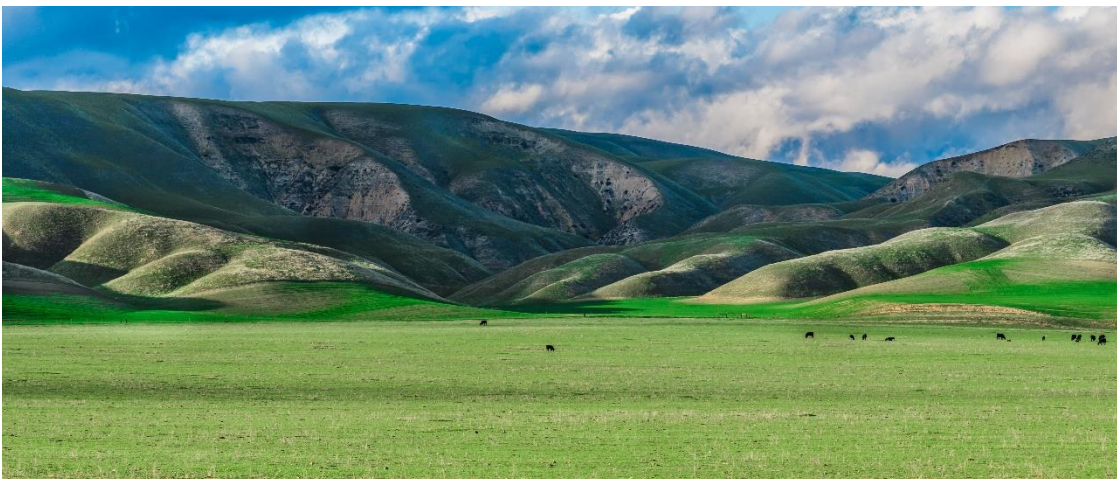


2021 Overview: Central Valley/ Mother Lode Region



This October 2021 labor market analysis prepared by the Central Valley/ Mother Lode Center of Excellence evaluates current occupational demand, wages, and educational supply for 11 sectors vital to the region's economy to determine if demand for these occupations is being met. The report also summarizes a variety of metrics related to population demographics and community college career education programs and enrollment in the region



California
Community
Colleges

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COVID-19 Statement: This report includes employment projection data by EMSI. EMSI's projections are modeled on recorded (historical) employment figures and incorporate several underlying assumptions, including the assumption that the economy during the projection period will be at approximately full employment or potential output. To the extent that a recession or labor shock, such as the economic effects of COVID-19, can cause long-term structural change, they may impact the projections. At this time, it is not possible to quantify the impact of COVID-19 on projections of industry and occupational employment. Other measures such as unemployment rates and monthly industry employment estimates will reflect the most recent information on employment and jobs in the state and, in combination with input from local employers, may help validate current and future employment needs as depicted here.



Exhibit 1: Map of community colleges in the Central Valley/Mother Lode region

EXECUTIVE SUMMARY

Having completed an extensive analysis of postsecondary supply and workforce demand, the Central Valley/Mother Lode Center of Excellence for Labor Market Research has released its 2021 annual report on the 11 sectors/occupational groupings critical to the region's economic vitality. This report examines where future job growth is expected to occur in the region and estimates workforce gaps, i.e., potential shortages of workers to fill middle-skill jobs in each sector.

The 11 sectors detailed in this study are projected to offer nearly 99,880 annual openings each year in middle-skill occupations, those requiring more education and training than a high school diploma, but less than a bachelor's degree.

By comparison, postsecondary institutions in the region are conferring 22,264 awards on average each year, an increase from the previous year's analysis which shows a total of 21,780 average annual awards. A comparison between workforce demand and the number of awards being earned in the region shows an undersupply of 77,616 workers in the region.

The three sectors with the greatest number of annual openings also have the largest gaps in workforce supply in the region:

- Business and entrepreneurship, a shortage of 15,273 workers
- Health, a shortage of 14,914 workers
- Energy, construction, and utilities, a shortage of 7,363 workers

Sectors with the smallest gaps in workforce supply include public safety (a shortage of only 932 workers) and advanced manufacturing (a shortage of 3,504 workers).

On average each year, the greatest number of awards are being conferred by programs in the health sector (7,833 awards), business and entrepreneurship sector (3,415 awards), and education sector (2,341 awards). The fewest awards are being conferred in advanced manufacturing (332 awards) and logistics (604 awards).

Other findings:

- Regionally, the business sector leads all other sectors in terms of number of anticipated job openings, accounting for nearly 19% of projected workforce demand in the region.
- Several sectors with programs that have a low number of awards also have proportionally large undersupplies: advanced manufacturing (332 average awards and an undersupply of 3,502 workers, translating to 10 times as much demand as supply); logistics (604 awards and an undersupply of 6,388, 10 times as much demand as supply); and ICT/digital media (716 awards and an undersupply of 6,302, 9 times as much demand as supply). While these potential workforce shortages are smaller in terms of overall number than the business and entrepreneurship sector and the health sector, these sectors still play a critical role in fueling the regional economy and intersect with other fields of work of regional importance, such as business and agriculture.
- The analysis identifies 15 occupations with the most annual openings across all 11 sectors in the region. Some sectors contain more than one of these occupations due to strong projected growth projections or large employment size for these occupations. (See the Conclusion section for the list of 15 occupations.) Please note that the education sector contains three of these occupations, as does the business and entrepreneurship sector.

INTRODUCTION

The Center of Excellence has conducted an extensive labor market analysis focusing on the Central Valley/Mother Lode region. The community colleges in the region are shown in Exhibit 1. In total, 11 sectors were analyzed for this report, and their workforce demand was compared with postsecondary supply. A sector represents a cluster or grouping of primary occupations, comprising a segment of one or multiple industries. For each sector, the report details current employment numbers, projected occupational demand, wages, common skills in job postings, race/ethnicity composition of the workforce, and a three-year average supply of awards (degrees and certificates) from two-year higher education institutions. Each sector section contains a gap analysis, i.e., a comparison of workforce demand (annual openings) and educational supply (awards), to illustrate potential shortages of workers. This report is organized by the 11 sectors in the region.

METHODOLOGY

Quantitative data collection and analysis were conducted for this report. Labor market data, particularly secondary data related to workforce demand and occupational employment, informed the report's findings. The North American Industry Classification System (NAICS) and the Standard Occupational Classification (SOC) System were used to source data. The average living wage for a single adult in the Central Valley/Mother Lode region is \$12.31/hour.¹ The criteria for occupations included in this report were determined by the Central Valley/Mother Lode Center of Excellence based on consortium discussions and recommendations. The occupational demand data include only community college relevant (middle-skill) jobs that are directly related to a sector having 10 or more annual openings. Occupational projections include annual openings. Replacements can be determined by subtracting annual openings from overall job change. If the change is negative, then all the annual openings are replacements. (For more information on the data sources employed by this study, please refer to Appendix A.) Each sector section of the report contains an analysis of postsecondary supply which counts awards by TOP6 codes for programs listed in the Taxonomy of Programs and Classification of Instructional Programs (CIP). Appendix B contains wage data for every middle-skill occupation directly related to a sector. Appendix C contains typical education level, work experience, and on-the-job training required for each occupation discussed in the sector sections.

A note on race/ethnicity data: The 2021 Central Valley/Mother Lode Overview contains some metrics not included in past reports. The top skills within each sector were identified as were race/ethnicity worker demographics for each sector.² It is important to note that the race/ethnicity demographics for residents in the region show that Hispanic or Latino residents account for the majority of the population. However, the race/ethnicity demographic data for workers in all 11 sectors reveal that white workers comprise the largest demographic group, with Hispanic or Latino workers comprising the second largest share of the workforce. This suggests underrepresentation of Hispanic or Latino workers in middle-skill jobs in the overall regional workforce. The data analysis of race/ethnicity demographics involved calculating percentages of the total for workers within a sector and comparing those percentages with the composition of workers across all sectors. For example, if 46% of workers are white in a sector, but across all sectors 30% of all workers are white, then there is overrepresentation of that demographic.

¹ The term "living wage" in Center of Excellence reports is calculated by averaging the self-sufficiency wages from the Insight Center's California Family Needs Calculator for each county in the region: <https://insightcced.org/tools-metrics/self-sufficiency-standard-tool-for-california/>.

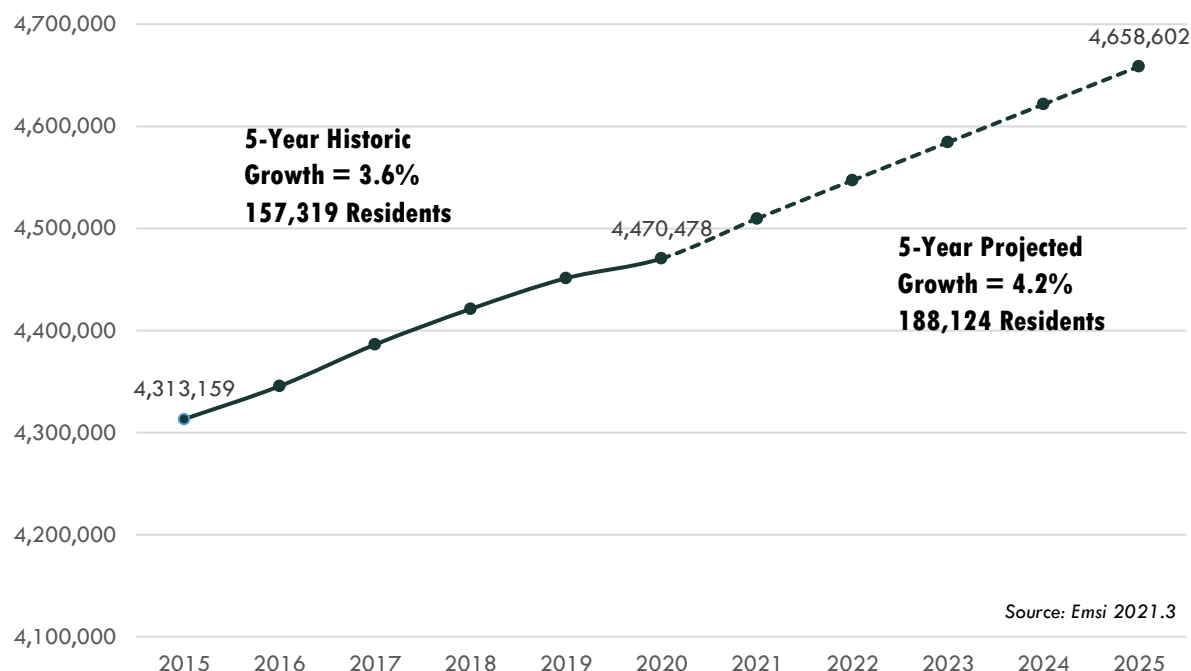
² Please note: This report uses race and ethnicity data from Emsi collected by the U.S. Census Bureau through the American Community Survey. This report uses the term Asian American instead of Asian. The race/ethnicity terms in this document, including white, Hispanic, and Black, adhere to the terms and definitions the Census Bureau uses in collecting its data. For definitions, refer to: <https://www.census.gov/topics/population/race/about.html>. Please refer to Appendix A for additional information on definitions.

REGIONAL OVERVIEW

Residential Population

According to the latest U.S. Census data, the CVML region is home to approximately 4.47 million residents (Exhibit 2). Between 2015 and 2020, the region added more than 157,300 residents. By 2025, the region is projected to add 188,124 new residents, totaling nearly 4.66 million residents.

Exhibit 2: Population estimates and projections in the CVML region



Demographics

The CVML region's gender composition is equivalent to the state. The population is equally divided between men and women. Exhibit 3 shows projected changes in the CVML region's race/ethnicity demographics by 2025. The largest group in the region by race/ethnicity is white, Hispanic, totaling more than 2 million residents in 2020. The number of individuals identifying as white, non-Hispanic, the second largest demographic group in the region, is expected to decline by 70,871 residents over the next five years. Rapid growth rates are projected for residents identifying as two or more races, Hispanic, 11% growth; native Hawaiian or Pacific Islander, non-Hispanic, 12%; and Asian, non-Hispanic, 13%.

The most substantial population growth by number of residents is projected for:

- White, Hispanic residents, an increase of 182,378, representing 9% growth;
- Asian, non-Hispanic residents, an increase of 45,277, 13% growth; and
- Black, non-Hispanic, an increase of 10,881, 6% growth.

Exhibit 3: Projected change in race/ethnicity in the CVML region

Race/Ethnicity	2020	2025	5-Year Change	5-Year % Change
White, Hispanic	2,065,382	2,247,760	182,378	9%
White, Non-Hispanic	1,454,158	1,383,287	(70,871)	(5%)
Asian, Non-Hispanic	355,255	400,532	45,277	13%
Black, Non-Hispanic	194,893	205,774	10,881	6%
Two or More Races, Non-Hispanic	104,013	111,381	7,368	7%
American Indian or Alaskan Native, Hispanic	93,819	95,100	1,281	1%
Two or More Races, Hispanic	65,291	72,189	6,898	11%
Black, Hispanic	47,842	49,905	2,063	4%
Asian, Hispanic	39,123	39,957	834	2%
American Indian or Alaskan Native, Non-Hispanic	29,453	29,379	(74)	(0%)
Native Hawaiian or Pacific Islander, Non-Hispanic	13,475	15,150	1,675	12%
Native Hawaiian or Pacific Islander, Hispanic	7,774	8,187	413	5%
TOTAL	4,470,478	4,658,602	188,124	4.2%

Source: Emsi 2021.3

Of relevance for community college planning in the region, the 15-to-19 age group is projected to add more than 20,700 residents over the next five years, while most younger cohorts will grow at a fairly lower rate (Exhibit 4). The 5-to-9 age cohort is expected to contract by 3%, representing a decline of more than 10,300 residents.

Exhibit 4: Projected change in age cohorts in the CVML region, 2020-2025

Age Cohort	2020	2025	Change	% Change	2020 % of Cohort
Under 5 years	317,987	326,204	8,217	3%	7.11%
5 to 9 years	350,185	339,827	(10,358)	(3%)	7.83%
10 to 14 years	356,799	359,179	2,380	1%	7.98%
15 to 19 years	329,456	350,212	20,756	6%	7.37%
20 to 24 years	305,268	315,004	9,736	3%	6.83%
25 to 29 years	336,483	317,136	(19,347)	(6%)	7.53%
30 to 34 years	324,073	344,011	19,938	6%	7.25%
35 to 39 years	304,507	330,040	25,533	8%	6.81%
40 to 44 years	275,093	305,195	30,102	11%	6.15%
45 to 49 years	252,834	269,548	16,714	7%	5.66%
50 to 54 years	245,913	247,245	1,332	1%	5.50%
55 to 59 years	248,901	236,580	(12,321)	(5%)	5.57%
60 to 64 years	233,359	235,071	1,712	1%	5.22%
65 to 69 years	194,655	216,097	21,442	11%	4.35%
70 to 74 years	155,729	176,000	20,271	13%	3.48%
75 to 79 years	104,954	134,179	29,225	28%	2.35%
80 to 84 years	67,551	82,582	15,031	22%	1.51%
85 years and over	66,731	74,491	7,760	12%	1.49%
TOTAL	4,470,478	4,658,602	188,124	4%	100.00%

Source: Emsi 2021.3

When the age of residents and the projected change in two separate groups—the 20-to-50 age cohort and 55+ age cohort—are considered, the analysis shows that both cohorts will add residents over the next five years. The 55+ age cohort will increase at a faster rate, however, adding more residents proportionally than the 20-to-54 age cohort (Exhibit 5).

