed. The [Michigan Skilled Trades Training Fund](#) is one example of a program that reimburses companies for upskilling existing employees and new hires in technical, short-term training programs, including robotics and automation.

Publicly accessible “makerspaces” could also serve as an important vehicle for knowledge transfer and skills development, notably related to advanced technologies, manufacturing or other STEM-related industries. Generally, makerspaces are collaborative, production-oriented workspaces where entrepreneurs, established and startup companies, skilled tradespeople—aspiring “makers” and others—can share tools, equipment, space, ideas, and knowledge. Makerspaces may be housed in community centers, libraries, schools, or facilities made available through public/private partnerships, and may include equipment such as 3D printers, welding tools, and computer numerical control (CNC) machines.

Bing Wong Elementary School’s [iSTEAM Lab](#) is a local example of a makerspace program. In the summer of 2018, the City of Ontario plans to open a public makerspace. At least two private makerspaces are available in the region: [Vocademy](#) in Riverside and [Umakers](#) in Upland. Developing more spaces like these in each of the County’s sub-regions could stimulate more interest in, and provide important hands-on learning experiences in careers that support key industries.

The SBCWDB's recent commitment to place students completing local pathways programs into internships with pathways-related businesses is an important step in facilitating knowledge transfer and exposing students to the real world of work. According to one focus group participant, one of the WDB's greatest opportunities is to "work in collaboration with employers to engage the labor force that will be entering the field. Specifically, employers need to engage the younger generations such as middle and high school students. Those grade levels are crucial to engage these students in preparing towards a career path." This observation, echoed by others, speaks not just to the importance of internships, but also to on-the-job training, apprenticeships, and pre-apprenticeship programming. It also reiterates the importance of bridging the information gap between education and businesses and forming sector partnerships by region and industry.

One of the most active topics communicated in focus groups and interviews was the importance of preparing future workers with relevant, in-demand skills. Despite attempts to steer the conversation towards discussions of hard/technical skills, focus group participants repeatedly stressed the need for customer service and soft skills training. K-20 career pathways that offer specialized skills training and include soft skills training were strongly recommended.

As noted earlier, the WDB can play an active role in ensuring that local training and education programs align with workforce needs expressed by the County's businesses. But these needs must also be responded to outside of the public education system. As communicated in previous reports by Chmura, the WDB could consider establishing standalone career one-stops tailored to serve younger workers. [The Next Generation Zone](#), located in Spokane, Washington, and partially funded by the Spokane Area Workforce Development Council, is a consortium-operated entity that delivers skills training for young adults moving through the workforce system. Their [21st Century Skills Academy](#) focuses on developing foundational workforce skills while also providing industry-specific training in fields such as manufacturing, healthcare, and information. This approach allows younger workers to gain in-depth experiences with growing, local industries, and supports their prospects for landing a job. In a similar vein, the Oakland County Workforce Development Board recently launched a [Robotics/Automation Training Cohort program](#) in collaboration with a local community college, using braided workforce funds. The 15-week program results in basic robotics and automation certifications and could easily stack on top of secondary or youth worker training programs.

In sum, there is an abundance of actionable opportunities for the SBCWDB to consider. The County's prospects for employment growth and the youth of its population distinguish it from much of the nation. Its industry strengths provide better opportunities for economic advancement to a broad range of workers. The keys for the WDB will be to commit on a deeper level to specific sectors of the region's economy and to invigorate the County's labor force to fuel the economy's expansion.

One of the WDB's greatest opportunities is to "work in collaboration with employers to engage the labor force that will be entering the field. Specifically, employers need to engage the younger generations such as middle and high school students."

VII. Appendices

Appendix: Climate-Capabilities Matrix

Data Collection

Data were compiled from the following sources to analyze the national climate as well as the capabilities in the region:

1. Quarterly Census of Employment and Wages (QCEW) provides data on past industry and wage growth as well as industry competitiveness (2017).
2. Data on national export growth were retrieved using IMPLAN Pro software (2015).⁴⁹
3. Regional and national output multipliers as well as regional supply chain capacity were retrieved from Chmura's JobsEQ software platform (2017).
4. Federal contract awards data by region and industry were retrieved from Chmura Economics & Analytics' FedSpendTOP database, which is derived from the U.S. General Services Administration's Federal Procurement database (2016).
5. National industry output and projected industry output were from the Bureau of Labor Statistics (2014 and 2024).
6. The national percentage of research and development (R&D) in sales by industry was calculated using data from the National Science Foundation (2013).
7. San Bernardino patent data by assignee is from the U.S. Patent and Trademark Office (2011-2015).

Complete List of Industries

The following table represents a complete list of all industries with at least a 0.1% share of the Inland Empire's total employment.⁵⁰ The average national climate index is 47.3 and the average regional capability index is 36.2.⁵¹ Any industries with respective figures above (or below) these index averages can be considered to have a strong (or weak) index relative to the average.

This matrix was developed using the 2012 NAICS definitions. As the Quarterly Census of Employment and Wages (and Chmura's JobsEQ software platform) were updated to the 2017 NAICS definitions in the third quarter of 2017, the employment data of a few industries were cross-walked to their 2017 counterparts. More information on the 2017 NAICS update can be found here: <http://www.chmuraecon.com/blog/2017/november/28/2017-naics-code-changes/>.

⁴⁹ IMPLAN Pro software allows economists to perform input-output analysis on regional economies.

⁵⁰ Industries are listed by the sum of their climate and capability indexes.

⁵¹ While the climate and capabilities indexes are on a scale of 0 to 100, the average for each index is not 0. This variation is due to "tied" rankings between some industries in the matrix's input variables.

