



CENTER FOR A COMPETITIVE WORKFORCE

L.A. & ORANGE COUNTY
COMMUNITY COLLEGES:

Powering Economic Opportunity



INSTITUTE FOR APPLIED ECONOMICS

Report Authors

Shannon M Sedgwick
Senior Economist
LAEDC

Eric Hayes
Associate Economist
LAEDC

Juan Madrigal
Assistant Director
Center of Excellence for
Labor Market Research

Arthur Girard
LAEDC Intern

CCW Advisory Council

Salvatrice Cummo
Pasadena City College

Lyla Eddington
Rio Hondo College

Margaret Fernandez
Rio Hondo College

Jennifer Galbraith
Mt. San Antonio College

Rick Hodge
L.A. Southwest College

Kendra Madrid
East Los Angeles College

Erica Mayorga
L.A. Harbor College

Anthony Pagán
Long Beach City College

Patricia Ramos
Santa Monica College

Virginia Rapp
El Camino College

Lucia Robles,
L.A. Community College District

Sandra Sanchez
L.A. Harbor College

Freddy Saucedo
Glendale Community College

Jan Swinton
Glendale Community College

Additional CCW Regional Project Partners

Gene Carbonaro
Long Beach City College

Carmen Dones
West L.A. College

Rodney Murray
Compton College

Laurie Nalepa
L.A. Valley College

Nick Real
Cerritos College

Armando Rivera-Figueroa
L.A. City College

Mike Slavich
Rio Hondo College

Marla Uliana
L.A. Mission College

Tom Vessella
Pierce College

Marcia Wilson
L.A. Trade-Tech College

Richard Verches
Executive Director
Center for a Competitive Workforce

Superintendents & Presidents

Dr. Jose Fierro
President/Superintendent
Cerritos Community College District

Dr. Geraldine M. Perri
Superintendent/President
Citrus Community College District

Dr. Keith Curry
Chief Executive Officer
Compton Community College District

Dr. Raul Rodriguez
Interim President
East Los Angeles College

Dr. Dena P. Maloney
Superintendent
El Camino Community College District

Dr. David Viar
Superintendent/President
Glendale Community College District

Dr. Francisco Rodriguez
Chancellor
Los Angeles Community College District

Dr. Mary Gallagher
President
Los Angeles City College

Dr. Otto W.K. Lee
President
Los Angeles Harbor College

Dr. Monte Perez
President
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Dr. Alexis S. Montevirgen
President
Los Angeles Pierce College

Dr. Seher Awan
President
Los Angeles Southwest College

Laurence B. Frank
President
Los Angeles Trade-Technical College

Dr. Denise Noldon
Interim President
Los Angeles Valley College

Dr. Bill Scroggins
President
Mt. San Antonio Community College District

Dr. Reagan Romali
Superintendent/President
Long Beach Community College District

Dr. Erika Endrijonas
Superintendent
Pasadena Community College District

Dr. Arturo Reyes
Superintendent/President
Rio Hondo Community College District

Dr. Kathryn E. Jeffery
Superintendent/President
Santa Monica Community College District

Dr. James M. Limbaugh
President
West Los Angeles College



CENTER FOR A COMPETITIVE WORKFORCE

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Center for a Competitive Workforce (CCW)

was established in 2017 as a Strong Workforce Program regional project, a collaboration among the 19 Los Angeles County community colleges of the Los Angeles/Orange County Regional Consortium, the Los Angeles/Orange County Center of Excellence for Labor Market Research and the Los Angeles County Economic Development Corporation (LAEDC). The CCW's mission is to produce regional economic intelligence reports to better align labor market supply and demand data, support industry-driven career education and workforce development programs, and strengthen industry engagement across the L.A. basin. The goal is a well-informed regional workforce development system positioned to train, educate and upskill residents with the knowledge, skills and abilities to be competitive for 21st century jobs and careers in the knowledge-intensive industries that drive the regional economy and will come to dominate our economic future. The CCW's work addresses the talent gaps employers face and compares the supply of middle-skill graduates with the projected demand of local firms, a balance which helps job-seekers and employers.

Learn more at www.CompetitiveWorkforce.LA

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INSTITUTE FOR APPLIED ECONOMICS
Los Angeles County Economic Development Corporation
444 S. Flower Street, 37th Floor • Los Angeles, CA 90071



California
Community
Colleges

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Executive Summary

Updating the original baseline.

In the Center for a Competitive Workforce's (CCW) baseline report "L.A. & Orange County Community Colleges: Powering Economic Opportunity" published in October 2017, the LAEDC's Institute for Applied Economics identified six target industries in the Los Angeles Basin expected to undergo significant middle-skill job growth between 2016 and 2021.

Similar to the initial report, an updated economic overview of the region will be provided hereunder; however, this second baseline report is more occupationally-focused compared to the first, severing the ties to target industries and instead selecting target occupations based on occupational demand projections across all industries in the Los Angeles Basin.

Economic Overview

Despite ample positive macroeconomic news, the labor market continues to bifurcate, as we produce greater numbers of high-tech and other "knowledge economy" jobs, as well as a vast quantity of low-skill service jobs that don't necessarily provide sustainable career trajectories.

Between 2017 and 2022, about 224,400 new jobs are forecast to be added across all industries in the Los Angeles Basin, a growth rate of 3.7 percent. When consideration is given to replacement jobs, approximately **2.4 million total openings (net new and replacement) are projected in the Basin over the period; close to one-third (32 percent) of these openings are expected to be in middle-skill occupations.**

Education Matters

The highest unemployment rates exist for individuals with lower levels of educational attainment. Earnings differentials exist among employed individuals with varying levels of educational attainment. Individuals with an associate degree, postsecondary nondegree award or some college enjoy a wage premium of more than \$15,000 annually over those with less than a high school education. Median earnings for those with an associate degree, postsecondary nondegree award or some college increased between 2016 and 2017 from \$36,380 to \$37,170 (a nominal change of \$800).

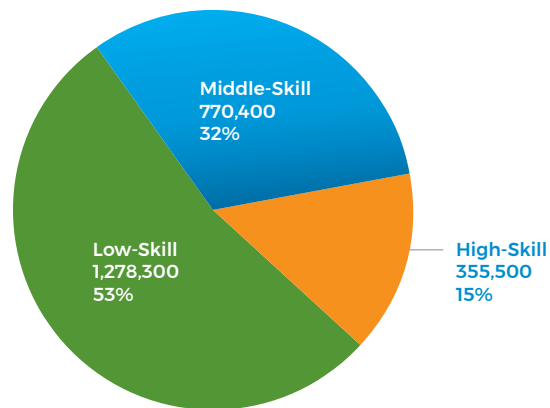
In this report, we remove the industrial umbrella and lead with occupational projections to forecast the region's labor demand for middle-skill jobs.

New Target Occupations

The target middle-skill occupations identified in this report are found across myriad industries including health care, government, education, construction and the information sector. All have wages that exceed the estimated living wage of \$14.36 and \$15.85 in Los Angeles County and Orange County, respectively. Together, these 15 target middle-skill occupations account for approximately 150,000 of all projected middle-skill openings (19.4 percent) in the Los Angeles Basin from 2017 through 2022.

- **Registered Nurses** (23,670 openings)
- **Teacher Assistants** (19,800 openings)
- **Carpenters** (14,330 openings)
- **Electricians** (9,240 openings)
- **Licensed Practical and Licensed Vocational Nurses** (9,070 openings)
- **Production, Planning, and Expediting Clerks** (8,420 openings)
- **Automotive Service Technicians and Mechanics** (8,250 openings)
- **Social and Human Service Assistants** (7,720 openings)
- **Dental Assistants** (7,700 openings)
- **Police and Sheriff's Patrol Officers** (7,100 openings)
- **Computer User Support Specialists** (13,770 openings)
- **Plumbers, Pipefitters, and Steamfitters** (6,830 openings)
- **Paralegals and Legal Assistants** (5,410 openings)
- **Pharmacy Technicians** (4,250 openings)
- **Web Developers** (3,210 openings)

EXHIBIT ES-1: SKILLS DISTRIBUTION FOR 2017-2022 JOB OPENINGS



Source: Estimates by LAEDC

The Center's efforts begin with research and analysis to compare middle-skill occupational demand with the community college's supply of skilled talent in the Los Angeles Basin.

Supply-Side Analysis

During the 2016-17 academic year, nearly 692,000 students enrolled in one or more community college courses in the Los Angeles Basin, with about 51 percent (351,822 students) enrolled in career education courses. Regionally, students can choose from more than 200 career education programs offered by 19 community colleges in Los Angeles County and 9 community colleges in Orange County.

In the region there will be approximately 150,000 job openings over the next five years (2017 to 2022) for the 15 occupations examined in supply and demand section of this report. Over 9,700 awards were conferred in programs training for the 15 target occupations in the 2017-18 academic year.

Revisiting the Target Industries

Our previously identified target industries are as follows:

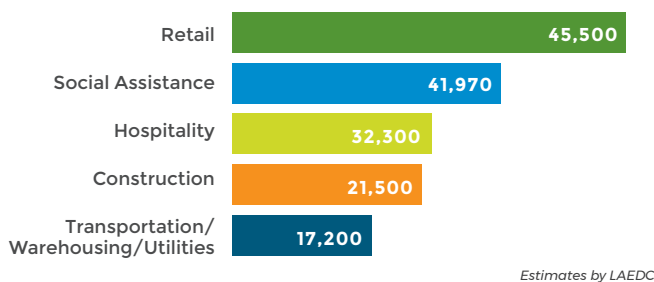
- Entertainment and digital media
- Health care services
- Professional services
- Aerospace manufacturing
- Biomedical manufacturing
- Port related transportation and supporting activities

We revisit these target industries and found:

- All the target industries have experienced growth in Los Angeles County between 2012 and 2017 (at varying rates), with the exception of aerospace.
- All six target industries are forecast to grow in the L.A. Basin over the next five years (2017 to 2022) apart from aerospace.

Looking ahead, total openings (net new and replacement) for middle-skill occupations in these six target industries are expected to reach 155,719 between 2017 and 2022, accounting for 20 percent of all projected middle-skill openings over the period.

**EXHIBIT ES-2:
L.A. BASIN INDUSTRIES WITH THE HIGHEST
MIDDLE-SKILL JOBS PROJECTED 2017-2022**



Potential for Further Research

We back into additional industries for which further research may be valuable to the community colleges in the region based upon their strong middle-skill job projections. The top five industries with the highest number of projected total openings between 2017 and 2022 (and not already covered in our previous deep-dive reports), which may be worth a closer look include:

- Construction
- Transportation, warehousing and utilities
- Hospitality
- Social Assistance
- Retail Trade (including eCommerce)

Together, these five industries account for approximately 23.2 percent of total employment and 33.2 percent of all middle-skill jobs in the L.A. Basin in 2017; over 158,000 total middle-skill openings (net new and replacement) are projected from 2017 to 2022 in the region in these industries.

Conclusion

We conclude this report with a brief discussion about the importance of achieving higher skill-levels in an economy that is transitioning from human and physical capital being the primary anchor of value creation to one where knowledge capital will be the primary anchor of industrial value creation and capture.

Individuals with the lowest levels of education are most at risk of disemployment related to technological innovation. As industries continue to evolve, it will be a major challenge for educational providers to keep pace; teaching students the skills they need to be hired and remain employed in this increasingly technical world.

We recommend the colleges continue to seek out and engage industry as a means to ensure that their programs are preparing students for advances in technology that may require new skill sets. Building relationships with employers provides the potential for establishing new programs and work-based learning opportunities (e.g., internships, specialized study) that provide direct pathways to employment, which will not only bolster the middle-skill talent supply pipeline but satisfy the labor demand needs of the industry. Finally, we identify next steps in activating this report.

Finally, we identify next steps in activating this report. Next steps include leveraging CCW’s partnership with LAEDC to engage industry leaders and professionals about the target occupations identified and the industries where they are employed. These efforts will be undertaken to gain intelligence, which will then be used to increase student access, better inform stakeholders of successes, gaps, opportunities and challenges in evolving industries, and to enhance the performance of L.A. Basin’s community colleges.

Introduction

What's new to the update.

This report is the product of a collaboration between the Los Angeles County Economic Development Corporation (LAEDC) and the Center for a Competitive Workforce (CCW), which was launched with funding from L.A. County's 19 community colleges in partnership with the LAEDC and the LA/OC Center of Excellence for Labor Market Research.

The goal of the first baseline report released in 2017 was to pinpoint select "target" industries and middle-skill occupations that will drive the regional economy, contributing to increased prosperity and improved standards of living for the residents in the economic region encompassed by Los Angeles and Orange counties (hereafter referred to as the "Los Angeles Basin" or the "L.A. Basin").

Middle-skill occupations are the focus for all work produced for the CCW. Middle-skill jobs are particularly relevant to community colleges because they typically require some college coursework, but less than a bachelor's degree.

This report continues CCW's mission to support "systems change" across the L.A. Basin, to more strategically align supply and demand of middle-skill talent across community college and workforce development systems through data driven collaboration, coordination and engagement with employers. With data from the original report and this update serving as a baseline, further primary firm-level research and input will inform the development of career education (CTE), workforce and job training programs that are better aligned with and related to the region's growing industries and occupations.

The talent development institutions and firms from the L.A. Basin's target industries identified in the first baseline report have been, and will continue to be, engaged and formally connected for the purpose of building industry-specific education and training programs and to create ongoing, permanent relationships that result in work-based learning opportunities (employment, internships) for the region's residents to promote career opportunity while addressing the skills needs of our region's employers.

The CCW Baseline Reports

Published in October of 2017, "L.A. & Orange County Community Colleges: Powering Economic Opportunity" identified six target industries in the Los Angeles Basin expected to undergo significant middle-skill job growth between 2016 and 2021. The original industries targeted for this initial research were:

1. aerospace;
2. bio-medical;
3. entertainment;
4. health care services;
5. port-related transport and support activities; and
6. professional and technical services.

With an industry base as large and diverse as the one here in the L.A. Basin, we identified the original target industries in a number of ways. Industries with the most middle-skill job growth potential was a factor. However, some of these industries might be mostly local-serving, compared to export-orientated industries which are wealth generating, as the sale of their goods and services bring in outside dollars to our region. Average annual wages were considered as was the competitiveness of an industry.

We wanted to include industries in which we have a comparative or productive advantage, such as industries with deep roots, a well-developed and specialized supply chain, a deep and concentrated talent pool and, requisite infrastructure. Additionally, we believed emerging and growing sectors are also key in establishing targets — for example, digital media — as they help us identify industries on the rise and aid in determining our workforce needs in the future.

For each of the target industries, we looked at middle-skill occupations with both the highest job creation potential and the highest replacement rates. We looked at the skills and competencies across other industries that are hiring these occupations, making them worthwhile job targets for students. Middle-skill occupations were chosen as targets, they represented over 20 percent of all projected new job openings between 2016 and 2021.

As the pace of change in businesses grows faster, the Center has created regional industry and education partnerships to bridge and build a local middle-skill talent pipeline.

A series of three “deep-dive” industry reports were produced to establish a baseline from which the CCW and the region’s community colleges can further build their knowledge and, working in partnership with industry, amplify their understanding about the region’s labor markets and the middle-skill workforce gaps, as gauged by the difference between industry needs and community college program completions.

In this update to that baseline report, we flip our approach.

Similar to the initial report, an updated economic overview of the region will be provided hereunder; however, this second baseline report is more occupationally-focused compared to the first, removing the industrial umbrella and leading with occupational demand projections.

We back into additional industries for which further research may be valuable to the community colleges in the region based upon their middle-skill job projections.

This report’s sections will address:

- The demand for labor in the L.A. Basin;
- The five-year (2017 to 2022) detailed industry employment forecast for the L.A. Basin;
- The 15 most promising target middle-skill occupations across all industries;
- An analysis of the regional community college supply of students to fill target occupations;
- Revisiting the original target industries and occupations in the Los Angeles Basin; and
- The most promising industries with the most expected middle-skill openings over the next five years.

Movement Beyond the Research

As the pace of change in businesses grows faster, the CCW has created regional industry and education partnerships to bridge and build local middle-skill talent pipeline.

The CCW’s efforts begin with research and analysis to compare the middle-skill occupational demand with the community college’s supply of skilled talent in the Los Angeles Basin. This data then influences the strategic initiatives arm of the CCW to convene industry councils and curriculum advisory committees to validate the data and identify opportunities for upward mobility for community colleges students, focusing on emerging and prominent industries here in the L.A. Basin with a middle-skill occupational need. Specifically, the CCW and LAEDC host quarterly industry councils in Bioscience, Digital Media and Entertainment, Advanced Transportation, and Aerospace. The industry councils help identify work-based learning opportunities for students, inform faculty externship and learning opportunities, provide new or updated information about occupational targets for the curriculum advisory committees, and create other fortifying opportunities and institutionalized “feedback” loops between industry and the community colleges to strengthen the supply of skilled talent.

In alignment with the Strong Workforce Task Force recommendations for regional coordination and student success, the CCW and LAEDC worked with 234 companies, identifying over 440 internships, the majority of them being new opportunities for community college students. The CCW is utilizing technology through its Workforce and Education Partner Portal to facilitate peer-to-peer interaction through industry-focused community pages, employer-direct messaging and engagement across all 19 community colleges, and student work-based learning and employment applications, along with performance-based metrics and outcomes tracking. CCW understands that if our community colleges are to be more demand-driven, industry-responsive, future-forward, and adaptive, then we need to integrate in real-time across the system and with employers.

Economic Environment Of the Los Angeles Basin.

In 2018, Los Angeles County's unemployment rate leveled off at a low of roughly 4.6 percent, while Orange County's declined to roughly 2.9 percent for the year.

Economic development, education and training success will be shaped increasingly by the nature and composition of the L.A. Basin's industries, their associated labor markets, and the value placed on their workers.

A region's available supply of skilled talent is one of the foremost determinants of whether a business comes to and ultimately remains in a market. A lack of workers with relevant skills could make the region a less attractive business environment for important growth industries. Thus, the L.A. Basin's skilled, educated workforce will help it attract and retain businesses, contributing to the growth of strong industry clusters and boosting overall economic activity.

In this section, we discuss the industrial base of the economy in the L.A. Basin and provide a five-year forecast from 2017 to 2022 to identify the future demand for labor in the region.

Economic Overview

The Los Angeles Basin is the largest urban agglomeration on the west coast, representing a GDP of over \$1 trillion, and a labor force of over 6.5 million people. The region represents a diverse and rapidly changing economy, anchored by well-known industries like entertainment, aerospace and tourism, but with growing impacts from nascent and growing industries, such as information technology and digital media.

The broader economy of the basin is quite strong, but the recovery from the financial crisis has dramatically shifted the economic fortunes of most of households. Therefore, despite the decline in unemployment rate, labor force participation remains anemic compared to pre-recession levels, and the workforce overall is still feeling the maleficent impacts of the structural shifts that resulted from that dramatic economic shock, coupled with a fast-transforming macro economy.

In 2018 Los Angeles County's unemployment rate leveled off at a low of roughly 4.6 percent, while Orange County's declined to roughly 2.9 percent for the year. These tight labor market conditions have finally begun to drive wage growth, with increases in wages being felt most strongly at the low and high ends of the income distribution.

Many long-term trends are also shifting the economy away from growth predicated on labor toward growth dependent on the productivity of the existing workforce. An aging population and workforce, coupled with historically low replacement rates, has created additional pressure to automate jobs, and even migration trends are reflecting less domestic labor demand for unskilled labor and more for immigrants with college degrees.

A significant challenge for the labor market is the shortage of available housing and high level of traffic congestion, which prevent workers from accessing the region's core job clusters, frequently trapping them in low-wage jobs due to the difficulty of taking advantage of this sprawling metropolitan labor market.

Another major difficulty for the regional labor market is the relatively low level of educational attainment for the working population. Only 31.3 percent of Los Angeles County residents have a college degree or higher, and, although this is in line with the United States as a whole, with 30.9 percent, it is quite a low number for a major urban economy. In contrast, neighboring San Diego has a full 37.4 percent of its population with a degree or higher, and this disparity poses obstacles to any attempt to improve the labor prospects of the region.

For the Los Angeles Basin to fully connect its population to the broader economy and to take advantage of its human capital, there is a powerful need to connect the education pipeline to growing industries in order to provide the labor force necessary for the region to experience broad based economic prosperity.

Forecasting Growth

The LAEDC produced a combined industry and occupational forecast that considers both the industrial changes that the region is undergoing and the demand for certain skills driving occupational growth. Using our model, we produce forecasts for the unique industries and occupations that are most likely to create opportunities for the regions dynamic and shifting labor market.

PROMINENT GROWTH INDUSTRIES

Using the economic forecast model, four industries were identified as having healthy growth rates over the last 10 years and projected to significantly expand over the next three to five years (Exhibit 1).

EXHIBIT 1
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022

	2017 (000s)	2017 to 2022 Forecast
Health Care (Public and Private)	915.6	5.2%
Accommodations and Food Services	600.1	5.9%
Professional, Scientific and Technical Services	406.9	4.3%
Transportation (incl. Postal Services)	225.2	4.1%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Health Care and Social Assistance

Health care and social assistance is the region's largest industry by employment with 915,600 jobs in 2017, across both private and public establishments.

Job growth in health care and social assistance has grown dramatically in recent years, and while the economy is growing less feverishly now, the health care sector is still adding jobs at a fast pace. While the growth is projected to be slower than in previous years, health care will continue to be a major source of economic opportunity for the region, especially with the aging population driving increased demand for health services.

Employment in this sector is projected to increase by over 5 percent over the next five years, and in contrast to many other growing industries, these jobs are typically high wage and with significant job security.

Health care and social assistance is the region's largest industry by employment with 915,600 jobs across both private and public establishments.

The Los Angeles Basin is becoming an increasingly important hub of professional services firms, as the knowledge sectors of our economy continue to grow and expand in new directions.

Hospitality

The hospitality industry includes accommodation and food services. With Southern California's massive population, and a record number of tourists and international visitors coming through Los Angeles International Airport (LAX), accommodation and food services is a major contributor to the regional economy.

A major barrier to the success of the industry is the high purchase and rental prices of commercial real estate. Although many food services establishments operate successfully, the crushing price of rent is making it harder to meet expenses, even amidst the continuing economic expansion. Coupled with minimum wage increases, the industry is currently supported by thin margins despite booming demand.

Like most industries, accommodation and food services is continuing to adapt to technological changes. For example, small restaurants and cafes have increasingly shifted to the now ubiquitous Square and tablet configuration to provide a simple point of sales system, making it easier than ever for small businesses to operate.

Increasingly, much of the employment effect of growth in this industry comes in the form of so-called "gig" workers and delivery drivers, with services such as DoorDash and UberEats simplifying the process of providing delivery services and consequently eating into the margins and wages of restaurant owners and employees, respectively.

Although this sector supports roughly 600,000 jobs in the region, and is continuing to grow, it is primarily producing low-wage and part-time work; so in spite of a forecast of nearly 6 percent growth over the next five years, most of this employment will translate into little to no growth in real wages.

Professional, Scientific and Technical Services

The Los Angeles Basin is becoming an increasingly important hub of professional services firms, as the knowledge sectors of our economy continue to grow and expand in new directions.

Firms in the professional services industry frequently locate regional headquarters in Los Angeles, and law firms and accounting practices both serve the local population, as well as nearby regions. In addition, scientific research, wherein major science and technology firms synergize with the strong regional universities, is rapidly becoming a growth and export opportunity.

The limited educational attainment of the regional population is a major barrier to more growth in the professional, scientific and technical services, and, despite the increasing prospects of the industry, the low supply of qualified workers means that local firms frequently source their employees from outside the region.

There are roughly 406,600 workers currently employed in professional services, with the industry set to expand by around 4.3 percent over the next five years.

Transportation

In 2017, about 225,400 workers were employed in L.A. Basin's transportation industry, which includes rail, water, air, truck, transit transportation, courier and messenger transportation, as well as warehousing and postal service workers. This number was effectively unchanged over the previous year.