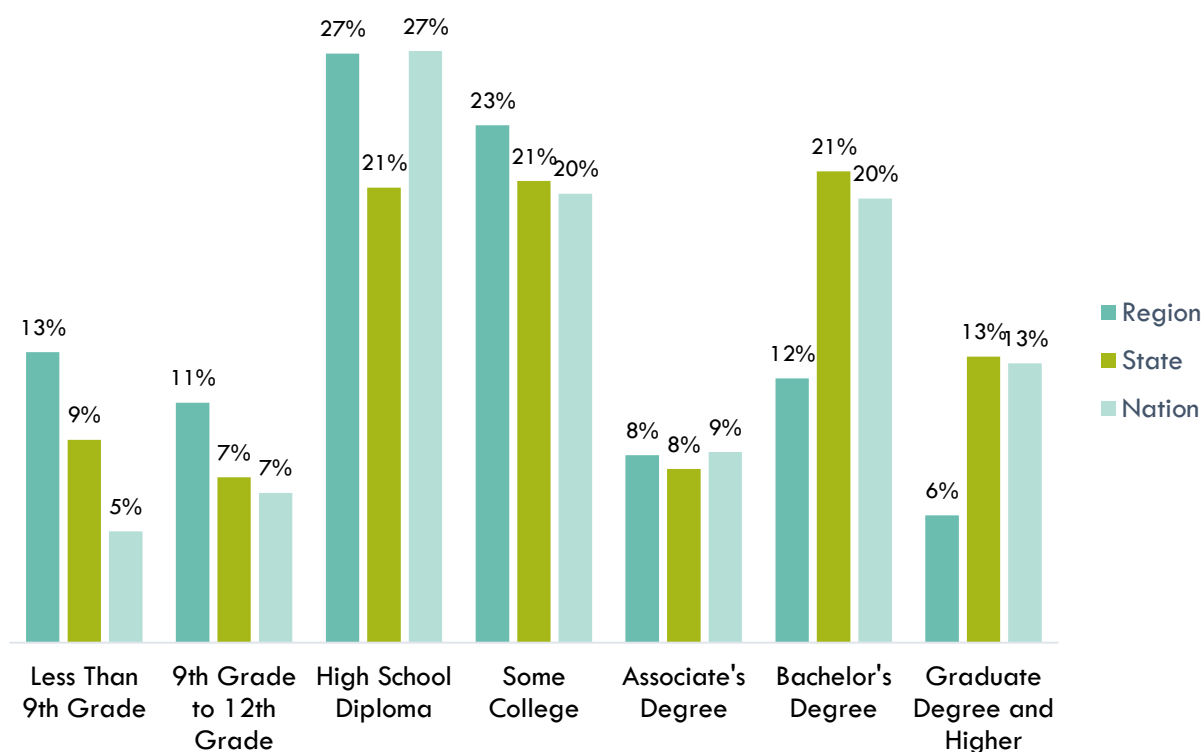
Exhibit 5: Projected change in two age cohorts in the CVML region, 2020-2025

Age Cohort	Number of Residents	Change	% Change
20 to 54 years	2,128,180	84,009	4%
55+ years	1,155,000	83,120	7%

Educational Attainment

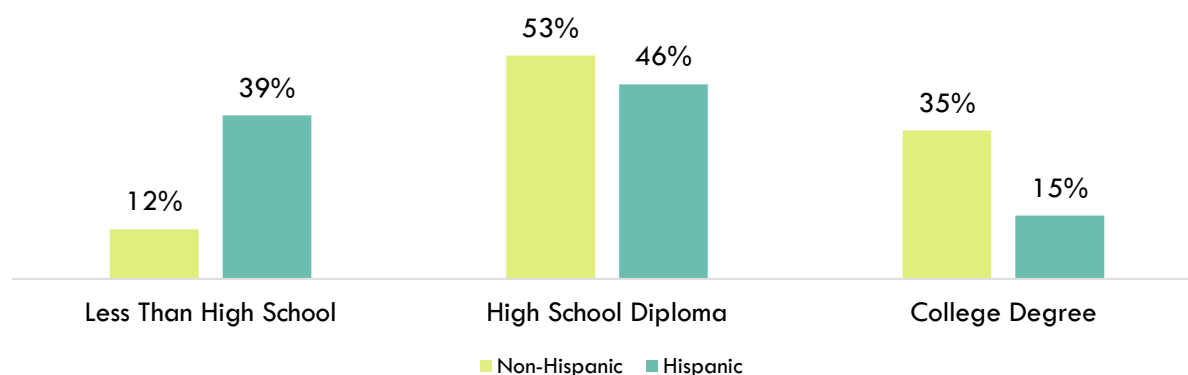
The CVML region continues to trail the state in bachelor's degree attainment, with only 12% of the adult population holding a bachelor's degree, compared to 21% in the state (Exhibit 6). Regarding associate degree attainment, the region and the state are similar, roughly 8%. The region leads the state in the percent of population that has completed only a high school diploma, 27% compared to 21%. A slightly greater proportion of the region has completed some college compared to the state and nation. In the region, 23% of the population has completed some college, while statewide the number is 21%. In the region, 23% of the population has completed some college, while statewide the number is 21%. In the region, 23% of the population has completed some college, while statewide the number is 21%. Compared to the state, a higher proportion of residents 25 years of age or older in the region have completed less than a 9th grade education and less than a 12th grade education, which indicates a greater need for adult education. In the region, 11% percent of residents have less than a 9th grade education, and 9% have a 9th-12th grade education, compared to 9% and 7% in the state, respectively.

Exhibit 6: Educational attainment comparison of the nation, state, and CVML region, 2020



In the region, 35% of the non-Hispanic adult population has a college degree, compared to 15% of the Hispanic population (Exhibit 7). Also, a greater proportion of the Hispanic population has less than a high school education, 39% of the Hispanic population compared to 12% of the non-Hispanic population.

Exhibit 7: Hispanic/non-Hispanic educational attainment in the region, 2020



Source: Emsi 2021.3

Labor Force & Employment

The size and characteristics of a region's labor force are important considerations in workforce planning. Labor force, employment and unemployment data are based upon "place of residence" – where people live, regardless of where they work. Individuals who have more than one job are counted only once. These data elements differ from industry employment estimates that are "place-of-work" based – where the employer/workplace is located, regardless of where the employee resides. (For terms and definitions, see Appendix A.) The labor force in the CVML region increased by 1,260 workers over the last five years (Exhibit 8). Employment declined by nearly 40,000 workers, from 1.73 million workers in 2016 to 1.69 million workers in 2020. Unemployment rose from 9.5% in 2016 to 11.6% in 2020.

Exhibit 8: Labor force size, employment, and unemployment in the CVML region, 2016-2020

	2016	2020	5-Year Change
Labor Force	1,911,950	1,913,210	1,260
Employment	1,731,170	1,691,170	(40,000)
Unemployment	180,880	222,440	41,560
Unemployment Rate	9.5%	11.6%	2.2%

Over the last five years, the state's labor force has lost nearly 191,000 workers, declining from 19 million in 2016 to 18.8 million in 2020 (Exhibit 9). More than 1 million workers in California were lost from the employment pool between 2016 and 2020. Employment declined from 17.9 million workers in 2016 to 16.9 million workers in 2019 statewide. At 10.1% in 2020, the state's unemployment rate was nearly double the rate in 2016, 5.5%.

Exhibit 9: Labor force size, employment, and unemployment in California, 2016-2020

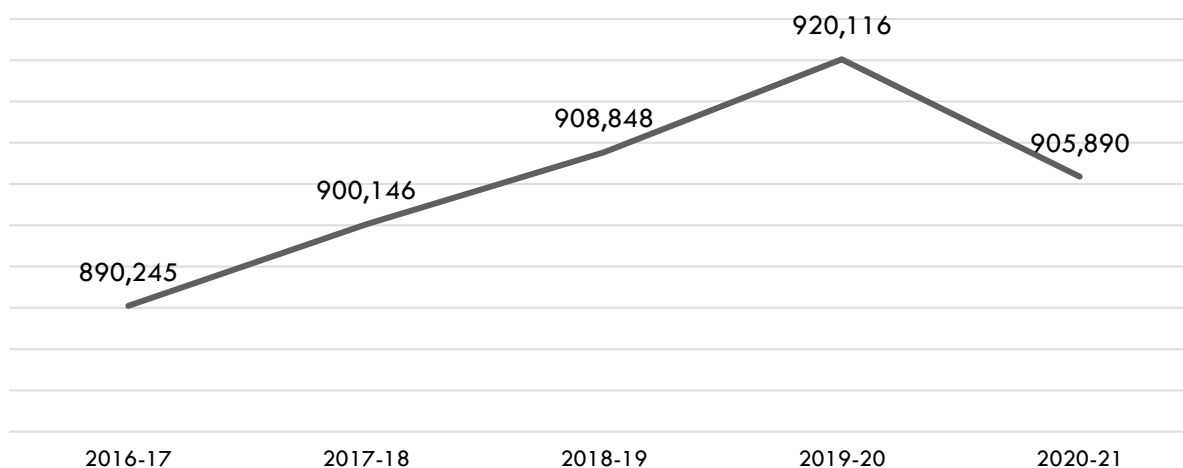
	2016	2020	5-Year Change
Labor Force	19,012,000	18,821,200	(190,800)
Employment	17,965,400	16,913,100	(1,052,300)
Unemployment	1,046,600	1,908,100	861,500
Unemployment Rate	5.5%	10.1%	4.6%

K-12 ENROLLMENT AND DEMOGRAPHICS

Regional K-12 Enrollment

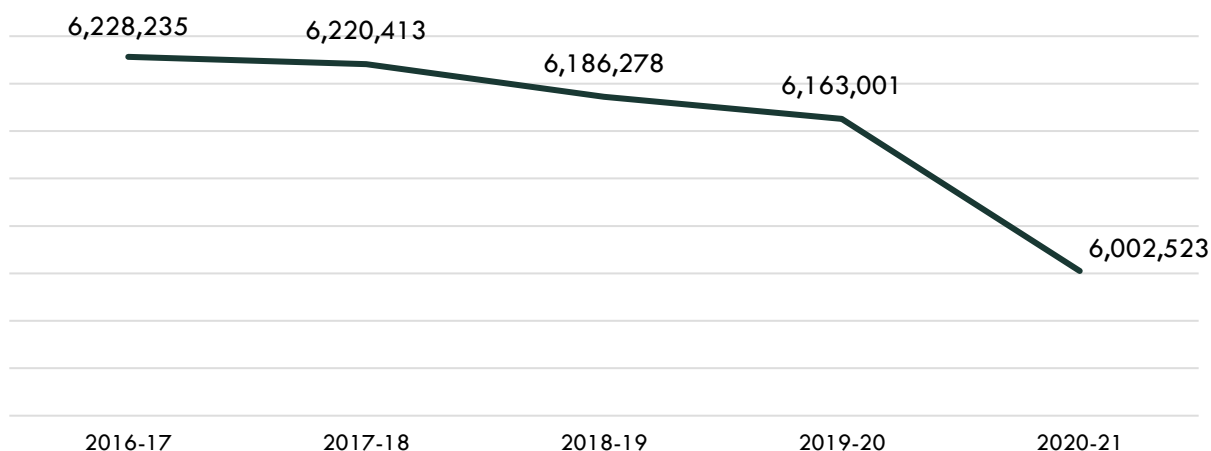
Deviating from past trends, K-12 enrollment in the region declined by 2%, representing a drop in enrollment of 14,226 students, between the 2019-20 and 2020-21 academic years (Exhibit 10). Up until the 2019-20 academic year, enrollment had steadily increased from 890,245 students in 2016-17 to 920,116 students in 2019-20. Enrollment increased by the greatest amount between the 2018-19 and 2019-20 academic years, with the addition of 11,268 students. Between 2016-17 and 2019-20, the region's net enrollment grew by 29,871 students.

Exhibit 10: Total enrollment for grades K-12 in the region, academic years 2016-17 to 2020-21



By comparison, enrollment has been steadily declining in the state since 2016-17. As in the Central Valley/Mother Lode region, a substantial drop in enrollment occurred in the 2020-21 academic year, when total K-12 enrollment fell by 160,478 students, a 3% decline (Exhibit 11). In the last five years, enrollment declined by more than 225,700 students, and projections show another decline of 65,234 students over the next five years.

Exhibit 11: Total enrollment for grades K-12 in California, academic years 2016-17 to 2020-21



Exhibits 12 and 13 show how enrollment has fluctuated by grade level over the past five years in the region. Within some of the grade levels, there has been substantial growth in student enrollment. Enrollment in 9th through 12th grade has consistently increased in year over year. However, for grades K through 8, enrollment has fluctuated, and in the most recent academic year largely declined. (Despite fluctuation, enrollment increased in the most recent academic year for grades 5 and 8.) Kindergarten enrollment declined by the greatest amount, 12% in the most recent academic year, representing the loss of 9,666 students. This finding suggests kindergarten enrollment may have been impacted by the COVID-19 pandemic with parents waiting for the pandemic to end before enrolling their children.

Exhibit 12: Enrollment by grade level in the region, academic years 2016-17 to 2020-21³

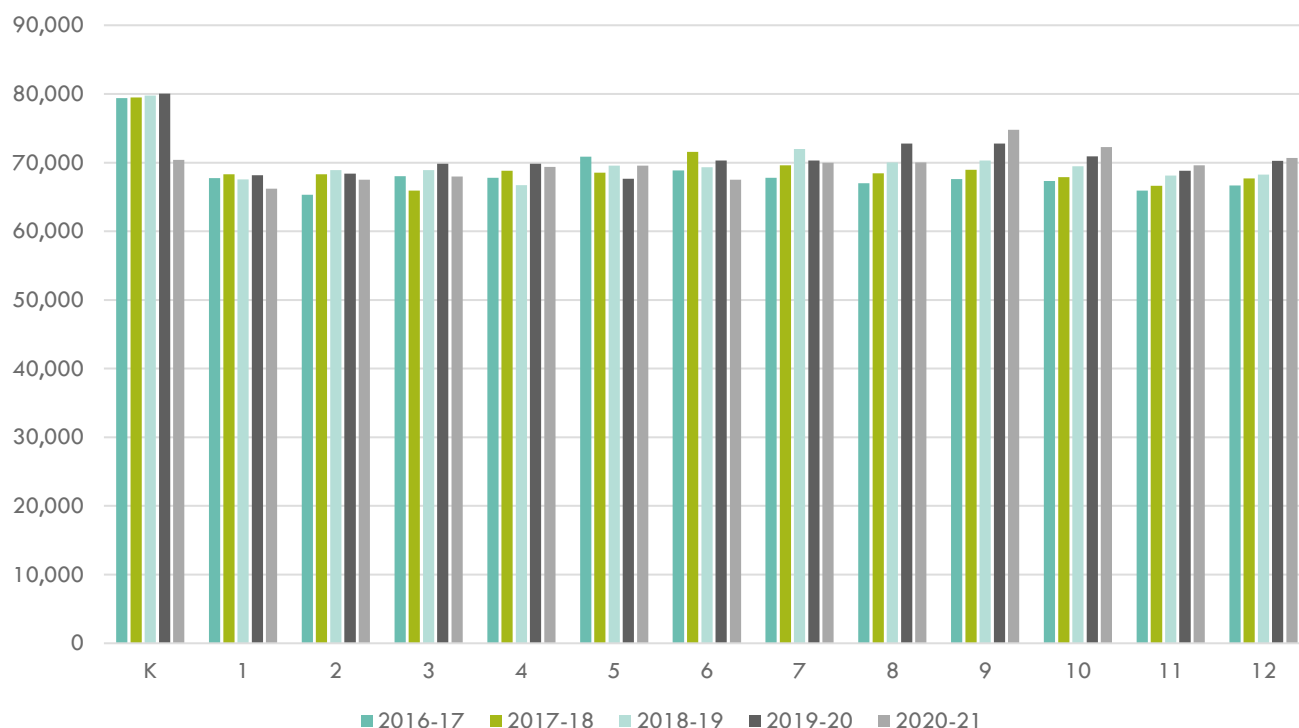


Exhibit 13: Enrollment by grade level in the region, academic years 2016-17 to 2020-21