NAICS	Industry	Inland Empire Capability Index	National Climate Index	San Bernardino County Employment (2017Q3)
5415	Computer Systems Design and Related Services	71.1	79.0	4,072
6221	General Medical and Surgical Hospitals	62.4	76.5	31,520
6211	Offices of Physicians	63.6	72.0	11,823
5611	Office Administrative Services	66.0	65.3	5,338
6113	Colleges, Universities, and Professional Schools	61.6	69.7	6,035
2362	Nonresidential Building Construction	63.9	65.7	2,636
5419	Other Professional, Scientific, and Technical Services	64.6	65.0	3,326
5416	Management, Scientific, and Technical Consulting Services	55.6	68.9	4,975
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Manufacturing	69.9	53.1	2,159
3364	Aerospace Product and Parts Manufacturing	49.0	73.7	1,837
7224	Drinking Places (Alcoholic Beverages)	53.5	68.4	772
5413	Architectural, Engineering, and Related Services	39.6	79.6	4,432
7223	Special Food Services	49.0	68.3	1,790
8131	Religious Organizations	46.0	71.2	6,413
3399	Other Miscellaneous Manufacturing	43.3	73.7	1,652
6231	Nursing Care Facilities (Skilled Nursing Facilities)	54.4	62.5	6,678
4881	Support Activities for Air Transportation	63.5	53.3	2,181
6112	Junior Colleges	46.4	69.8	4,737
6222	Psychiatric and Substance Abuse Hospitals	37.5	76.6	3,268
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly	50.8	62.6	3,025
3363	Motor Vehicle Parts Manufacturing	56.4	56.9	1,115
2373	Highway, Street, and Bridge Construction	44.1	68.8	956
6243	Vocational Rehabilitation Services	44.6	67.7	2,057
5612	Facilities Support Services	64.2	46.8	1,439
3391	Medical Equipment and Supplies Manufacturing	38.1	72.3	1,205
6232	Residential Intellectual and Developmental Disability, Mental Health, and Substance Abuse Facilities	49.5	60.6	1,955
7139	Other Amusement and Recreation Industries	43.3	66.6	6,816
6216	Home Health Care Services	47.5	62.2	5,534
5619	Other Support Services	42.3	66.6	1,782
3329	Other Fabricated Metal Product Manufacturing	63.6	44.9	1,005
6214	Outpatient Care Centers	42.1	65.1	9,589
6215	Medical and Diagnostic Laboratories	44.9	61.5	800
8123	Drycleaning and Laundry Services	44.8	61.5	1,651
6115	Technical and Trade Schools	47.9	57.8	1,705
2382	Building Equipment Contractors	41.4	64.3	10,252

6219	Other Ambulatory Health Care Services	39.4	65.5	2,069
3339	Other General Purpose Machinery Manufacturing	49.9	53.9	683
2361	Residential Building Construction	34.0	69.6	5,043
3323	Architectural and Structural Metals Manufacturing	42.6	60.1	2,116
6116	Other Schools and Instruction	44.9	57.7	1,517
5511	Management of Companies and Enterprises	40.4	61.5	6,142
7225	Restaurants and Other Eating Places	42.2	59.5	58,476
5621	Waste Collection	47.5	54.0	692
2389	Other Specialty Trade Contractors	35.6	65.5	4,529
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	35.8	65.2	2,571
8134	Civic and Social Organizations	47.5	53.2	1,235
6241	Individual and Family Services	37.3	62.6	25,043
4885	Freight Transportation Arrangement	46.3	53.0	1,735
4931	Warehousing and Storage	34.1	64.6	32,018
2383	Building Finishing Contractors	32.0	65.9	6,797
3222	Converted Paper Product Manufacturing	38.0	58.3	1,331
3231	Printing and Related Support Activities	35.7	60.5	1,558
3273	Cement and Concrete Product Manufacturing	34.0	62.1	3,102
6213	Offices of Other Health Practitioners	38.1	58.0	3,203
2371	Utility System Construction	39.0	57.1	2,346
5615	Travel Arrangement and Reservation Services	37.2	57.8	489
5614	Business Support Services	43.3	51.7	1,723
8139	Business, Professional, Labor, Political, and Similar Organizations	41.3	53.2	1,286
3362	Motor Vehicle Body and Trailer Manufacturing	31.6	62.8	1,028
6111	Elementary and Secondary Schools	44.6	49.5	52,217
6244	Child Day Care Services	39.9	50.8	5,444
3118	Bakeries and Tortilla Manufacturing	35.4	54.1	2,415
2381	Foundation, Structure, and Building Exterior Contractors	24.5	64.9	7,649
4884	Support Activities for Road Transportation	34.4	54.0	1,441
3119	Other Food Manufacturing	38.5	49.6	2,032
5313	Activities Related to Real Estate	40.0	47.6	3,019
3261	Plastics Product Manufacturing	36.9	49.9	5,460
4841	General Freight Trucking	30.2	56.2	17,242
4921	Couriers and Express Delivery Services	34.6	51.6	9,789
5418	Advertising, Public Relations, and Related Services	28.4	57.8	929
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	36.3	49.4	1,400
5412	Accounting, Tax Preparation, Bookkeeping, and Payroll Services	32.6	52.1	3,247
7115	Independent Artists, Writers, and Performers	32.7	52.0	974
4842	Specialized Freight Trucking	28.0	56.2	3,988
7211	Traveler Accommodation	32.7	50.1	4,391

5616	Investigation and Security Services	34.8	48.0	5,468
3321	Forging and Stamping	38.5	44.1	1,188
4529	Other General Merchandise Stores	42.3	40.2	10,645
5613	Employment Services	27.1	55.4	28,637
5312	Offices of Real Estate Agents and Brokers	32.7	47.8	2,344
6212	Offices of Dentists	36.6	43.1	5,455
5223	Activities Related to Credit Intermediation	31.5	46.7	1,630
3219	Other Wood Product Manufacturing	22.9	54.3	1,605
4471	Gasoline Stations	40.1	36.8	4,869
3121	Beverage Manufacturing	30.8	45.5	1,493
4541	Electronic Shopping and Mail-Order Houses	40.9	35.4	1,686
8121	Personal Care Services	32.8	43.5	5,768
5617	Services to Buildings and Dwellings	28.9	46.9	11,038
4911	Postal Service	36.4	39.1	2,804
4854	School and Employee Bus Transportation	36.2	39.3	1,518
4461	Health and Personal Care Stores	37.5	36.8	5,791
5411	Legal Services	29.6	44.4	2,530
8111	Automotive Repair and Maintenance	26.8	46.9	7,248
8129	Other Personal Services	29.9	43.1	3,104
5242	Agencies, Brokerages, and Other Insurance Related Activities	32.3	40.5	3,654
4411	Automobile Dealers	38.9	32.9	7,771
9261	Administration of Economic Program	43.3	28.0	2,464
4821	Rail Transportation	21.8	48.7	2,480
3344	Semiconductor and Other Electronic Component Manufacturing	23.9	46.4	494
4451	Grocery Stores	36.8	33.5	14,922
9211	Executive, Legislative, and Other General Government Support	41.1	28.5	10,004
4511	Sporting Goods, Hobby, and Musical Instrument Stores	33.8	35.8	3,081
4539	Other Miscellaneous Store Retailers	32.6	36.8	1,714
4431	Electronics and Appliance Stores	30.8	36.5	2,553
4422	Home Furnishings Stores	30.3	36.8	1,107
4244	Grocery and Related Product Merchant Wholesalers	35.5	31.1	5,903
4421	Furniture Stores	30.2	35.8	1,395
4452	Specialty Food Stores	32.1	33.6	835
5121	Motion Picture and Video Industries	13.6	51.7	1,208
5222	Nondepository Credit Intermediation	18.6	46.7	2,236
4521	Department Stores	24.4	40.4	9,962
9241	Administration of Environmental Quality Programs	36.4	28.2	1,559
4483	Jewelry, Luggage, and Leather Goods Stores	29.5	35.0	865
4481	Clothing Stores	28.7	35.8	7,900
4482	Shoe Stores	27.9	36.5	1,721