Although the industry has not grown much in recent years, the demand for new advanced transportation solutions, as well as a burst of demand for delivery couriers and last-mile solutions means that the industry is poised for substantial growth in the near future.

Employment growth in the L.A. Basin's transportation industry is expected to be roughly 4.1 percent over the next five years.

NEW GROWTH INDUSTRIES

There are two industries with particular importance to the economic landscape of the Los Angeles Basin that fall into the new growth category (Exhibit 2). These two industries are projected to grow healthily over the next five years, even though employment levels have barely changed over the last ten years.

**EXHIBIT 2: NEW GROWTH INDUSTRIES
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022**

	2017 (000s)	2017 to 2022 Forecast
Administrative Support	394.1	3.1%
Education	415.6	2.9%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Administrative and Support Services

Employment in administrative and support services currently stands at nearly 400,000 workers.

Increases in demand for part-time and temporary workers, resulting from increasingly agile workspaces, should drive continued demand for the industry. In particular, the increasingly technical nature of many industries means that there is a demand for human resources workers and recruiters who understand the specific technical intricacies of jobs and are able to help find and supply needed labor.

In addition, the ongoing real estate boom in major employment districts such as downtown Los Angeles means that we should expect the need for custodial services and security to continue to increase.

Employment in the administrative and support services industry is projected to increase by 3.1 percent over the next five years.

Education Services

Employment levels in the education industry are generally expected to remain consistent, with modest growth over the next five years.

The structure of education in the region is changing, as increasingly more technology enabled classes and education services are utilized. Although we do not expect the increasing use of technology to displace large numbers of jobs in the near future, it is likely that the nature of educational jobs will change.

In addition, it is expected that recent collapses in enrollment in many humanities subjects will continue, with shifts into more directly marketable skills in STEM fields, with a commensurate increase in demand for qualified instructors in those subjects.

Regional employment in the education services industry will increase by nearly 3 percent over the next five years.

While employment levels over the past decade have barely changed, administrative and support services and public and private education services are projected to grow healthily over the next five years.

The construction industry is in the midst of an unprecedented boom of new projects, with the revitalization of downtown Los Angeles chief among them.

REBOUND INDUSTRIES

Despite having contracted in recent years, construction and wholesale trade are two rebound industries projected to grow over the next five years. (Exhibit 3)

EXHIBIT 3: REBOUND INDUSTRIES
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022

	2017 (000s)	2017 to 2022 Forecast
Construction	240.6	5.4%
Wholesale Trade	304.0	2.7%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Construction

The construction industry in Southern California has begun to rebound strongly over the past few years after a major collapse following the financial crises. Although this industry has experienced continuous growth since bottoming out in 2010, at 240,000 employees it is still below the pre-recession high of roughly 260,000.

In spite of the lower level of employment, the construction industry is in the midst of an unprecedented boom of new projects, with the revitalization of downtown Los Angeles chief among them. In fact, the combination of massive public works buildouts in the form of new transit infrastructure, coupled with huge new housing and office developments in the urban core, mean that the primary issue for the construction industry is a lack of available workers rather than a lack of demand.

The industry is expected to increase by roughly 5.4 percent over the next five years, although it could grow more quickly if efforts were made to increase the potential workforce.

Wholesale Trade

The Los Angeles Basin’s wholesale trade industry employs 304,000 workers (2017).

Although wholesale trade employment has declined in recent years, the region’s central importance as a gateway to the United States via the ports (air and sea) means that there will continue to be demand for the wholesale trade industry.

There are major concerns about the potential for automation in the industry, but so far this has proven to be more speculative than categorical, as timelines for technologies such as fully autonomous robots and vehicles have continued to be pushed back. So, despite concerns, employment is likely to continue to modestly increase over the next few years.

The number of workers in L.A. Basin’s wholesale trade industry is projected to expand by 2.7 percent over the next five years.

MODERATE GROWTH INDUSTRIES

These industries are expected to growth at healthy moderate rates over the next five years. (Exhibit 4)

EXHIBIT 4: MODERATE GROWTH INDUSTRIES
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022

	2017 (000s)	2017 to 2022 Forecast
Arts and Entertainment	148.6	3.9%
Other Services	196.1	3.4%
Information	232.2	3.4%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Arts and Entertainment

Increasing consumer confidence from the strong regional economy, and record-setting numbers of tourists have strengthened the arts and entertainment industry, which now employs nearly 150,000 workers.

Dramatic increases in the number of cultural institutions and their resultant spending have meant that the regional arts industry is at all-time highs. New investment, like the redevelopment of LACMA and the renovation of the Music Center — occurring in the context of the LA Philharmonic celebrates its centennial season — are showing there is an appetite for the arts in the region that should continue to support regional employment.

The increase in demand for the sport industry is a key driver of employment growth in this sector, as dramatic investments in new stadiums, as well as newly arrived teams such as the Chargers have expanded the need for workers.

Overall, the L.A. Basin's arts and entertainment industry will expand by a 3.9 percent over the next five years.

Other Services

In 2017, roughly 196,100 workers were employed in the “other services” industry in the Los Angeles Basin. Establishments in this industry include: private households; repair and maintenance businesses; and personal care and laundry services. Although this is something of a “catchall” industry, for establishments that don't fit cleanly into other service industries, the variety of employment found is an increasingly important part of the more service-oriented modern economy.

The broad-based economic growth found in the region has driven increase in demand for local population-serving employment, as the wage growth in key industries leaves more consumer spending for services such as hair salons, home improvement and dry cleaning. This sector is expected to grow by roughly 3.4 percent over the next five years.

Information

The information sector in the Los Angeles Basin is dominated by the motion picture industry, accounting for more than half of all employment in the sector. In addition, it is responsible for outsized share of Los Angeles County economic activity and remains the largest of Los Angeles County's export-oriented industries.

The dominant entertainment industry is dramatically changing, Netflix and Hulu have now become an inseparable part of daily life around the world, and while this presents some challenges to traditional media companies, they are responding rapidly to the shift. Disney is set to launch its own streaming service in the next year.

Regional employment in the information sector has remained largely stagnant over the past decade, recovering from major declines, but without the strong growth that we would expect from one of the key industries of the “innovation economy”. This is likely because the technology “industry” has become more dispersed, with high tech jobs filtering out amongst a variety of different industries, rather than clustering in pure technology firms.

In addition, although there have been declines in traditional information subsectors such as a cable television, they have been met with a strong increase in employment in internet media and data processing companies.

Employment in the L.A. Basin's information industry is projected to increase by roughly 3.4 percent over the next five years, with a shift in composition to more digital tech companies.

The technology “industry” has become more dispersed, with high tech jobs filtering out amongst a variety of different industries, rather than clustering in pure technology firms.

SLOW GROWTH INDUSTRIES

These industries are expected to maintain low but positive growth rates over the next five years. (Exhibit 5)

**EXHIBIT 5: SLOW GROWTH INDUSTRIES
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022**

	2017 (000s)	2017 to 2022 Forecast
Financial Activities	338.1	2.4%
Government (ex. Postal Service, Education, and Health Care)	213.4	2.8%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Financial Activities

The financial activities sector is still substantially below its pre-recession peak, with total employment of 338,100 workers, versus roughly 380,000 prior to the financial crisis.

Although the housing market has been in a major boom, its finance industry impacts have been limited as restrictions on construction have reduced mortgage origination. In contrast, consumer credit has been increasing tremendously over the past decade, and major consumer banks have stood to benefit from the dramatic increase in outstanding loans.

However, banks are having to fend off challenges from upstart financial technology firms, as well as major technology players moving into the finance industry. Competition from products like Venmo and Apple Pay means that the relatively staid world of consumer banking is having to rapidly adapt to avoid losing out on market share.

In spite of this increased level of competition from outside firms, the financial activities sector is expected to grow employment by roughly 2.4 percent over the next five years.

Government

With local governments increasingly looking to step in and provide services where state and federal governments have not, employment in the public sector is expected to increase.

Government employment is expected to expand by 2.8 percent over the next five years, from its current total of 213,400.

Workers still employed in manufacturing are typically those with more specific technical skills that allow them to take advantage of the technology investments of their firms, meaning that there is a dramatic need to support the technical education of potential workers.

CHALLENGED INDUSTRIES

Retail trade and manufacturing are considered challenged industries, with negative job growth projections over the next five years. (Exhibit 6)

EXHIBIT 6: CHALLENGED INDUSTRIES
LOS ANGELES BASIN EMPLOYMENT 2017 TO 2022

	2017 (000s)	2017 to 2022 Forecast
Retail Trade	574.7	-0.4%
Manufacturing	495.3	-2.6%
Total	6,056.4	3.7%

Source: Bureau of Labor Statistics, QCEW; estimates and forecast by LAEDC.

Retail Trade

Retail trade is still a key employer for worker with low educational attainment, but the prospects for the industry have declined precipitously in recent years, with the specter of increasing automation and online competition increasingly challenging a traditional low-skill job opportunity. However, despite challenges, the industry is unlikely to decline precipitously from its current total of nearly 575,000 jobs. Rather, it is more likely to stagnate and decrease slowly over the next five years.

Employment in the Los Angeles Basin's retail trade industry is projected to decline by 0.4 percent over the next five years.

Manufacturing

Despite substantial declines in recent years, and a loss of over 100,000 jobs in the past decade, manufacturing is still a massive employer for the region, being responsible for nearly 500,000 jobs in the region. The appeal of stable manufacturing jobs, with good wages and job security is still clear, and the decline is worrisome for workers hoping to transition into the middle class.

Production-based industries continue to substantially increase manufacturing output, at a time when employment in manufacturing overall is reaching record lows. Heavy investment in automation, and other productivity-enhancing technologies has meant that local manufacturing industries, like apparel and aerospace, are still powerful local economic forces, but the associated employment opportunities are increasingly concentrated to fewer residents.

In addition, those workers who are still employed in the industry are typically those with more specific technical skills that allow them to take advantage of the technology investments of their firms, meaning that there is a dramatic need to support the technical education of potential workers.

Employment in the L.A. Basin's manufacturing industry is projected to decrease by 2.6 percent over the next five years.

Community Colleges and Middle-Skill Jobs

Narrowing our focus.

Understanding how industries are expected to grow or decline over a period of time and estimating their job creation potential provides one aspect of overall workforce needs assessment. The more important aspect, however, is the composition of those expected jobs and their educational attainment and skills needs.

While the region has recently experienced economic rebound and strong job growth, it does not tell the whole story because many of the new jobs being created are low-wage, low-skill, highly-routine positions that may be vulnerable to automation and without significant opportunities for career advancement. Indeed, the fastest growing occupations in the region include: waiters and waitresses; retail salespeople; home health care workers; cashiers; and food preparation and other food service sector jobs. Few of these jobs provide pathways out of poverty into the middle class. Furthermore, many of the region's low-wage, low-skill positions are part time as opposed to full time, which reflects an important shift in the labor market.

In this section, we convert industry job creation projections into occupational projections and select industry targets for middle-skill jobs; 15 detailed occupations have been chosen as promising targets for post-secondary programs for Los Angeles Basin community colleges.

Why Education Matters

Educational attainment is a key element in understanding challenges and opportunities present in a region's workforce. It identifies the quality of the local labor pool to potential employers, quantifies the benefits of pursuing additional education to individuals, and can reveal whether an area is economically disadvantaged, requiring higher levels of public services and resources.

Educational attainment levels are varied across the Los Angeles Basin (Exhibit 7). Orange County has an especially well-educated population with just over 40 percent of its residents aged 25 years and older holding at least a bachelor's degree; this share increased by 0.3 percentage points over 2016. On the other side of the educational attainment spectrum, more than 41 percent and 32 percent of Los Angeles and Orange County residents, respectively, have only a high school education or less. These are the residents who need the most attention in this transitioning economy, which rewards higher levels of education and skills attainment.

Civilian unemployment rates declined for all levels of education between 2016 and 2017; unemployment rates for those who had earned an associate degree, postsecondary nondegree award or some college in the Los Angeles Basin fell from 5.3 percent in 2016 to 4.8 percent in 2017. As expected, the highest unemployment rates exist for individuals with lower levels of educational attainment.

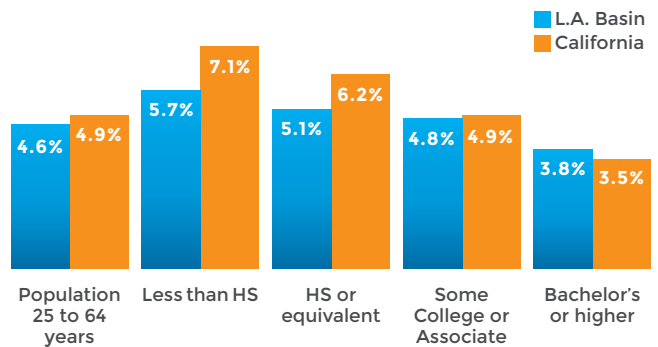
Educational attainment identifies the quality of the local labor pool to potential employers, quantifies the benefits of pursuing additional education to individuals, and can reveal whether an area is economically disadvantaged requiring higher levels of public services and resources.

In the Los Angeles Basin, those with the highest level of education – a graduate or professional degree – earn an annual wage premium of \$59,000 over those with less than a high school education.

Earnings differentials exist among employed individuals with varying levels of educational attainment. In the Los Angeles Basin, those with the highest level of education--a graduate or professional degree--earn an annual wage premium of about \$59,000 over those with less than a high school education. Individuals with an associate degree, postsecondary nondegree award or some college enjoy a wage premium over lower levels of educational attainment as well; approximately \$7,400 over those with a high school diploma or equivalent annually, and more than \$15,100 over those with less than a high school education annually. Median earnings increased for those with an associate degree, postsecondary nondegree award or some college between 2016 and 2017 from \$36,380 to \$37,170 (a nominal change of \$800).

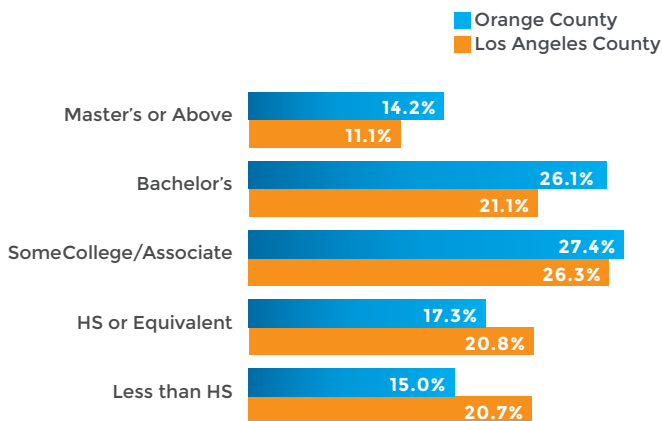
The combination of higher rates of unemployment and lower annual median earnings yield higher levels of poverty for those with lower levels of education.

EXHIBIT 8: CIVILIAN UNEMPLOYMENT RATE 2017 BY EDUCATIONAL ATTAINMENT



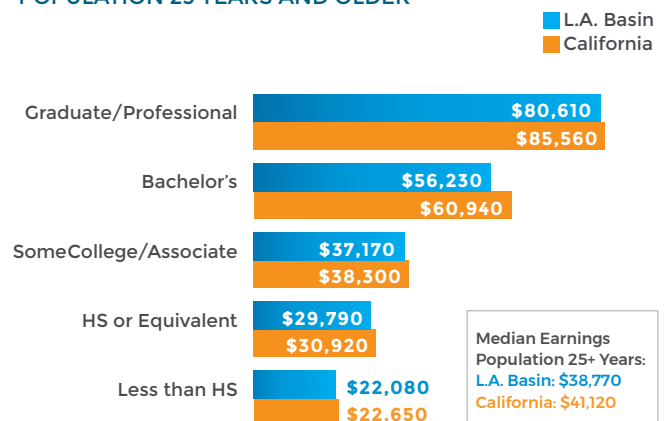
Source: 2017 ACS 1-year estimates

EXHIBIT 7: EDUCATIONAL ATTAINMENT IN 2017 POPULATION 25 YEARS AND OLDER



Source: 2017 ACS 1-year estimates

EXHIBIT 9: MEDIAN EARNINGS AND EDUCATIONAL ATTAINMENT 2017 POPULATION 25 YEARS AND OLDER

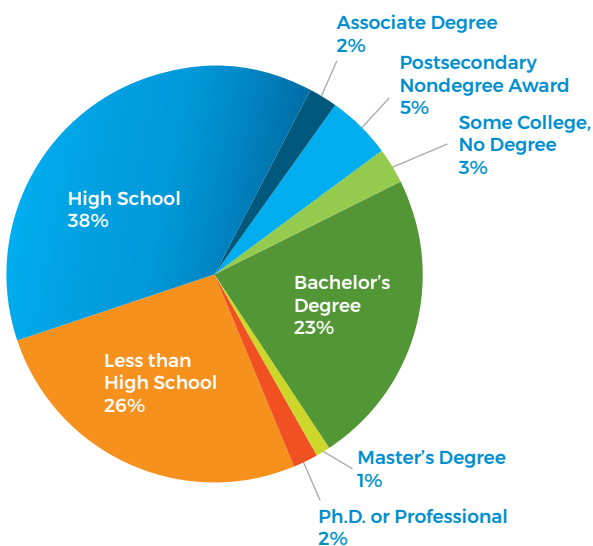


Median Earnings Population 25+ Years:
L.A. Basin: \$38,770
California: \$41,120

Source: 2017 ACS 1-year estimates

Education requirements will likely increase over time. As a result, technical training is expected to play a major role in helping new workers find employment in a fast-evolving labor market.

EXHIBIT 10: JOB DISTRIBUTION IN L.A. BASIN 2017
ENTRY-LEVEL EDUCATION REQUIREMENTS



Source: BLS, OES

Middle-skill Education

Another way to illustrate the value in postsecondary education is by looking at occupational employment grouped together by entry-level educational requirements.

In the Los Angeles Basin in 2017, ten percent of employment exists in occupations having the entry-level education requirement of an associate degree, postsecondary nondegree award or some college. Occupations in this category include: paralegals, computer network specialists, and technicians and technologists related to several industries, such as health care and engineering, automotive service techs, licensed vocational nurses (LVNs), heavy and tractor truck drivers, teacher assistants, and bookkeeping, accounting and auditing clerks. (Between 2016 and 2017, this share stayed the same.)

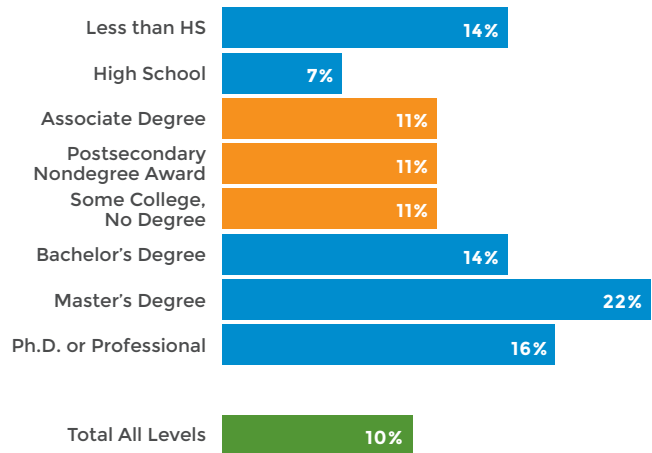
Occupations requiring the lowest level of education, less than high school, account for 26 percent of occupational employment in the basin, but these occupations, including cashiers and retail salespersons, janitors, food preparation workers and landscaping workers, are also associated with the lowest wages.

The net change in jobs in the Los Angeles Basin between 2012 and 2017 by entry-level education provides insight into hiring trends over time. Over the five-year period, the number of jobs in occupations requiring an associate degree, postsecondary nondegree award, or some college all grew by 11 percent, a faster growth rate than jobs requiring an entry-level education of a high school diploma or equivalent (7 percent).

Jobs requiring an entry-level education of less than high school grew at a fastest rate (14 percent), over the period, but this growth is primarily related to the rehiring of these jobs post-recession (December 2007 to June 2009). During a contractionary period, jobs in lower skilled occupations are shed at a disproportionately higher rate compared to middle- and high-skill occupations and are rehired during expansionary periods in the business cycle, as has been the case from 2012 through 2017.

In conclusion, jobs in occupations with an entry-level education requirement of an associate degree, postsecondary nondegree award, or some college are growing at a faster rate compared to occupations requiring high school for entry-level. Additionally, some students completing community college programs will continue on to obtain higher levels of educational attainment; indeed, occupations requiring a bachelor's degree for entry grew by 14 percent over the period, meaning employment prospects for these individuals are also promising.

EXHIBIT 11:
JOB GROWTH BY ENTRY-LEVEL EDUCATION
PERCENTAGE CHANGE FROM 2012 TO 2017

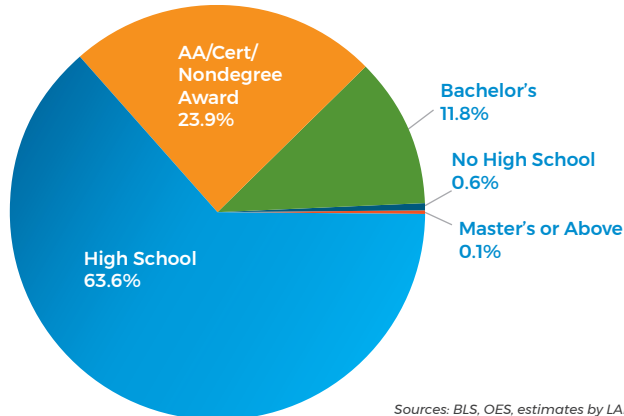


Source: BLS, OES

Occupations with an entry-level education requirement of an associate degree, postsecondary nondegree award, or some college are growing at a faster rate compared to occupations requiring high school for entry-level.

Occupations requiring an education of an associate degree, postsecondary nondegree award, or some college figure prominently in every industry.

EXHIBIT 12:
ENTRY-LEVEL EDUCATION FOR 2017-2022
JOB OPENINGS



The Demand for Middle-Skill Jobs

Where are middle-skill jobs found? Demand for labor is generated by local and regional businesses across all industries. This is a function of the economic health of the regional economy and its expected growth, as well as locational and hiring decisions made by growing businesses.

The number of additional workers that businesses will need is referred to as net new jobs.

Replacement jobs are those jobs created by workers who permanently retire or permanently change occupations.

When combined, net new jobs and replacement jobs constitute the total number of job openings.

Among the occupations with the highest replacement rates include: locksmith and safe repairers; library technicians; social science research technicians; and forest and conservation technicians. In addition, some middle-skill occupations also have high replacement needs, including registered nurses and teacher assistants.

Careful examination of the occupations with the most job openings over the next five years reveals that many of these occupations require lower levels of educational attainment (Exhibit 12).

Just over 64 percent of projected openings are in occupations that require a high school education or less. These two categories represent entry-level jobs for unskilled workers across industries and occupations.