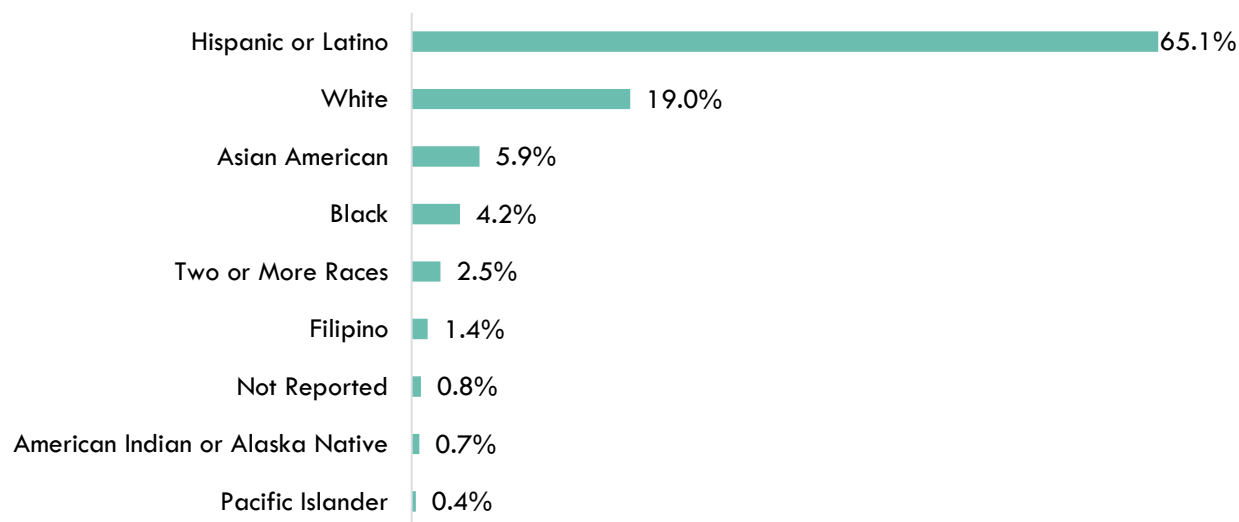
YEAR	K	1	2	3	4	5	6	7	8	9	10	11	12
2016-17	79,395	67,736	65,333	68,012	67,777	70,845	68,877	67,793	66,979	67,612	67,323	65,914	66,649
2017-18	79,489	68,295	68,292	65,924	68,799	68,547	71,577	69,604	68,449	68,975	67,883	66,627	67,685
2018-19	79,758	67,544	68,888	68,907	66,717	69,552	69,336	71,978	70,038	70,290	69,471	68,122	68,247
2019-20	80,063	68,147	68,395	69,815	69,860	67,667	70,323	70,282	72,783	72,786	70,897	68,818	70,280
2020-21	70,397	66,197	67,522	67,969	69,353	69,564	67,493	69,985	70,023	74,800	72,281	69,612	70,694

³ The ungraded/non-grade assigned students are excluded.

High School Graduation Analysis

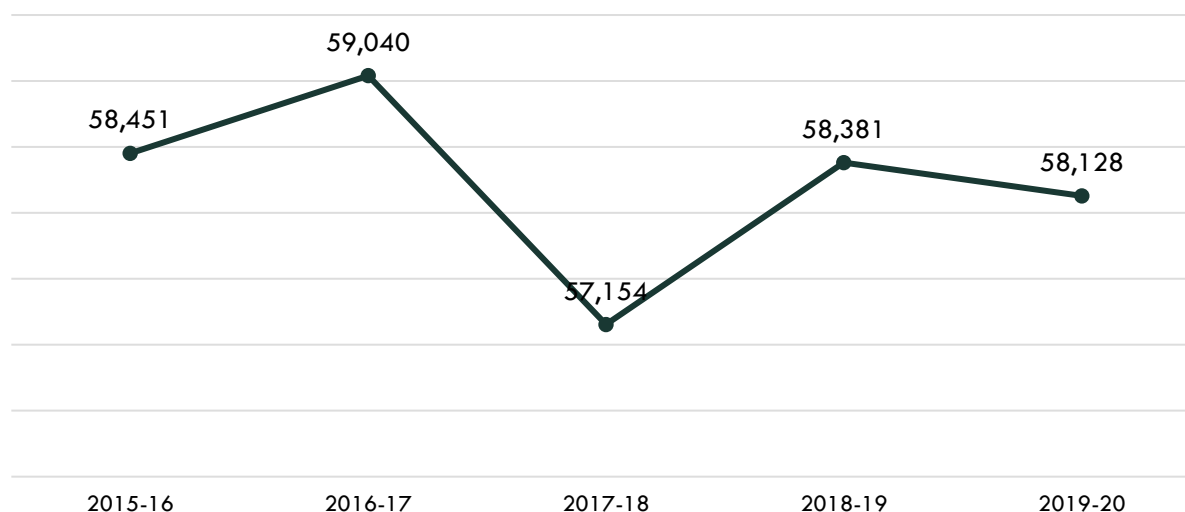
Students who identify as Hispanic or Latino comprise the largest share of students graduating high school in the region, totaling nearly 590,000 (Exhibit 14). The second largest group is white students, a total of 172,507, followed by Asian American students, 53,654. Students who identify as American Indian or Alaska Native, or as Pacific Islander, comprise the smallest groups in terms of race/ethnicity data reporting.

Exhibit 14: High school graduates by race/ethnicity in the region, 2019-20 academic year



The graduation trend in the region has somewhat stabilized (Exhibit 15). Between the 2016-17 and 2017-18 academic years, graduation numbers decreased by about 2,000 students. However, during the period between 2017-18 and 2018-19, the number of graduating students increased by 1,227 students. About the same number of students graduated in 2019-20 compared to the previous academic year, a difference of only 253 students.

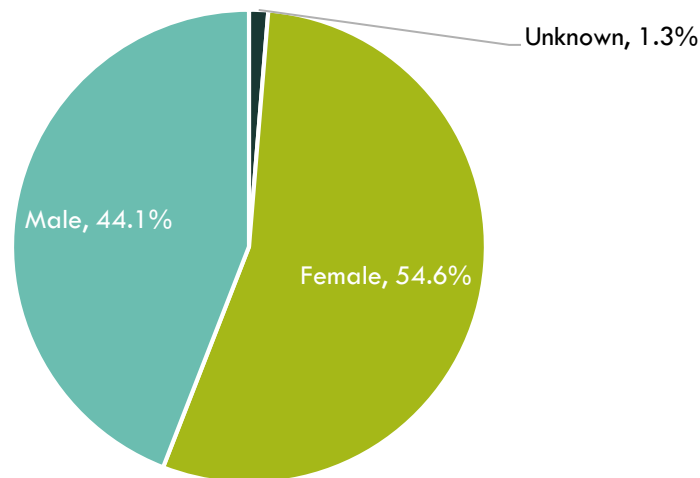
Exhibit 15: High school graduation trend in the region, academic years 2015-16 to 2020-21



CE ENROLLMENT AND DEMOGRAPHICS

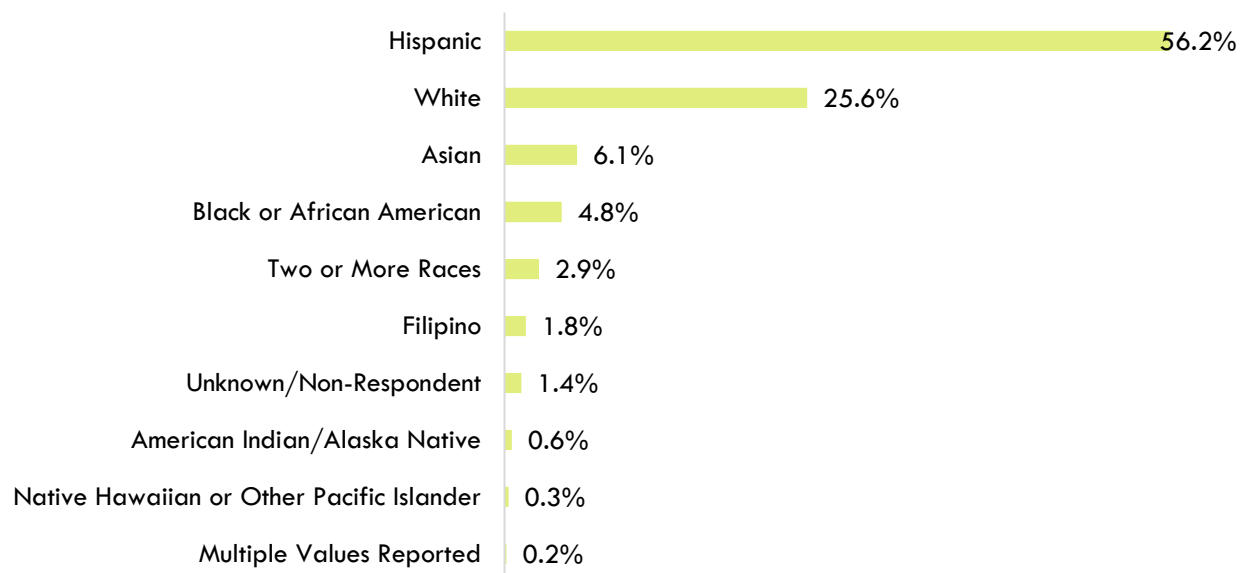
Female students comprise a slightly larger percentage of career education (CE) enrollment than male students (Exhibit 16). Women account for 54.6% of CE students, while men total 44.1%. Gender is unreported for about 1% of students.

Exhibit 16: CE student gender comparison



More than half, nearly 56% of CE students, identify as Hispanic (Exhibit 17). About 27% identify as white, while 6% identify as Asian American and 5% identify as Black. Approximately 3% of students identify as two or more races.

Exhibit 17: Race/ethnicity of CE students

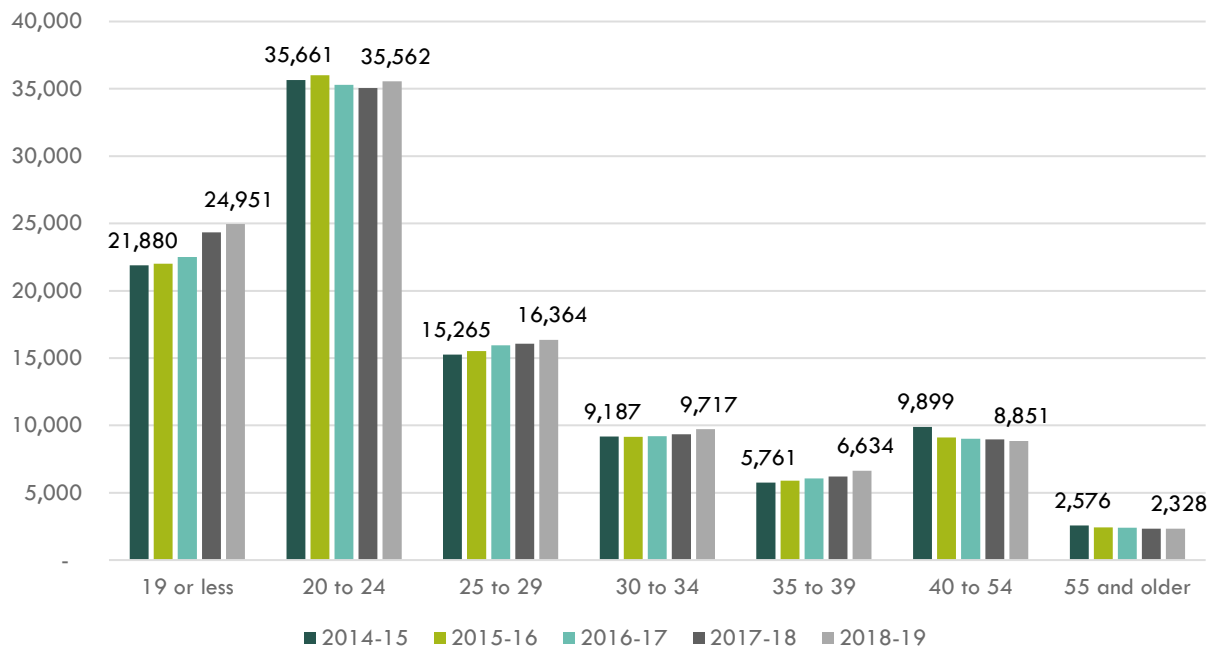


CE enrollment over the last five years has increased by more than 4,000 students, totaling 104,407 in the 2018-19 academic year (Exhibit 18). For the most part, overall CE enrollment has increased steadily over the past five years.

An analysis of student age shows that CE enrollment has grown the most in the 19-or-less age group over the last five years, an increase of 3,071 students, to a high of 24,951 students in the 2018-19 academic year. Enrollment also increased by 1,099 students for the 25-to-29 age group to a total of 16,364 in the 2018-19 academic year.

Enrollment numbers have consistently been highest for the 20-to-24 age group, totaling more than 35,500, for the last five years. Enrollment also has remained fairly consistent for this age group over the same time period.

Exhibit 18: CE enrollment by age group in the region, academic years 2014-15 to 2018-19



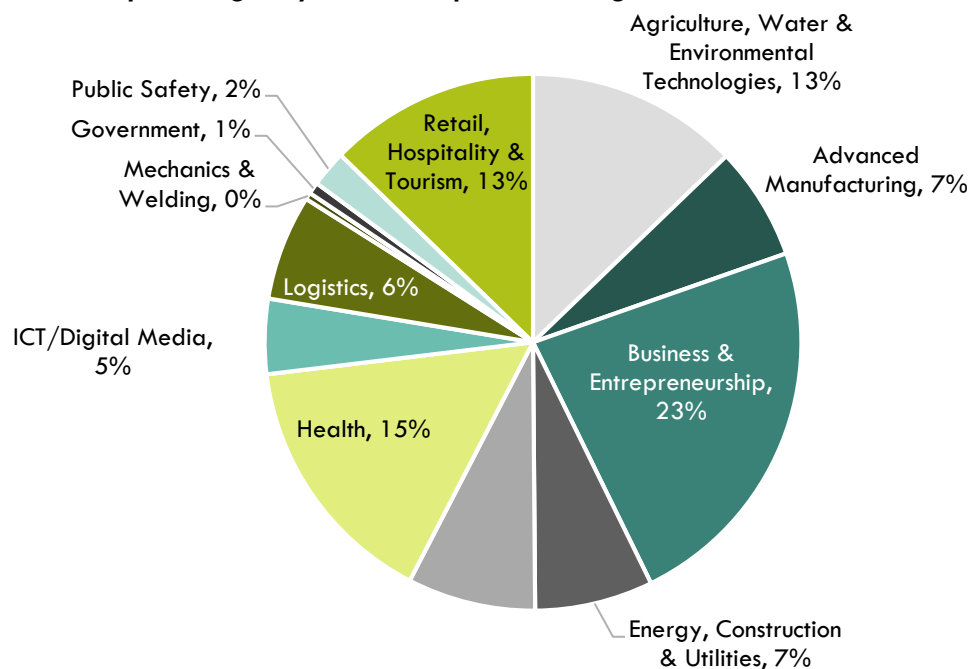
SECTOR COMPOSITION

When below-middle-skill, middle-skill, and above-middle-skill jobs are all accounted for, the business and entrepreneurship sector contained the greatest number of jobs in 2020 in the CVML region, nearly 400,000, followed by the health sector, which had nearly 266,000 jobs (Exhibit 19). There were more than 1.7 million total jobs in the region in 2020. Several sectors comprise the majority of employment in the region: business and entrepreneurship; health; retail, hospitality, and tourism; and agriculture, water; and environmental technologies (Exhibit 20).

Exhibit 19. Number of jobs by sector in the region, 2020

Sector	2020 Jobs
Business & Entrepreneurship	396,675
Health	265,802
Agriculture, Water & Environmental Technologies	219,529
Retail, Hospitality & Tourism	218,054
Education	132,514
Energy, Construction & Utilities	122,122
Advanced Manufacturing	117,100
Logistics	109,064
ICT/Digital Media	77,510
Public Safety	37,685
Government	12,084
Mechanics & Welding	7,128
TOTAL	1,715,267

Exhibit 20. Sector percentages by number of jobs in the region, 2020



ADVANCED MANUFACTURING

Summary

- **Employment and projected demand:** The largest middle-skill occupation is packaging and filling machine operators and tenders which will have 856 annual openings.
- **Wages:** The highest paid occupation is industrial production managers, \$36.86/hour entry level.
- **Specialized skills:** The top skill is quality assurance, followed by scheduling.
- **Race/ethnicity:** Analysis shows underrepresentation of white workers and overrepresentation of Hispanic or Latino workers.
- **Postsecondary supply and gap analysis:** A total of 332 awards are conferred on average each year, and there is a potential shortage of 3,504 workers.