9231	Administration of Human Resource Programs	35.5	28.5	5,356
4441	Building Material and Supplies Dealers	27.9	35.8	5,949
9999	Unclassified	51.0	12.4	3,931
4543	Direct Selling Establishments	27.3	35.8	2,013
9221	Justice, Public Order, and Safety Activities	33.8	28.8	14,016
4532	Office Supplies, Stationery, and Gift Stores	26.7	35.8	1,591
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	30.4	31.1	3,293
4413	Automotive Parts, Accessories, and Tire Stores	28.9	32.6	3,932
8114	Personal and Household Goods Repair and Maintenance	27.0	34.4	1,486
5171	Wired Telecommunications Carriers	36.7	24.6	1,896
4239	Miscellaneous Durable Goods Merchant Wholesalers	29.3	31.1	3,213
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	27.0	32.8	2,849
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	27.5	32.1	2,236
5241	Insurance Carriers	28.0	31.0	2,447
4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	27.7	31.1	2,078
1151	Support Activities for Crop Production	28.8	29.9	282
3311	Iron and Steel Mills and Ferroalloy Manufacturing	28.3	30.0	1,369
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	26.8	30.6	2,158
4251	Wholesale Electronic Markets and Agents and Brokers	26.9	30.5	3,420
4241	Paper and Paper Product Merchant Wholesalers	25.0	32.1	862
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	25.3	31.6	808
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	25.2	31.1	1,228
5221	Depository Credit Intermediation	19.1	36.6	4,433
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	24.4	31.1	4,452
4232	Furniture and Home Furnishing Merchant Wholesalers	24.3	31.1	2,016
2213	Water, Sewage and Other Systems	25.5	29.2	1,874
4412	Other Motor Vehicle Dealers	21.4	32.7	1,170
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	21.9	32.1	1,731
5321	Automotive Equipment Rental and Leasing	22.9	30.8	1,059
4233	Lumber and Other Construction Materials Merchant Wholesalers	21.3	30.6	2,116
2211	Electric Power Generation, Transmission and Distribution	18.6	31.4	2,436
5311	Lessors of Real Estate	18.9	30.3	2,328
9281	National Security and International Affairs	20.6	28.2	2,877
1114	Greenhouse, Nursery, and Floriculture Production	29.9	15.7	393
7132	Gambling Industries	18.7	25.9	3,014
1113	Fruit and Tree Nut Farming	19.1	15.1	190

Source:
Chmura

Vulnerable Industries

Based on the climate-capabilities matrix, Chmura built a list of vulnerable industries in San Bernardino County. This list is comprised of industries that have both a weak national climate and weak regional capabilities, leading to a bleak growth outlook and potential contraction. While an abbreviated list is presented in the vulnerable industries section of the main report, the following table presents all 56 vulnerable industries sorted by total San Bernardino County employment.

NAICS	Industry	Inland Empire Capability Index	National Climate Index	San Bernardino County Employment (2017Q3)
9221	Justice, Public Order, and Safety Activities	33.8	28.8	14,016
5617	Services to Buildings and Dwellings	28.9	46.9	11,038
4521	Department Stores	24.4	40.4	9,962
4481	Clothing Stores	28.7	35.8	7,900
8111	Automotive Repair and Maintenance	26.8	46.9	7,248
4441	Building Material and Supplies Dealers	27.9	35.8	5,949
4244	Grocery and Related Product Merchant Wholesalers	35.5	31.1	5,903
8121	Personal Care Services	32.8	43.5	5,768
9231	Administration of Human Resource Programs	35.5	28.5	5,356
4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers	24.4	31.1	4,452
5221	Depository Credit Intermediation	19.1	36.6	4,433
4413	Automotive Parts, Accessories, and Tire Stores	28.9	32.6	3,932
5242	Agencies, Brokerages, and Other Insurance Related Activities	32.3	40.5	3,654
4251	Wholesale Electronic Markets and Agents and Brokers	26.9	30.5	3,420
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	30.4	31.1	3,293
4239	Miscellaneous Durable Goods Merchant Wholesalers	29.3	31.1	3,213
8129	Other Personal Services	29.9	43.1	3,104
4511	Sporting Goods, Hobby, and Musical Instrument Stores	33.8	35.8	3,081
7132	Gambling Industries	18.7	25.9	3,014
9281	National Security and International Affairs	20.6	28.2	2,877
4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers	27.0	32.8	2,849
4431	Electronics and Appliance Stores	30.8	36.5	2,553
5411	Legal Services	29.6	44.4	2,530
5241	Insurance Carriers	28.0	31.0	2,447
2211	Electric Power Generation, Transmission and Distribution	18.6	31.4	2,436
5311	Lessors of Real Estate	18.9	30.3	2,328
4236	Household Appliances and Electrical and Electronic Goods Merchant Wholesalers	27.5	32.1	2,236
5222	Nondepository Credit Intermediation	18.6	46.7	2,236
4243	Apparel, Piece Goods, and Notions Merchant Wholesalers	26.8	30.6	2,158
4233	Lumber and Other Construction Materials Merchant Wholesalers	21.3	30.6	2,116

4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers	27.7	31.1	2,078
4232	Furniture and Home Furnishing Merchant Wholesalers	24.3	31.1	2,016
4543	Direct Selling Establishments	27.3	35.8	2,013
2213	Water, Sewage and Other Systems	25.5	29.2	1,874
4249	Miscellaneous Nondurable Goods Merchant Wholesalers	21.9	32.1	1,731
4482	Shoe Stores	27.9	36.5	1,721
4539	Other Miscellaneous Store Retailers	32.6	36.8	1,714
5223	Activities Related to Credit Intermediation	31.5	46.7	1,630
4532	Office Supplies, Stationery, and Gift Stores	26.7	35.8	1,591
4854	School and Employee Bus Transportation	36.2	39.3	1,518
3121	Beverage Manufacturing	30.8	45.5	1,493
8114	Personal and Household Goods Repair and Maintenance	27.0	34.4	1,486
4421	Furniture Stores	30.2	35.8	1,395
3311	Iron and Steel Mills and Ferroalloy Manufacturing	28.3	30.0	1,369
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	25.2	31.1	1,228
4412	Other Motor Vehicle Dealers	21.4	32.7	1,170
4422	Home Furnishings Stores	30.3	36.8	1,107
5321	Automotive Equipment Rental and Leasing	22.9	30.8	1,059
4483	Jewelry, Luggage, and Leather Goods Stores	29.5	35.0	865
4241	Paper and Paper Product Merchant Wholesalers	25.0	32.1	862
4452	Specialty Food Stores	32.1	33.6	835
5324	Commercial and Industrial Machinery and Equipment Rental and Leasing	25.3	31.6	808
3344	Semiconductor and Other Electronic Component Manufacturing	23.9	46.4	494
1114	Greenhouse, Nursery, and Floriculture Production	29.9	15.7	393
1151	Support Activities for Crop Production	28.8	29.9	282
1113	Fruit and Tree Nut Farming	19.1	15.1	190

Vulnerable Occupations

Based on the vulnerable industries, Chmura developed a list of vulnerable occupations employed by companies in these industries. The top 100 occupations that comprise 82% of the total vulnerable occupation employment are shown below. Note that the employment figures for each occupation only include the workers employed by firms in the vulnerable industries.