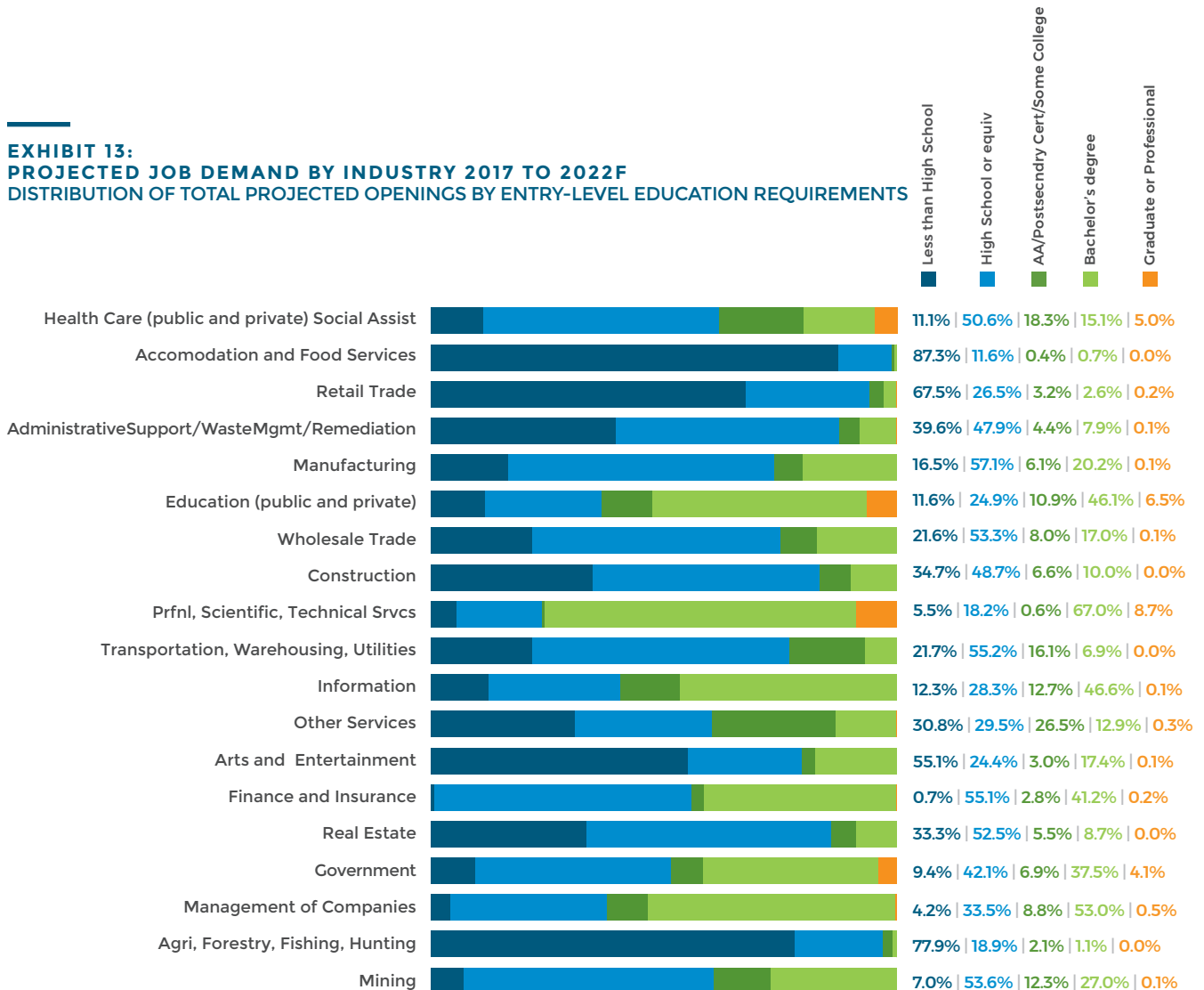
Of the remaining projected openings, a quarter will require an associate degree, postsecondary nondegree award, or some college, while only 12 percent will require a bachelor's degree.

One thing to consider is that education requirements will likely increase over time. As a result, technical training is expected to play a major role in helping new workers find employment in a fast-evolving labor market.

Projected demand for labor (total openings, including net new jobs and replacement jobs) from 2017 to 2022 by industry sector is broken out according to the job's entry-level education requirements in Exhibit 13.

Occupations requiring an education of an associate degree, postsecondary nondegree award, or some college figure prominently in every industry, but especially in other services (55.6 percent of total openings); which includes maintenance and repair industries, public and private education (45.5 percent of total openings); health care services (38.6 percent of projected total openings); and transportation, warehousing and utilities industries (34.1 percent of total openings).

EXHIBIT 13:
PROJECTED JOB DEMAND BY INDUSTRY 2017 TO 2022
DISTRIBUTION OF TOTAL PROJECTED OPENINGS BY ENTRY-LEVEL EDUCATION REQUIREMENTS



Target Middle-Skill Occupations

Highest growth and living wages.

Nearly a third of the total projected openings in the L.A. Basin between 2017 and 2022 are for middle-skill jobs.

Understanding how industries are expected to grow or decline and estimating their job creation potential together provide one aspect of the overall workforce needs. The more important aspect, however, is the composition of those expected jobs.

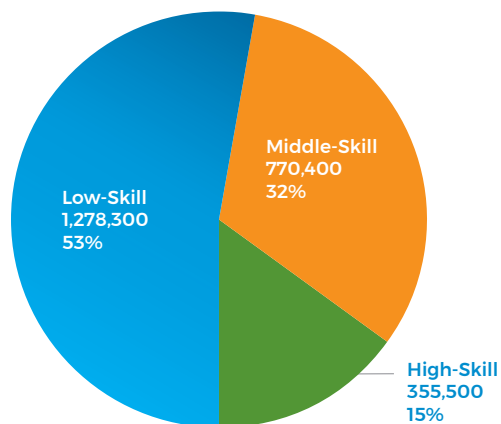
In this section, we look at the intersection of occupational projections and industry job creation projections and select 15 middle-skill detailed occupations as promising targets for post-secondary programs for community colleges.

Occupational Projections in the L.A. Basin

Projected demand for labor (total openings, including net new jobs and replacement jobs) from 2017 to 2022 broken out according to skill-level is shown in Exhibit 14.

Close to a third of total projected openings between 2017 and 2022 are for middle-skill jobs; those that require more than a high school level education for entry, but less than a bachelor's degree

EXHIBIT 14:
SKILLS DISTRIBUTION FOR 2017-2022
JOB OPENINGS



Source: Estimates by LAEDC

Selecting Target Occupations

The growth of industries in the region will precipitate the growth of particular occupations. Across all industries in the Los Angeles Basin, the occupations with a living wage, the most job creation potential and the highest replacement rates were selected and compiled in a comprehensive list. These occupations were looked at for their skill and competency relevance across all industries and identified as viable job targets for student completing a training program.

The overall net growth of an occupation is a consequence of its contribution to industries that are growing and to industries that are declining. Additionally, workers within industries leave current positions, either through retirement or through promotion, or for other reasons, leaving positions open and in need of replacement.

This may result in an occupation experiencing no or little growth as workers that had been employed in a failing industry shift to similar roles in industries that are growing, or as workers in certain occupations are replaced with improved technologies or processes.

Exhibit 15 presents the top 15 detailed middle-skill occupations selected as target industry occupations with the most potential for community college programs.

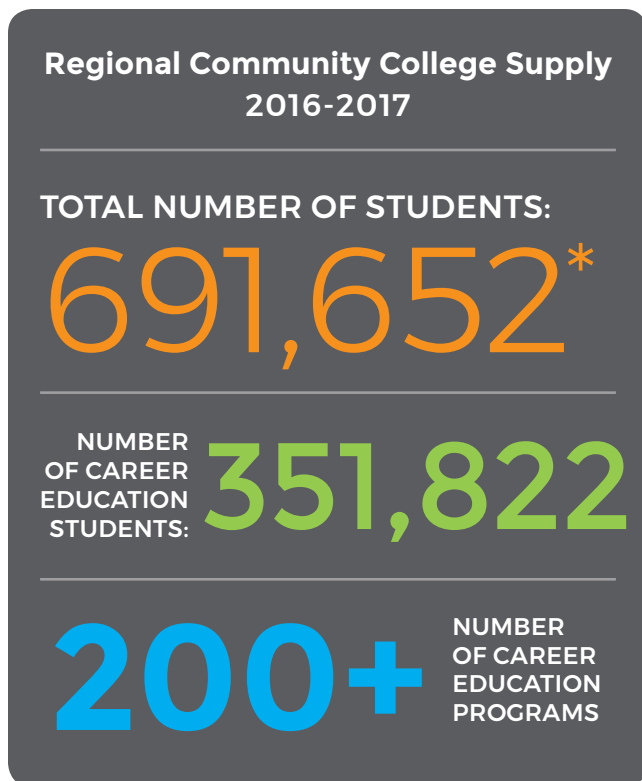
EXHIBIT 15: TARGET INDUSTRY OCCUPATIONS IN L.A. BASIN MIDDLE-SKILL OCCUPATIONS

SOC	Detailed Occupation	Total Jobs 2016	Projected Openings 2016-21
29-1141	Registered Nurses	102,340	23,670
25-9041	Teacher Assistants	52,670	19,800
47-2031	Carpenters	25,450	14,330
47-2111	Electricians	19,710	9,240
29-2061	Licensed Vocational Nurses	25,480	9,070
43-5061	Production, Planning and Expediting Clerks	24,940	8,420
49-3023	Automotive Service Technicians and Mechanics	20,400	8,250
21-1093	Social and Human Service Assistants	25,060	7,720
31-9091	Dental Assistants	17,000	7,700
33-3051	Police and Sheriff's Patrol Officers	30,410	7,100
15-1232	Computer User Support Specialists	23,110	13,770
47-2152	Plumbers, Pipefitters and Steamfitters	14,550	6,830
23-2011	Paralegals and Legal Assistants	13,840	5,410
29-2052	Pharmacy Technicians	13,680	4,250
15-1254	Web Developers	8,320	3,210
TOTAL	Target Industry Occupations	416,960	148,770

Source: Estimates by LAEDC

Supply-Side Analysis

The region's community college talent pool.



*Represents the unduplicated number of students who enrolled in one or more courses - across all programs in the region.

The following sections, the 10 occupational clusters are discussed in more detail:

- **Computer and Mathematical**
- **Community and Social Service**
- **Legal**
- **Education, Training, and Library**
- **Health Care Practitioners**
- **Health Care Support**
- **Protective Service**
- **Office and Administrative Support**
- **Construction and Extraction**
- **Installation, Maintenance and Repair**

Within each occupational cluster, one to three occupations were selected for closer examination that offer promising career prospects for community college students.

The 15 occupations identified by this study are middle-skill occupations with strong employment projections and the potential for facilitating economic mobility. Middle-skill jobs are particularly relevant to community colleges because they typically require some college coursework, but less than a bachelor's degree.

It is estimated that half of all jobs in the nation are middle-skill. However, there have been mounting concerns in recent years that a shortage of skilled workers to fill middle-skill jobs could hamper the nation's future economic growth.

"The future of the U.S. Workforce: Middle-skill jobs and the growing importance of postsecondary education." 2012. Achieve. <http://www.achieve.org/files/MiddleSkillsJobs.pdf>
Modestino, Alicia Sasser. "The importance of middle-skill jobs." Vol. 33, Issue 1. Fall 2016. *Issues in Science and Technology*. <http://issues.org/33-1/the-importance-of-middle-skill-jobs/>

As a result, employers and educational providers have been directing more attention toward the training of middle-skill workers. Middle-skill jobs can be highly technical and are viewed as having great potential to lift individuals out of poverty because they offer strong wages and typically require educational preparation that can be completed in only a couple of years, such as an associate degree, apprenticeship or on-the-job training.

The 15 occupations highlighted in this report are middle-skill and require a typical entry-level education that can be obtained through the California community colleges — such as the completion of some college coursework, a postsecondary nondegree award or an associate degree.

Some of the selected occupations have a typical entry-level education of bachelor's degree according to the Bureau of Labor Statistics, but still qualify as middle-skill. This is because at least 33 percent of the occupation's current workers have completed some college coursework or an associate degree, but do not hold a bachelor's degree.

Other occupations included in the analysis may not require college coursework or an associate degree but are still considered middle-skill because they may require more than 12 months of on-the-job training or an apprenticeship.

UNDERSTANDING FIGURES

During the 2016-17 academic year, nearly 692,000 students enrolled in one or more community college courses in the Los Angeles Basin.*

Of those students, 351,822 students, about 51 percent, enrolled in career education courses. This is noteworthy because career education programs allow students the opportunity to explore many career options and quickly enter the workforce after only a couple of years of education and training. Typically, career education programs train students to enter middle-skill jobs.

Regionally, students can choose from more than 200 career education programs offered by 19 community colleges in Los Angeles County and 9 community colleges in Orange County.

According to the latest data available, from the academic year 2016-17, there were fewer than 25,500 career education award earners in the Los Angeles Basin.

In the region there will be **approximately 42,104 job openings over the next five years (2017-2022)** for the 15 occupations examined in supply and demand section of this report.

Over 9,700 awards were conferred in programs training for the 15 target occupations in the 2017-2018 academic year.

Since community colleges play a leading and vital role in training students to enter these target occupations, the following sections further examine each occupational cluster and provide detailed information about the current workforce and available training.

TALENT SUPPLY AND DEMAND

In this section, we examine employer demand for middle-skill occupations in relation to the supply of talent from related community college programs. However, supply-and-demand matching do not result in an absolute value for unmet or oversupplied labor market need due to the fact that a single community college program can train students to enter more than one occupation. In fact, most community college programs train students to enter an array of occupations related to a specific area. However, analysis of program completion data can serve as a somewhat broad indicator of whether an adequate number of students are being prepared to enter high-growth occupations.

For the complete list of associate degrees and certificates conferred in the region by TOP code, refer to the Appendix.

*2016-17 academic year data is the most recent available for community college totals through LaunchBoard

Supply-Side Analysis

The region's community college talent pool.

Computer and Mathematical

OVERVIEW

Occupations in the computer and mathematical cluster are responsible for collecting data, analyzing computer systems and networks, and designing software to help businesses with their day-to-day operations.

COMPUTER AND MATHEMATICAL SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Computer User Support Specialists	23,110	2,043	\$26.60
Web Developers	7,920	953	\$32.57

Supply

CC Programs	2017-18 Awards
Computer Networking	995
Computer Infrastructure and Support	217
Computer Information Systems	
Website Design and Development	
Computer Support	31
World Wide Web Administration	15
TOTAL	1,258

Workers in this cluster may design websites or provide technical assistance to computer users. They may create computer programs, or plan and design computer systems that integrate computer hardware, software and communication technologies. Community college programs related to this cluster teach students about information storage and processing, as well as computer support. Curriculum may include networking design (installation, maintenance and troubleshooting), website development and managing computer systems and networks.

JOBS TO WATCH

There are two occupations of regional importance within the computer and mathematical occupational cluster:

- **Web developers, and**
- **Computer user support specialists.**

In 2017, the region employed 31,030 workers in these occupations. Between the two, computer user support specialists comprised 75 percent of employment in 2017.

With an average wage of \$32.57/hour, web developers can expect to earn around \$68,000 annually. Computer user support specialists earn slightly less, \$26.60/hour, which translates to around \$55,000/year. However, there are twice as many annual openings for computer support specialists than web developers in the Los Angeles Basin.

This number is substantial and most likely due to the differences in education requirements for the two occupations. Generally, less education and training is required for computer user support specialists compared to web developers.

STUDENT SUPPLY

Six programs offered by community colleges in the Los Angeles Basin were identified that prepare students for the occupations above mentioned. In total, 543 awards were conferred by these programs in the 2017-18 academic year. This number falls far below the projected job openings for web developers and computer user support specialists.

Community and Social Service

OVERVIEW

Community and social services occupations typically include social workers, counselors and religious workers. While responsibilities may vary by employer, those working in this cluster primarily facilitate the delivery of services and support to individuals and clients. Those in this field may be employed by government agencies, health care facilities, adult day care home and other social services providers.

In fact, most jobs fall within the following industries: services for the elderly and person with disabilities; residential mental health and substance abuse facilities; child and youth services; outpatient mental health and substance abuse centers; and vocational rehabilitation services.

Community college programs related to this cluster prepare students for work in public and private human services organization; students develop skills necessary to work in the field of alcohol or drug abuse, as well as with families or employers of chemically dependent persons.

JOBS TO WATCH

One occupation within the cluster was selected for closer analysis:

- **Social and Human Service Assistants**

In 2017, the region employed 25,060 workers in this occupation, which is projected to generate over net 1,618 new jobs over the next five years, or 458 job openings per year.

Social and human service assistants have median hourly wages of \$21.08, translating to approximately \$44,000 per year. Although the typical entry level education is a high school diploma, nearly 40 percent of the workforce holds a community college degree or certificate, qualifying this occupation as middle-skill.

STUDENT SUPPLY

One community college program preparing students for this occupation conferred more than 400 awards in the 2017-18 academic year.

COMMUNITY AND SOCIAL SERVICE SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Social and Human Service Assistants	25,060	2,290	\$21.08

Supply

CC Programs	2017-18 Awards
Alcohol and Controlled Substances	273
Human Services	166
TOTAL	439

Supply-Side Analysis

The region's community college talent pool.

LEGAL SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Paralegals and Legal Assistants	13,840	1,606	\$22.86

Supply

CC Programs	2017-18 Awards
Paralegal	416

Legal

OVERVIEW

Workers within the legal occupational cluster study, facilitate complex legal dialogue, assist in various processes and apply law. Paralegals and legal assistants are employed or retained by a lawyer, law office, corporation, governmental agency or other entities. Typically, workers draft legal documents, conduct legal research, and maintain and organize files. Employers in the region include law offices, local government agencies, as well as corporate, subsidiary and regional managing offices.

Community college programs related to this cluster teach students legal terminology, forms and procedures. Specifically, students learn about legal research, including analysis of legal issues, documentation of appropriate legal precedents, and presentation of research findings useable by attorneys, judges and others.

JOBS TO WATCH

One occupation within the cluster was selected for closer analysis:

- **Paralegals and Legal Assistants**

In 2017, the region employed 13,840 workers in this occupation, which is projected to generate over 971 new jobs over the next five years and a total 1,606 job openings through 2022, which translates to appropriately 321 jobs per year.

Paralegals and legal assistants have median hourly wages of \$22.86, translating to nearly \$48,000 per year.

STUDENT SUPPLY

One community college program preparing students for this occupation conferred 416 awards in the 2017-18 academic year.

Education, Training and Library

OVERVIEW

Occupations in the education, training, and library cluster are responsible for instructing students of different ages at public and private institutions, curriculum and helping individuals navigate libraries.

Workers in this cluster may teach language, motor and social skills to young children; develop instructional material; oversee school curriculum; or work under a teacher's supervision to give students additional attention and instruction.

Community college programs related to this cluster prepare individuals to provide services to students and parents – including those whose native language is not English – under the direction of professional staff (e. g. teachers and administrators).

JOBS TO WATCH

One occupation within the cluster was selected for closer analysis:

- **Teacher Assistants**

In 2017, the region employed 52,670 workers in this occupation, which is projected to generate over 1,550 net new jobs over the next five years. There will be nearly 1,200 job openings per year.

STUDENT SUPPLY

One community college program preparing students for this occupation conferred nearly 50 awards in the 2017-18 academic year.

EDUCATION, TRAINING AND LIBRARY SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Teacher Assistants	52,670	5,876	-

Supply

CC Programs	2017-18 Awards
Educational Aide (Teacher Assistant) includes bilingual	46

Supply-Side Analysis

The region's community college talent pool.

Healthcare Practitioners

OVERVIEW

The health care practitioner cluster is expected to undergo rapid growth both statewide and regionally in coming years. This is attributed to the aging baby boomer generation and an aging workforce that will place greater demands on regional health systems, which will experience a forecast increase in retirements in health care occupations.

Health care practitioners care for their patients in a range of environments, from hospitals and nursing homes to clinics, private homes and group homes.

Community college programs train students how to assess patient health problems and needs, maintain records and develop care plans for patients.

Community college programs prepare students for licensure by either the California Board of Registered Nursing or the state's Board of Vocational Nursing and Psychiatric Technicians.

HEALTH CARE PRACTITIONERS SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Registered Nurses	102,340	7,024	\$45.27
Licensed Vocational Nurses	25,480	2,691	\$24.59
Pharmacy Technicians	13,680	1,260	\$18.29

Supply

CC Programs	2017-18 Awards
Registered Nursing	1,737
Licensed Vocational Nursing	145
Pharmacy Technology	117
TOTAL	1,999

JOBS TO WATCH

Most occupations within this cluster require a bachelor's degree or higher. However, three occupations are considered middle-skill, with a significantly higher proportion of workers having completed community college training.

The three occupations projected to undergo robust growth and offer strong wages are:

- **Registered nurses,**
- **Licensed vocational nurses, and**
- **Pharmacy Technicians.**

In 2017, the region employed 141,500 workers as registered nurses, licensed vocational nurses, and pharmacy technicians. These three occupations are projected to have 10,975 job openings over the next five years, or 2,195 job openings per year.

There will be far more openings for registered nurses, over 1,400 each year, compared to licensed vocational nurses, around 538 each year, and pharmacy technicians, around 252 per year.

Of the three occupations, registered nurses require more training and specialization, which translates to higher compensation – a median wage of \$45.27 per hour.

The average wage of registered nurses is nearly twice that of licensed vocational nurses, \$24.59 per hour. While registered nurses can earn around \$94,000 annually, licensed vocational nurses earn over \$51,000 per year, and pharmacy technicians earn \$38,000 per year.

STUDENT SUPPLY

Community college programs preparing students for the three occupations in the region conferred nearly 2,000 awards in the 2017-18 academic year.

Only 145 of those awards were for licensed vocational nursing programs, whereas this occupation is projected to have 538 annual openings.

With nearly 2,200 job openings expected each year for registered nurses, licensed vocational nurses, and pharmacy technicians combined, and with only about 2,000 awards conferred per year, there may be a supply gap for these professions.

Health Care Support

OVERVIEW

Health care support occupations provide administrative and clinical assistance at clinics, hospitals and other institutions.

Workers generally complete a postsecondary certificate that allows them to provide basic patient care under the direction of a health care practitioner, as well as perform office duties and laboratory duties.

Students interested in a career as a dental assistant can enroll in the dental assistant program offered by a community college where they will be trained to conduct routine services.

These services involve assisting dentist, setting up equipment, preparing patients for treatment and keeping records.

Health care support occupations are supervised by nursing or medical staff. In the case of dental assistants, workers must pass a dental assistant certification examination and background check to be employed. The credential of CDA, certified dental assistant, is recognized in dozens of states and is administered by the Dental Assisting National Board.

Health care support workers must be well versed in and adaptable to rapidly changing technology in order to keep up with the fast-paced and ever-changing health care industry.

HEALTH CARE SUPPORT SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Dental Assistants	17,000	2,285	\$16.86

Supply

CC Programs	2017-18 Awards
Dental Assistant	131

JOBS TO WATCH

In this cluster, the dental assistant occupation has shown growth in the region.

In 2017, the region employed 17,000 health care support workers as dental assistants.

Moreover, it is projected that there will be more than 2,285 job openings for this occupation over the next five years. That equates to more than 450 job openings each year.

The average wage for this occupation is \$16.86 per hour. In general, a dental assistant earning the median wage in the region can expect to earn around \$35,000 per year.

STUDENT SUPPLY

In the 2017-18 academic year, community colleges conferred 131 dental assistant awards in the region.

With approximately 457 job openings expected each year for dental assistants, and with only about 131 awards conferred per year, there may be a supply gap in dental assisting.

Supply-Side Analysis

The region's community college talent pool.

PROTECTIVE SERVICE SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Police and Sheriff's Patrol Officers	30,410	2,106	\$49.95

Supply

CC Programs	2017-18 Awards
Administration of Justice	2,487
Police Academy	471
TOTAL	2,958

Protective Service

OVERVIEW

Jobs within the protective service occupational cluster revolve around services and resources aimed at protecting lives and property. From police officers to firefighters and security guards, those who work in this field must have at least a high school diploma or equivalent, as well as some intensive on-the-job training. In the case of police officers, many begin at a community college and then enroll in police academy – where they must graduate before completing a period of on-the-job training.

Community college programs related to this cluster teach students theories, principles, and techniques of law enforcement agencies, juvenile justice and corrections.

JOBS TO WATCH

One occupation within the cluster was selected for closer analysis:

- **Police and Sheriff's Patrol Officers**

In 2017, the region employed 30,410 workers in this occupation, which is projected to generate over 700 new jobs over the next five years or 421 job openings per year.

Police and sheriff's patrol officers have median hourly wages of \$49.95, translating to nearly \$104,000 per year.

Although the typical entry level education is a high school diploma, nearly 40 percent of the workforce holds a community college degree or certificate, qualifying this occupation as middle-skill jobs.

STUDENT SUPPLY

Two community college programs preparing students for this occupation conferred nearly 3,000 awards in the 2017-18 academic year – 2,487 in administration of justice and 471 in police academy.

Office and Administrative Support

OVERVIEW

Office and administrative support workers have a significant role in the advancement of the business services industry, specifically in the areas of accounting and other financial services.