Exhibit 21: Advanced manufacturing employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Packaging and Filling Machine Operators and Tenders	8,112	8,202	90	1%	856
Inspectors, Testers, Sorters, Samplers, and Weighers	5,150	4,977	(173)	(3%)	557
First-Line Supervisors of Production and Operating Workers	5,230	5,474	244	5%	522
Machinists	2,023	2,135	113	6%	215
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	1,612	1,647	34	2%	168
Mixing and Blending Machine Setters, Operators, and Tenders	1,291	1,353	62	5%	148
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	1,111	1,209	98	9%	133
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	1,189	1,271	82	7%	132
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	1,309	1,328	19	1%	117
Industrial Production Managers	1,525	1,583	58	4%	108
Printing Press Operators	976	1,001	25	3%	106
Cutting and Slicing Machine Setters, Operators, and Tenders	771	787	15	2%	85
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	784	816	32	4%	83
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	600	636	36	6%	69
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	627	685	58	9%	69
Computer Numerically Controlled Tool Operators	550	566	15	3%	53
Stationary Engineers and Boiler Operators	481	494	13	3%	51
TOTAL	33,343	34,165	822	2%	3,472

Exhibit 22: Advanced manufacturing entry-level wages

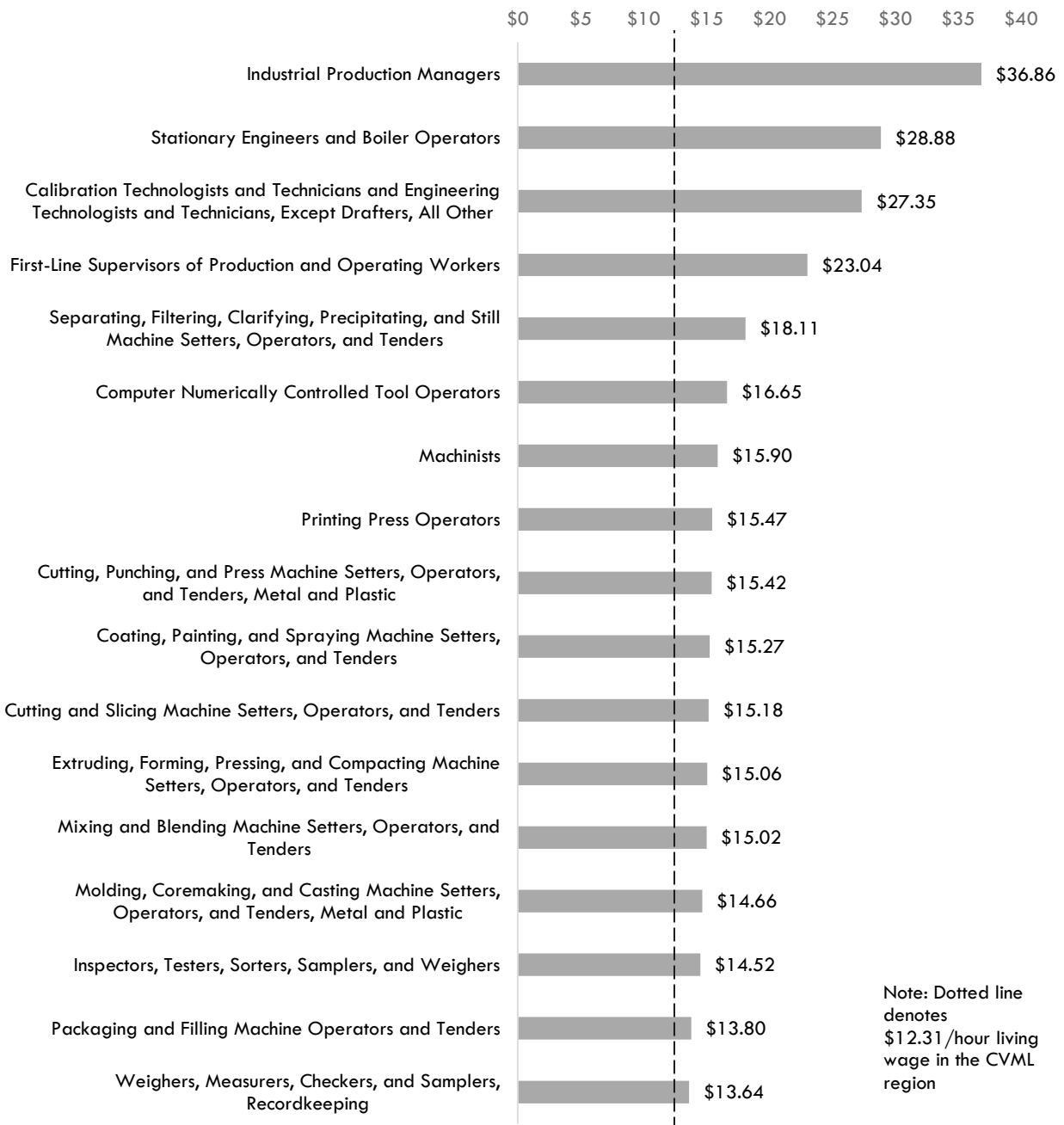


Exhibit 23. Top specialized skills in job postings for advanced manufacturing occupations



Exhibit 24. Race/ethnicity composition of the advanced manufacturing workforce

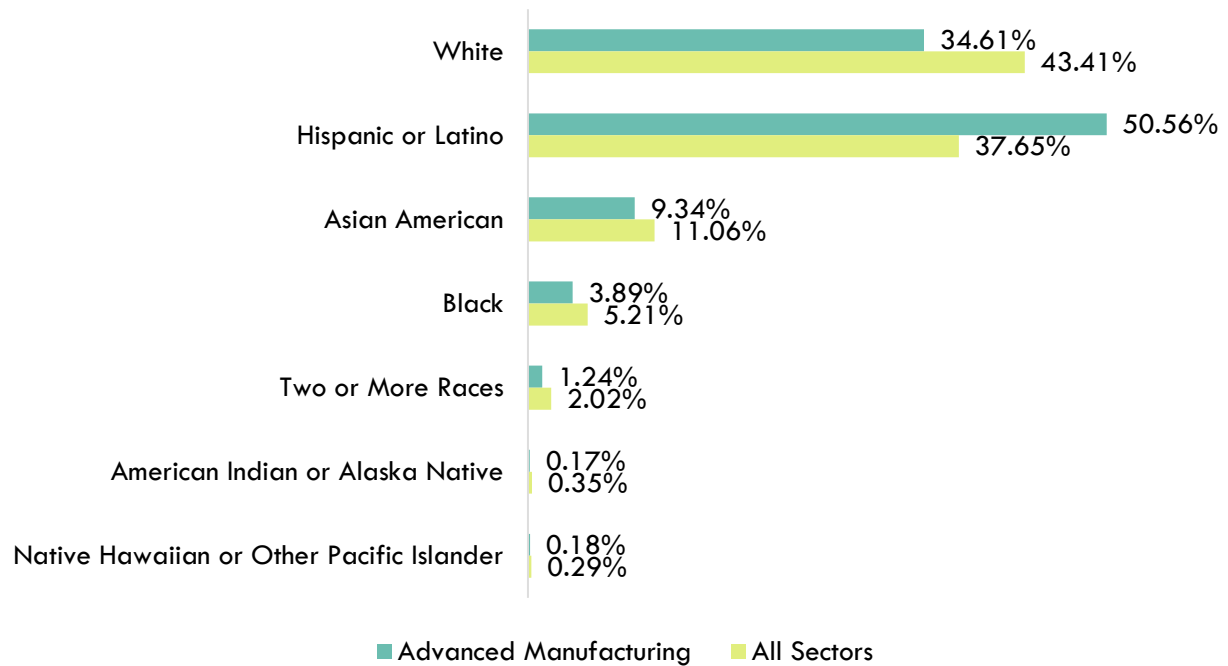
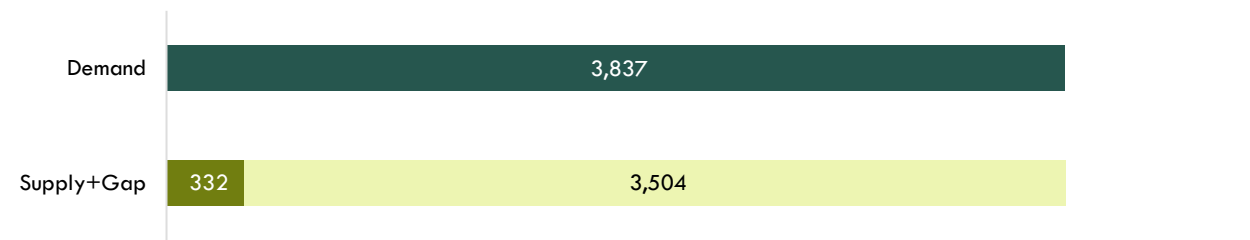


Exhibit 25. Postsecondary supply for the advanced manufacturing workforce

TOP/CIP Code – Title	College	Associate Degree	Award 1 < 2 Academic Years	Certificates	Noncredit	Subtotal
093410 – Computer Electronics	Merced	7		14	-	22
	Modesto	3		0	-	3
093420 – Industrial Electronics	Fresno City			17	-	17
	Merced	0		-	-	0
	Modesto	7		9	-	15
47.0303 – Industrial Mechanics and Maintenance Technology	San Joaquin Valley College-Visalia	15	117	-	-	132
094500 – Industrial Systems Technology and Maintenance	Clovis	0		1	-	1
	Fresno City			8	31	39
	Merced	1		1	-	1
	San Joaquin Delta			3	-	3
	Sequoias	7		74	-	81
	West Hills Lemoore			1	-	1
093600 – Printing and Lithography	Fresno City	3		3	-	6
094300 – Instrumentation Technology	Merced	1		1	-	3
099900 – Other Engineering and Related Industrial Technologies	Taft	1		5	-	6
130330 – Fashion Production	San Joaquin Delta			1	-	1
TOTAL		46	117	138	31	332

Exhibit 26: Advanced manufacturing workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



AGRICULTURE, WATER & ENVIRONMENTAL TECHNOLOGIES

Summary

- **Employment and projected demand:** The largest middle-skill occupation is farmers, ranchers, and other agricultural managers which will have 2,188 annual openings.
- **Wages:** The highest paid occupation is compliance officers, \$26.68/hour entry level.
- **Specialized skills:** The top skill is sales, followed by customer service.
- **Race/ethnicity:** Analysis shows overrepresentation of white workers and underrepresentation of workers of color in every other category.
- **Postsecondary supply and gap analysis:** A total of 1,180 awards are conferred on average each year, and there is a potential shortage of 5,912 workers.

Exhibit 27: Agriculture, water, and environmental technologies employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Farmers, Ranchers, and Other Agricultural Managers	23,449	22,386	(1,064)	(5%)	2,188
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	10,655	10,983	328	3%	1,047
Agricultural Equipment Operators	6,395	6,550	155	2%	990
First-Line Supervisors of Farming, Fishing, and Forestry Workers	5,148	5,237	88	2%	721
Buyers and Purchasing Agents	2,937	2,948	11	0%	271
Compliance Officers	2,406	2,614	208	9%	232
Cost Estimators	2,323	2,391	68	3%	213
Pest Control Workers	1,408	1,490	82	6%	197
Agricultural and Food Science Technicians	1,321	1,317	(4)	(0%)	150
Veterinary Assistants and Laboratory Animal Caretakers	826	933	107	13%	147
Agricultural Inspectors	795	800	6	1%	115
Animal Trainers	841	850	9	1%	114
Forest and Conservation Technicians	915	922	8	1%	108
Forest and Conservation Workers	667	721	53	8%	108
Veterinary Technologists and Technicians	765	874	109	14%	82
Pesticide Handlers, Sprayers, and Applicators, Vegetation	518	556	38	7%	71
Life, Physical, and Social Science Technicians, All Other	486	509	23	5%	60
Environmental Science and Protection Technicians, Including Health	466	489	23	5%	58

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Biological Technicians	494	517	23	5%	57
TOTAL	62,815	63,087	271	0%	6,928

Exhibit 28: Agriculture, water, and environmental technologies entry-level wages

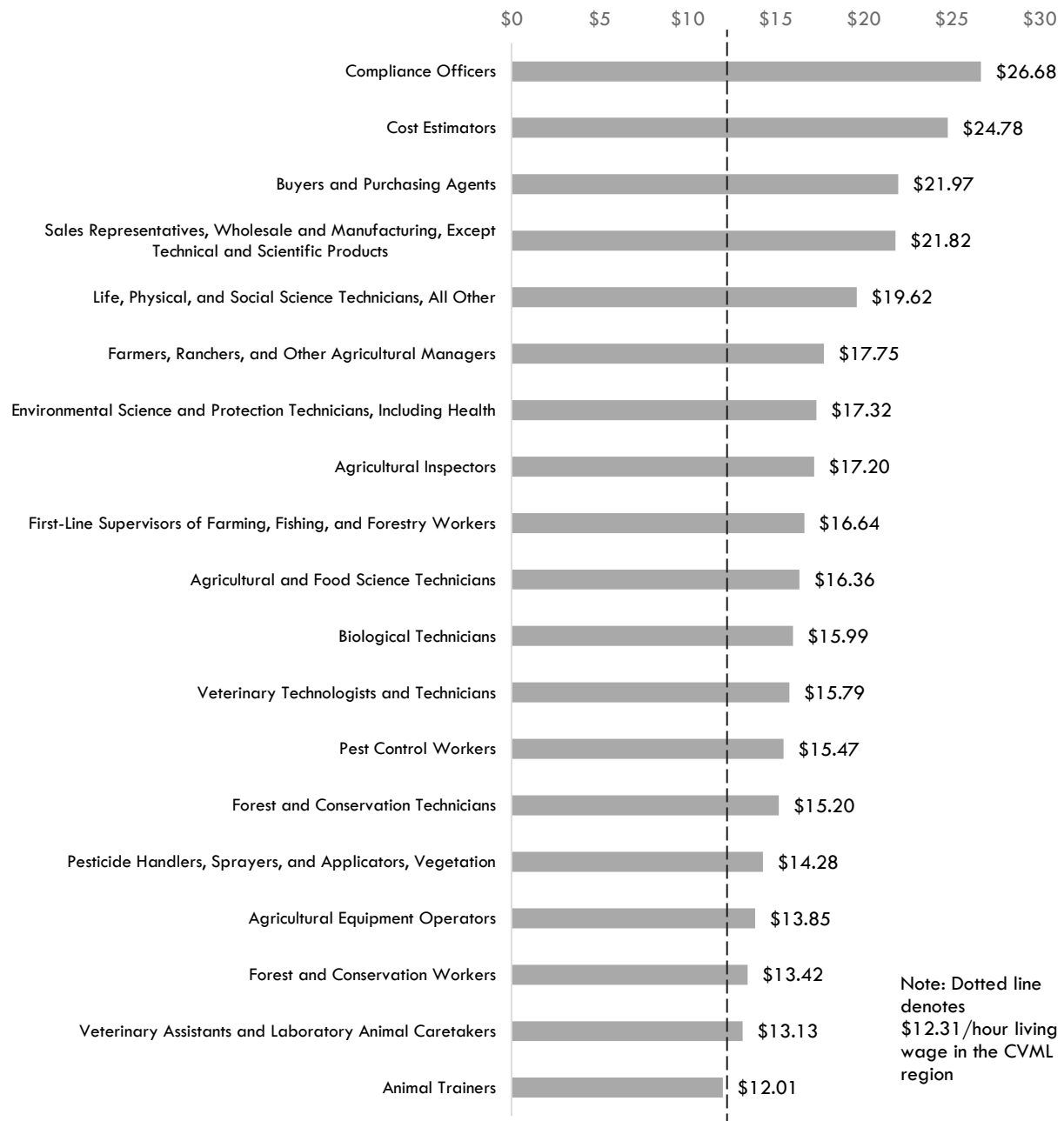


Exhibit 29. Top specialized skills in job postings for agriculture, water, and environmental technologies occupations