SOC	Title	San Bernardino County Employment (2017Q3)
41-2031	Retail Salespersons	18,822
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	6,339
43-5081	Stock Clerks and Order Fillers	5,656
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	5,226
41-1011	First-Line Supervisors of Retail Sales Workers	4,960
41-2011	Cashiers	4,906
37-3011	Landscaping and Groundskeeping Workers	4,273
43-4051	Customer Service Representatives	3,361
37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	3,239
39-5012	Hairdressers, Hairstylists, and Cosmetologists	3,212
43-9061	Office Clerks, General	3,159
11-1021	General and Operations Managers	3,008
49-3023	Automotive Service Technicians and Mechanics	2,748
53-3033	Light Truck or Delivery Services Drivers	2,319
43-3031	Bookkeeping, Accounting, and Auditing Clerks	2,165
43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	2,016
13-1031	Claims Adjusters, Examiners, and Investigators	1,993
43-5071	Shipping, Receiving, and Traffic Clerks	1,977
43-1011	First-Line Supervisors of Office and Administrative Support Workers	1,868
53-7061	Cleaners of Vehicles and Equipment	1,818
43-3071	Tellers	1,753
33-3012	Correctional Officers and Jailers	1,676
53-3032	Heavy and Tractor-Trailer Truck Drivers	1,662
41-3021	Insurance Sales Agents	1,608
33-3051	Police and Sheriff's Patrol Officers	1,541
49-9071	Maintenance and Repair Workers, General	1,520
37-2012	Maids and Housekeeping Cleaners	1,465
23-1011	Lawyers	1,437
41-2021	Counter and Rental Clerks	1,399
41-2022	Parts Salespersons	1,266

41-1012	First-Line Supervisors of Non-Retail Sales Workers	1,254
11-2022	Sales Managers	1,144
13-2072	Loan Officers	1,138
53-3022	Bus Drivers, School or Special Client	1,085
53-7051	Industrial Truck and Tractor Operators	974
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	954
41-3099	Sales Representatives, Services, All Other	947
43-9041	Insurance Claims and Policy Processing Clerks	908
13-1199	Business Operations Specialists, All Other	896
49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	892
53-3031	Driver/Sales Workers	890
49-3093	Tire Repairers and Changers	792
43-4151	Order Clerks	778
11-9199	Managers, All Other	771
43-4131	Loan Interviewers and Clerks	753
13-2011	Accountants and Auditors	742
39-5092	Manicurists and Pedicurists	730
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	722
49-3021	Automotive Body and Related Repairers	712
33-2011	Firefighters	707
53-7064	Packers and Packagers, Hand	703
41-3031	Securities, Commodities, and Financial Services Sales Agents	701
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	701
39-2021	Nonfarm Animal Caretakers	670
37-1011	First-Line Supervisors of Housekeeping and Janitorial Workers	651
37-1012	First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	646
39-3011	Gaming Dealers	644
23-2011	Paralegals and Legal Assistants	641
43-4171	Receptionists and Information Clerks	624
43-4061	Eligibility Interviewers, Government Programs	582
49-9099	Installation, Maintenance, and Repair Workers, All Other	581
39-1021	First-Line Supervisors of Personal Service Workers	562
11-3031	Financial Managers	559
51-1011	First-Line Supervisors of Production and Operating Workers	556
33-9032	Security Guards	533

51-8031	Water and Wastewater Treatment Plant and System Operators	511
53-1021	First-Line Supervisors of Helpers, Laborers, and Material Movers, Hand	492
13-1161	Market Research Analysts and Marketing Specialists	486
13-1111	Management Analysts	482
37-2021	Pest Control Workers	476
49-9041	Industrial Machinery Mechanics	473
43-6011	Executive Secretaries and Executive Administrative Assistants	457
51-2092	Team Assemblers	405
31-9011	Massage Therapists	396
33-9099	Protective Service Workers, All Other	394
43-6012	Legal Secretaries	393
43-3011	Bill and Account Collectors	390
13-1022	Wholesale and Retail Buyers, Except Farm Products	382
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	382
39-5011	Barbers	381
51-9111	Packaging and Filling Machine Operators and Tenders	378
15-1151	Computer User Support Specialists	373
13-1041	Compliance Officers	372
41-9011	Demonstrators and Product Promoters	364
41-9091	Door-to-Door Sales Workers, News and Street Vendors, and Related Workers	355
39-9032	Recreation Workers	354
49-9051	Electrical Power-Line Installers and Repairers	353
43-5061	Production, Planning, and Expediting Clerks	350
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	349
13-1071	Human Resources Specialists	348
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	334
27-1026	Merchandise Displayers and Window Trimmers	333
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	326
49-9031	Home Appliance Repairers	324
53-6031	Automotive and Watercraft Service Attendants	308
49-2011	Computer, Automated Teller, and Office Machine Repairers	304
37-3013	Tree Trimmers and Pruners	301
43-9199	Office and Administrative Support Workers, All Other	298
43-4031	Court, Municipal, and License Clerks	290
49-9098	Helpers--Installation, Maintenance, and Repair Workers	289

Appendix: Advanced Technologies

The following table represents a more complete list of the occupation mix for advanced industries in San Bernardino County. The 100 listed occupations represent 80% of total employment in advanced industries in the County.