These occupations perform a wide range of activities. For example, workers in office and administrative occupations may be tasked with preparing, transcribing, systematizing and preserving written communications and records.

They may also gather and distribute information and maintain stores of materials. Operating telephone switchboards and coordinating the flow of work and materials within or between departments are other skills associated with this occupational cluster.

The ability to systemize information is critical to this field of study.

Community colleges train students to verify accuracy of data by applying accounting, internal reporting and decision-making principles. Students also learn about many aspects of the day-to-day operations of businesses and financial establishments.

JOBS TO WATCH

One occupation critical to the Los Angeles Basin's economic landscape within the office and administrative support occupational cluster was identified:

- **Production, planning and expediting clerks**

In 2017, the region employed 29,940 workers in this occupation, which is projected to have 2,500 openings over the next five years or approximately 500 job openings per year.

The occupation of production, planning and expediting clerks pays \$22.31 per hour, about the equivalent of \$46,405 per year.

STUDENT SUPPLY

Community colleges programs training for production, planning and expediting clerk jobs conferred 226 awards in the 2017-18 academic year.

OFFICE AND ADMINISTRATIVE SUPPORT SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Production, Planning and Expediting Clerks	29,940	2,499	\$22.31

Supply

CC Programs	2017-18 Awards
Logistics and Materials Transportation	226

Supply-Side Analysis

The region's community college talent pool.

CONSTRUCTION AND EXTRACTION SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Carpenters	25,450	4,253	\$25.12
Electricians	19,710	2,743	\$30.28
Plumbers, Pipefitters, and Steamfitters	14,550	2,027	\$25.16

Supply

CC Programs	2017-18 Awards
Carpentry	38
Mill and Cabinet Work	32
Electrical	177
Plumbing, Pipefitting and Steamfitting	35
TOTAL	282

Construction and Extraction

OVERVIEW

Occupations in the construction and extraction cluster are characterized by their role in erecting and maintaining buildings. Workers may drive, maneuver or control the heavy machinery used in the construction of buildings, as well as work with electrical wiring, equipment and fixtures.

A critical field of expertise within construction and extraction is related to electrical systems.

At the community college level, programs related to this area prepare students to install, maintain and repair electrical systems in buildings.

Students learn about residential, commercial and industrial electric power wiring, as well as motors, controls and electrical-distribution panels.

JOBS TO WATCH

Three occupation critical to this occupational cluster were identified:

- **Carpenters,**
- **Electricians, and**
- **Plumbers, Pipefitters, and Steamfitters.**

In 2017, the region employed 59,710 workers in these three occupations, and it is projected that there will be 1,805 annual openings between 2017 and 2022.

STUDENT SUPPLY

There are several community college programs that train for the three occupations selected as part of this occupation cluster in the region.

These programs conferred a total of 282 awards in the academic year 2017-18 in the region.

Electrical programs conferred the most awards, 177, followed by carpentry programs, 38 awards

The smallest number of awards, only 32, were earned from mill and cabinet work programs in the region.

Installation, Maintenance and Repair

OVERVIEW

Occupations in the installation, maintenance and repair cluster conduct a wide range of activities. These jobs are typically characterized by the type of equipment with which they work.

Some workers specialize in aircraft repair and maintenance, while others focus on heavy and mobile equipment, industrial machinery, or automotive.

At the community college level, programs related to installation, maintenance and repair instruct students in the servicing, maintenance, and diagnosis of malfunctions, and repair and overhaul of components and systems in automotive vehicles.

JOBS TO WATCH

In this cluster, the automotive service technicians and mechanics occupation is important for the region. In 2017, the region employed 20,400 workers in the occupation particularly relevant to the installation, repair and maintenance cluster.

Moreover, it is projected that there will be nearly 2,500 job openings for this occupation over the next five years. That equates to nearly 500 job openings per year. Workers typically earn \$20.02/hour.

STUDENT SUPPLY

There are two community college programs in the region that train for automotive service technicians and mechanics. The most student completions in the 2017-18 academic year were in automotive technology, 2,326 awards, followed by alternative fuels and advanced transportation technology, 48 awards.

INSTALLATION, MAINTENANCE AND REPAIR SCORECARD

Demand

Occupation	2017 Jobs	Annual Openings	Avg. Hourly Wage
Automotive Service Technicians and Mechanics	20,400	2,448	\$20.02

Supply

CC Programs	2017-18 Awards
Automotive Technology	2,326
Alternative Fuels and Advanced Transportation Technology	48
TOTAL	2,374

Revisiting the Target Industries Progress so far.

Together the six identified target industries are expected to add 32,900 middle-skill jobs over the five-year period of 2017 through 2022.

Economic development efforts are organized around several priorities, including encouraging job growth in industries that are export-oriented, most competitive, regionally concentrated, and that will generate high-paying jobs that, through their spillover effects, will drive economic growth, further job creation, and increase wages for a greater number of residents.

The LAEDC identified industries in the Los Angeles Basin that would be prime targets for new or continued investments made to programs specializing in the training and/or education for individuals to fill the projected demand for middle-skill jobs between 2016 and 2021. These training and education programs, to be provided by community colleges, include postsecondary nondegree awards, career technical education (CTE) and associate degree programs.

To choose target industries in the Los Angeles Basin that incorporate all these considerations, the LAEDC identified five target industries in each the following three categories: prominent industries; emerging and growing industries; and so-called “matrix” industries, which are identified via a multi-metric matrix developed to identify industries providing the greatest economic benefit, in terms of both wealth generation and the most opportunities for middle-skill job growth. The final six industry targets were selected from these three listings.

The six selected target industries with promising middle-skill potential in alphabetical order are as follows: (1) aerospace; (2) biomedical manufacturing; (3) entertainment; (4) health care services; (5) ports and related transportation support activities; (6) professional services.

In this section, we review the performance of the previously identified target industries and update the five-year employment forecast for middle-skill jobs in the Los Angeles Basin between 2017 through 2022.

Together these six target industries are expected to add 32,900 middle-skill jobs between 2017 and 2022.

Entertainment and Digital Media

The entertainment and digital media industry has experienced massive and rapid growth, with few signs of slowing in the near future. A variety of enticing new technologies and disruptive platforms has upended the traditional forms of content distribution in favor of personalized, often mobile, experiences for each consumer, and there are extensive opportunities for employment in this quickly developing industry. The L.A. Basin in particular is an exciting location due to the tremendous scale of entertainment and digital media presence in the region, with companies seeking workers to fill a range of evolving roles.

The greatest industry development in recent years has been the transition away from traditional cable television services in favor of video streaming on-demand models, as it is estimated that over half of U.S. households now subscribe to paid streaming services. Even traditional cinemas face competition from such platforms and have placed greater reliance on big-budget franchise movies to compensate for dropping admissions, as companies like Netflix and HBO are devoting immense resources to producing original content.

The target consumer of the entertainment and digital media industry has become more fixated on mobile accessibility, and television's command over advertising has quickly given way to digital, which now captures nearly half of all advertising revenue. A focus on personalizing media experiences for each customer is also driving a data analytics revolution in the industry, where machine learning is used to customize content for each particular individual. Recently, gaming has established itself as a more important segment of entertainment, as online streaming services and the rise of e-sports has propelled massive increases in its popularity and heightened revenue from ticket sales and advertisements.

When looking to the future, the recent explorations into technology such as artificial intelligence and virtual reality will be at the forefront. Voice-assisted platforms, either through smartphones or digital home assistants, are quickly increasing in usage, and virtual reality (VR) promises to augment traditional entertainment consumption across all forms of interaction.

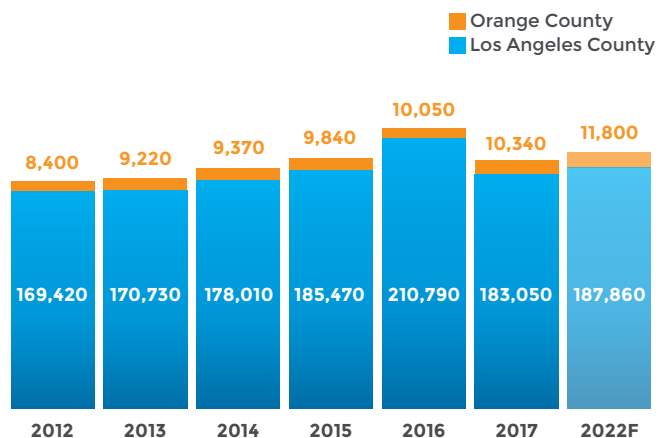
Demand from a variety of established media houses and newer production enterprises will attract high amounts of middle-skilled labor in the entertainment and digital media industries in the years to come.

Due to the extreme pace of industry growth, it is clear that employment opportunities in entertainment and digital media will be abundant, particularly in the Los Angeles Basin. Demand from a variety of established media houses and newer production enterprises will attract high amounts of middle-skilled labor in the years to come.

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the entertainment industry from 2012 through 2017 is displayed in Exhibit 26.

EXHIBIT 26: PAYROLL JOBS IN ENTERTAINMENT



Payroll jobs have grown by 8.0 percent (13,630 jobs) in the industry in Los Angeles County from 2012 to 2017, while employment in Orange County has increased by approximately 1,940 jobs (23.1 percent) over the period.

Between 2017 and 2022, the entertainment industry is expected to grow by 3.2 percent (6,300 jobs) in the L.A. Basin. About 2,500 middle-skill jobs are expected to be added in the industry over the period.

Revisiting the Target Industries

Progress so far.

Health Care Services

Health care services has been continuously evolving with the introduction of emerging technologies and a changing consumer market that finds itself increasingly fragmented by private and public sector divisions. While the nature of services demanded and treatments provided has adopted a new look, overall demand for health care provision is rising, creating a variety of new employment opportunities in the industry.

Recent developments in health care involve the exploration of digital therapeutics, which are reshaping the landscape of diagnoses and treatments. Consumers have demonstrated an inclination towards lower cost, alternative forms of service that place greater reliance on technology, and medical providers have responded through the adoption of connected health devices and data sharing processes that can improve patient interactions and outcomes. This is creating a necessary upskilling of the workforce, as robotic process automation, predictive analytics and artificial intelligence become important skills for workers to possess.

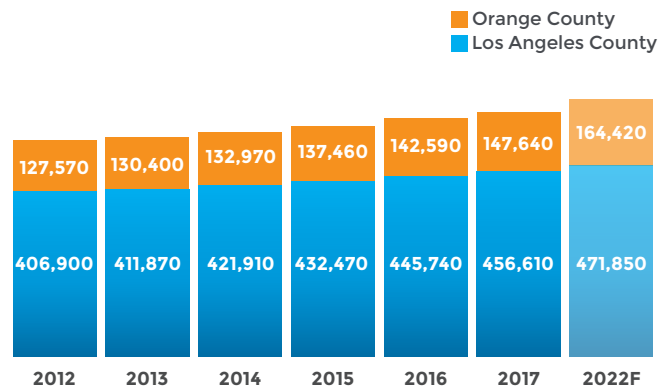
The composition of industry participants itself is changing, for several large mergers in 2018 between companies like CVS Health and Aetna demonstrate the importance of integration and expansion to combat the rise of disruptive new entrants into the market. Technology and MedTech companies have provided innovative new perspectives in healthcare services and experimented with care provision. As a result, there are many opportunities for workers looking to enter the industry, as companies are in dire need of employees familiar with new technology that can help them navigate the changing healthcare landscape.

Healthcare services has been continuously evolving with the introduction of emerging technologies and a changing consumer market that finds itself increasingly fragmented by private and public sector divisions.

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the health care services industry from 2012 through 2017 is displayed in Exhibit 27.

EXHIBIT 27:
PAYROLL JOBS IN HEALTH CARE SERVICES



Payroll jobs have grown by 12.2 percent (49,700 jobs) in the industry in Los Angeles County from 2012 to 2017, while employment in Orange County has risen by approximately 20,100 jobs (15.7 percent) over the period.

Between 2017 and 2022, the health care services industry is expected to grow by 5.3 percent (32,000 jobs) across all skill levels in the L.A. Basin. About 12,900 middle-skill jobs are expected to be added in the industry over the period.

Knowledge and experience with leveraging data to create actionable insights has become a focus of professional service firms.

Professional Services

The professional and technical services industry is becoming increasingly competitive, and market incumbents are experiencing the pressures of heightened competition and disruption of standard operating procedures. To remain relevant and retain customers, many in the industry are looking for methods to reduce costs, provide more efficient and valuable service, and digitize operations to save time and manpower.

Executives have noted how clients have recently increased their expectations for quality of work and delivery of solutions and systems; as a result, firms are changing their business models to adapt. This has included exploring value-oriented billing instead of hourly fees and the modularization of service elements to meet extremely specific customer needs. In an effort to build stronger, lasting relationships with clients, content and services have become ever more personalized and tailored.

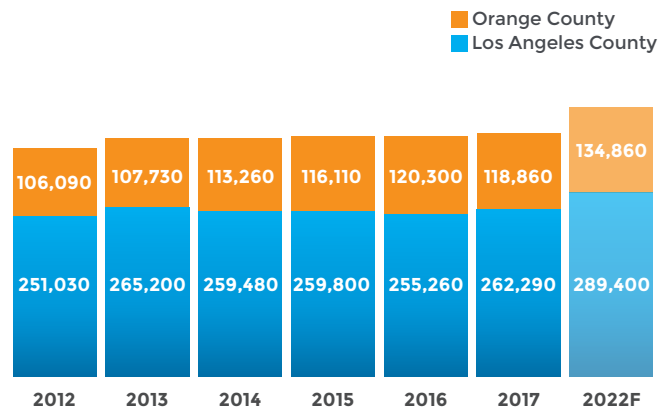
The growth of social media has also permeated the professional and technical services industry, as companies have embraced these mediums to engage new clients, improve brand awareness and monitor their competitors. Meanwhile, back-end services and paper-driven processes are becoming automated to reduce operational costs and allow employees to focus more time on customer interactions.

Knowledge and experience with leveraging data to create actionable insights has become a focus of professional service firms. As a result of these trends, technology is becoming more important both to digitize the less valuable, number-crunching, aspects of service and to find exciting new strategies for providing value to clients.

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the professional services industry from 2012 through 2017 is displayed in Exhibit 28.

**EXHIBIT 28:
PAYROLL JOBS IN PROFESSIONAL SERVICES**



Payroll jobs have grown by 4.5 percent (11,300 jobs) in the industry in Los Angeles County from 2012 to 2017, while employment in Orange County has increased by approximately 12,800 jobs (12.0 percent) over the period.

Between 2017 and 2022, the professional services industry is expected to grow by 4.3 percent (16,600 jobs) in the L.A. Basin. Less than 100 middle-skill jobs are expected to be added in the industry over the period.

Revisiting the Target Industries

Progress so far.

As companies turn to the development of fuel-efficient narrow-body aircraft to replace older models, they will require a larger mid- to high-skilled workforce to facilitate production.

Aerospace

Aerospace vehicles and parts manufacturing has had a strong performance since the baseline report, and expectations for future growth bode well for the industry in the L.A. Basin. A diverse combination of government and commercial contracts will sustain companies through the potential challenges created by rising input costs or changing fiscal policy. Furthermore, the growth of private aerospace ventures and new associated manufacturers in California will create employment opportunities across a variety of industry segments.

Revenue passenger miles have increased by over six percent (6%) annually for the past five years, supporting the rising demand for commercial aircraft, and the growing global middle class should create a large market of new consumers in the coming decade. As companies turn to the development of fuel-efficient narrow-body aircraft to replace older models, they will require a larger mid- to high-skilled workforce to facilitate production. Although tariffs on aluminum, steel and other important imports could create higher costs for American manufacturers, the high demand for new products should maintain growth and profitability. The expanding size of the commercial fleet has also led to a greater importance of the aerospace aftermarket sector, where an increased number of workers will be necessary to service and maintain aircraft.

As aerospace vehicles and parts manufacturing is closely linked to the defense industry, there are additional manufacturing opportunities created by rising geopolitical tensions which are driving the rise in defense spending by the U.S. and its allies and adversaries. Top defense contractors witnessed an acceleration in revenue and profit growth last year, and more federal contracts will likely follow as the defense budget continues to increase.

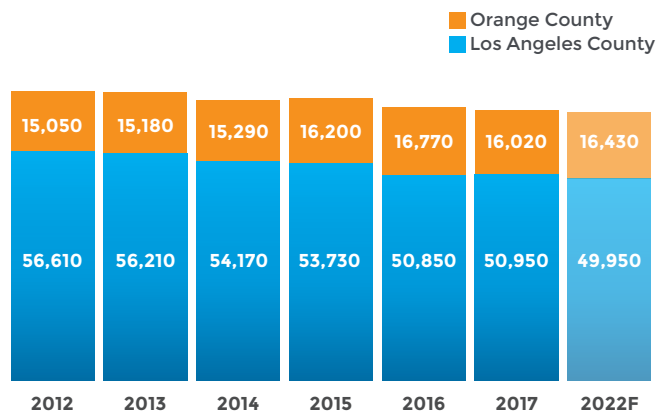
These trends are contributing to a healthy demand for workers in the aerospace industry. Although overall employment has remained steady at around twenty-four million workers, retirement rates in an aging workforce and industry growth will produce new openings, particularly in the emerging cyber

and space systems divisions. Workers with technical skills, especially in data analytics, automation and software, are expected to be highly demanded. As the aerospace industry accounts for a significant percentage of U.S. exports and generates a major trade surplus, its growth will continue to create manufacturing jobs both nationwide and in the California region.

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the aerospace (manufacturing) industry from 2012 through 2017 is displayed in Exhibit 29.

EXHIBIT 29:
PAYROLL JOBS IN AEROSPACE MAUFACTURING



Payroll jobs have fallen by 10.0 percent (5,700 jobs) in the industry in Los Angeles County from 2012 to 2017, though it posted annual year-over-year growth from 2016 to 2017 of 0.2 percent. Employment in Orange County has increased by approximately 1,000 jobs (6.4 percent) from 2012 to 2017 due to payroll gains in parts manufacturing.

Between 2017 and 2022, the aerospace manufacturing industry is expected to slow by 0.9 percent (800 jobs) in the L.A. Basin. Just over 600 middle-skill jobs are expected to be lost in the industry over the period. However, the industry in Orange County is expected to add just over 400 jobs over the period.

Biomedical Manufacturing

The biomedical field is growing nationwide and becoming a signature industry in California due to its geographic concentration in regions from San Diego County to the L.A. Basin up to the San Francisco Bay Area. Increased demand for workers is stemming from the formation of new health companies and research ventures.

Exploration into new medical implants and surgical equipment have created a surging market around biomedical metals, while the rise of mobile and wearable technology that tracks bodily measurements is allowing medicine to become more effectively tailored for each individual patient.

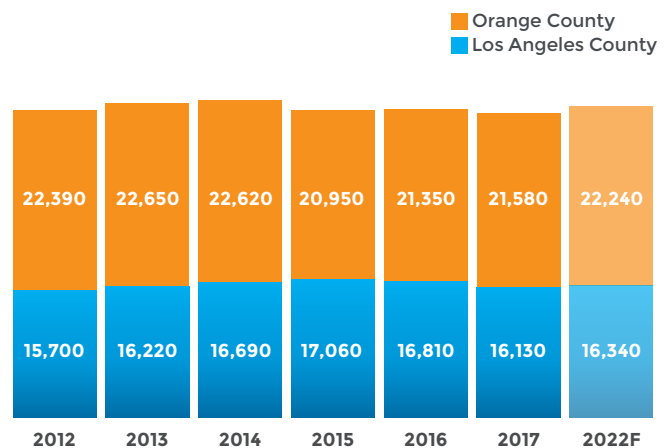
Three-dimensional printing experienced a biomedical breakthrough in 2016 with the creation of the Integrated Tissue and Organ Printing system capable of generating muscle, cartilage and bone; this has encouraged growing research into the capabilities of bioprinting and artificial organs. Meanwhile, nanotechnology is becoming more ubiquitous for precise treatments that are less invasive and costly. Future efforts will involve the development of microneedles and nanobots to deliver drugs directly to the affected area of a patient's body.

As the biomedical industry develops more critical and life-saving applications for the world of healthcare and patient services, it will garner increased recognition and spur a demand for talented new employees. Workers will require training in robotics, artificial intelligence, three-dimensional printing, sensor and imaging technology, and a variety of related fields.

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the biomedical manufacturing industry from 2012 through 2017 is displayed in Exhibit 30.

**EXHIBIT 30:
PAYROLL JOBS IN BIOMEDICAL MAUFACTURING**



Payroll jobs have grown by 2.7 percent (430 jobs) in the industry in Los Angeles County from 2012 to 2017, while employment in Orange County has fallen by approximately 800 jobs (-3.7 percent) over the period.

Between 2017 and 2022, the biomedical manufacturing industry is expected to grow by 2.3 percent (900 jobs) in the L.A. Basin. Close to 200 middle-skill jobs are expected to be added in the industry over the period.

Increased demand for workers in the biomedical field is stemming from the formation of new health companies and research ventures.

Revisiting the Target Industries

Progress so far.

Transportation, Ports and Related Support Activities

Increasing demand for manufactured and consumer products have contributed to the sustained strength of port-related transportation and support activities, while technological development and improvements to efficiency have been driving change in the industry.

The industry is more susceptible to global fluctuations in trade and production than most others, which makes forecasting short-term outcomes more difficult as trade hostilities between the U.S. and China escalate, which could negatively impact overseas shipping. There has also been speculation that recent advancements in three-dimensional printing could encourage manufacturers to reduce offshore production and transport, though widespread adoption of this innovation is likely far off.

However, other advances in technology have contributed to the greatest new developments in port-related transportation and support activities. Consumers have grown accustomed to a model of online commerce where products can be ordered anywhere at any time. This has created a greater importance for logistics planning and management services, and opened up opportunities for third-party companies to serve more producers that neglect brick-and-mortar stores, warehouses or vehicles in favor of electronic operations.

As knowledge and innovation become increasingly important factors in determining the competitiveness of a port, employees will have to incorporate technology into their everyday tasks to a greater degree. Automation is becoming particularly impactful within the industry, as autonomous driving technology has rapidly improved and is likely to cause disruptions in the workforce due to its efficiency and ability to substitute for human labor. Furthermore, the push for environmentally friendly and energy-efficient transportation methods has begun forcing companies to upgrade vehicles and infrastructure.

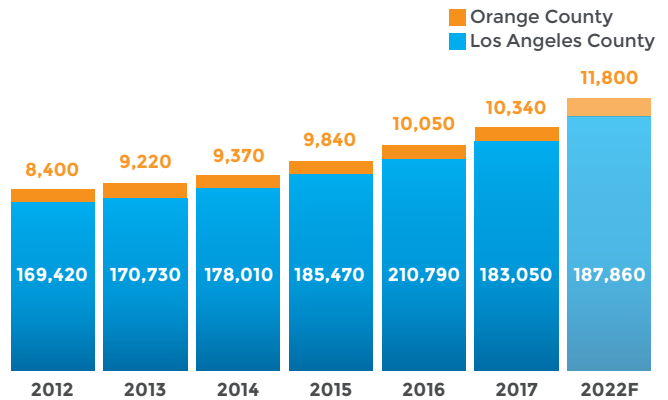
Port-related transportation companies face risks with an escalation of trade hostilities between the U.S. and China, which could negatively impact overseas shipping.

Growth in the entire transportation industry is predicted to remain positive, so new workers will find several opportunities in this field. Ports will look to gain an advantage through streamlining supply chain operations, improving logistics, and refining their interactions with transportation companies, requiring talented new employees that can capitalize on the benefits of technology

TARGET INDUSTRY PERFORMANCE

Annual payroll employment in the port-related transportation and supporting activities from 2012 through 2017 is displayed in Exhibit 31.

EXHIBIT 31: PAYROLL JOBS IN PORT RELATED TRANSPORTATION AND SUPPORTING ACTIVITIES



Payroll jobs have grown by 36.1 percent (22,500 jobs) in the industry in Los Angeles County from 2012 to 2017, while employment in Orange County has increased by approximately 700 jobs (15.2 percent) over the period.