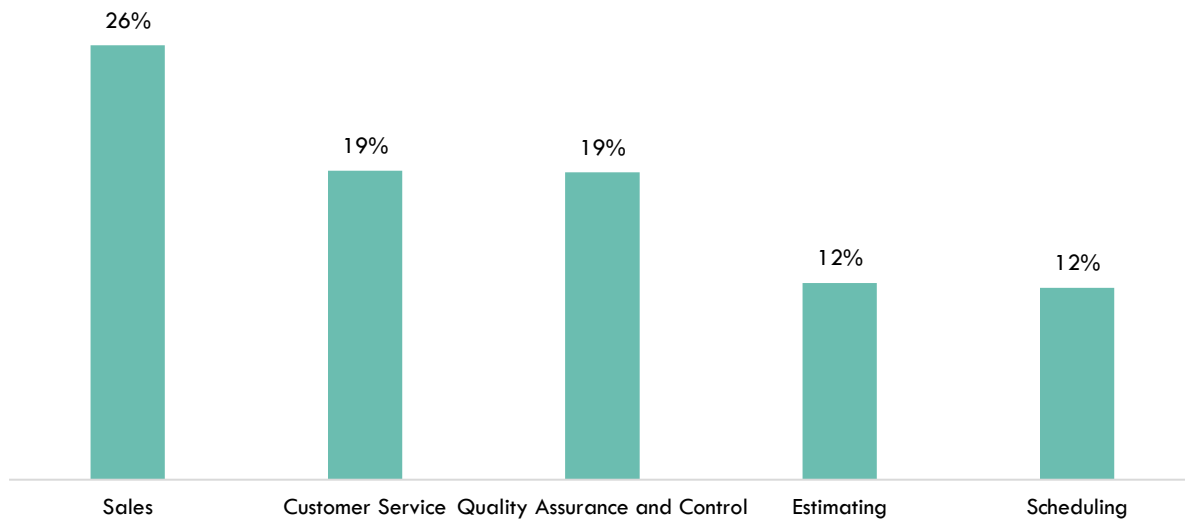


Exhibit 30. Race/ethnicity composition of the agriculture, water, and environmental technologies workforce

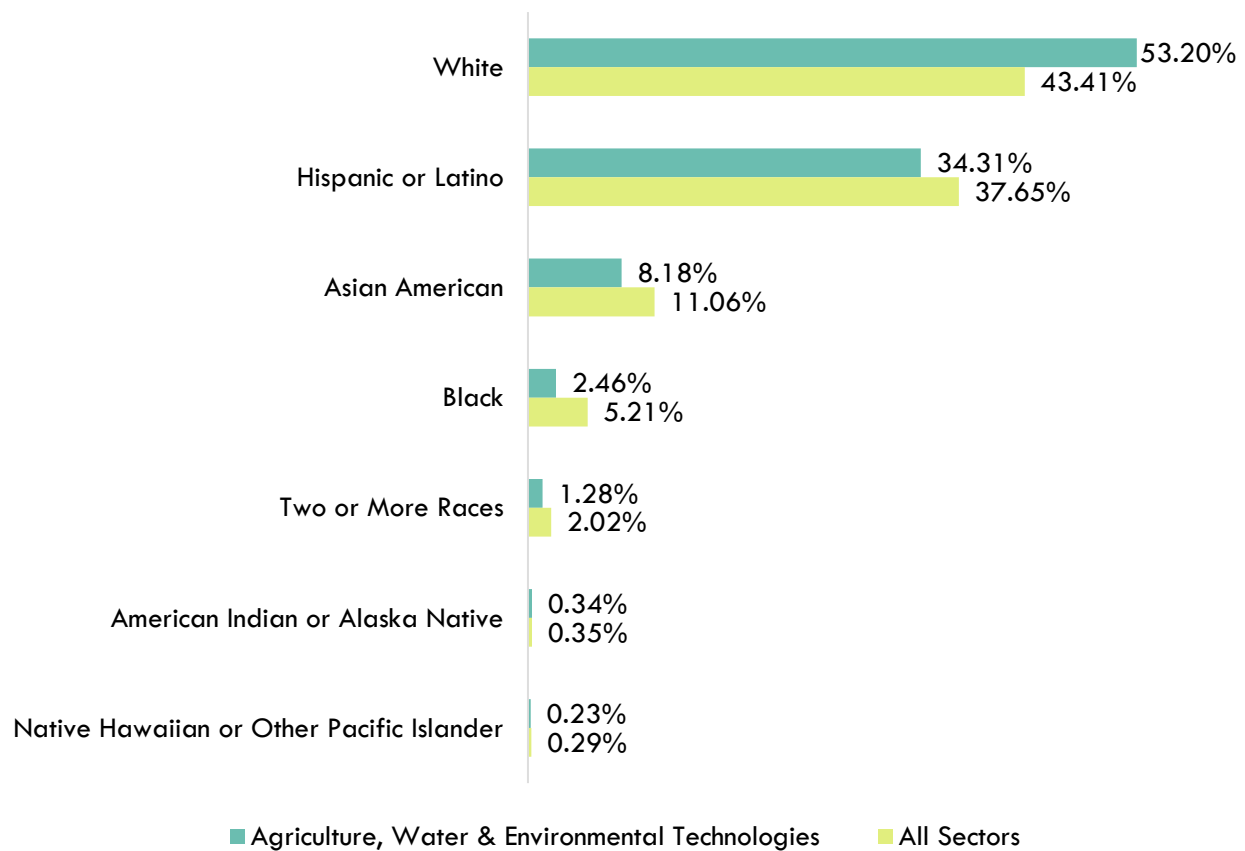
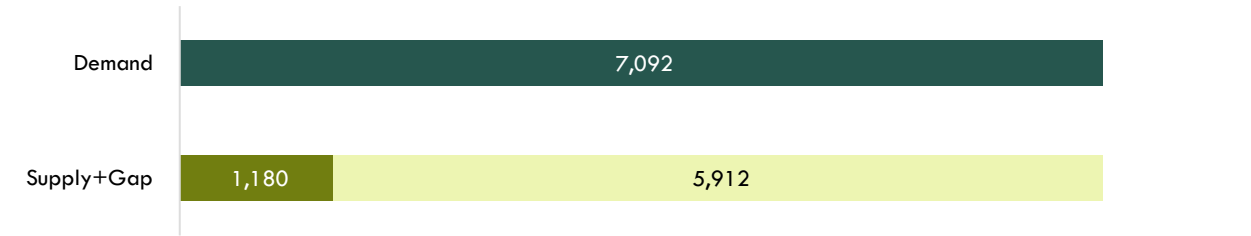


Exhibit 31. Postsecondary supply for the agriculture, water, and environmental technologies workforce

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
010100 – Agriculture Technology and Sciences, General	Merced	9			-	9
	Modesto	6			0	6
	Porterville	9			-	9
	Reedley College	1			1	2
	West Hills Coalinga	2			2	4
010310 – Agricultural Pest Control Adviser and Operator (Licensed)	Sequoias				2	2
	West Hills Coalinga				3	3
011200 – Agriculture Business, Sales and Service	Bakersfield	10	43		1	53
	Merced	16	18		4	38
	Modesto	23	9		-	32
	Porterville		3		-	3
	Reedley College	0	18		6	25
	San Joaquin Delta	1	1		-	2
	Sequoias	3	5		10	18
011600 – Agricultural Power Equipment Technology	Bakersfield	4			1	6
	Merced	5			58	63
	Modesto	7			29	36
	Reedley College	18			200	218
	San Joaquin Delta				5	5
	Sequoias	1			1	2
019900 – Other Agriculture and Natural Resources	Modesto	9			-	9
010200 – Animal Science	Bakersfield	14	6		2	22
	Merced	9			1	10
	Modesto	20	7		-	28
	Reedley College	1	11		9	22
	Sequoias	5	10		3	18
010210 – Veterinary Technician (Licensed)	Modesto	10			33	43
	Sequoias				0	0
51.0808 – Veterinary/Animal Health Technology/Technician and Veterinary Assistant	Carrington College-Stockton	34			-	34
	San Joaquin Valley College-Visalia	88		14	-	102
010220 – Artificial Inseminator (Licensed)	Modesto				3	3
010230 – Dairy Science	Modesto	3			-	3
	Sequoias	0			3	3
010240 – Equine Science	Modesto	1			5	5

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
010300 – Plant Science	Reedley College				5	5
	Sequoias				3	3
	Bakersfield	8	2		1	11
	Merced	3			1	4
	Modesto	16	1		-	17
	Reedley College	1	26		37	63
	San Joaquin Delta		1		-	1
	Sequoias	2	8		3	13
	West Hills Coalinga		34		-	34
010400 – Viticulture, Enology, and Wine Business	Reedley College				1	1
010900 – Horticulture	Bakersfield	1			1	2
	Merced	4			0	5
	Modesto	3			-	3
	San Joaquin Delta	2			1	3
	Sequoias	1			2	3
010910 – Landscape Design and Maintenance	San Joaquin Delta				3	3
	Sequoias	1			4	5
010930 – Nursery Technology	Modesto				0	0
	San Joaquin Delta				2	2
010940 – Turfgrass Technology	San Joaquin Delta				0	0
011300 – Food Processing and Related Technologies	Clovis				4	4
011400 – Forestry	Bakersfield	19			2	21
	Columbia	11			6	16
	Reedley College	10			14	23
011500 – Natural Resources	Columbia	12			6	18
	Fresno City				1	1
	Reedley College	5			18	23
011510 – Parks and Outdoor Recreation	Reedley College				3	3
020100 – Architecture and Architectural Technology	Bakersfield	9			4	14
	Fresno City	7			5	12
	San Joaquin Delta	1			-	1
	Sequoias	3			24	28
TOTAL		430	203	14	533	1,180

Exhibit 32: Agriculture, water, and environmental technologies workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



BUSINESS & ENTREPRENEURSHIP

Summary

- **Employment and projected demand:** The largest middle-skill occupation is general and operations managers which will have 1,559 annual openings.
- **Wages:** The highest paid occupation is general and operations manager, \$32.62/hour entry level.
- **Specialized skills:** The top skill is customer service, followed by sales.
- **Race/ethnicity:** Analysis shows overrepresentation of white workers and underrepresentation of Hispanic or Latino workers.
- **Postsecondary supply and gap analysis:** A total of 3,415 awards are conferred on average each year, and there is a potential shortage of 15,273 workers.

Exhibit 33: Business and entrepreneurship employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
General and Operations Managers	16,751	18,116	1,365	8%	1,559
Project Management Specialists and Business Operations Specialists, All Other	13,612	14,502	891	7%	1,386
First-Line Supervisors of Office and Administrative Support Workers	12,695	13,150	454	4%	1,297
Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	8,141	8,614	473	6%	638
Human Resources Specialists	4,622	5,068	446	10%	510
Production, Planning, and Expediting Clerks	3,387	3,641	254	7%	378
Eligibility Interviewers, Government Programs	3,138	3,366	228	7%	328
Training and Development Specialists	2,007	2,227	220	11%	234
Insurance Claims and Policy Processing Clerks	2,602	2,513	(89)	(3%)	234
First-Line Supervisors of Non-Retail Sales Workers	2,625	2,651	26	1%	234
Paralegals and Legal Assistants	1,858	1,973	115	6%	207
Payroll and Timekeeping Clerks	1,882	1,888	6	0%	190
Claims Adjusters, Examiners, and Investigators	2,231	2,213	(18)	(1%)	169
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	1,484	1,552	68	5%	151
Loan Officers	2,012	1,938	(74)	(4%)	145
Court, Municipal, and License Clerks	1,325	1,446	121	9%	145
Loan Interviewers and Clerks	1,293	1,290	(3)	(0%)	120
Real Estate Brokers	1,163	1,173	9	1%	102
Legal Secretaries and Administrative Assistants	935	853	(82)	(9%)	92
Fundraisers	604	667	64	11%	70
TOTAL	84,368	88,842	4,474	5%	8,190

Exhibit 34: Business and entrepreneurship entry-level wages

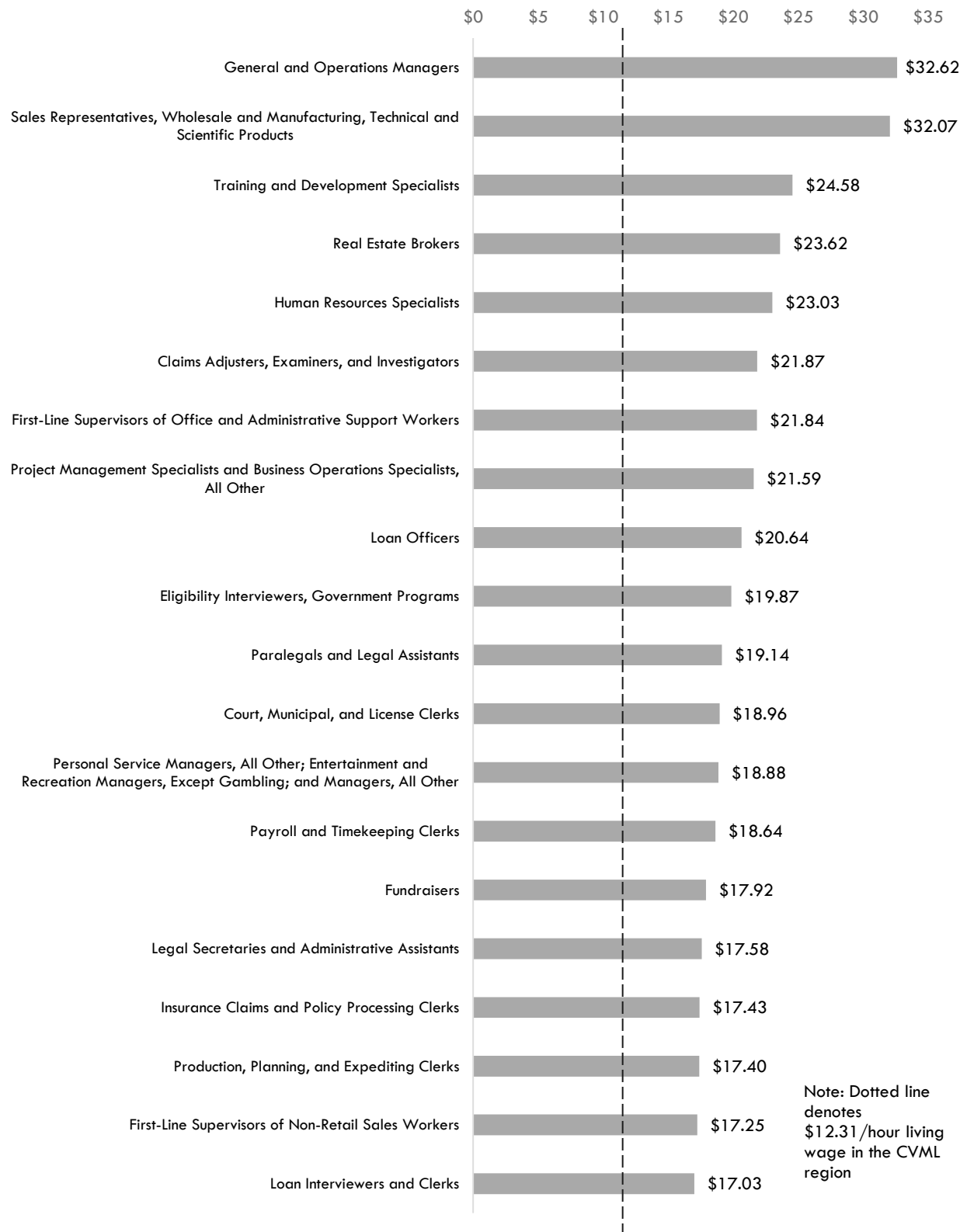


Exhibit 35. Top specialized skills in job postings for business and entrepreneurship occupations