SOC	Title	Current Emp.	Regional Average Wage	10-Year Separation Demand	10-Year Growth Demand	10-Year Total Demand	Typical Entry-Level Education	Typical OJT
51-2092	Team Assemblers	1,739	\$29,400	1,866	-247	1,619	High school diploma or equivalent	Moderate-term OJT
13-1111	Management Analysts	1,170	\$80,800	1,084	270	1,354	Bachelor's degree	None
15-1132	Software Developers, Applications	1,010	\$98,100	735	369	1,104	Bachelor's degree	None
11-1021	General and Operations Managers	852	\$116,500	714	95	809	Bachelor's degree	None
43-4051	Customer Service Representatives	845	\$37,300	1,054	-11	1,042	High school diploma or equivalent	Short-term OJT
49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	839	\$52,700	820	-106	714	Postsecondary non-degree award	Moderate-term OJT
11-9199	Managers, All Other	799	\$113,500	585	110	695	Bachelor's degree	None
51-1011	First-Line Supervisors of Production and Operating Workers	772	\$60,700	735	-12	723	High school diploma or equivalent	None
41-3099	Sales Representatives, Services, All Other	690	\$54,500	853	78	931	High school diploma or equivalent	Moderate-term OJT
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	677	\$39,600	742	-100	642	High school diploma or equivalent	Moderate-term OJT
43-9061	Office Clerks, General	577	\$34,400	670	1	671	High school diploma or equivalent	Short-term OJT
17-2051	Civil Engineers	568	\$104,600	429	81	510	Bachelor's degree	None
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	565	\$29,100	770	14	784	None	Short-term OJT
15-1151	Computer User Support Specialists	524	\$52,100	403	82	485	Some college, no degree	None
51-2022	Electrical and Electronic Equipment Assemblers	521	\$33,000	549	-103	447	High school diploma or equivalent	Moderate-term OJT
15-1121	Computer Systems Analysts	521	\$78,500	351	82	433	Bachelor's degree	None
13-1199	Business Operations Specialists, All Other	502	\$67,700	468	56	524	Bachelor's degree	None
13-1161	Market Research Analysts and Marketing Specialists	492	\$60,800	527	145	672	Bachelor's degree	None
15-1133	Software Developers, Systems Software	482	\$107,500	321	64	386	Bachelor's degree	None

43-6014	Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	472	\$38,500	489	-23	466	High school diploma or equivalent	Short-term OJT
41-4012	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	411	\$68,900	413	8	421	High school diploma or equivalent	Moderate-term OJT
17-1011	Architects, Except Landscape and Naval	405	\$77,500	296	39	335	Bachelor's degree	Internship/residency
51-4041	Machinists	402	\$43,300	402	1	402	High school diploma or equivalent	Long-term OJT
51-4121	Welders, Cutters, Solderers, and Brazers	401	\$38,900	423	5	428	High school diploma or equivalent	Moderate-term OJT
43-5071	Shipping, Receiving, and Traffic Clerks	391	\$33,000	379	-16	362	High school diploma or equivalent	Short-term OJT
17-2141	Mechanical Engineers	381	\$82,500	247	38	285	Bachelor's degree	None
49-9041	Industrial Machinery Mechanics	372	\$52,500	318	7	325	High school diploma or equivalent	Long-term OJT
43-3031	Bookkeeping, Accounting, and Auditing Clerks	362	\$41,800	397	-2	395	Some college, no degree	Moderate-term OJT
11-3021	Computer and Information Systems Managers	358	\$119,400	277	60	336	Bachelor's degree	None
13-2011	Accountants and Auditors	332	\$71,000	302	35	337	Bachelor's degree	None
43-5061	Production, Planning, and Expediting Clerks	328	\$45,100	331	7	338	High school diploma or equivalent	Moderate-term OJT
49-9071	Maintenance and Repair Workers, General	328	\$41,200	316	7	323	High school diploma or equivalent	Moderate-term OJT
11-9041	Architectural and Engineering Managers	316	\$140,100	222	22	243	Bachelor's degree	None
43-1011	First-Line Supervisors of Office and Administrative Support Workers	316	\$57,300	310	10	320	High school diploma or equivalent	None
15-1131	Computer Programmers	316	\$73,500	197	2	199	Bachelor's degree	None
17-2112	Industrial Engineers	312	\$80,900	210	36	245	Bachelor's degree	None
17-3011	Architectural and Civil Drafters	308	\$51,400	272	36	308	Associate's degree	None
49-9051	Electrical Power-Line Installers and Repairers	305	\$79,300	236	-1	236	High school diploma or equivalent	Long-term OJT
11-2022	Sales Managers	297	\$107,700	257	31	288	Bachelor's degree	None
51-9198	Helpers--Production Workers	292	\$25,500	430	-5	425	High school diploma or equivalent	Short-term OJT
51-9199	Production Workers, All Other	286	\$28,000	317	-4	313	High school diploma or equivalent	Moderate-term OJT
15-1142	Network and Computer Systems Administrators	286	\$73,700	180	24	204	Bachelor's degree	None

17-2072	Electronics Engineers, Except Computer	284	\$101,500	182	11	192	Bachelor's degree	None
13-1023	Purchasing Agents, Except Wholesale, Retail, and Farm Products	269	\$61,000	221	-18	203	Bachelor's degree	Moderate-term OJT
17-2071	Electrical Engineers	261	\$94,800	171	25	196	Bachelor's degree	None
17-3023	Electrical and Electronic Engineering Technicians	258	\$64,300	222	7	229	Associate's degree	None
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	256	\$35,000	270	-30	240	High school diploma or equivalent	Moderate-term OJT
11-3051	Industrial Production Managers	255	\$102,300	175	-2	173	Bachelor's degree	None
15-1199	Computer Occupations, All Other	242	\$80,800	171	40	211	Bachelor's degree	None
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	233	\$71,600	192	-7	185	High school diploma or equivalent	None
53-7051	Industrial Truck and Tractor Operators	231	\$33,300	250	-5	245	None	Short-term OJT
43-5081	Stock Clerks and Order Fillers	222	\$27,700	282	5	287	High school diploma or equivalent	Short-term OJT
51-4011	Computer-Controlled Machine Tool Operators, Metal and Plastic	216	\$38,400	211	1	212	High school diploma or equivalent	Moderate-term OJT
13-1071	Human Resources Specialists	213	\$62,000	214	28	242	Bachelor's degree	None
43-6011	Executive Secretaries and Executive Administrative Assistants	207	\$56,800	204	-31	173	High school diploma or equivalent	None
51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	207	\$29,800	203	-29	174	High school diploma or equivalent	Moderate-term OJT
49-9052	Telecommunications Line Installers and Repairers	205	\$51,800	188	-25	163	High school diploma or equivalent	Long-term OJT
41-4011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	202	\$75,400	211	21	232	Bachelor's degree	Moderate-term OJT
15-1152	Computer Network Support Specialists	199	\$71,200	147	12	158	Associate's degree	None
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	193	\$32,700	198	-34	164	High school diploma or equivalent	Moderate-term OJT
47-2111	Electricians	190	\$58,900	205	-1	205	High school diploma or equivalent	Apprenticeship