Between 2017 and 2022, the port-related transportation and supporting activities is expected to grow by 4.2 percent (4,100 jobs) in the L.A. Basin. Over 100 middle-skill jobs are expected to be added in the industry over the period.

Looking at Other Industries Where middle-skill job growth is strongest.

The previously identified target industries are not the only industries expected to experience significant growth in middle-skill occupations between 2017 and 2022.

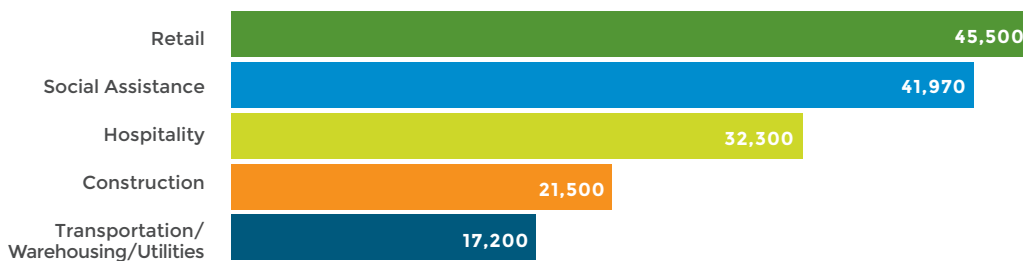
Other opportunities exist for further research into industries expected to have robust growth in middle-skill jobs. The industries covered in our deep-dive reports: entertainment and digital media; health care services; and professional business services, account for just over 20 percent of total payroll employment across all skill levels in the Los Angeles Basin, but they are not the only industries expected to experience significant growth in middle-skill occupations from 2017 to 2022.

Exhibit 32 shows the top-five industries with the highest projected growth in middle-skill jobs over the next five years, excluding industries we have already covered in depth in our previous deep-dive industry reports (health care and entertainment).

The top-five industries with the highest projected middle-skill job growth are found in industries of varying sizes. For instance, hospitality might rank third for middle-skill job growth between 2017 and 2022, but it is currently the smallest of the top-five in terms of its total middle-skill employment.

Although the size of each of these industries varies, as do their staffing patterns and growth projections, each has a significant share of its employment in middle-skill occupations. More than half the jobs in the repair and maintenance, insurance carriers and construction industries are in middle-skill occupations. Government and social assistance have a middle-skill employment share of 48 percent and 31 percent, respectively and approximately 9 percent of the jobs in the hospitality industry are middle-skill.

EXHIBIT 32:
**L.A. BASIN INDUSTRIES WITH THE HIGHEST
MIDDLE-SKILL OPENINGS PROJECTED 2017-2022**



Looking at Other Industries

Where middle-skill job growth is strongest.

Together, these five identified industries account for 23 percent of all middle-skill jobs in the L.A. Basin in 2017, with total middle-skill openings expected to reach over 155,700 between 2017 and 2022.

Sizing Things Up

Together, these five target industries account for approximately 30 percent of total employment and 23 percent of all middle-skill jobs in the L.A. Basin in 2017, with **more than 158,400 total middle-skill openings expected from 2017 to 2022** in the region.

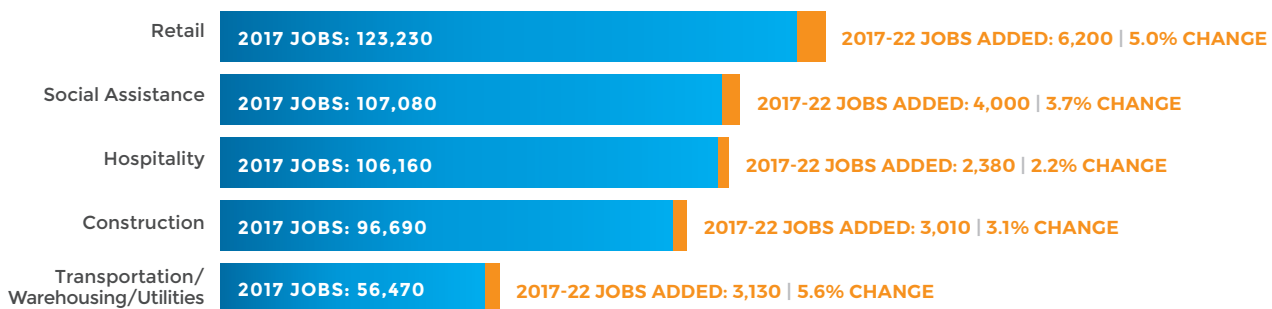
In the pages that follow, each of the industries shown in Exhibits 32 and 33 is detailed in an infographic providing the following:

- Description and definition of the industry is outlined and detailed
- The employment level in this industry is presented in both 2017 and 2022
- Total employment in the industry along with its middle-skill job share in 2017
- Average annual wages paid in 2017 for workers in this industry in the L.A. Basin
- The distribution of workers by major occupation group across the industry
- Middle-skill jobs data and projected openings for workers in the L.A. Basin in 2017 and through 2022
- A selection of other metrics specific to this industry, including economic output, value added, industry concentration and wage data.

Directory of Other Middle-Skill Industries

- Construction (NAICS 23)
- Transportation, Warehousing and Utilities (NAICS 48-49 and 22)
- Hospitality (NAICS 72)
- Social Assistance (NAICS 624)
- Retail (including eCommerce) (NAICS 44-45)

EXHIBIT 33: HIGHEST MIDDLE-SKILL JOBS GROWTH INDUSTRIES 2017-2022



Construction (NAICS 23)

The construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this sector.



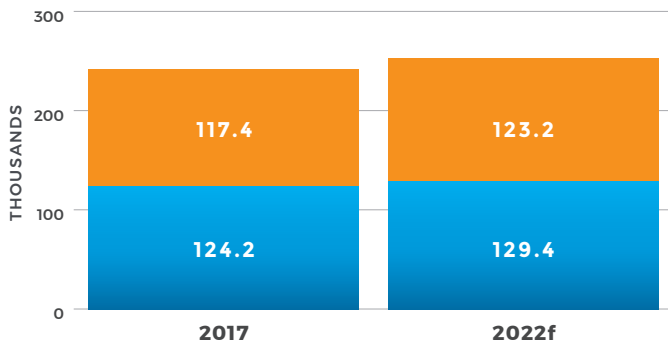
Average Annual Wage:

\$63,570

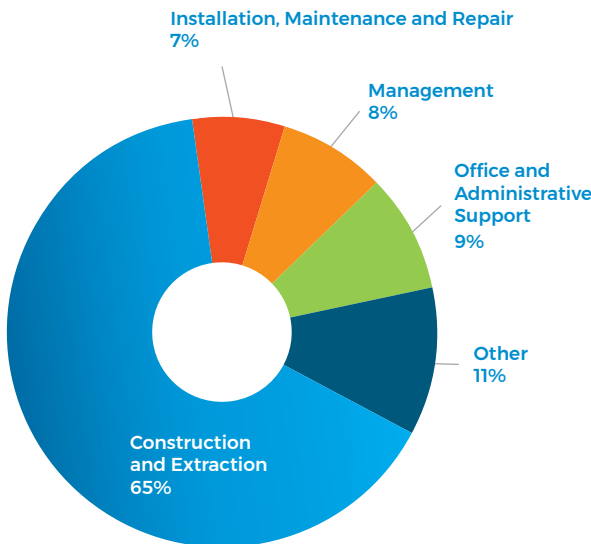
in 2017

**EMPLOYMENT IN INDUSTRY
2017 TO 2022f**

Other Jobs
Middle-skill Jobs



**EMPLOYMENT DISTRIBUTION BY OCCUPATION
L.A./O.C. REGION 2017**



**Middle-skill Jobs
2017-2022:**

- 2017 MS Jobs: 124,200
- 2022 MS Jobs: 129,400
- Projected MS Job Growth: 4.2%
- Projected New MS Jobs: 5,200
- Projected 5-year Replacement Rate: 5.8%
- Projected MS Total Openings: 21,500

Middle-skill
Job Share:
51%

Employment Growth:

- 2017 to 2022f: 4.6%

Industry Concentration:

- 2016 LQ: 0.7
- 30 percent less concentrated vs. U.S.

Wages in 2017:

- Wage relative to 2017 All Industries: 101%
- Increased from 2012 to 2017

Sources: BLS, QCEW and OES May 2016; forecasts and estimates by LAEDC

Transportation, Warehousing and Utilities

(NAICS 48-49 & 22)

The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline.



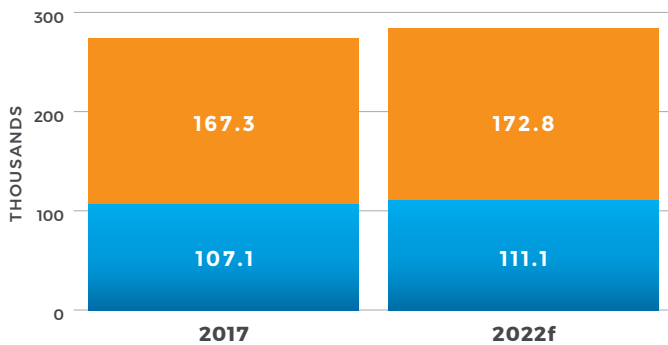
Average Annual Wage:

\$68,100

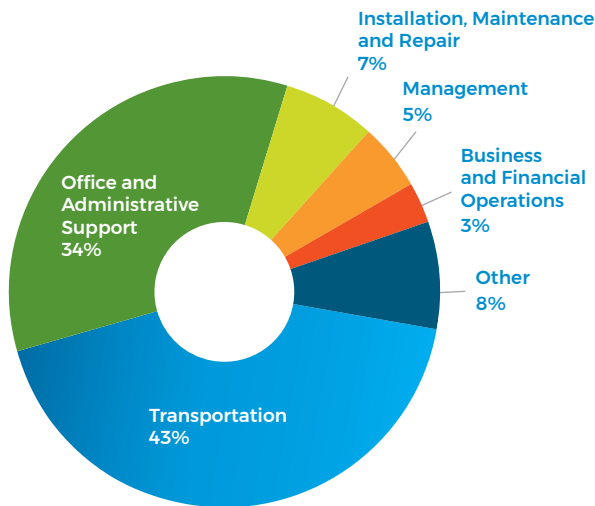
in 2017

EMPLOYMENT IN INDUSTRY
2017 TO 2022f

Other Jobs
Middle-skill Jobs



EMPLOYMENT DISTRIBUTION BY OCCUPATION
L.A./O.C. REGION 2017



Middle-skill Jobs
2017-2022:

- 2017 MS Jobs: 107,100
- 2022 MS Jobs: 111,100
- Projected MS Job Growth: 3.7%
- Projected New MS Jobs: 4,000
- Projected 5-year Replacement Rate: 14.1%
- Projected MS Total Openings: 21,500

Middle-skill
Job Share:
51%

Employment Growth:

- 2017 to 2022f: 3.5%

Industry Concentration:

- 2016 LQ: 0.9
- 10 percent less concentrated vs. U.S.

Wages in 2016:

- Wage relative to 2016 All Industries: 108%
- Increased from 2012 to 2017

Sources: BLS, QCEW and OES May 2016; forecasts and estimates by LAEDC

Hospitality

(NAICS 72)

The Accommodation and Food Services sector comprises establishments providing customers with lodging and/or preparing meals, snacks, and beverages for immediate consumption. The sector includes both accommodation and food services establishments because the two activities are often combined at the same establishment.

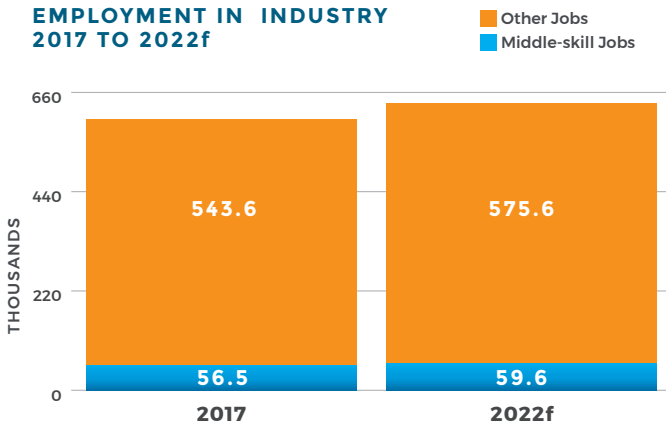


Average Annual Wage:

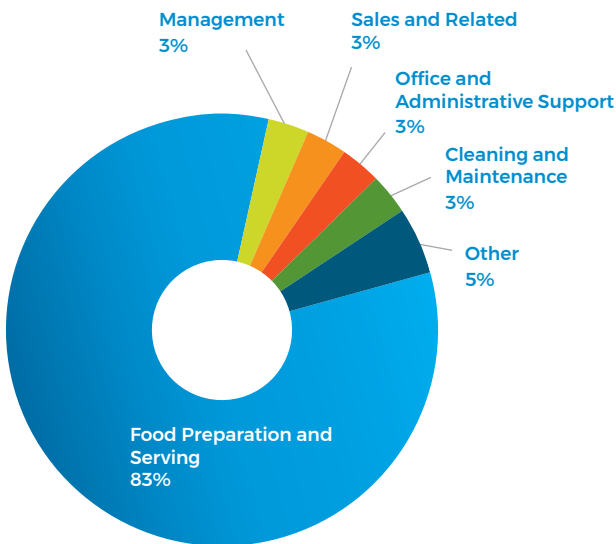
\$24,360

in 2017

EMPLOYMENT IN INDUSTRY
2017 TO 2022f



EMPLOYMENT DISTRIBUTION BY OCCUPATION
L.A./O.C. REGION 2017



Middle-skill Jobs
2017-2022:

- 2017 MS Jobs: 56,500
- 2022 MS Jobs: 59,600
- Projected MS Job Growth: 5.5%
- Projected New MS Jobs: 3,100
- Projected 5-year Replacement Rate: 12%
- Projected MS Total Openings: 32,300

Middle-skill
Job Share:

9%

Employment Growth:

- 2017 to 2022f: 5.8%

Industry Concentration:

- 2016 LQ: 1.04
- 4 percent more concentrated vs. U.S.

Wages in 2017:

- Wage relative to 2017 All Industries: 108%
- Increased from 2012 to 2017

Sources: BLS, QCEW and OES May 2016; forecasts and estimates by LAEDC

Social Assistance (NAICS 624)

Industries in the Social Assistance subsector provide a wide variety of social assistance services directly to their clients. These services do not include residential or accommodation services, except on a short stay basis.

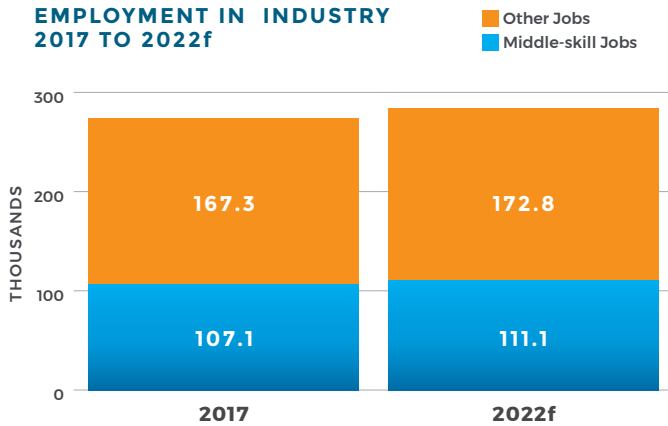


Average Annual Wage:

\$18,260

in 2017

**EMPLOYMENT IN INDUSTRY
2017 TO 2022f**



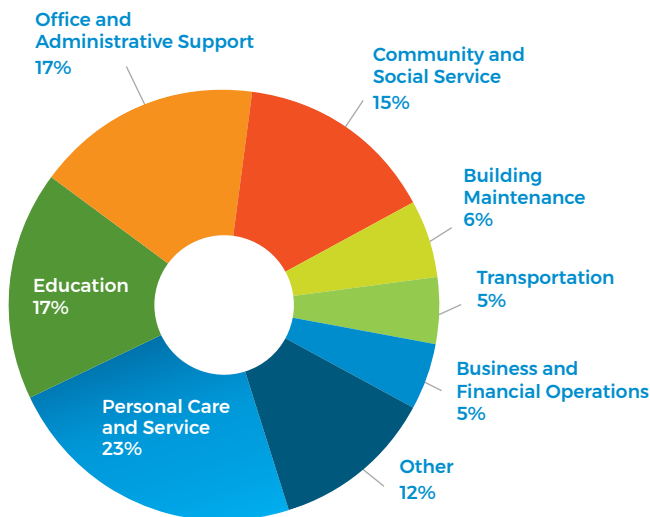
**Middle-skill Jobs
2017-2022:**

- 2017 MS Jobs: 96,700
- 2022 MS Jobs: 99,700
- Projected MS Job Growth: 3.1%
- Projected New MS Jobs: 3,000
- Projected 5-year Replacement Rate: 6.9%
- Projected MS Total Openings: 41,970

Middle-skill
Job Share:

31%
in 2017

**EMPLOYMENT DISTRIBUTION BY OCCUPATION
L.A./O.C. REGION 2017**



Employment Growth:

- 2017 to 2022f: 5.1%

Industry Concentration:

- 2016 LQ: 2.3
- 2.3 times more concentrated vs. U.S.

Wages in 2017:

- Wage relative to 2017 All Industries: 29%
- Increased from 2012 to 2017

Sources: BLS, QCEW and OES May 2016; forecasts and estimates by LAEDC

Retail Trade, Including eCommerce (NAICS 44-45)

The Retail Trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and nonstore retailers, which includes web retailers.

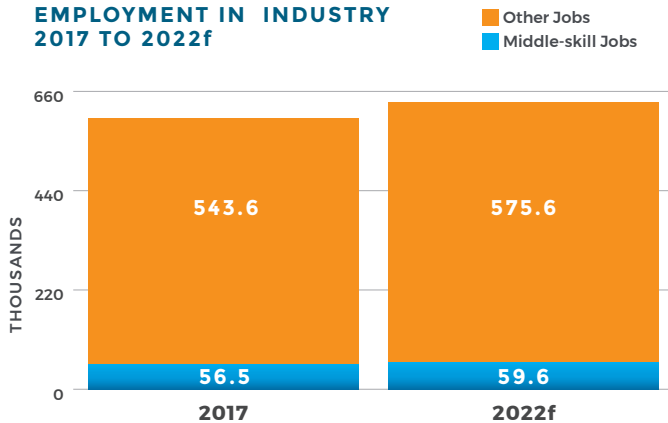


Average Annual Wage:

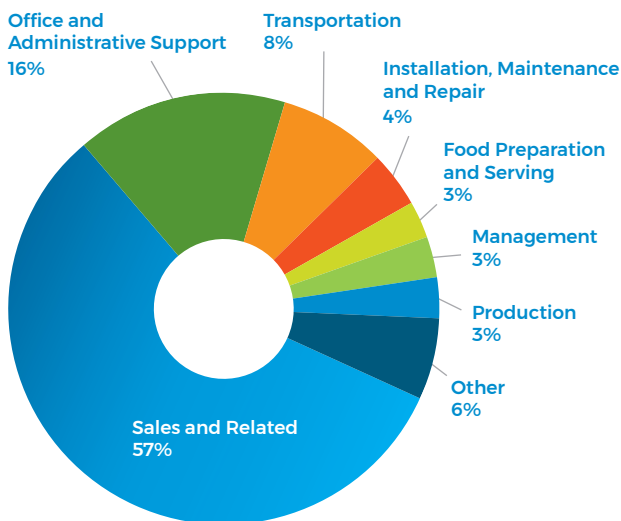
\$35,380

in 2017

EMPLOYMENT IN INDUSTRY 2017 TO 2022f



EMPLOYMENT DISTRIBUTION BY OCCUPATION L.A./O.C. REGION 2017



Middle-skill Jobs 2017-2022:

- 2017 MS Jobs: 106,200
- 2022 MS Jobs: 108,500
- Projected MS Job Growth: 2.2%
- Projected New MS Jobs: 2,400
- Projected 5-year Replacement Rate: 9.5%
- Projected MS Total Openings: 45,500

Middle-skill Job Share:

18%
in 2017

Employment Growth:

- 2017 to 2022f: 2.0%

Industry Concentration:

- 2016 LQ: 0.9
- 0.9 times less concentrated vs. U.S.

Wages in 2017:

- Wage relative to 2017 All Industries: 56%
- Increased from 2012 to 2017

Sources: BLS, QCEW and OES May 2016; forecasts and estimates by LAEDC

Conclusion

Challenges, recommendations and next steps.

Middle-skill jobs have great potential to lift individuals out of poverty, offering strong wages and requiring only a few years of educational preparation.

Middle-skill jobs are particularly relevant to community colleges because they typically require some college coursework, but less than a bachelor's degree. Middle-skill jobs have great potential to lift individuals out of poverty, offering strong wages and requiring only a few years of educational preparation. Since community colleges play a leading role in training students to enter these target occupations, it is imperative that more attention be given toward meeting forecasted employer demand.

Why Reaching for Higher Skill-Levels is More Important than Ever

As an increasing number of industries become more capital-intensive and less labor-intensive, individuals with the lowest levels of education are most vulnerable to having their jobs eliminated as a result of automation and other forms of technological innovation.

While widespread automation is not a direct threat near-term (as it is cost prohibitive for many operations and legislation has failed to keep pace with advances in technology in certain industries), partial automation is quite prevalent in many workplaces today. This labor-technology substitution trend is expected to accelerate over time as continued innovation allows the capabilities of machines to surpass those of humans. Additionally, the cost of technology will continue to decline over time. Still, technology can also have a complementary effect on labor, increasing the demand for labor and making existing workers more productive. All things considered, it will be at least another decade, possibly two, before automation becomes a true pressing threat to employment.

The jobs most at risk of becoming automated include those that involve simple repetitive tasks and those that involve data; the first is at-risk of being replaced by machines and the other by algorithms. Individuals who lose their jobs to automation must be upskilled or retrained to fill other occupations less susceptible to the threat of automation. This puts enormous pressure on community colleges and other education systems to create programs to fill this gap.

Work activities that require the management of people, experience in decision making, planning or tasks requiring creativity, interactions with other people, and work with physical activity taking place in unpredictable environments have the least exposure to risk of being displaced. These skills will continue to be in demand, and represent opportunities for educational institutions, such as community colleges, to adapt their different program curricula to include more emphasis on STEM fields of study, soft skills required for successful professional interactions, and to promote more creative and critical thinking.

In today's economy, some industries are more at risk of losing jobs as a result of automation compared to others, these include leisure and hospitality industries (especially food services), retail trade (due to the rise in e-commerce), and warehousing and logistics industries (as a result of widespread use of automatic storage, retrieval handling and distribution and logistics software). Manufacturing industries have long been identified as vulnerable to disemployment related to technological innovation. For example, workers in factories have been moving away from traditional assembly functions and into higher-skilled positions, such as CNC (Computer Numerical Control) operators. Recent advancements in robotics, artificial intelligence and machine learning are poised to cause greater levels of disruption in the future, not only in manufacturing, but also across numerous other industries. Individuals will need skills that can be employed in conjunction with the functions of machines.

As industries continue to evolve, it will be a major challenge for educational providers to keep pace; teaching students the skills they need to be hired and remain employed in this increasingly technical world will require educational providers to become much more adaptive to the pace of change outside of their institutions. For this reason, success will require heavy interaction with industry stakeholders and public-private partnerships for career education programs tailored to satisfy industry employment needs.

If educators cannot keep up and provide local industries with qualified workers with the skills they need, skills gaps will widen and result in unfilled job vacancies for businesses, causing them to seek out

talent from other places or leave the region completely, which will increase unemployment and economic instability for individuals and their households and communities.

Partnering with Industry

The L.A. Basin's regional educators and workforce development and training stakeholders have the opportunity to collaborate on innovative solutions to the most pressing issues facing the region. The skills gap, for example, can only be closed by more cooperation between educators and employers to ensure programs, curricula and stackable certificates reflect the in-demand skills and knowledge that students will need in the industries and occupations of the future.