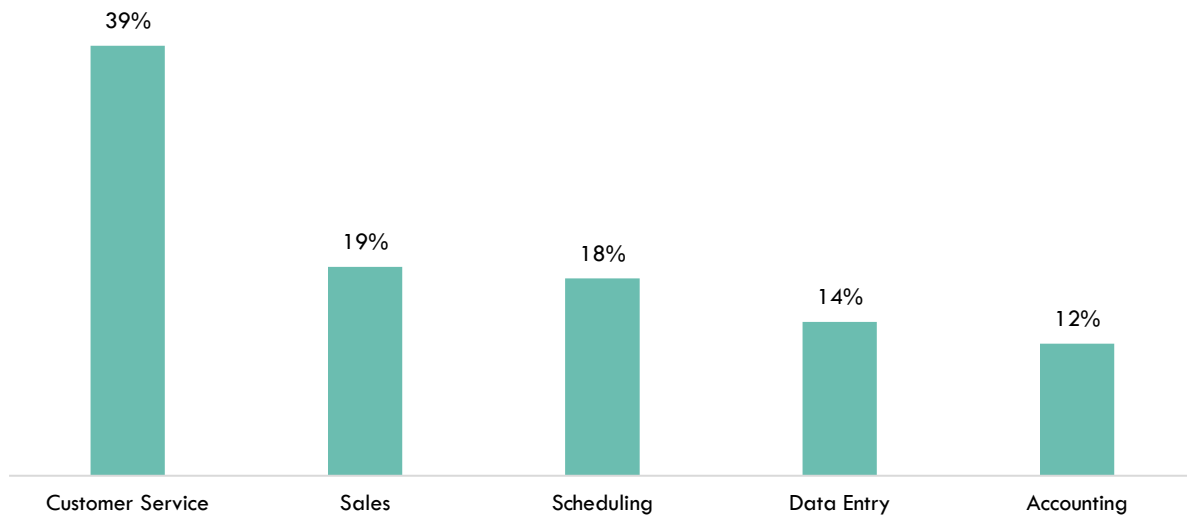


Exhibit 36. Race/ethnicity composition of the business and entrepreneurship workforce

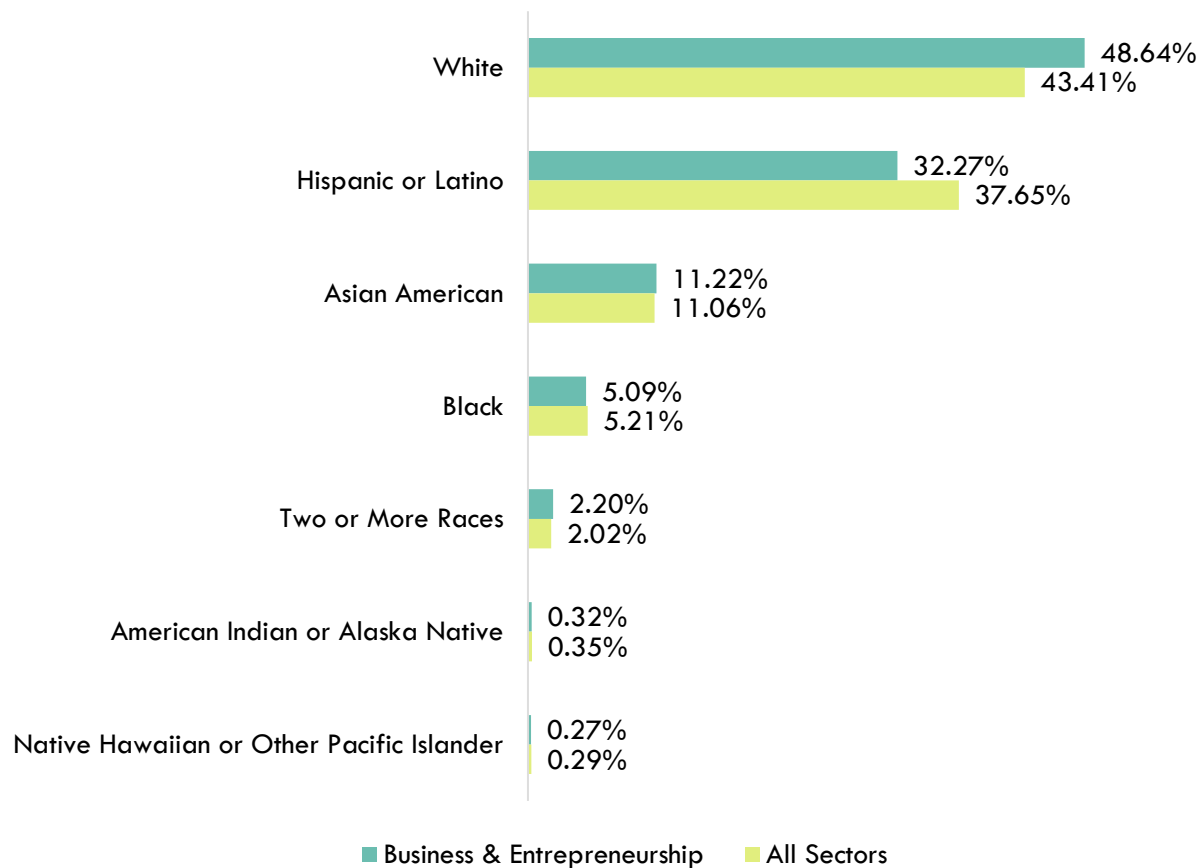


Exhibit 37. Postsecondary supply for the business and entrepreneurship workforce

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Year s	Award 2 < 4 Academic Year s	Certificates	Noncredit	Subtotal
050100 – Business and Commerce, General	Bakersfield						21	-	21
	Cerro Coso		7				-	-	7
	Columbia	5					-	-	5
	Merced	22					3	-	25
	Porterville	4					-	-	4
	Reedley College	0					147	-	147
	San Joaquin Delta	142					41	-	183
	Sequoias	10					2	-	12
	Taft	18					-	-	18
050500 – Business Administration	Bakersfield	7	155				-	-	162
	Cerro Coso	9	20				7	-	36
	Clovis	4	115				-	-	118
	Columbia	1	11				-	-	12
	Fresno City	9	234				-	-	243
	Merced	0	118				-	-	118
	Modesto	33	108				-	-	142
	Porterville		44				1	-	45
	Reedley College	6	96				-	-	102
	San Joaquin Delta		46				-	-	46
	Sequoias		101				3	-	105
	Taft	8	26				-	-	34
	West Hills Coalinga	1	12				-	-	12
	West Hills Lemoore	20	49				-	-	69
52.0201 – Business Administration and Management, General	Advanced College-Stockton	-					-	-	-
	Humphreys University-Stockton and Modesto Campuses	6					-	-	6
050600 – Business Management	Cerro Coso	2					2	-	4
	Clovis	1					1	-	2
	Columbia						15	-	15
	Fresno City	6					54	-	60
	Modesto	17					0	-	18
	Porterville	2					-	-	2
	Reedley College	3					1	-	4
	Sequoias	0					-	-	0

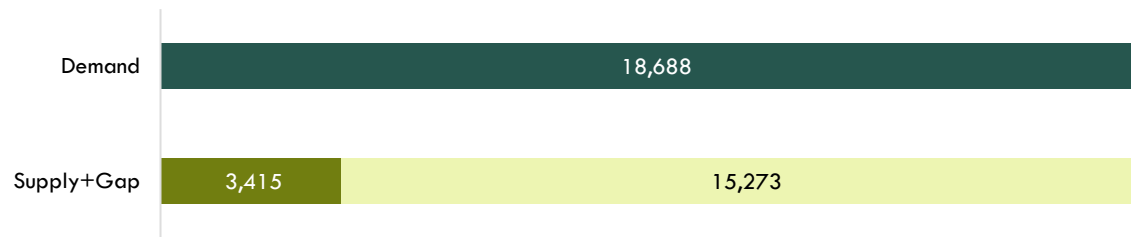
TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Year s	Award 2 < 4 Academic Year s	Certificates	Noncredit	Subtotal
	West Hills Coalinga	2					1	-	3
	West Hills Lemoore	3					4	-	7
059900 – Other Business and Management	San Joaquin Delta						0	-	0
52.0407 – Business/Office Automation/Technology/Data Entry	MTI Business College Inc				1		-	-	1
050200 – Accounting	Bakersfield	25					17	-	42
	Columbia	4					3	-	7
	Fresno City	12					42	-	54
	Merced	17					5	-	21
	Modesto	24					5	-	29
	Porterville						1	-	1
	Reedley College	7					8	-	15
	San Joaquin Delta	67					16	-	82
	Sequoias	12					3	-	15
	Taft	3					1	-	4
	West Hills Coalinga	3					4	-	7
	West Hills Lemoore	3					9	-	12
52.0301 – Accounting	Advanced College-Stockton			-			-	-	-
	Humphreys University-Stockton and Modesto Campuses	5					-	-	5
52.0302 – Accounting Technology/Technician and Bookkeeping	Advanced College-Stockton				-		-	-	-
	Institute of Technology	7					-	-	7
	Santa Barbara Business College-Bakersfield	25			0		-	-	25
	Stellar Career College			30			-	-	30
52.0399 – Accounting and Related Services, Other	Milan Institute-Visalia			10			-	-	10
050210 – Tax Studies	Columbia						1	-	1
	San Joaquin Delta						3	-	3
050400 – Banking and Finance	Sequoias						1	-	1
050630 – Management Development and Supervision	Merced	2					40	-	42
	Modesto	4					1	-	5
	Porterville						0	-	0
	San Joaquin Delta						7	-	7
	Taft	2					11	-	12

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Year s	Award 2 < 4 Academic Year s	Certificates	Noncredit	Subtotal
52.1001 – Human Resources Management/Personnel Administration, General	Institute of Technology	17			1		-	-	18
	San Joaquin Valley College-Visalia	16			24		-	-	40
050640 – Small Business and Entrepreneurship	Clovis	0					-	-	0
	Columbia	2					5	-	7
	Merced	3					2	-	5
	Reedley College	1					1	-	2
050650 – Retail Store Operations and Management	Columbia						0	-	0
	Fresno City	3					22	-	25
	Modesto						2	-	2
	San Joaquin Delta	10					-	-	10
	West Hills Coalinga	1					1	-	2
	West Hills Lemoore	0					9	-	10
051800 – Customer Service	Porterville						3	-	3
050800 – International Business and Trade	Modesto						1	-	1
050900 – Marketing and Distribution	Bakersfield	0					-	-	0
	Fresno City	4					-	-	4
	Merced	3					2	-	5
	Modesto	5					1	-	6
	San Joaquin Delta						1	-	1
051000 – Logistics and Materials Transportation	Fresno City						-	17	17
	Modesto	0					2	-	3
	San Joaquin Delta	1					2	-	3
051100 – Real Estate	Merced	0					3	-	4
	Modesto	4					54	-	58
	San Joaquin Delta	4					3	-	7
051400 – Office Technology/Office Computer Applications	Bakersfield	5					18	-	23
	Cerro Coso	4					32	-	36
	Columbia						1	-	1
	Fresno City	16					29	8	53
	Merced	22					56	-	78
	Modesto	8					11	-	19
	Reedley College	11					70	-	81
	San Joaquin Delta						14	-	14

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Year s	Award 2 < 4 Academic Year s	Certificates	Noncredit	Subtotal
	Sequoias	0					1	-	2
	Taft	4					1	-	5
	West Hills Coalinga	3					2	-	4
	West Hills Lemoore	0					-	-	0
52.0401 – Administrative Assistant and Secretarial Science, General	Clovis Adult Education			18			-	-	18
	Institute of Technology				1		-	-	1
	Milan Institute-Visalia			15			-	-	15
	Stellar Career College			24			-	-	24
52.0408 – General Office Occupations and Clerical Services	MTI Business College Inc				6		-	-	6
	San Joaquin Valley College-Visalia	111			100		-	-	211
	Stellar Career College			3			-	-	3
	UEI College-Bakersfield				40		-	-	40
	UEI College-Fresno				62		-	-	62
	United Education Institute-UEI College Stockton				24		-	-	24
051410 – Legal Office Technology	Fresno City	1					2	-	2
	Sequoias						1	-	1
22.0301 – Legal Administrative Assistant/Secretary	MTI Business College Inc				2		-	-	2
140200 – Paralegal	Cerro Coso	4					6	-	10
	Fresno City	23					31	-	54
	Sequoias	13					4	-	17
22.0302 – Legal Assistant/Paralegal	Humphreys University-Stockton and Modesto Campuses					3	-	-	3
	Santa Barbara Business College-Bakersfield	10			-		-	-	10
051420 – Medical Office Technology	Columbia	2					1	-	3
	Fresno City	8					19	-	27
	Merced	16					21	-	37
	Reedley College	16					20	-	36
	San Joaquin Delta						17	-	17
051430 – Court Reporting	Taft	2					2	-	3
22.0303 – Court Reporting/Court Reporter	Humphreys University-Stockton and Modesto Campuses	1					-	-	1
051440 – Office Management	Bakersfield	6					-	-	6
	San Joaquin Delta	5					3	-	8

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Year s	Award 2 < 4 Academic Year s	Certificates	Noncredit	Subtotal
TOTAL		927	1,143	99	260	3	957	25	3,415

Exhibit 38: Business and entrepreneurship workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



EDUCATION

Summary

- **Employment and projected demand:** The largest middle-skill occupation is teaching assistants, except postsecondary which will have 2,555 annual openings.
- **Wages:** The highest paid occupation is interpreters and translators, \$19.12/hour entry level.
- **Specialized skills:** The top skill is teaching, followed by childcare.
- **Race/ethnicity:** Analysis shows slight underrepresentation of white workers and slight overrepresentation of workers who are Hispanic or Latino, Black, and two or more races.
- **Postsecondary supply and gap analysis:** A total of 2,341 awards are conferred on average each year, and there is a potential shortage of 5,986 workers.

Exhibit 39: Education employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Teaching Assistants, Except Postsecondary	23,988	25,126	1,137	5%	2,555
Childcare Workers	14,403	13,430	(973)	(7%)	1,956
Substitute Teachers, Short-Term	13,940	14,536	597	4%	1,610
Recreation Workers	4,760	5,195	435	9%	835
Preschool Teachers, Except Special Education	4,588	4,731	143	3%	462
Teaching Assistants, Postsecondary	3,769	3,644	(125)	(3%)	294
Library Technicians	1,558	1,569	10	1%	226
Directors, Religious Activities and Education	1,142	1,157	15	1%	130
Library Assistants, Clerical	636	649	13	2%	94
Interpreters and Translators	777	860	83	11%	86
Education and Childcare Administrators, Preschool and Daycare	854	866	12	1%	62
TOTAL	70,417	71,764	1,347	2%	8,311