51-2011	Aircraft Structure, Surfaces, Rigging, and Systems Assemblers	189	\$46,000	180	-32	147	High school diploma or equivalent	Moderate-term OJT
15-1134	Web Developers	188	\$55,800	145	52	197	Associate's degree	None
11-3031	Financial Managers	181	\$112,500	142	38	180	Bachelor's degree	None
51-2099	Assemblers and Fabricators, All Other	179	\$28,900	188	-32	156	High school diploma or equivalent	Moderate-term OJT
27-1024	Graphic Designers	174	\$47,900	165	13	178	Bachelor's degree	None
51-9111	Packaging and Filling Machine Operators and Tenders	172	\$29,100	193	-4	189	High school diploma or equivalent	Moderate-term OJT
13-1081	Logisticians	163	\$76,800	160	14	174	Bachelor's degree	None
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	162	\$33,400	174	-10	164	High school diploma or equivalent	Moderate-term OJT
19-2041	Environmental Scientists and Specialists, Including Health	161	\$80,600	156	29	185	Bachelor's degree	None
51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	158	\$36,000	143	-31	112	High school diploma or equivalent	Moderate-term OJT
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	148	\$30,300	154	-6	149	High school diploma or equivalent	Moderate-term OJT
11-2021	Marketing Managers	147	\$115,200	130	20	150	Bachelor's degree	None
47-4011	Construction and Building Inspectors	142	\$86,600	160	21	181	High school diploma or equivalent	Moderate-term OJT
41-1012	First-Line Supervisors of Non-Retail Sales Workers	141	\$68,100	128	7	136	High school diploma or equivalent	None
19-4031	Chemical Technicians	139	\$48,900	129	2	131	Associate's degree	Moderate-term OJT
51-9011	Chemical Equipment Operators and Tenders	137	\$43,100	142	-5	137	High school diploma or equivalent	Moderate-term OJT
49-9043	Maintenance Workers, Machinery	137	\$47,600	138	4	143	High school diploma or equivalent	Long-term OJT
13-1151	Training and Development Specialists	136	\$60,000	139	24	163	Bachelor's degree	None
49-2095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	135	\$84,100	118	7	126	Postsecondary non-degree award	Moderate-term OJT
17-1022	Surveyors	135	\$86,500	101	22	123	Bachelor's degree	Internship/residency
53-7064	Packers and Packagers, Hand	132	\$26,800	195	-1	195	None	Short-term OJT
51-9081	Dental Laboratory Technicians	128	\$36,700	150	19	169	High school diploma or equivalent	Moderate-term OJT
51-8091	Chemical Plant and System Operators	128	\$59,900	120	-12	108	High school diploma or equivalent	Moderate-term OJT
31-9097	Phlebotomists	122	\$39,800	144	47	191	Postsecondary non-degree award	None

15-1143	Computer Network Architects	120	\$106,000	78	9	87	Bachelor's degree	None
19-2031	Chemists	117	\$67,100	106	6	112	Bachelor's degree	None
17-2199	Engineers, All Other	117	\$86,500	76	8	84	Bachelor's degree	None
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	116	\$27,400	107	-20	88	High school diploma or equivalent	Moderate-term OJT
17-3029	Engineering Technicians, Except Drafters, All Other	113	\$64,100	97	4	102	Associate's degree	None
51-8013	Power Plant Operators	113	\$64,600	95	-4	90	High school diploma or equivalent	Long-term OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	112	\$48,100	119	2	121	Postsecondary non-degree award	Short-term OJT
17-3022	Civil Engineering Technicians	111	\$61,600	100	15	116	Associate's degree	None
11-1011	Chief Executives	111	\$195,900	77	-2	76	Bachelor's degree	None
17-2011	Aerospace Engineers	109	\$103,700	65	7	72	Bachelor's degree	None
17-3031	Surveying and Mapping Technicians	109	\$60,300	121	16	137	High school diploma or equivalent	Moderate-term OJT
13-2051	Financial Analysts	106	\$85,700	93	13	106	Bachelor's degree	None
51-4051	Metal-Refining Furnace Operators and Tenders	105	\$39,300	97	-11	85	High school diploma or equivalent	Moderate-term OJT
17-3013	Mechanical Drafters	105	\$49,600	91	7	97	Associate's degree	None
49-3011	Aircraft Mechanics and Service Technicians	103	\$70,900	79	5	83	Postsecondary non-degree award	None

Source: Chmura

Data as of 2017Q3, except for occupation wages which are as of 2016 and represent the average for all covered employment across all industries

Appendix: Top In-Demand Occupations by Education Requirement

The following tables represent the most in-demand occupations over the next year at each education requirement level for San Bernardino County and sub-regions. Educational requirement is the typical education needed for entry for each occupation as defined by the BLS. Total annual demand is a sum of growth demand and separation demand. Data are as of 2017Q3.

Top 25 Occupations That Typically Require No Formal Educational Credential								
Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Laborers and Freight, Stock, and Material Movers, Hand	31,923	4,922	29,188	4,506	2,191	336	128	19
Retail Salespersons	25,948	3,810	20,859	3,062	3,713	550	406	58
Combined Food Preparation and Serving Workers, Including Fast Food	21,961	4,520	16,807	3,458	3,456	712	558	115
Cashiers	20,803	3,850	15,737	2,906	3,401	633	486	90
Stock Clerks and Order Fillers	16,006	2,164	13,349	1,807	1,955	266	224	29
Waiters and Waitresses	10,377	2,084	8,112	1,629	1,310	263	219	44
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	9,719	1,390	7,781	1,112	1,061	151	315	46
Personal Care Aides	7,771	1,611	5,807	1,199	473	97	375	79
Industrial Truck and Tractor Operators	7,436	923	6,882	856	460	57	14	2
Packers and Packagers, Hand	6,742	1,101	6,154	1,012	466	71	30	4
Landscaping and Groundskeeping Workers	6,394	862	5,012	675	668	90	85	12
Construction Laborers	6,366	760	5,332	636	471	56	73	9
Cooks, Fast Food	5,475	715	4,178	545	877	115	135	18
Cooks, Restaurant	5,139	812	4,013	634	663	105	110	17
Maids and Housekeeping Cleaners	4,968	722	3,881	566	536	78	163	23
Food Preparation Workers	4,465	804	3,493	629	610	109	107	19
Cleaners of Vehicles and Equipment	2,969	462	2,384	371	471	73	31	5
Dishwashers	2,868	468	2,253	368	363	59	63	10
Counter and Rental Clerks	2,789	380	2,293	312	299	41	40	5
Helpers--Production Workers	2,693	477	2,503	446	135	22	6	1
Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	2,689	591	2,084	459	396	86	68	15
Dining Room and Cafeteria Attendants and Bartender Helpers	2,151	391	1,673	304	269	49	50	9
Bartenders	1,998	343	1,570	269	216	37	38	7
Painters, Construction and Maintenance	1,994	181	1,667	151	156	14	28	3
Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	1,664	399	1,307	313	213	51	35	8