With employers facing a number of worker retention, expansion and attraction challenges, including: staffing shortages; high replacement rates (i.e. turnover and retirement); advances in technology requiring workers with new skill sets; and increased social awareness pushing for more diversity in the workforce. As such, there is a strong incentive for employers to engage more directly in education and workforce development activities and, in particular, to meaningfully partner with community colleges.

Education increasingly involves collaboration between educators and private sector stakeholders, reflecting a growing need for internships and other hands-on, practical ways to gain relevant workplace skills.

By partnering with industry, the community college system can be kept abreast of changing industrial changes in the hiring in industries that directly relate to the workforce needs, such as new technological advancements requiring the use of new tools and skills in their operation, current and predicted oversaturation or shortages for particular occupations; and legislative, regulatory and other policy mandates that will impact employers in the industry. Building relationships with employers provides the potential for establishing new programs and work-based learning opportunities (e.g., internships, specialized study) that provide direct pathways to employment, which will not only bolster the middle-skill talent supply pipeline but satisfy the labor demand needs of the industry.

Working toward aligning programs and curricula with the skills and knowledge needed in the regional labor market could have major benefits for both sides of the education-industry partnership.

Immediate Next Steps in Activating the Report

As stated earlier, this report is the intelligence underpinning the Center for a Competitive Workforce's comprehensive program to retool our region's career education programs for the in-demand occupations of tomorrow.

With the middle-skill talent being trained at community colleges throughout the L.A. Basin, the CCW is poised to engage industry and partners in the next steps. Building on the labor market data and industry trends identified in this report related to supply and demand in the Los Angeles Basin, the real work begins to further validate and qualitatively expand on the report's quantitative findings. Much of this work will be conducted through the CCW's partnership with the LAEDC.

Guided by this report, the CCW, in partnership with the LAEDC, will deploy the LAEDC's industry councils to engage with industry leaders and professionals from the target occupations identified, along with their direct supervisors, as the individuals best-positioned with industry and firm-level intelligence regarding job-related changes, and new competencies that are required for the candidates they interview and hire.

By engaging industry experts on behalf of the community colleges, the CCW seeks to garner first-hand knowledge about the essential and trending requirements for students to be prepared for current and future occupations and careers in the industry.

Once target occupational profiles are established, the CCW, in partnership with the LAEDC, will facilitate and invest in developing stronger ties with employers through our key community college partners, such as Deputy Sector Navigators, curriculum development specialists, faculty and career education deans, to enhance, reconfigure or develop new industry-validated programs and curricula. One of our goals is the development of industry-informed and recognized "model curriculum" that colleges can adopt or adapt and that inspires more relevant student work-based learning opportunities.

Finally, the CCW will continuously communicate these findings and outcomes, primarily through its website, www.CompetitiveWorkforce.LA. The goal of this outreach is to increase student access; better inform all regional stakeholder of the successes, gaps, opportunities and challenges in these rapidly evolving industries; and enhance the performance of the L.A. Basin's community colleges as they endeavor to empower their students to thrive in this incredibly dynamic space.

Occupational Profiles

Employment numbers and worker characteristics.

Together, these fifteen target middle-skill occupations account for approximately 10 percent of all projected new jobs in the Los Angeles Basin from 2017 through 2022.

Detailed information has been compiled for the top 15 middle-skill occupations in the Los Angeles Basin. Data from 2017, the most recent available, was used to determine wages and worker characteristics for the charts included with the profiles.

Together, these fifteen target middle-skill occupations account for approximately 10 percent of all projected new jobs in the Los Angeles Basin from 2017 through 2022.

The information on top industries employing these occupations, current and projected employment, wages and demographics can be used by community colleges to tailor existing programs and guide outreach to potential students. The occupational analyses that follow may even inspire new program development or new approaches in attracting students to promising career paths.

Each occupational profile contains:

- Hourly wages paid in 2017 for workers in Los Angeles and Orange counties compared to the living wage;
- The distribution of workers across industry sectors in the Los Angeles Basin;
- Metrics for the occupation including the number of current jobs and projected openings; and
- Worker characteristics, such as educational attainment, age distribution, race and ethnicity, and gender.

Top 15 Occupations

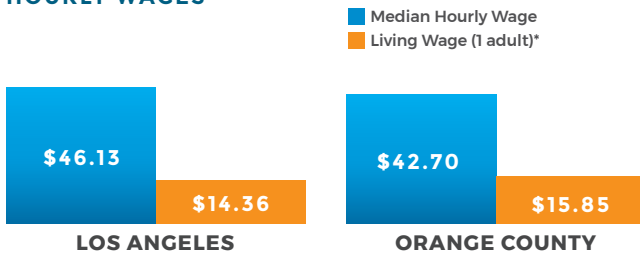
- **Registered Nurses** (SOC 29-1141)
- **Teacher Assistants** (SOC 25-9041)
- **Carpenters** (SOC 47-2031)
- **Electricians** (SOC 47-2111)
- **Licensed Vocational Nurses** (SOC 29-2061)
- **Production, Planning and Expediting Clerks** (SOC 43-5061)
- **Automotive Service Technicians and Mechanics** (SOC 49-3023)
- **Social and Human Service Assistants** (SOC 21-1093)
- **Dental Assistants** (SOC 31-9091)
- **Police and Sheriff's Patrol Officers** (SOC 33-3051)
- **Computer User Support Specialists** (SOC 15-1232)
- **Plumbers, Pipefitters and Steamfitters** (SOC 47-2152)
- **Paralegals and Legal Assistants** (SOC 23-2011)
- **Pharmacy Technicians** (SOC 29-2052)
- **Web Developers** (SOC 15-1254)

Registered Nurses (SOC 29-1141)

Assess patient health problems and needs, develop and implement nursing care plans, and maintain medical records. Administer nursing care to ill, injured, convalescent, or disabled patients. May advise patients on health maintenance and disease prevention or provide case management. Licensing or registration required. Includes Clinical Nurse Specialists.

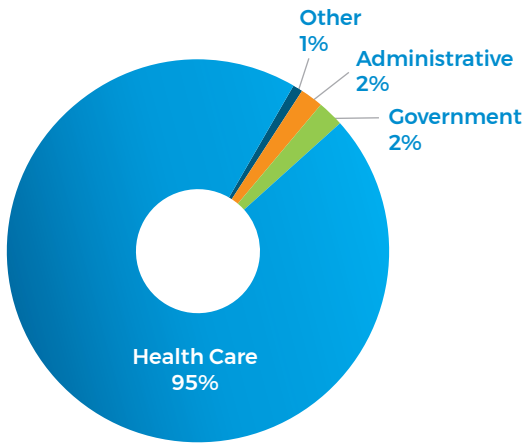
While a large share of RNs have an associate degree, preference is increasingly being given to those with a BSN. More openings exist for those with experience or specialty nurses.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Microsoft Access
- IBM Notes
- Oracle Taleo
- Epic Systems
- Healthcare common procedure coding system HCPCS
- Medical procedure coding software
- MEDITECH software
- Medical condition coding software

Total Projected Openings 2022

23,670 Total Openings (5-yr)

6,430 Net Job Change
17,250 5-Yr Replacements
1,737 Community Colleges Awards 2017-18
1 Program
21 Colleges

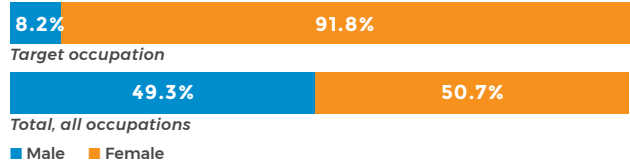
Total Jobs in 2017

79,420
in L.A. County

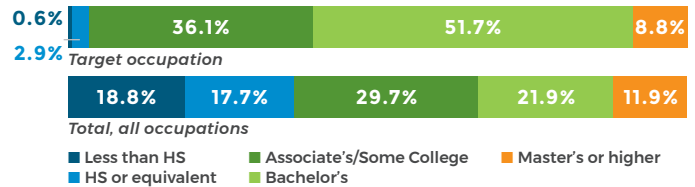
22,920
in Orange County

Regional Worker Characteristics

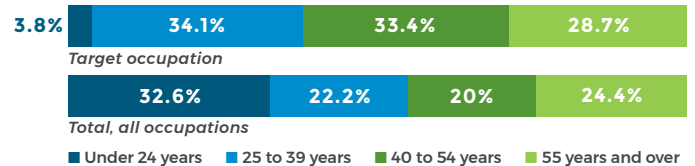
GENDER OF WORKERS



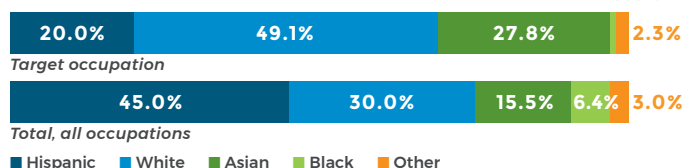
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



RACE AND ETHNICITY OF WORKERS

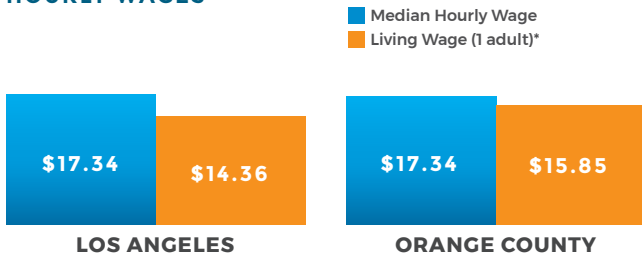


Teacher Assistants (SOC 25-9041)

copy Perform duties that are instructional in nature or deliver direct services to students or parents. Serve in a position for which a teacher has ultimate responsibility for the design and implementation of educational programs and services.

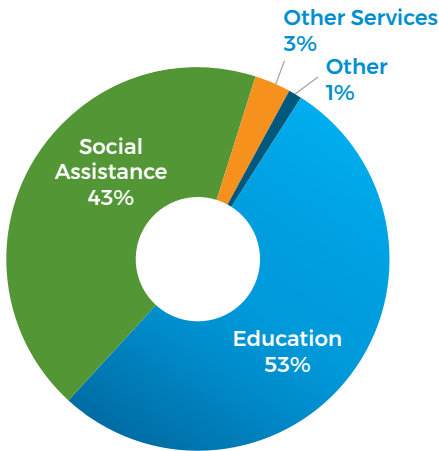
Teacher assistants work with a licensed teacher to give students additional attention and instruction, they work predominantly in schools, at childcare centers, and for religious organizations.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Automate the Schools ATS
- Special Education Student Information System SESIS
- Blackboard
- Student information systems SIS
- Transcript HSST
- Children's educational software
- Microsoft PowerPoint
- Microsoft Excel

Total Projected Openings 2022

19,800 Total Openings (5-yr)

1,550 Net Job Change
18,250 5-Yr Replacements
46 Community Colleges Awards 2017-18
2 Programs
5 Colleges

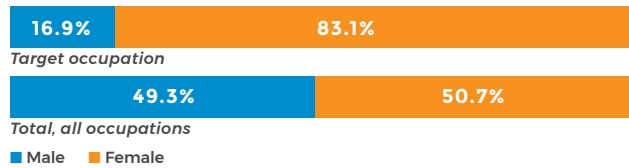
Total Jobs in 2017

39,330
in L.A. County

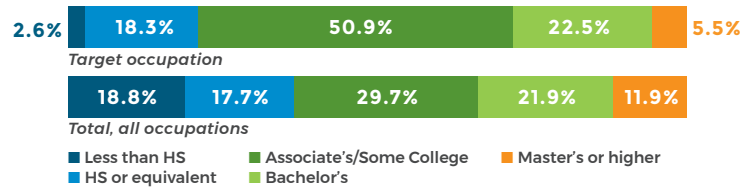
13,340
in Orange County

Regional Worker Characteristics

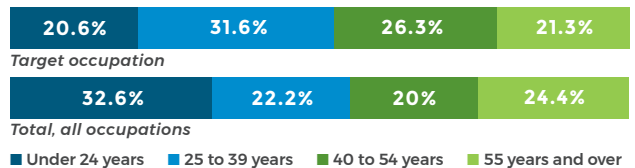
GENDER OF WORKERS



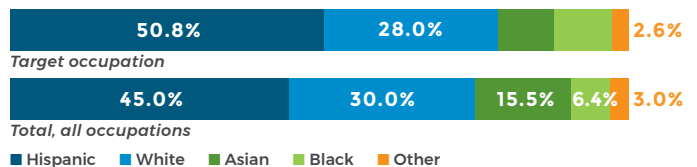
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



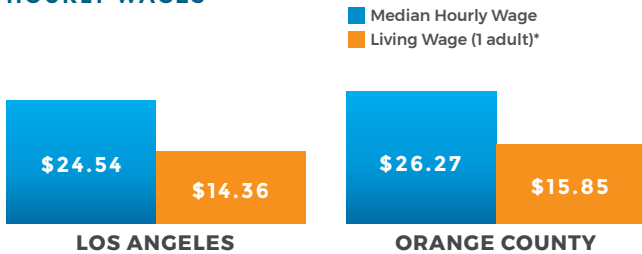
RACE AND ETHNICITY OF WORKERS



Carpenters (SOC 47-2031)

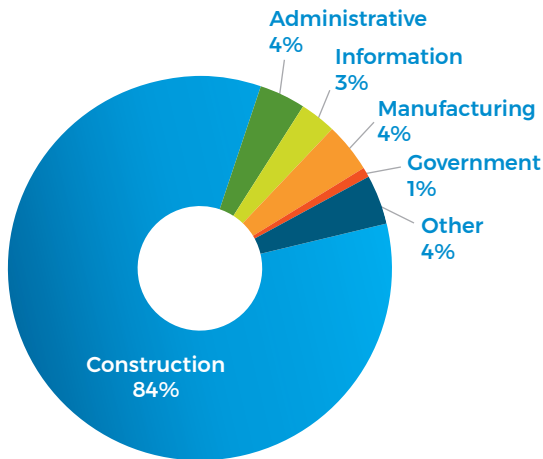
Construct, erect, install, or repair structures and fixtures made of wood, such as concrete forms; building frameworks, including partitions, joists, studding, and rafters; and wood stairways, window and door frames, and hardwood floors. May also install cabinets, siding, drywall and batt or roll insulation. Includes brattice builders who build doors or brattices (ventilation walls or partitions) in underground passageways.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Intuit QuickBooks
- Computer aided design CAD software
- Job costing software
- Renaissance MasterCarpenter
- Bosch Punch List
- Craftsman CD Estimator
- VirtualBoss
- Turtle Creek Software Goldenseal

Total Projected Openings 2022

14,330 Total Openings (5-yr)

1,660 Net Job Change
12,760 5-Yr Replacements
70 Community Colleges Award 2017-18
2 Programs
2 Colleges

Total Jobs in 2017

16,160

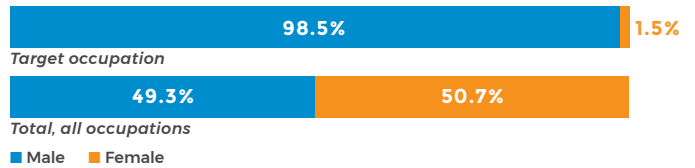
in L.A. County

9,290

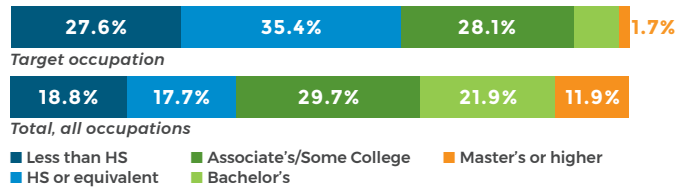
in Orange County

Regional Worker Characteristics

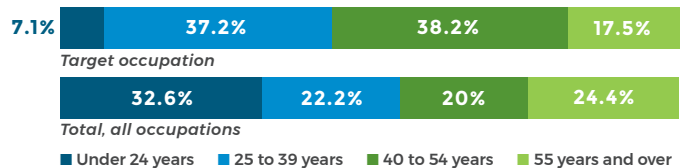
GENDER OF WORKERS



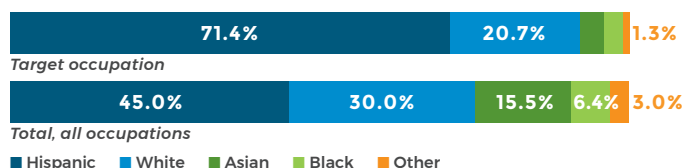
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



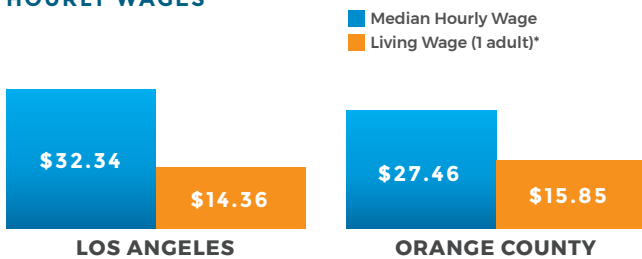
RACE AND ETHNICITY OF WORKERS



Electricians (SOC 47-2111)

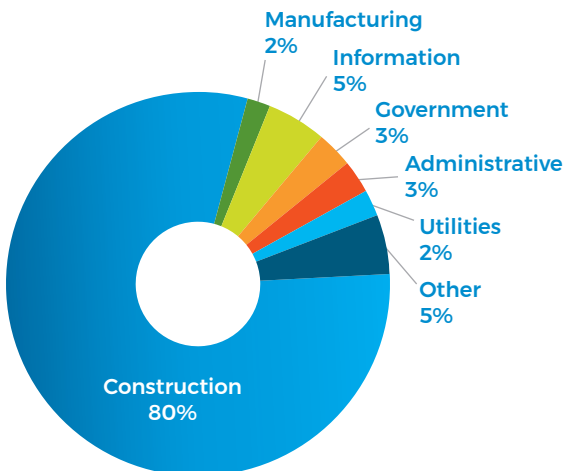
Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems. Excludes "Security and Fire Alarm Systems Installers" (49-2098).

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Autodesk AutoCAD
- Enterprise resource planning ERP software
- Elite Software(E-Coord, Inpoint, Outpoint, Short, VDRO)
- Electrosoft FlashWorks
- Supervisory control and data acquisition SCADA software
- Craftsman CD Estimator
- SAP
- Socrates Contractor's Library

Total Projected Openings 2022

9,240 Total Openings (5-yr)

990 Net Job Change

8,260 5-Yr Replacements

177 Community Colleges Awards 2017-18

1 Program

4 Colleges

Total Jobs in 2017

11,690

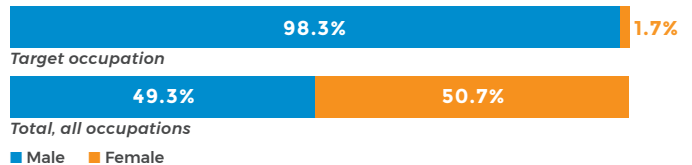
in L.A. County

8,020

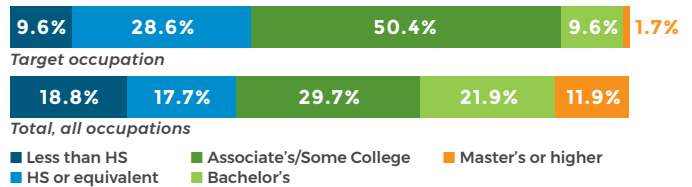
in Orange County

Regional Worker Characteristics

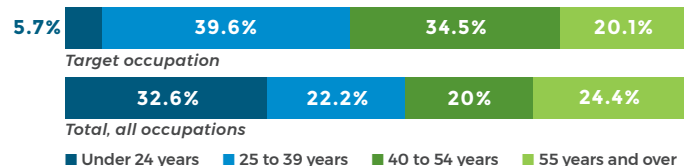
GENDER OF WORKERS



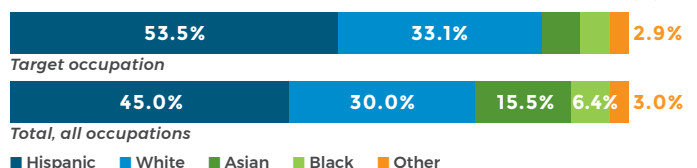
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



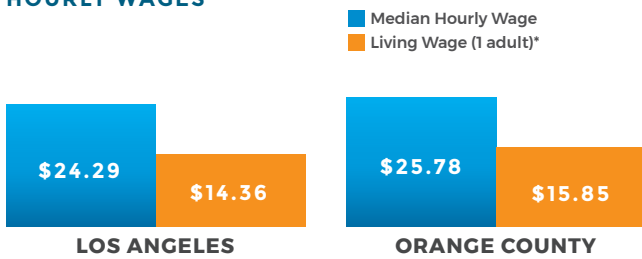
RACE AND ETHNICITY OF WORKERS



Licensed Vocational Nurses (SOC 29-2061)

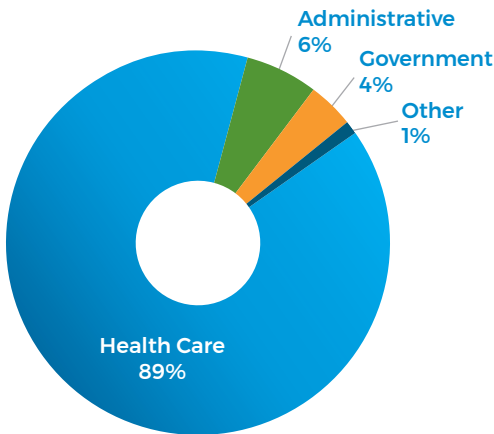
Care for ill, injured, or convalescing patients or persons with disabilities in hospitals, nursing homes, clinics, private homes, group homes, and similar institutions. May work under the supervision of a registered nurse. Licensing required.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- MEDITECH software
- Electronic medical record EMR software
- Medical condition coding software
- Epic Systems
- Healthcare common procedure coding system HCPCS
- Infusion management software
- PointClickCare
- Prescription processing software

Total Projected Openings 2022

9,070 Total Openings (5-yr)

1,300 Net Job Change

7,370 5-Yr Replacements

145 Community Colleges Award 2017-18

1 Program

4 Colleges

Total Jobs in 2017

19,280

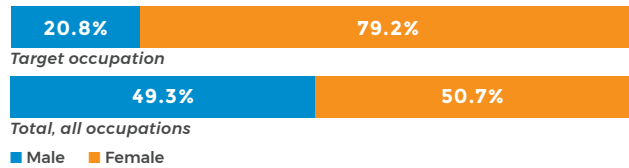
in L.A. County

6,200

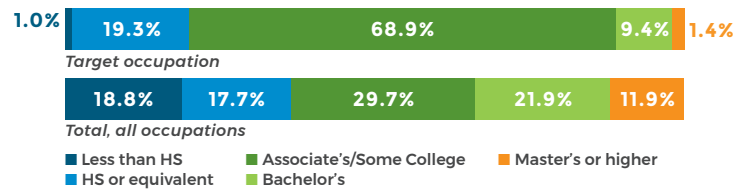
in Orange County

Regional Worker Characteristics

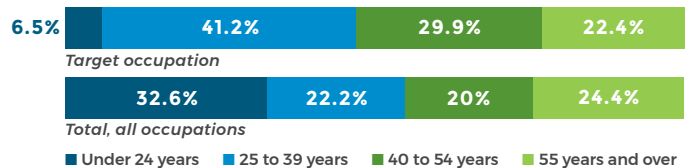
GENDER OF WORKERS



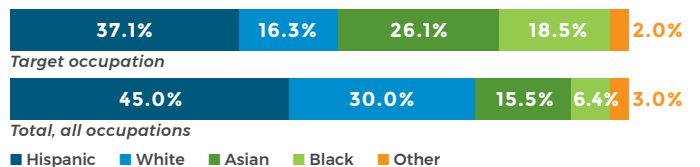
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



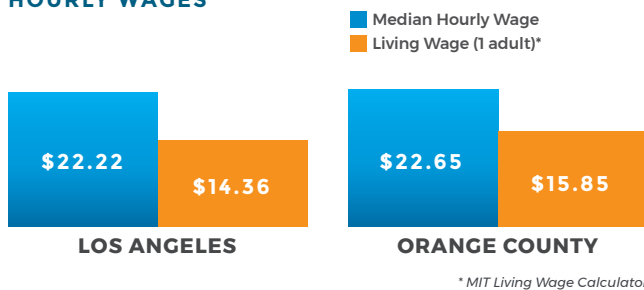
RACE AND ETHNICITY OF WORKERS



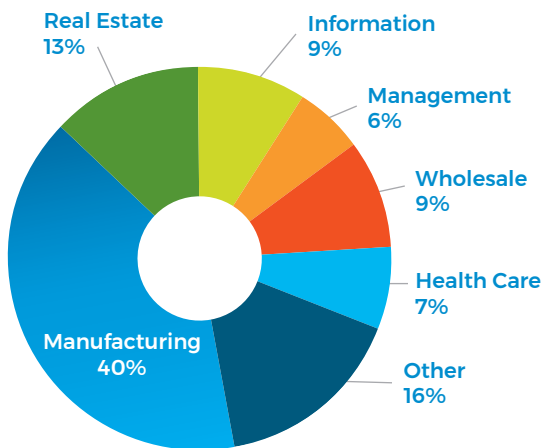
Production, Planning, and Expediting Clerks (SOC 43-5061)

Coordinate and expedite the flow of work and materials within or between departments of an establishment according to production schedule. Duties include reviewing and distributing production, work, and shipment schedules; conferring with department supervisors to determine progress of work and completion dates; and compiling reports on progress of work, inventory levels, costs, and production problems. Excludes “Weighers, Measurers, Checkers, and Samplers, Recordkeeping” (43-5111).