Exhibit 40: Education entry-level wages

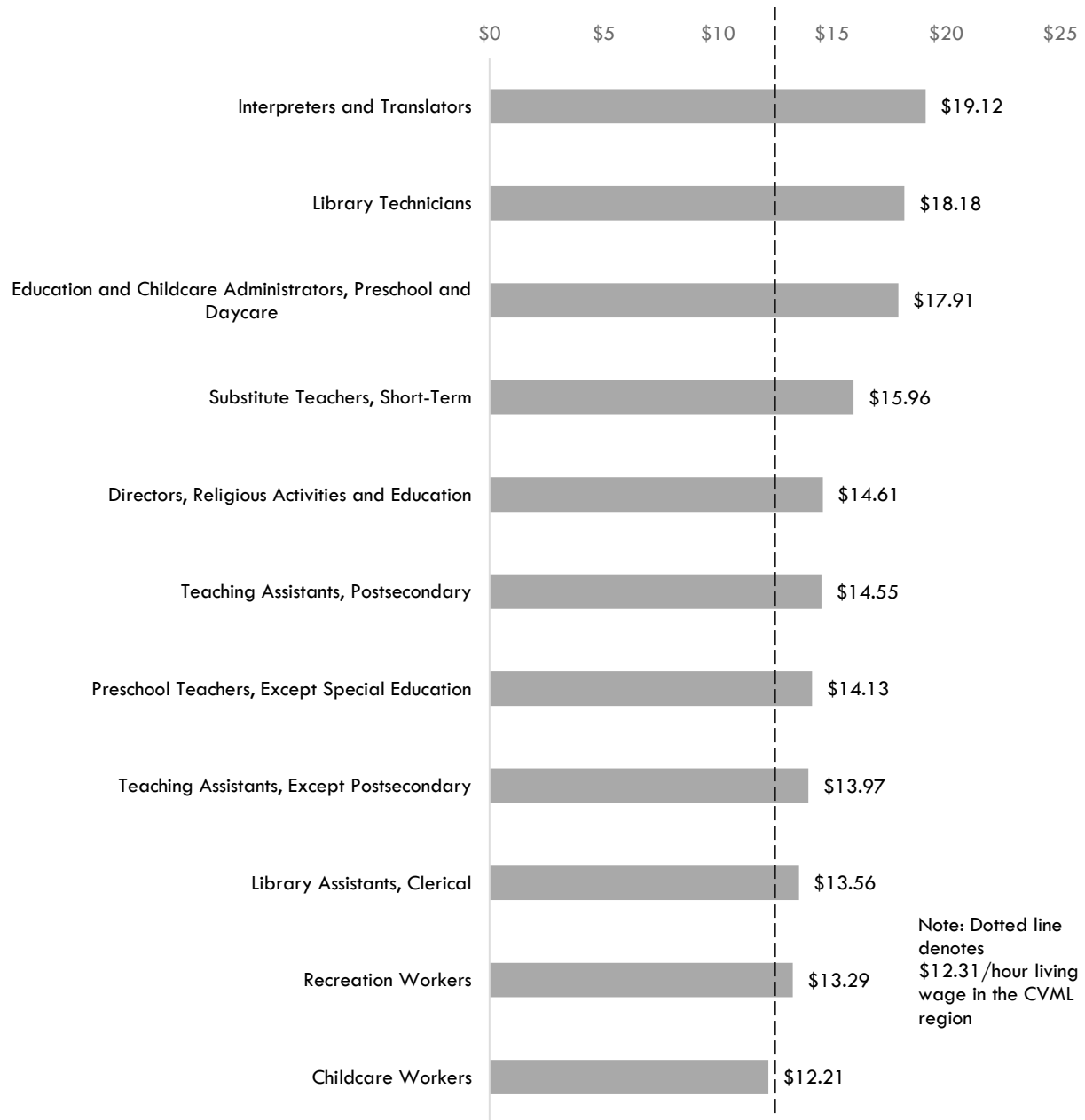


Exhibit 41. Top specialized skills in job postings for education occupations

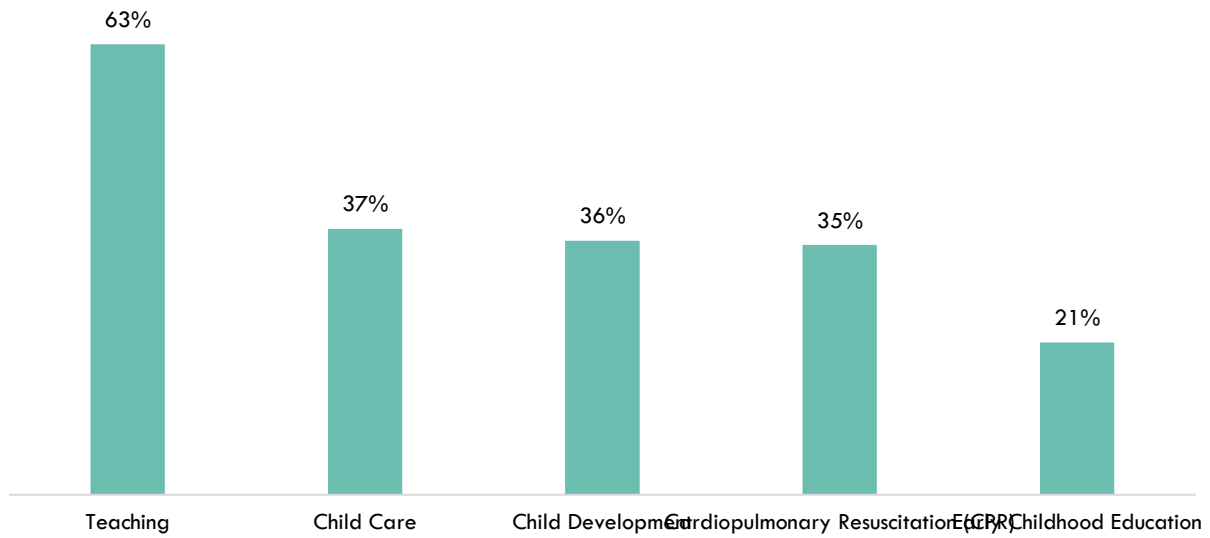


Exhibit 42. Race/ethnicity composition of the education workforce

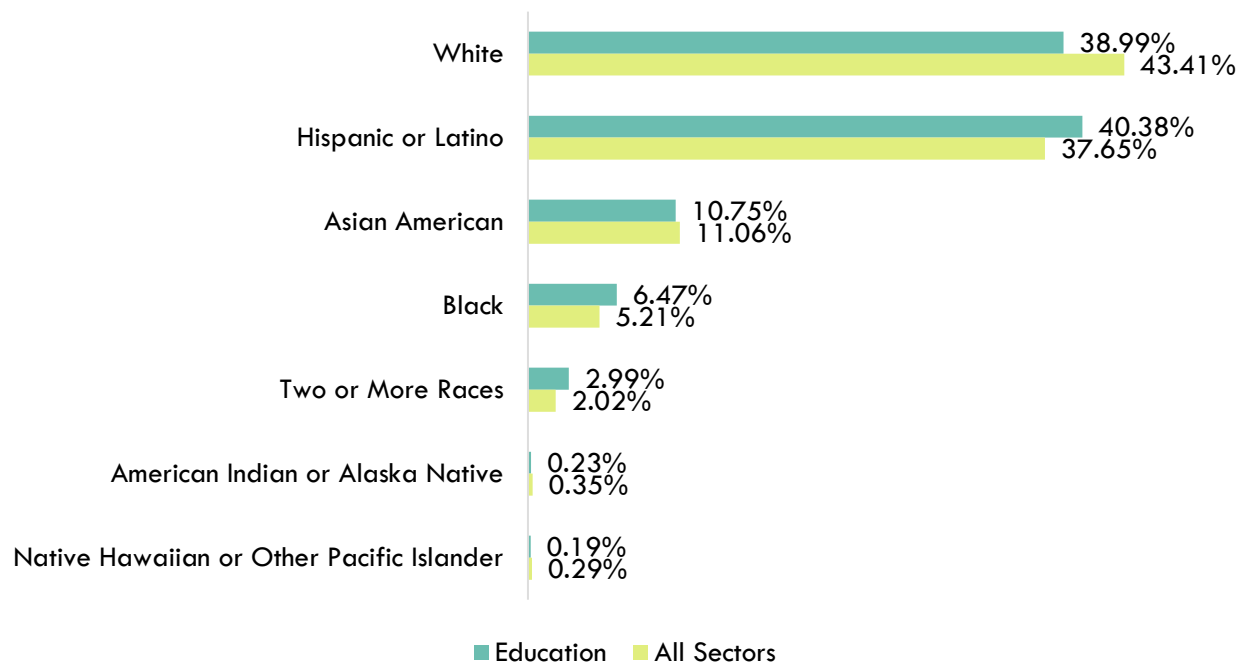
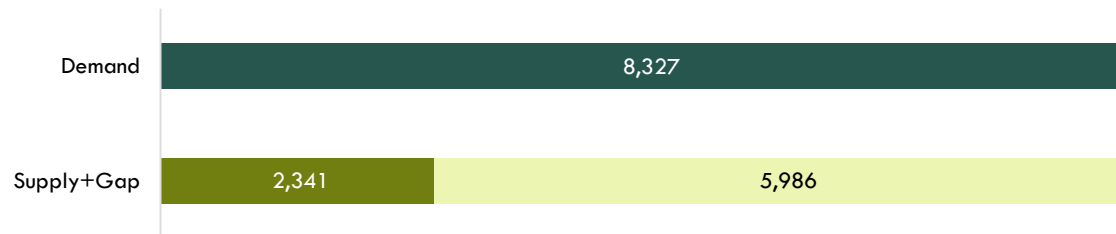


Exhibit 43. Postsecondary supply for the education workforce

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Certificates	Subtotal
080200 – Educational Aide (Teacher Assistant)	Fresno City	1		1	2
080900 – Special Education	Fresno City			3	3
	Taft	2		3	5
083520 – Fitness Trainer	San Joaquin Delta			5	5
083610 – Recreation Assistant	San Joaquin Delta			1	1
085010 – Sign Language Interpreting	Bakersfield			1	1
	Fresno City			5	5
130500 – Child Development/Early Care and Education	Bakersfield	30	89	310	428
	Cerro Coso	1	11	58	71
	Clovis	5	18	15	38
	Columbia	6	2	9	16
	Fresno City	16	44	101	162
	Merced	25	34	10	69
	Modesto	47	36	201	284
	Porterville	31	12	22	65
	Reedley College	24	38	168	230
	San Joaquin Delta		4	54	57
	Sequoias	38	52	350	440
	Taft	21	17	68	106
	West Hills Coalinga	5	4	75	84
	West Hills Lemoore	19	9	107	134
130580 – Child Development Administration and Management	Cerro Coso			3	3
	Modesto			6	6
	San Joaquin Delta			1	1
130520 – Children with Special Needs	Fresno City	2		3	5
	Modesto			8	8
	Reedley College			2	2
	Sequoias			5	5
	Taft			1	1
13.1210 – Early Childhood Education and Teaching	Humphreys University-Stockton and Modesto Campuses	9		-	9
086000 – Educational Technology	Columbia			1	1
130100 – Family and Consumer Sciences, General	San Joaquin Delta	14		-	14
130590 – Infants and Toddlers	Fresno City			8	8
130540 – Preschool Age Children	San Joaquin Delta	37		-	37

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Certificates	Subtotal
130550 – The School Age Child	Clovis			10	10
	Reedley College			9	9
130570 – Foster and Kinship Care	Fresno City			2	2
160200 – Library Technician (Aide)	Fresno City	4		11	15
TOTAL		337	369	1,635	2,341

Exhibit 44: Education workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



ENERGY, CONSTRUCTION & UTILITIES

Summary

- **Employment and projected demand:** The largest middle-skill occupation is electricians which will have 916 annual openings.
- **Wages:** The highest paid occupation is telecommunications line installers and repairers, \$38.28/hour entry level.
- **Specialized skills:** The top skill is forklift operation, followed by repair.
- **Race/ethnicity:** Analysis shows overrepresentation of white workers and underrepresentation of workers who are Hispanic or Latino, Asian American, Black, and two or more races.
- **Postsecondary supply and gap analysis:** A total of 1,370 awards are conferred on average each year, and there is a potential shortage of 7,363 workers.

Exhibit 45: Energy, construction, and utilities employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Electricians	7,078	7,901	823	12%	916
First-Line Supervisors of Construction Trades and Extraction Workers	6,048	6,243	195	3%	610
Plumbers, Pipefitters, and Steamfitters	4,355	4,692	337	8%	498
Operating Engineers and Other Construction Equipment Operators	3,887	4,109	222	6%	442
Construction Managers	4,108	4,425	317	8%	328
Telecommunications Equipment Installers and Repairers, Except Line Installers	3,101	3,008	(93)	(3%)	317
Administrative Services and Facilities Managers	2,592	2,781	190	7%	237
Telecommunications Line Installers and Repairers	1,317	1,293	(23)	(2%)	135
Water and Wastewater Treatment Plant and System Operators	1,468	1,479	11	1%	121
Sheet Metal Workers	1,057	1,121	64	6%	111
Construction and Building Inspectors	870	930	60	7%	108
Structural Iron and Steel Workers	949	1,004	55	6%	107
Electrical and Electronic Engineering Technologists and Technicians	1,119	1,132	13	1%	101
Electrical Power-Line Installers and Repairers	1,093	1,130	37	3%	97
Architectural and Civil Drafters	729	740	11	2%	69
Civil Engineering Technologists and Technicians	668	721	53	8%	68
Brickmasons and Blockmasons	581	638	58	10%	66
Stonemasons	687	678	(8)	(1%)	63
Power Plant Operators	652	676	24	4%	62
Occupational Health and Safety Specialists	899	955	56	6%	58

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
TOTAL	43,256	45,658	2,402	6%	4,516



Exhibit 46: Energy, construction, and utilities entry-level wages

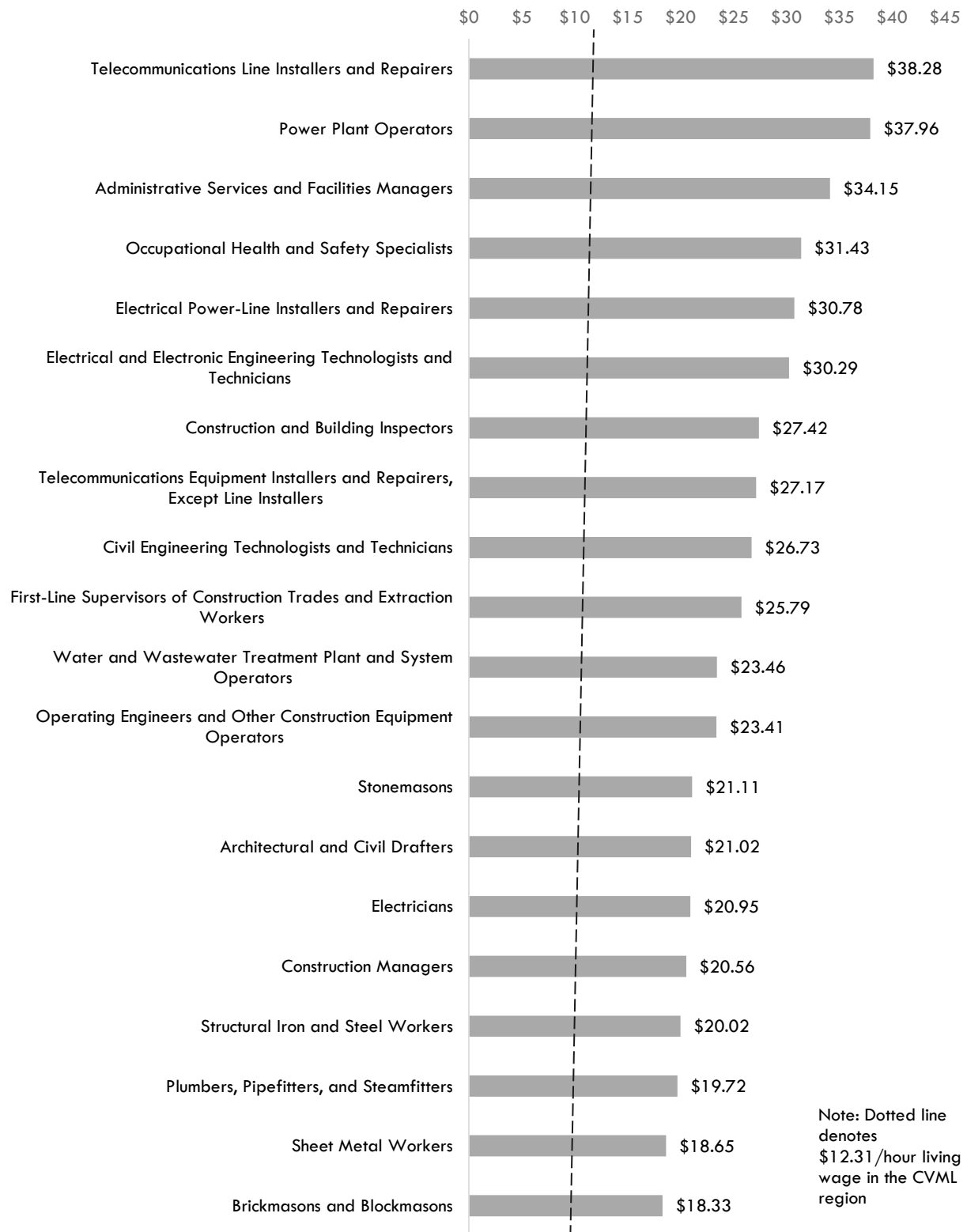


Exhibit 47. Top specialized skills in job postings for energy, construction, and utilities occupations