Top 25 Occupations That Typically Require A High School Diploma or Equivalent

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Office Clerks, General	14,666	1,750	12,414	1,476	1,325	159	238	30
Customer Service Representatives	9,933	1,332	8,612	1,153	931	126	104	14
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	11,070	1,123	9,191	928	1,068	108	208	22
Childcare Workers	6,468	1,046	4,941	797	834	136	207	34
First-Line Supervisors of Retail Sales Workers	8,898	965	7,007	760	1,367	148	160	18
Light Truck or Delivery Services Drivers	8,171	963	7,192	848	734	85	72	9
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	8,710	939	8,037	866	497	54	27	3
Security Guards	6,318	897	5,638	801	468	67	56	7
First-Line Supervisors of Office and Administrative Support Workers	7,398	781	6,280	662	754	80	105	11
First-Line Supervisors of Food Preparation and Serving Workers	4,786	741	3,702	573	697	108	118	18
Maintenance and Repair Workers, General	6,461	713	5,299	582	614	69	116	13
Receptionists and Information Clerks	4,768	704	3,957	583	579	86	82	12
Shipping, Receiving, and Traffic Clerks	6,267	671	5,700	611	443	47	28	3
Carpenters	6,180	633	5,083	520	503	52	83	9
Sales Representatives, Services, All Other	4,135	548	3,479	461	434	56	50	7
Team Assemblers	5,304	533	4,899	494	279	26	10	1
Medical Secretaries	3,200	438	2,690	369	408	56	56	7
Electricians	3,468	424	2,937	359	258	31	41	5
Recreation Workers	1,879	364	1,521	291	164	33	49	10
Bus Drivers, School or Special Client	2,704	360	2,100	279	394	51	87	12
First-Line Supervisors of Production and Operating Workers	3,177	313	2,828	278	223	22	16	2
Billing and Posting Clerks	2,469	298	2,119	255	252	31	35	4
Packaging and Filling Machine Operators and Tenders	2,404	296	2,244	277	123	15	3	0
Supervisors of Construction and Extraction Workers	2,628	293	2,177	243	209	23	31	3
Inspectors, Testers, Sorters, Samplers, and Weighers	2,695	290	2,463	265	167	18	7	1

Occupations That Typically Require Some College, No Degree

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Teacher Assistants	8,108	936	6,157	710	1,221	140	236	28
Bookkeeping, Accounting, and Auditing Clerks	7,970	889	6,739	749	740	82	117	14
Computer User Support Specialists	2,062	178	1,757	151	204	18	25	2
Computer, Automated Teller, and Office Machine Repairers	577	54	497	47	50	5	5	0
Actors	139	15	119	13	10	1	2	0
Wind Turbine Service Technicians	43	8	30	5	4	1	0	0

Top 25 Occupations That Typically Require a Postsecondary Non-Degree Award

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Heavy and Tractor-Trailer Truck Drivers	20,243	2,317	17,896	2,052	1,548	175	141	16
Nursing Assistants	5,900	793	4,957	662	573	77	173	23
Medical Assistants	3,716	538	3,160	459	476	68	49	7
Automotive Service Technicians and Mechanics	4,673	475	3,877	395	578	59	74	7
Hairdressers, Hairstylists, and Cosmetologists	3,293	453	2,801	385	347	48	69	9
Licensed Practical and Licensed Vocational Nurses	3,962	358	3,363	302	402	37	99	8
Dental Assistants	2,179	294	1,742	235	371	50	38	5
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	1,384	158	1,170	133	111	13	19	2
Telecommunications Equipment Installers and Repairers, Except Line Installers	1,360	133	1,095	108	210	19	14	1
Massage Therapists	801	112	666	94	100	14	15	2
Emergency Medical Technicians and Paramedics	1,308	103	1,084	85	186	15	18	1
Firefighters	1,316	98	1,250	94	52	4	5	0
Manicurists and Pedicurists	743	97	629	82	79	10	17	2
Phlebotomists	665	87	577	76	72	9	10	1
Medical Records and Health Information Technicians	1,006	78	865	67	107	8	19	1
Aircraft Mechanics and Service Technicians	836	75	697	62	127	12	2	0
Library Technicians	418	60	371	53	32	5	5	1
Surgical Technologists	600	57	516	49	67	6	11	1

Psychiatric Technicians	745	50	659	44	37	4	33	2
Skincare Specialists	352	46	297	39	40	5	7	1
Barbers	385	42	330	36	40	4	8	1
Electrical and Electronics Repairers, Commercial and Industrial Equipment	338	31	296	27	24	2	2	0
Audio and Video Equipment Technicians	281	30	237	25	26	3	4	0
Medical Transcriptionists	174	19	150	17	18	2	3	0
Electronic Home Entertainment Equipment Installers and Repairers	171	19	143	16	16	2	2	0

Top 25 Occupations That Typically Require an Associate's Degree

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Preschool Teachers, Except Special Education	1,760	198	1,371	153	245	28	46	5
Paralegals and Legal Assistants	840	101	760	91	57	7	7	1
Dental Hygienists	1,007	83	801	66	175	14	18	1
Human Resources Assistants, Except Payroll and Timekeeping	724	82	616	70	66	8	12	1
Radiologic Technologists	1,087	72	932	62	122	8	21	1
Respiratory Therapists	831	59	708	51	93	7	19	1
Medical and Clinical Laboratory Technicians	720	57	624	49	78	6	11	1
Computer Network Support Specialists	581	48	492	41	63	5	6	1
Web Developers	507	46	427	39	52	5	7	1
Architectural and Civil Drafters	452	44	383	37	44	4	6	1
Physical Therapist Assistants	265	42	226	35	29	5	6	1
Electrical and Electronic Engineering Technicians	446	40	394	35	34	3	3	0
Veterinary Technologists and Technicians	332	34	232	23	70	7	11	1
Forest and Conservation Technicians	268	33	243	30	17	2	3	0
Medical Equipment Repairers	298	29	261	26	24	2	3	0
Engineering Technicians, Except Drafters, All Other	307	28	277	25	20	2	2	0
Civil Engineering Technicians	274	27	245	24	18	2	3	0
Life, Physical, and Social Science Technicians, All Other	199	26	179	23	13	2	2	0
Diagnostic Medical Sonographers	319	25	272	21	38	3	6	0
Mechanical Drafters	262	24	236	22	18	2	2	0
Chemical Technicians	236	23	201	19	16	2	1	0
Cardiovascular Technologists and Technicians	292	18	247	16	36	2	6	0

Industrial Engineering Technicians	206	18	189	16	12	1	0	0
Occupational Therapy Assistants	103	16	87	14	11	2	3	0
Environmental Science and Protection Technicians, Including Health	117	15	101	13	11	1	2	0