HOURLY WAGES



INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Fund accounting software
- Intuit QuickBooks
- SAP Crystal Reports
- Structured query language SQL
- Oracle Primavera Enterprise Project Portfolio Management
- Enterprise resource planning ERP software
- Google Docs/ Drive
- Adobe Systems Adobe (Illustrator, Photoshop, InDesign, Acrobat)

Total Projected Openings 2022

8,420 Total Openings (5-yr)

740 Net Job Change

7,690 5-Yr Replacements

226 Community Colleges Awards 2017-18

1 Program

4 Colleges

Total Jobs in 2017

19,340

in L.A. County

5,600

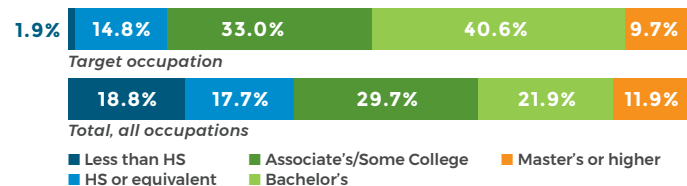
in Orange County

Regional Worker Characteristics

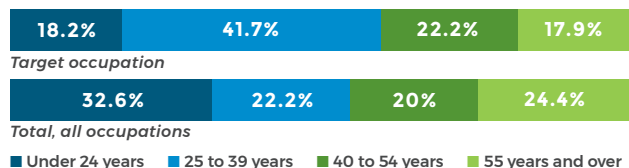
GENDER OF WORKERS



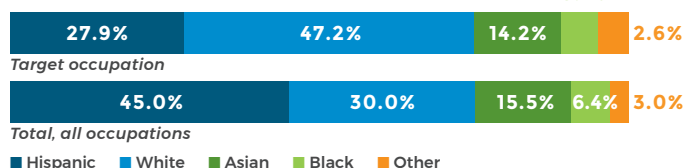
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



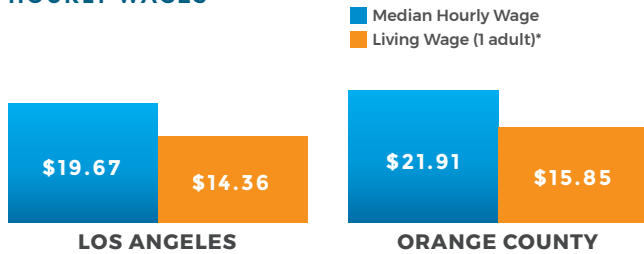
RACE AND ETHNICITY OF WORKERS



Automotive Service Technicians and Mechanics (SOC 49-3023)

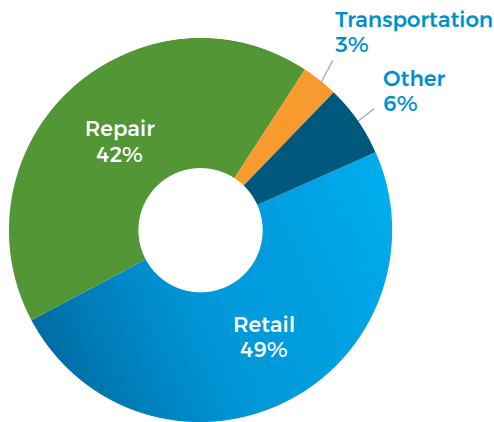
Diagnose, adjust, repair, or overhaul automotive vehicles. Excludes "Automotive Body and Related Repairers" (49-3021), "Bus and Truck Mechanics and Diesel Engine Specialists" (49-3031), and "Electronic Equipment Installers and Repairers, Motor Vehicles" (49-2096).

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Hunter WinAlign
- Nexiq Tech HDS Suite for Palm
- Blue Streak Electronics Buell Diagnostic
- IBM Notes
- Enterprise resource planning ERP software
- CODA Engine Analysis System
- Estimating software
- SPX/OTC Genisys ConnecTech PC

Total Projected Openings 2022

8,250 Total Openings (5-yr)

570 Net Job Change
 7,680 5-Yr Replacements
 2,374 Community Colleges Awards 2017-18
 2 Programs
 18 Colleges

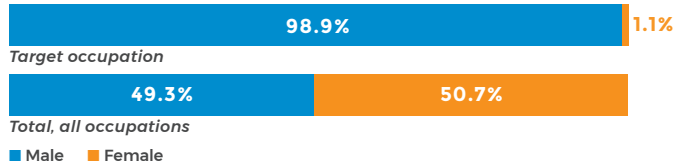
Total Jobs in 2017

14,960
in L.A. County

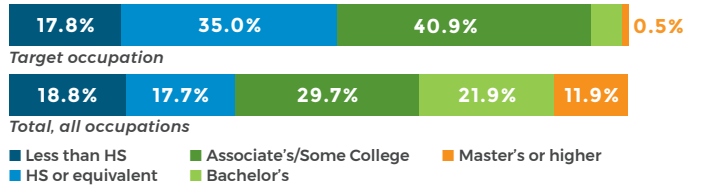
5,440
in Orange County

Regional Worker Characteristics

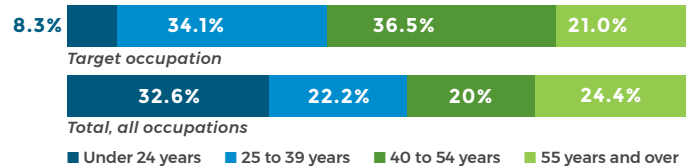
GENDER OF WORKERS



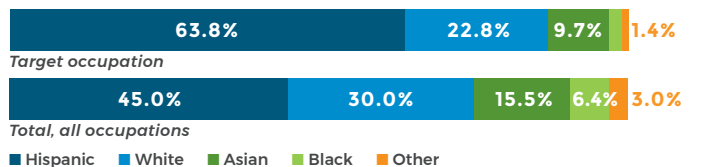
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



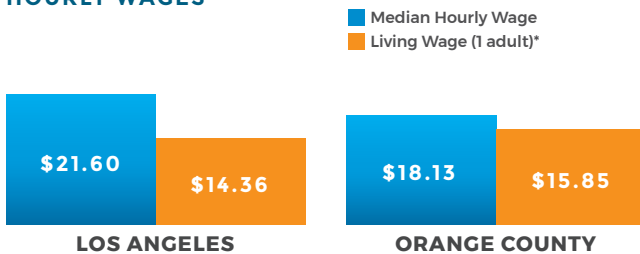
RACE AND ETHNICITY OF WORKERS



Social and Human Service Assistants (SOC 21-1093)

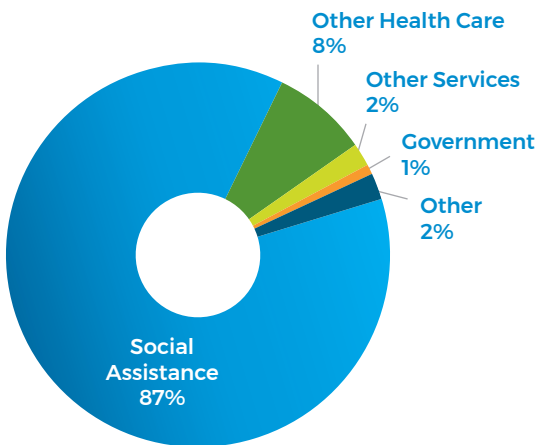
Assist in providing client services in a wide variety of fields, such as psychology, rehabilitation, or social work, including support for families. May assist clients in identifying and obtaining available benefits and social and community services. May assist social workers with developing, organizing, and conducting programs to prevent and resolve problems relevant to substance abuse, human relationships, rehabilitation, or dependent care. Excludes "Rehabilitation Counselors" (21-1015), "Psychiatric Technicians" (29-2053), and "Personal Care Aides" (39-9021)".

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- MEDITECH software
- Electronic medical record EMR software
- PointClickCare HER
- Microsoft Access
- Nuance Dragon NaturallySpeaking
- Microsoft Excel

Total Projected Openings 2022

7,720 Total Openings (5-yr)

1,620 Net Job Change

6,100 5-Yr Replacements

439 Community Colleges Awards 2017-18

2 Programs

15 Colleges

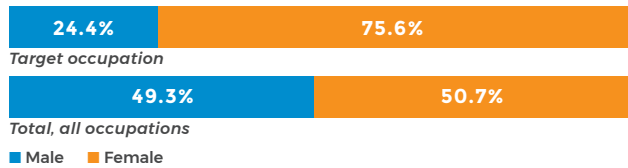
Total Jobs in 2017

22,380
in L.A. County

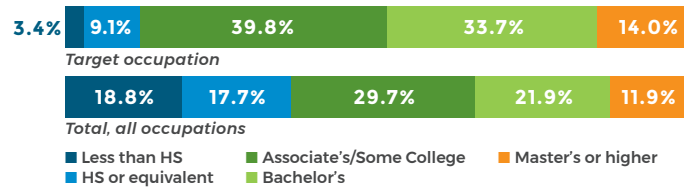
2,680
in Orange County

Regional Worker Characteristics

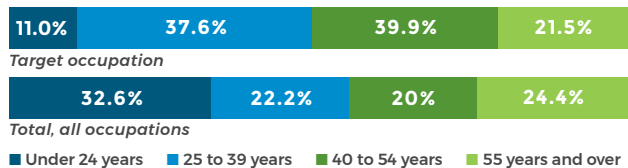
GENDER OF WORKERS



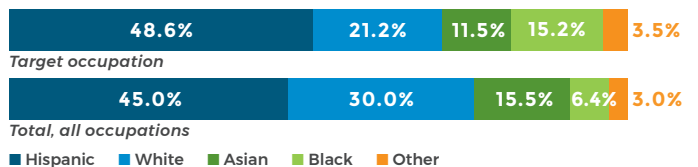
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



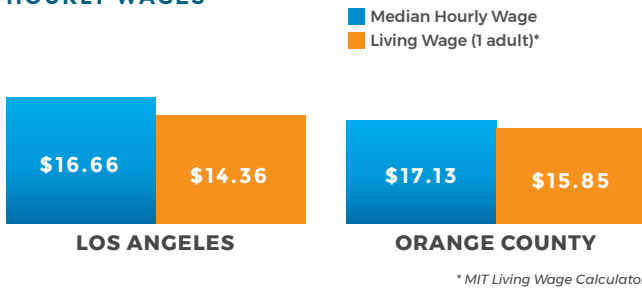
RACE AND ETHNICITY OF WORKERS



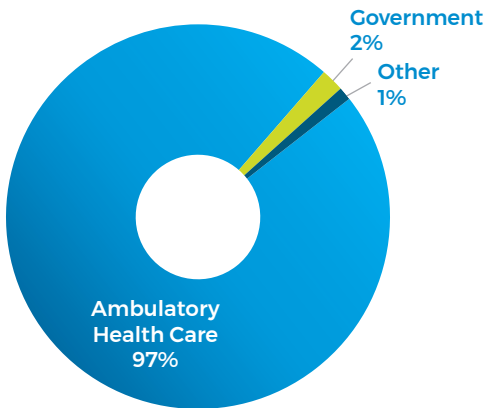
Dental Assistants (SOC 31-9091)

Assist dentist, set up equipment, prepare patient for treatment, and keep records.

HOURLY WAGES



INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Henry Schein Dentrax
- Kodak Dental Systems Kodak SOFTDENT Practice management software PMS
- Patterson Dental Supply Patterson EagleSoft
- The Systems Workplace TDOCS
- Microsoft Office
- Intuit Quicken
- Microsoft Excel
- Email software

Total Projected Openings 2022

7,700 Total Openings (5-yr)

1,040 Net Job Change
6,660 5-Yr Replacements
131 Community Colleges Awards 2017-18
1 Program
6 Colleges

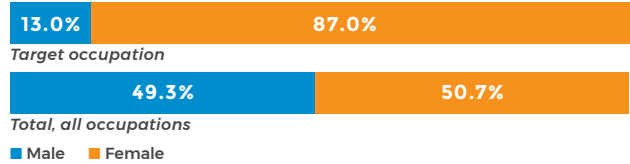
Total Jobs in 2017

11,540
in L.A. County

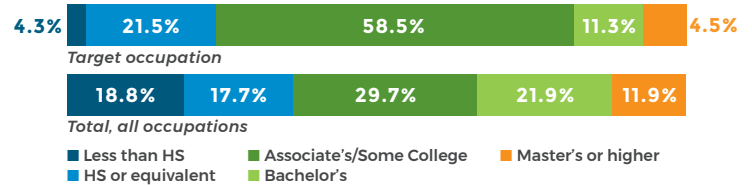
5,460
in Orange County

Regional Worker Characteristics

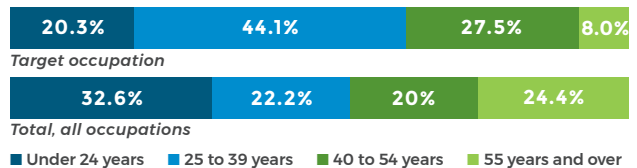
GENDER OF WORKERS



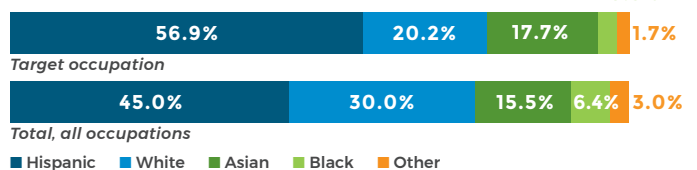
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



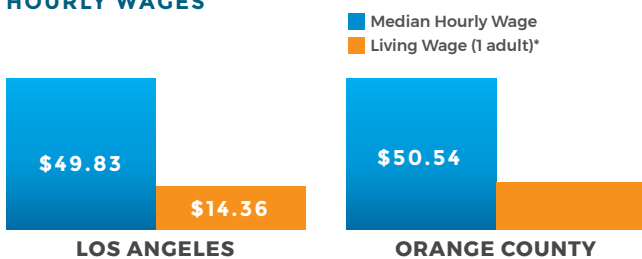
RACE AND ETHNICITY OF WORKERS



Police and Sheriff's Patrol Officers (SOC 33-3051)

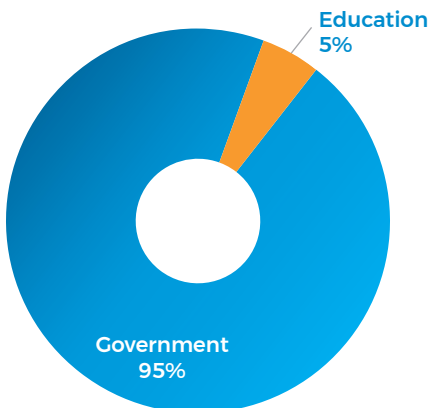
Maintain order and protect life and property by enforcing local, tribal, State, or Federal laws and ordinances. Perform a combination of the following duties: patrol a specific area; direct traffic; issue traffic summonses; investigate accidents; apprehend and arrest suspects, or serve legal processes of courts.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Microsoft Visio
- Integrated Automated Fingerprint Identification System IAFIS
- National Crime Information Center NCIC database
- ESRI ArcView
- National Integrated Ballistics Information Network NIBIN
- Spillman Technologies Records Management
- DesignWare 3D EyeWitness
- SmartDraw.com SmartDraw Legal

Total Projected Openings 2022

7,100 Total Openings (5-yr)

740 Net Job Change
 6,360 5-Yr Replacements
 2,958 Community Colleges Awards 2017-18
 2 Programs
 24 Colleges

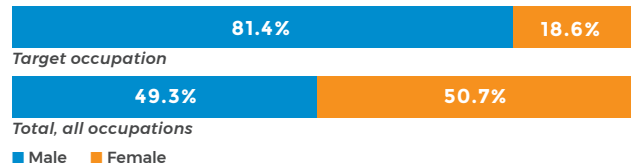
Total Jobs in 2017

26,050
in L.A. County

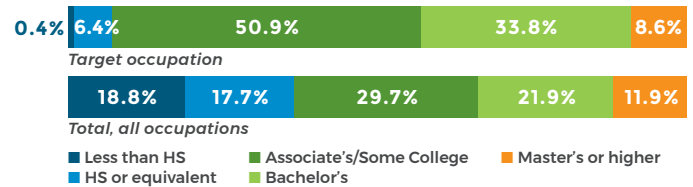
4,360
in Orange County

Regional Worker Characteristics

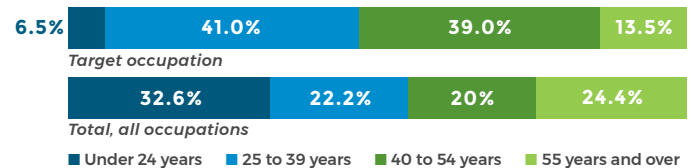
GENDER OF WORKERS



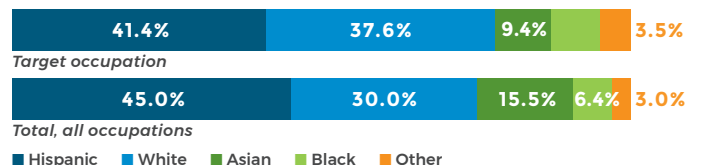
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



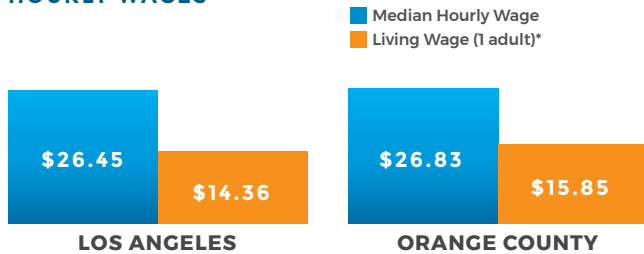
RACE AND ETHNICITY OF WORKERS



Computer User Support Specialists (SOC 15-1232)

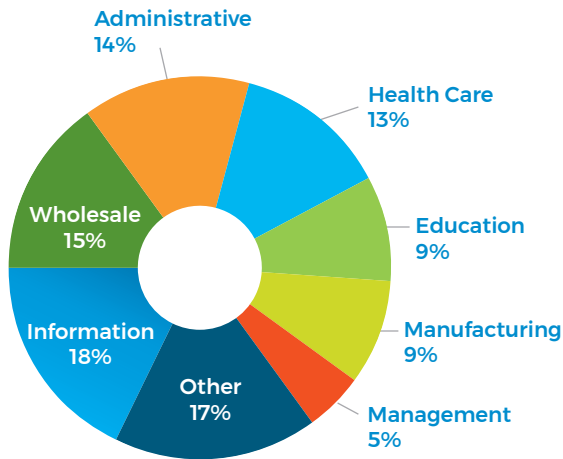
Provide technical assistance to computer users. Answer questions or resolve computer problems for clients in person, or via telephone or electronically. May provide assistance concerning the use of computer hardware and software, including printing, installation, word processing, electronic mail, and operating systems. Excludes "Network and Computer Systems Administrators" (15-1142).

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Citrix
- Microsoft PowerShell
- Microsoft ASP.NET Core MVC
- MySQL
- Hypertext markup language HTML
- JavaScript
- C++
- Oracle Java

Total Projected Openings 2022

13,770 Total Openings (5-yr)

2,500 Net Job Change
11,270 5-Yr Replacements
485 Community Colleges Awards 2017-18
4 Programs
24 Colleges

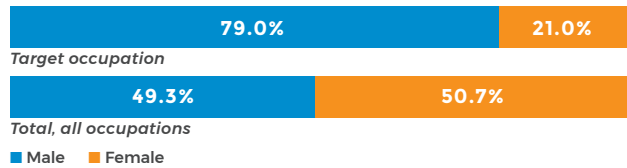
Total Jobs in 2017

14,960
in L.A. County

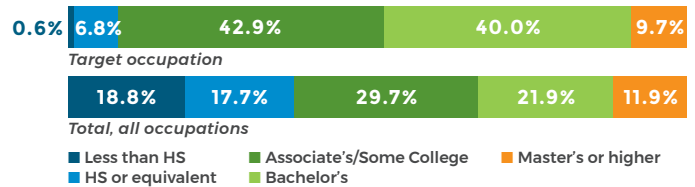
8,150
in Orange County

Regional Worker Characteristics

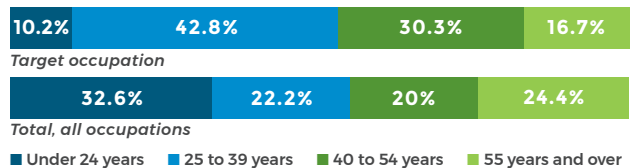
GENDER OF WORKERS



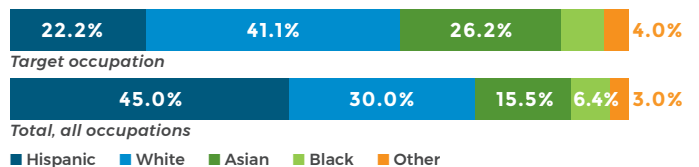
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



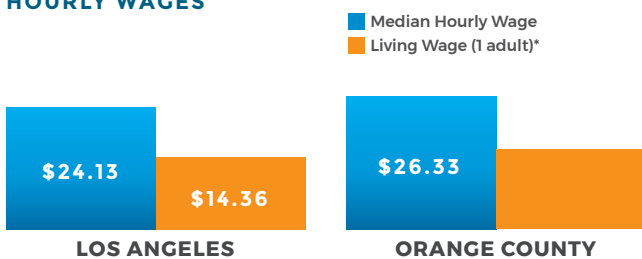
RACE AND ETHNICITY OF WORKERS



Plumbers, Pipefitters, and Steamfitters (SOC 47-2152)

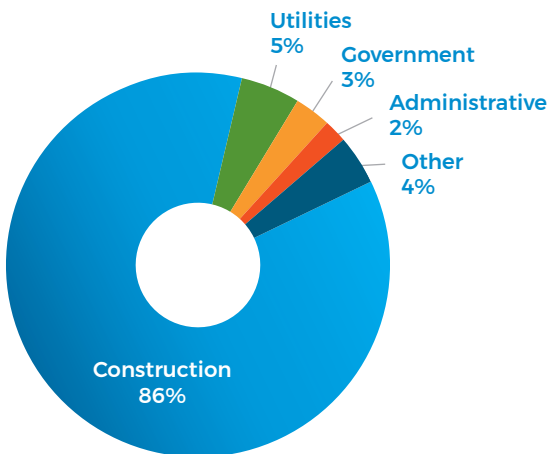
Assemble, install, alter, and repair pipelines or pipe systems that carry water, steam, air, or other liquids or gases. May install heating and cooling equipment and mechanical control systems. Includes sprinklerfitters.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- FastEST software
- Computer aided design CAD software
- Elite Software (DPIPE, FIRE, HSYM, Spipe)
- Intuit QuickBooks
- Vision InfoSoft Plumbing Bid Manager
- Bentley Systems AutoPIPE
- COADE CAESAR II
- Pipepro Pipefitting