Top 25 Occupations That Typically Require a Bachelor's Degree

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Registered Nurses	16,587	1,155	14,136	983	1,758	124	364	23
General and Operations Managers	10,585	999	8,922	838	997	94	149	15
Substitute Teachers	6,802	817	5,278	635	983	118	180	22
Elementary School Teachers, Except Special Education	8,815	716	6,647	540	1,403	114	254	21
Accountants and Auditors	4,332	442	3,714	378	398	41	53	6
Secondary School Teachers, Except Special and Career/Technical Education	5,563	441	4,195	332	888	71	160	13
Business Operations Specialists, All Other	3,744	390	3,231	335	324	34	50	5
Managers, All Other	4,090	352	3,474	298	415	36	58	5
Human Resources Specialists	2,508	276	2,197	240	191	21	32	4
Management Analysts	2,521	263	2,133	220	254	27	34	4
Market Research Analysts and Marketing Specialists	2,077	259	1,784	221	188	24	23	3
Sales Managers	2,670	249	2,335	217	233	22	21	2
Teachers and Instructors, All Other	1,807	232	1,425	182	242	31	41	5
Middle School Teachers, Except Special and Career/Technical Education	2,842	231	2,143	174	455	37	82	7
Financial Managers	1,896	185	1,648	160	159	16	22	2
Coaches and Scouts	1,180	177	930	139	141	21	20	3
Software Developers, Applications	1,837	176	1,560	148	195	19	16	2
Construction Managers	2,023	168	1,644	136	179	15	26	2
Medical and Health Services Managers	1,509	159	1,289	136	156	17	31	3
Child, Family, and School Social Workers	1,151	148	912	114	148	20	35	5
Loan Officers	1,371	137	1,195	119	135	14	12	1
Cost Estimators	1,193	131	1,013	111	97	11	13	1
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1,174	125	1,079	115	70	8	4	1
Training and Development Specialists	1,098	125	931	105	105	12	16	2
Administrative Services Managers	1,173	112	1,005	95	107	10	16	2

Top 25 Occupations That Typically Require a Master's Degree

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Educational, Guidance, School, and Vocational Counselors	1,299	152	1,017	119	179	21	33	4
Healthcare Social Workers	889	123	711	97	74	10	31	4
Education Administrators, Elementary and Secondary School	1,216	104	917	78	195	17	35	3
Mental Health Counselors	745	99	600	79	88	12	24	3
Rehabilitation Counselors	745	98	586	76	61	8	26	4
Community and Social Service Specialists, All Other	591	89	471	70	54	8	19	3
Instructional Coordinators	778	80	609	63	107	11	19	2
Nurse Practitioners	734	64	628	55	87	8	11	1
Marriage and Family Therapists	350	48	277	37	52	8	11	2
Librarians	409	43	342	36	44	5	8	1
Speech-Language Pathologists	581	41	466	33	73	5	15	1
Occupational Therapists	527	40	439	33	57	4	13	1
Physician Assistants	398	38	339	32	51	5	5	0
Education Administrators, Postsecondary	436	38	377	33	39	3	6	1
Nursing Instructors and Teachers, Postsecondary	269	28	225	23	30	3	5	1
Art, Drama, and Music Teachers, Postsecondary	276	25	233	21	28	2	5	0
Counselors, All Other	162	21	130	17	20	3	5	1
Urban and Regional Planners	175	17	162	16	9	1	1	0
Nurse Anesthetists	222	15	189	12	27	2	4	0
Health Diagnosing and Treating Practitioners, All Other	182	14	155	12	22	2	3	0
Statisticians	81	9	70	8	7	1	1	0
Psychologists, All Other	58	5	50	4	6	1	1	0
Curators	35	4	30	4	3	0	0	0
Nurse Midwives	37	3	31	2	4	0	0	0
Survey Researchers	28	3	23	2	3	0	0	0

Top 25 Occupations That Typically Require a Doctoral or Professional Degree

Occupation Title	San Bernardino County		East & West Valleys		High Desert Cities		Morongo Basin	
	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand	Current Empl	Total 1-Yr Demand
Lawyers	2,189	118	1,917	103	185	10	26	1
Pharmacists	1,635	81	1,292	65	256	13	39	2
Clinical, Counseling, and School Psychologists	932	77	748	61	106	9	29	2
Physical Therapists	933	65	792	55	106	7	18	1
Physicians and Surgeons, All Other	1,468	62	1,243	53	183	8	26	1
Postsecondary Teachers, All Other	707	62	573	51	86	7	16	1
Health Specialties Teachers, Postsecondary	522	55	445	47	52	5	8	1
Dentists, General	904	43	732	35	146	7	15	1
Medical Scientists, Except Epidemiologists	338	33	298	29	30	3	4	0
Family and General Practitioners	578	26	490	22	72	3	10	0
English Language and Literature Teachers, Postsecondary	276	24	222	20	35	3	6	1
Business Teachers, Postsecondary	240	23	202	19	25	2	5	0
Mathematical Science Teachers, Postsecondary	209	18	167	15	27	2	5	0
Education Teachers, Postsecondary	197	18	168	15	18	2	3	0
Veterinarians	291	17	211	12	57	3	9	0
Biological Science Teachers, Postsecondary	154	15	127	12	17	2	3	0
Psychology Teachers, Postsecondary	122	11	102	10	12	1	2	0
Computer Science Teachers, Postsecondary	105	9	86	8	12	1	2	0
Internists, General	190	9	162	8	25	1	2	0
Foreign Language and Literature Teachers, Postsecondary	96	9	80	7	10	1	2	0
Surgeons	184	8	153	7	27	1	3	0
Communications Teachers, Postsecondary	93	8	76	7	11	1	2	0
Recreation and Fitness Studies Teachers, Postsecondary	92	8	74	7	12	1	2	0
Optometrists	161	8	133	7	22	1	3	0
Anesthesiologists	155	7	128	6	24	1	2	0

Appendix: Hyperlinks for Useful Resources

Hyperlinks for useful resources are used throughout the report for ease of access to the reference material. Full URLs are provided below by section.

Section	Source Text	URL
Demographic Analysis	Industrial Technical Learning Center	http://intechcenter.org/
	Linked Learning Academies	https://sbcusd.com/student_resources/linked_learning
	Bing Wong Industries	http://www.bingwongindustries.com
Industry and Workforce Themes	Commonwealth Center for Advanced Logistics Systems (CCALS)	https://www.ccals.com
Conclusions	Advanced Manufacturing Skills Needs Assessment Project	https://www.oakgov.com/advantageoakland/resources/Documents/wd_skillsneedsreport.pdf
	ReBuilding Center	http://www.rebuildingcenter.org/who-we-are/
	YouthBuild Inland Empire	https://www.youthbuildinlandempire.org/
	Michigan Skilled Trades Training Fund	http://www.michigan.gov/wda/0,5303,7-304-64365_64538-312972--,00.html
	iSTEAM Lab	https://wong.sbcusd.com/about_us/
	Vocademy	https://www.vocademy.com/
	Umakers	https://www.umakers.org/
	The Next Generation Zone	http://www.nextgenzone.org/
	21st Century Skills Academy	http://www.nextgenzone.org/career-training
	Robotics/Automation Training Cohort program	https://oakland.k12.mi.us/employment/joblink/Documents/WD%20Robotics%20Automation%20Cohort%20Program%20Flyer%20FINAL.pdf