Total Projected Openings 2022

6,830 Total Openings (5-yr)

1,100 Net Job Change

5,730 5-Yr Replacements

35 Community Colleges Awards 2017-18

1 Program

1 College

Total Jobs in 2017

8,950

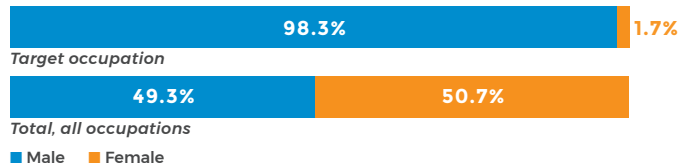
in L.A. County

5,600

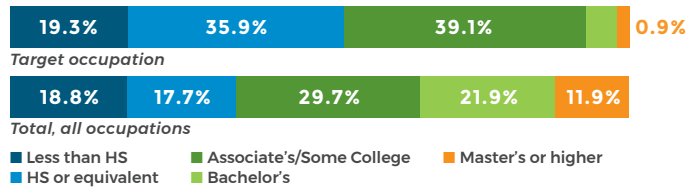
in Orange County

Regional Worker Characteristics

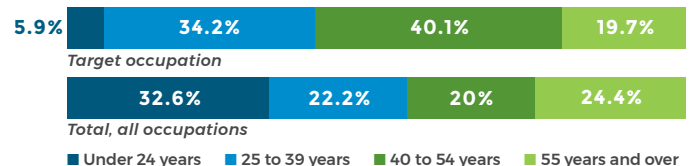
GENDER OF WORKERS



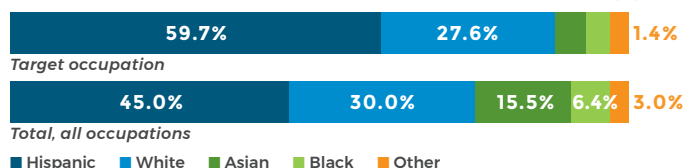
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



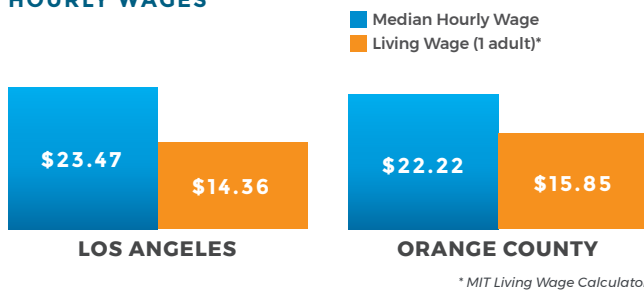
RACE AND ETHNICITY OF WORKERS



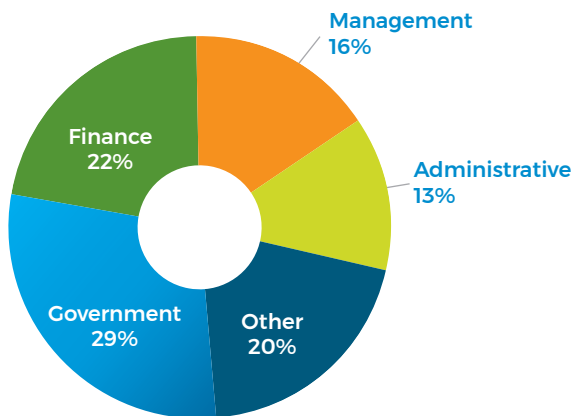
Paralegals and Legal Assistants (SOC 23-2011)

Assist lawyers by investigating facts, preparing legal documents, or researching legal precedent. Conduct research to support a legal proceeding, to formulate a defense, or to initiate legal action. Excludes "Legal Secretaries" (43-6012).

HOURLY WAGES



INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Intuit QuickBooks
- Bridgeway eCounsel
- ProForce Paralegal Pro-Pack
- LexisNexis software
- CaseSoft software
- Tumbleweed SecureTransport
- Tax software
- Case analysis software

Total Projected Openings 2022

5,410 Total Openings (5-yr)

970 Net Job Change
 4,440 5-Yr Replacements
 416 Community Colleges Awards 2017-18
 1 Program
 12 Colleges

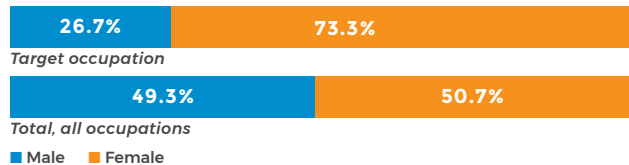
Total Jobs in 2017

10,360
in L.A. County

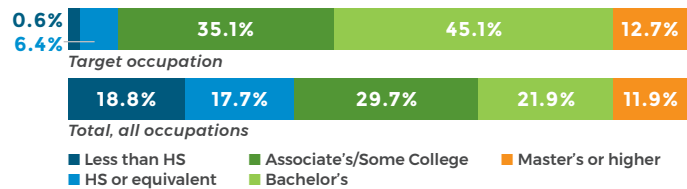
3,480
in Orange County

Regional Worker Characteristics

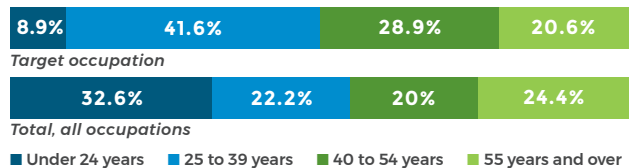
GENDER OF WORKERS



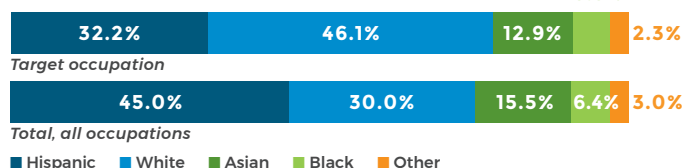
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



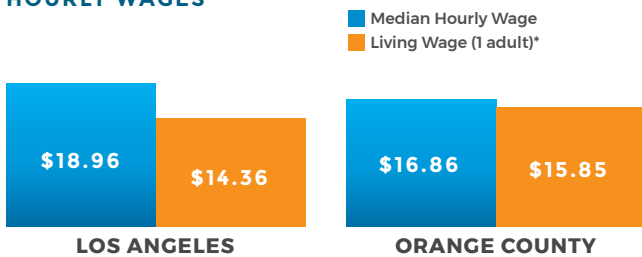
RACE AND ETHNICITY OF WORKERS



Pharmacy Technicians (SOC 29-2052)

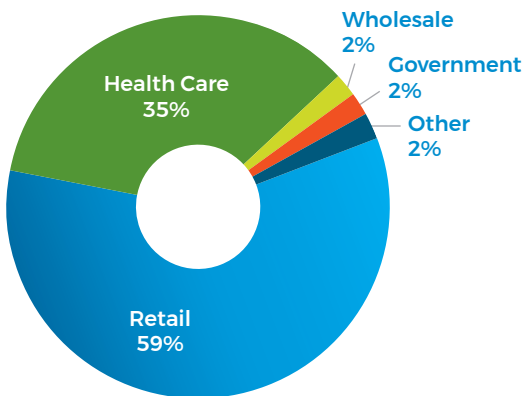
Prepare medications under the direction of a pharmacist. May measure, mix, count out, label, and record amounts and dosages of medications according to prescription orders.

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Pharmacy management software
- Pyxis MedStation software
- Drug compatibility software
- Medical condition coding software
- Billing and reimbursement software
- Compounder software
- MEDITECH software
- Prescription processing software

Total Projected Openings 2022

4,250 Total Openings (5-yr)

800 Net Job Change

3,450 5-Yr Replacements

117 Community Colleges Awards 2017-18

1 Program

4 Colleges

Total Jobs in 2017

10,170

in L.A. County

3,510

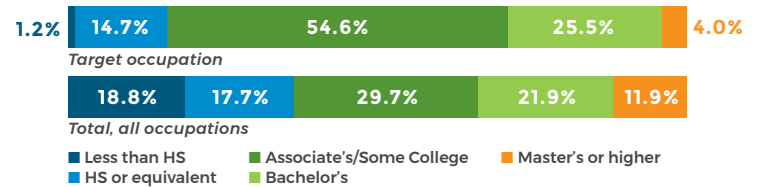
in Orange County

Regional Worker Characteristics

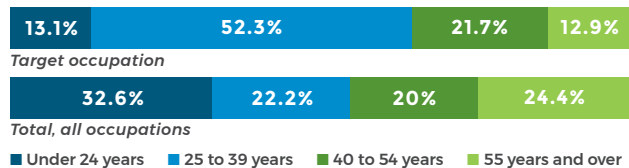
GENDER OF WORKERS



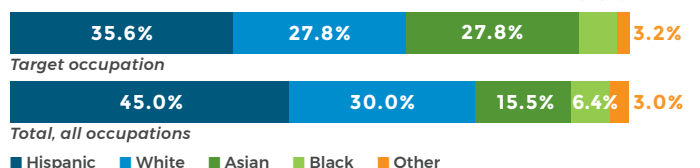
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



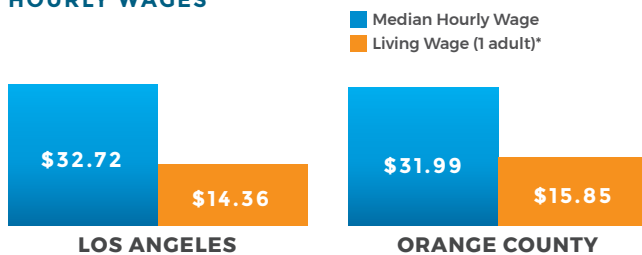
RACE AND ETHNICITY OF WORKERS



Web Developers (SOC 15-1254)

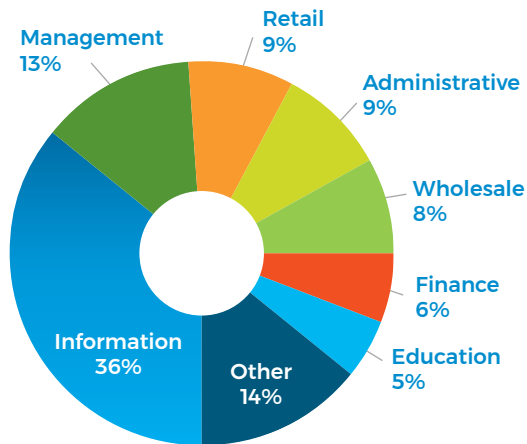
Design, create, and modify Web sites. Analyze user needs to implement Web site content, graphics, performance, and capacity. May integrate Web sites with other computer applications. May convert written, graphic, audio, and video components to compatible Web formats by using software designed to facilitate the creation of Web and multimedia content. Excludes "Multimedia Artists and Animators" (27-1014).

HOURLY WAGES



* MIT Living Wage Calculator

INDUSTRY DISTRIBUTION OF 29-1141 L.A./O.C. REGION



Technology:

- Google Analytics
- Integrated development environment IDE software
- Oracle WebLogic Server
- Tableau
- Customer relationship management CRM software
- Microsoft SQL Server Reporting Services
- CA Erwin Data Modeler
- Adobe Systems Adobe Dreamweaver

Total Projected Openings 2022

3,210 Total Openings (5-yr)

580 Net Job Change
2,630 5-Yr Replacements
58 Community Colleges Awards 2017-18
2 Programs
8 Colleges

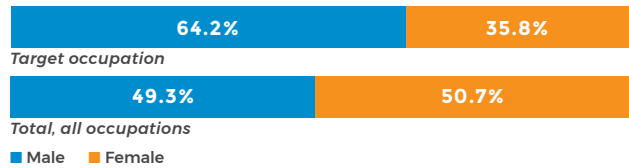
Total Jobs in 2017

5,660
in L.A. County

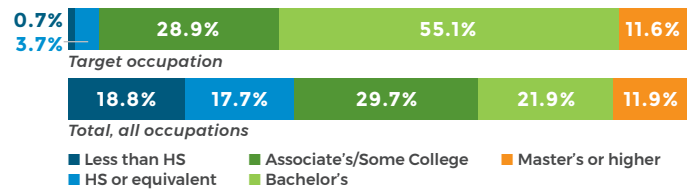
2,660
in Orange County

Regional Worker Characteristics

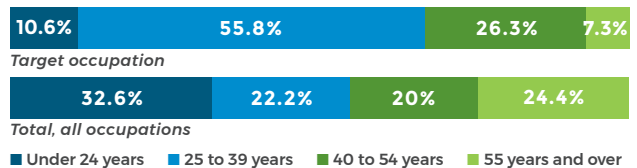
GENDER OF WORKERS



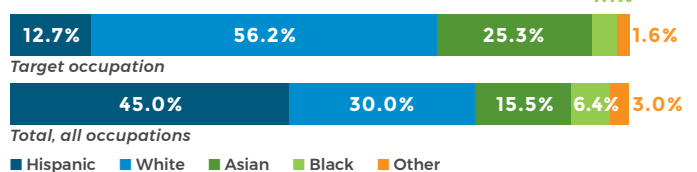
EDUCATIONAL ATTAINMENT OF WORKERS



AGE DISTRIBUTION OF WORKERS



RACE AND ETHNICITY OF WORKERS



Appendix Detailed Tables

TOP Code - Program	2017-18 Awards
051000 - Logistics and Materials Transportation	226
Associate of Arts (A.A.) degree	87
Associate of Science (A.S.) degree	12
Certificate requiring 12 to < 18 units	21
Certificate requiring 18 to < 30 semester units	38
Certificate requiring 6 to < 18 semester units	68
061430 - Website Design and Development	16
Certificate requiring 18 to < 30 semester units	9
Certificate requiring 30 to < 60 semester units	1
Certificate requiring 6 to < 18 semester units	6
070200 - Computer Information Systems	133
Associate of Arts (A.A.) degree	28
Associate of Science (A.S.) degree	61
Certificate requiring 12 to < 18 units	2
Certificate requiring 18 to < 30 semester units	20
Certificate requiring 30 to < 60 semester units	18
Certificate requiring 6 to < 18 semester units	4
070210 - Software Applications	54
Associate of Arts (A.A.) degree	5
Associate of Science (A.S.) degree	6
Certificate requiring 18 to < 30 semester units	3
Certificate requiring 30 to < 60 semester units	11
Certificate requiring 6 to < 18 semester units	29

TOP Code - Program	2017-18 Awards
070700 - Computer Software Development	14
Associate of Arts (A.A.) degree	1
Associate of Science (A.S.) degree	4
Certificate requiring 18 to < 30 semester units	5
Certificate requiring 30 to < 60 semester units	2
Certificate requiring 6 to < 18 semester units	2
070710 - Computer Programming	239
Associate of Arts (A.A.) degree	4
Associate of Science (A.S.) degree	89
Certificate requiring 12 to < 18 units	2
Certificate requiring 18 to < 30 semester units	61
Certificate requiring 30 to < 60 semester units	23
Certificate requiring 6 to < 18 semester units	60
070800 - Computer Infrastructure and Support	96
Associate of Science (A.S.) degree	69
Certificate requiring 18 to < 30 semester units	18
Certificate requiring 6 to < 18 semester units	9
Certificate 6 to < 18 semester units	9
070810 - Computer Networking	231
Associate of Arts (A.A.) degree	13
Associate of Science (A.S.) degree	40
Certificate requiring 12 to < 18 units	46
Certificate requiring 18 to < 30 semester units	14
Certificate requiring 30 to < 60 semester units	13
Certificate requiring 6 to < 18 semester units	105

TOP Code - Program	2017-18 Awards
070820 - Computer Support	25
Associate of Science (A.S.) degree	1
Certificate requiring 12 to < 18 units	7
Certificate requiring 18 to < 30 semester units	4
Certificate requiring 30 to < 60 semester units	2
Certificate requiring 6 to < 18 semester units	11
070900 - World Wide Web Administration	42
Associate of Arts (A.A.) degree	6
Associate of Science (A.S.) degree	8
Certificate requiring 12 to < 18 units	11
Certificate requiring 18 to < 30 semester units	9
Certificate requiring 30 to < 60 semester units	6
Certificate requiring 6 to < 18 semester units	2
080200 - Educational Aide (Teacher Assistant)	45
Associate of Science (A.S.) degree	27
Certificate requiring 18 to < 30 semester units	11
Certificate requiring 6 to < 18 semester units	7
080210 - Educational Aide (Teacher Assistant), Bilingual	1
Certificate requiring 30 to < 60 semester units	1
094800 - Automotive Technology	2,326
Associate of Arts (A.A.) degree	28
Associate of Science (A.S.) degree	110
Certificate requiring 12 to < 18 units	202
Certificate requiring 18 to < 30 semester units	304
Certificate requiring 30 to < 60 semester units	237

TOP Code - Program	2017-18 Awards
Certificate requiring 6 to < 18 semester units	1,442
Certificate requiring 60+ semester units	3
094840 - Alternative Fuels and Advanced Transportation Technology	48
Associate of Science (A.S.) degree	7
Certificate requiring 12 to < 18 units	21
Certificate requiring 18 to < 30 semester units	18
Certificate requiring 6 to < 18 semester units	2
095210 - Carpentry	38
Associate of Science (A.S.) degree	5
Certificate requiring 30 to < 60 semester units	33
095220 - Electrical	177
Associate of Arts (A.A.) degree	11
Associate of Science (A.S.) degree	28
Certificate requiring 30 to < 60 semester units	125
Certificate requiring 6 to < 18 semester units	13
095230 - Plumbing, Pipefitting and Steamfitting	35
Associate of Science (A.S.) degree	4
Certificate requiring 18 to < 30 semester units	1
Certificate requiring 30 to < 60 semester units	30
095250 - Mill and Cabinet Work	32
Associate of Arts (A.A.) degree	2
Associate of Science (A.S.) degree	2
Certificate requiring 18 to < 30 semester units	3
Certificate requiring 30 to < 60 semester units	25

TOP Code - Program	2017-18 Awards
122100 - Pharmacy Technology	117
Associate of Arts (A.A.) degree	13
Associate of Science (A.S.) degree	21
Certificate requiring 12 to < 18 units	21
Certificate requiring 18 to < 30 semester units	39
Certificate requiring 30 to < 60 semester units	23
123010 - Registered Nursing	1,737
Associate of Arts (A.A.) degree	67
Associate of Science (A.S.) degree	1,456
Certificate requiring 30 to < 60 semester units	100
Certificate requiring 60+ semester units	114
123020 - Licensed Vocational Nursing	145
Associate of Science (A.S.) degree	38
Certificate requiring 30 to < 60 semester units	107
124010 - Dental Assistant	131
Associate of Arts (A.A.) degree	5
Associate of Science (A.S.) degree	32
Certificate requiring 18 to < 30 semester units	55
Certificate requiring 30 to < 60 semester units	39
140200 - Paralegal	416
Associate of Arts (A.A.) degree	117
Associate of Science (A.S.) degree	45
Certificate requiring 18 to < 30 semester units	119
Certificate requiring 30 to < 60 semester units	135
210400 - Human Services	166
Associate of Arts (A.A.) degree	107

TOP Code - Program	2017-18 Awards
Associate of Science (A.S.) degree	2
Certificate requiring 12 to < 18 units	8
Certificate requiring 18 to < 30 semester units	18
Certificate requiring 30 to < 60 semester units	22
Certificate requiring 6 to < 18 semester units	9
210440 - Alcohol and Controlled Substances	273
Associate of Arts (A.A.) degree	33
Associate of Science (A.S.) degree	26
Certificate requiring 30 to < 60 semester units	142
Certificate requiring 6 to < 18 semester units	72
210500 - Administration of Justice	2,487
Associate in Arts for Transfer (A.A.-T) Degree	15
Associate in Science for Transfer (A.S.-T) Degree	1,212
Associate of Arts (A.A.) degree	251
Associate of Science (A.S.) degree	202
Certificate requiring 12 to < 18 units	52
Certificate requiring 18 to < 30 semester units	198
Certificate requiring 30 to < 60 semester units	19
Certificate requiring 6 to < 18 semester units	538
210550 - Police Academy	471
Associate of Arts (A.A.) degree	4
Certificate requiring 12 to < 18 units	16
Certificate requiring 6 to < 18 semester units	451
Grand Total	9,721

How (and why) we did what we did.

Numerous data sources and methodologies were used to measure the target industry for this deep dive.

Industry Forecast

An economic forecast is created to project employment by industry over the next five years using statistical analysis of historical data paired with the most recent qualitative information impacting a set of 151 industries in the Los Angeles Basin. The industries configured for this forecast are defined through the North American Industry Classification System (NAICS) and comprise industries denoted with 2-digit, 3-digit and 4-digit codes through the NAICS hierarchical classification system. Industry projections take into account the shifting demands for specific industries, as well as population changes and the broader macroeconomic environment.

Occupations and Projections

Occupations are commonly classified using the Standard Occupational Classification (SOC) system, developed by the Bureau of Labor Statistics. This system classifies workers into 840 detailed occupations that share similar job duties, skills, education and training. These occupations are not industry-specific, but are common to many industries. For example, retail salespersons are employed in a full spectrum of industries, from department and discount stores to computer systems design.

Projections for changes in occupations are created based on changing needs for specific skillsets and broader macroeconomic changes, as well as the industries in which specific occupations reside. These forecasts are then combined with the industry projections to create a single unified set of projections for occupations by industry.

The United States Census Bureau estimates replacement needs by industry and occupation through detailed surveys of employers and households. These take into account industry changes, the age of the current workforce within each industry and occupation, and the nature of the career path. These estimates are an important component of occupational job openings and workforce development needs, since the retirement and promotion of individuals leave openings for new entrants and those moving up the career ladder.

Total openings are the sum of projected five-year replacement needs and positive net new jobs forecast over the period.

Target Occupations

Target occupations are selected in a two-step process. First, all occupations identified as middle-skill are isolated from each target industry. Then, a variety of metrics are used to select target occupations: 2016 employment; projected net job change; replacement rate; number of projected replacement jobs from 2016 to 2021; number of projected total job openings from 2016 to 2021; and annual median wages.

Location Quotient

A common metric to assess a region's competitiveness is employment concentration or location quotients. A location quotient for an industry in a specific region compares the percent of total employment in the industry to the average percent nationwide. For example, if 4 percent of employment in a region is in the aerospace industry compared to 2 percent across the nation, the location quotient for the region's aerospace industry is 2, indicating the region is more specialized in aerospace than the nation.

A location quotient equal to 1.0 indicates the employment concentration in the region is equal to the nation, meaning the region is not highly-specialized in that industry. Higher location quotients imply a competitive advantage. While there can be some variation in this metric, the location quotient threshold of 1.2 usually demonstrates regional specialization and competitiveness.

Supply

Community colleges and other two-year educational institutions provide education and training relevant to middle-skill occupations. Comparing occupations with related training programs provides information for supply-and-demand analysis. The number of awards conferred by community colleges reflects the most recent data available from the 2017-18 academic year. Due to data and timing limitations, training gap forecasts are an approximation of unmet labor demand and do not represent an absolute oversupply or undersupply of available talent. In addition, a one-to-one relationship between program completions and occupational demand does not exist because some programs train for multiple occupations. Consequently, awards for some education and training programs overall with multiple occupations.

Data Sources

All data was obtained from the Bureau of Labor Statistics and the Census Bureau. Annual employment and payroll data are from the Quarterly Census of Employment and Wages series. Estimates for non-disclosed employment and payroll data were produced using proportional shares of the prior year's data or using midpoint estimates from the Census Bureau's County Business Patterns dataset. Occupational data are from the Occupational Employment Statistics program. Unless noted otherwise, all data is for the 2016 calendar year.

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INSTITUTE FOR APPLIED ECONOMICS
Los Angeles County Economic Development Corporation
444 S. Flower Street, 37 Floor · Los Angeles, CA 90071



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