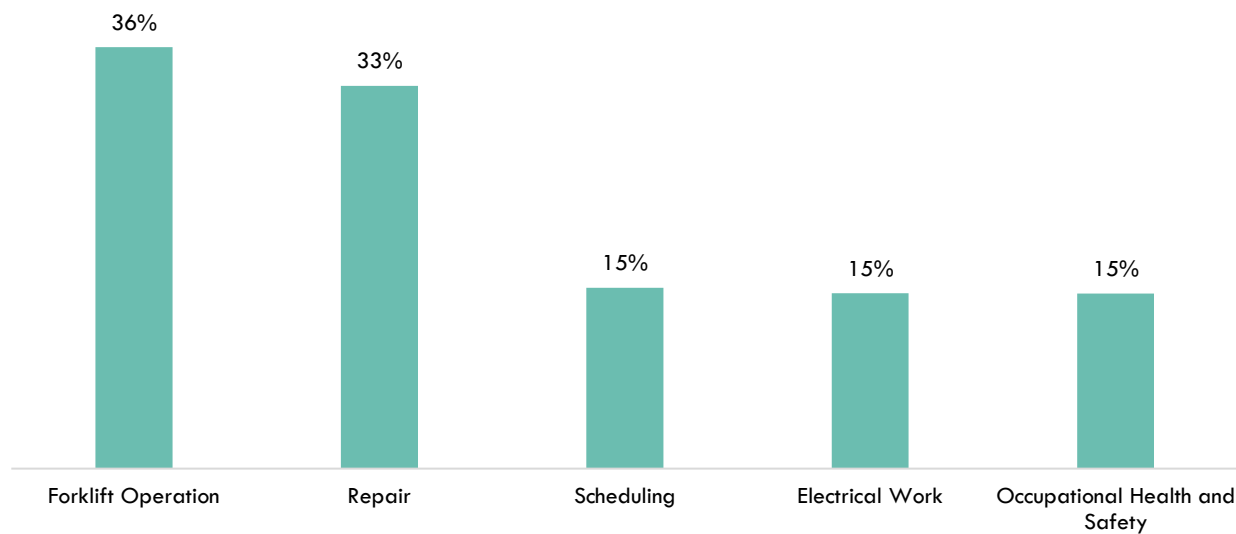


Exhibit 48. Race/ethnicity composition of the energy, construction, and utilities workforce

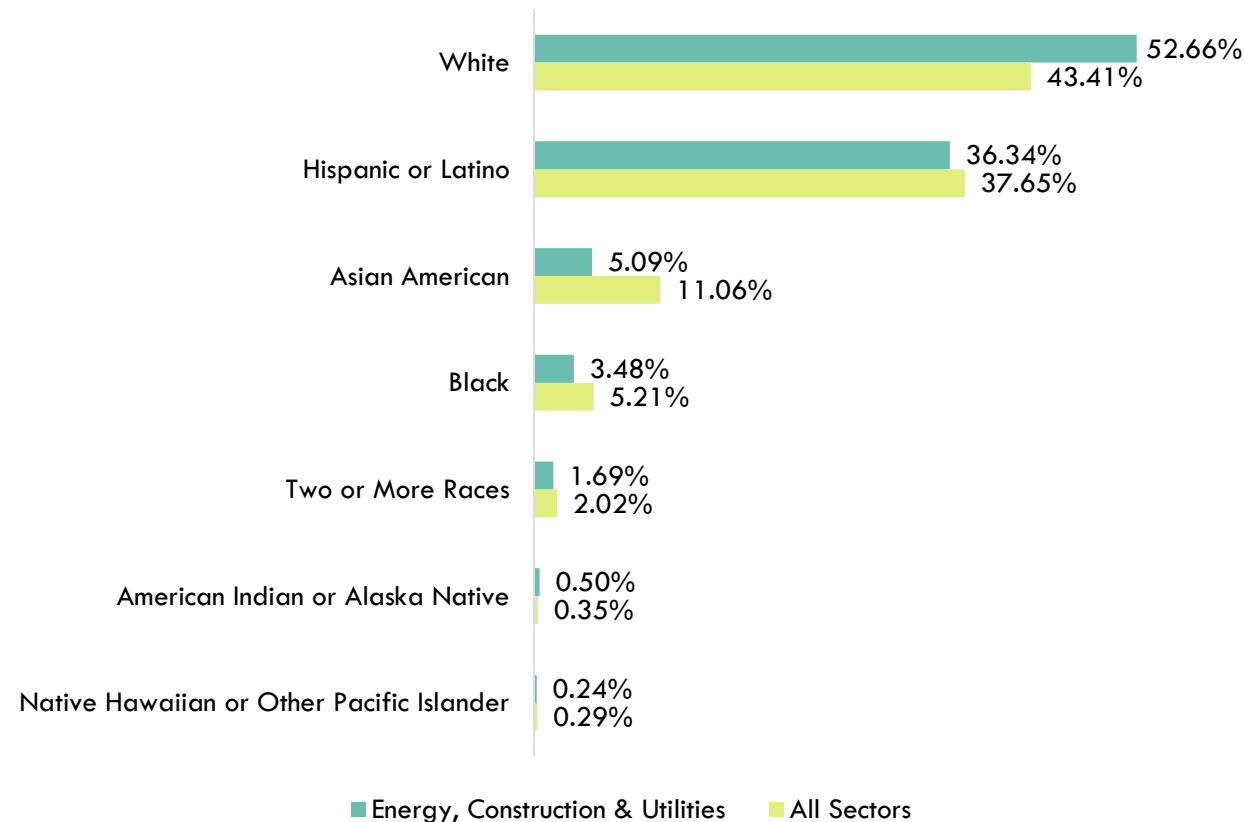


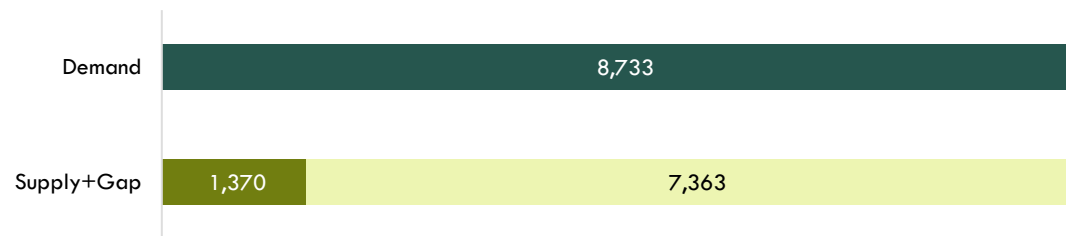
Exhibit 49. Postsecondary supply for the energy, construction, and utilities workforce

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Noncredit	Subtotal
093430 – Telecommunications Technology	Fresno City				23	-	23
093470 – Electron Microscopy	San Joaquin Delta	14			5	-	19
093400 – Electronics and Electric Technology	Bakersfield	14			59	-	73
	Fresno City	15			17	-	32
	Merced	1			2	-	3
	San Joaquin Delta				7	-	7
	Sequoias				2	-	2
093500 – Electro-Mechanical Technology	Bakersfield	11			3	-	14
	San Joaquin Delta	2			2	-	3
092400 – Engineering Technology, General (requires Trigonometry)	Bakersfield	1			0	-	1
	Merced	0			-	-	0
094600 – Environmental Control Technology	Bakersfield	1			3	-	4
	Fresno City	7			47	-	54
	Merced	2			2	-	4
	San Joaquin Delta	1			11	-	12
	Sequoias	2			26	-	28
	West Hills Coalinga				2	-	2
47.0201 – Heating, Air Conditioning, Ventilation and Refrigeration Maintenance Technology/	DeHart Technical School		32	9	-	-	41
	Institute of Technology			105	-	-	105
	San Joaquin Valley College-Visalia	54		157	-	-	211
	Santa Barbara Business College-Bakersfield			19	-	-	19
	UEI College-Bakersfield			33	-	-	33
	UEI College-Fresno			29	-	-	29
	United Education Institute-UEI College Stockton			25	-	-	25
095200 – Construction Crafts Technology	Bakersfield	1			2	-	3
	Fresno City	1			1	-	2
	Sequoias	2			7	-	9
095720 – Construction Inspection	Sequoias	1			3	-	4
52.2001 – Construction Management	San Joaquin Valley College-Visalia	40			-	-	40
095700 – Civil and Construction Management Technology	San Joaquin Delta				0	-	0
095220 – Electrical	Bakersfield	2			22	-	24

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Noncredit	Subtotal
	Merced	4			20	-	25
	Modesto				2	-	2
	San Joaquin Delta	9			16	-	25
	Sequoias				19	-	19
46.0302 – Electrician	Milan Institute- Bakersfield West			33	-	-	33
	San Joaquin Valley College-Visalia	7		64	-	-	72
095230 – Plumbing, Pipefitting and Steamfitting	Bakersfield				7	-	7
095250 – Mill and Cabinet Work	Bakersfield	0			1	-	1
095300 – Drafting Technology	Bakersfield	14			41	-	55
	Fresno City	4			6	-	10
	Merced	0			-	-	0
	San Joaquin Delta	8			6	-	14
095310 – Architectural Drafting	Merced				0	-	0
095340 – Mechanical Drafting	Merced	5			12	-	16
	San Joaquin Delta	4			3	-	7
	Sequoias	0			3	-	3
095500 – Laboratory Science Technology	Fresno City				2	-	2
095600 – Manufacturing and Industrial Technology	Bakersfield	7			1	-	7
	Cerro Coso	1			1	-	2
	Fresno City	2			7	22	31
	Modesto				4	-	4
	Porterville				32	-	32
	Reedley College	1			90	-	91
095640 – Sheet Metal and Structural Metal	Bakersfield				2	-	2
	Modesto				4	-	4
095630 – Machining and Machine Tools	Bakersfield				31	-	31
	Modesto	1			4	-	5
	Reedley College	3			20	-	24
	San Joaquin Delta	1			2	-	3
095670 – Industrial and Occupational Safety and Health	Bakersfield	1			-	-	1
	Taft	3			3	-	6
095800 – Water and Wastewater Technology	Clovis				4	-	4
	Columbia	4			1	-	5
	Sequoias				2	-	2

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Noncredit	Subtotal
TOTAL		253	32	475	588	22	1,370

Exhibit 50: Energy, construction, and utilities workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



HEALTH

Summary

- **Employment and projected demand:** The largest middle-skill occupation is registered nurses which will have 2,074 annual openings.
- **Wages:** The highest paid occupation is dental hygienists, \$41.03/hour entry level.
- **Specialized skills:** The top skill is patient care, followed by advanced cardiac life support.
- **Race/ethnicity:** Analysis shows overrepresentation of Asian American and Black workers and underrepresentation of white, and Hispanic or Latino workers.
- **Postsecondary supply and gap analysis:** A total of 7,832 awards are conferred on average each year, and there is a potential shortage of 14,914 workers.

Exhibit 51: Health employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Registered Nurses	29,360	32,318	2,958	10%	2,074
Social and Human Service Assistants	5,831	6,664	833	14%	832
Licensed Practical and Licensed Vocational Nurses	7,140	7,945	806	11%	680
Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	4,144	4,675	531	13%	415
Pharmacy Technicians	3,912	4,140	228	6%	343
Clinical Laboratory Technologists and Technicians	2,263	2,536	273	12%	190
Psychiatric Technicians	1,862	1,989	127	7%	170
Phlebotomists	990	1,166	176	18%	136
Healthcare Support Workers, All Other	981	1,084	103	10%	130
Respiratory Therapists	1,697	1,926	229	13%	126
Community Health Workers	1,015	1,134	119	12%	126
Radiologic Technologists and Technicians	1,604	1,797	193	12%	120
Dental Hygienists	1,502	1,626	124	8%	119
Surgical Technologists	985	1,114	129	13%	103
Physical Therapist Assistants	607	751	144	24%	99
Health Education Specialists	791	881	90	11%	97
Social Science Research Assistants	714	744	30	4%	90
Medical Equipment Preparers	585	637	51	9%	75
Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers,	779	855	76	10%	56
Diagnostic Medical Sonographers	659	751	93	14%	52
TOTAL	67,421	74,734	7,314	11%	6,034

Exhibit 52: Health entry-level wages

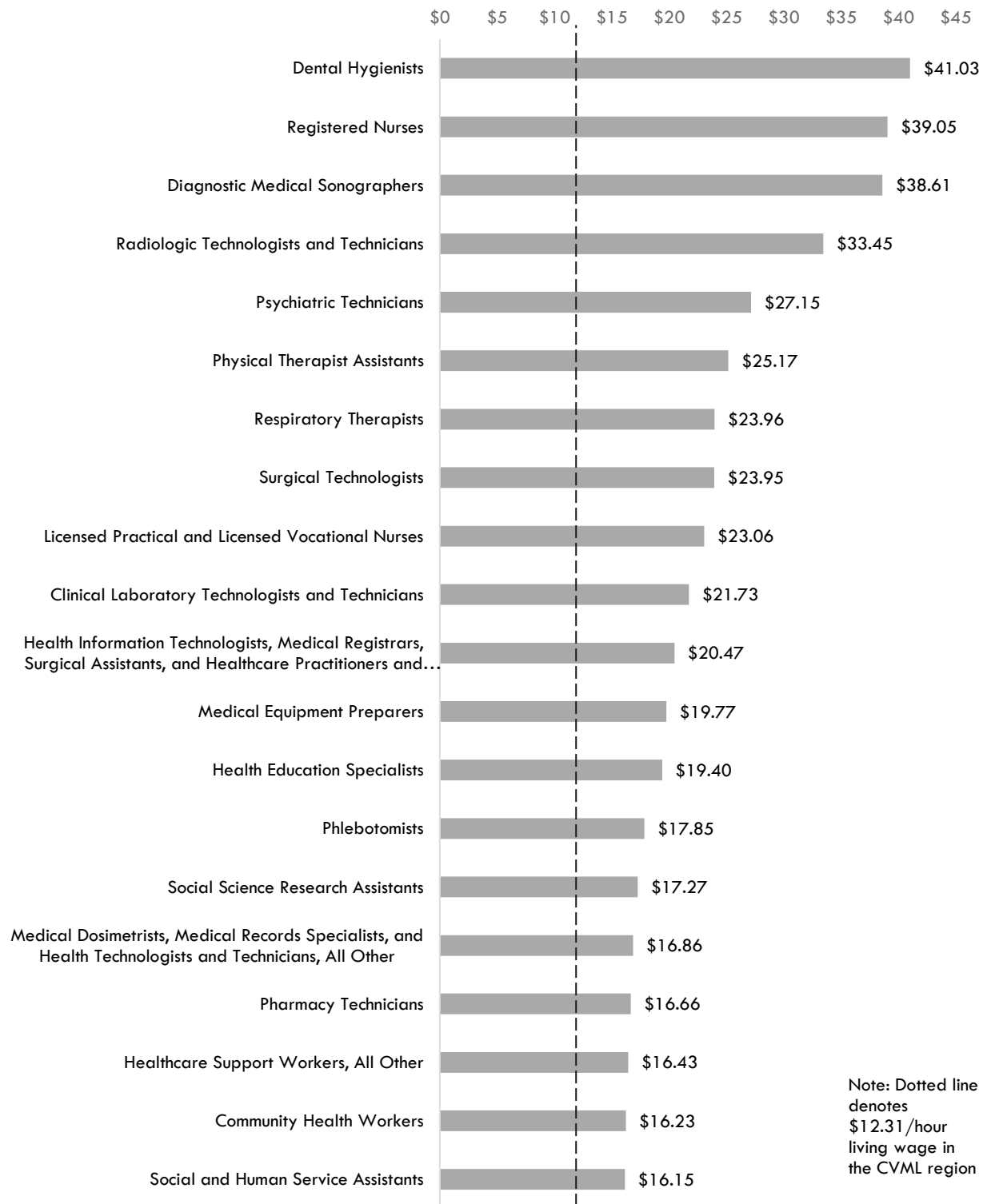


Exhibit 53. Top specialized skills in job postings for health occupations

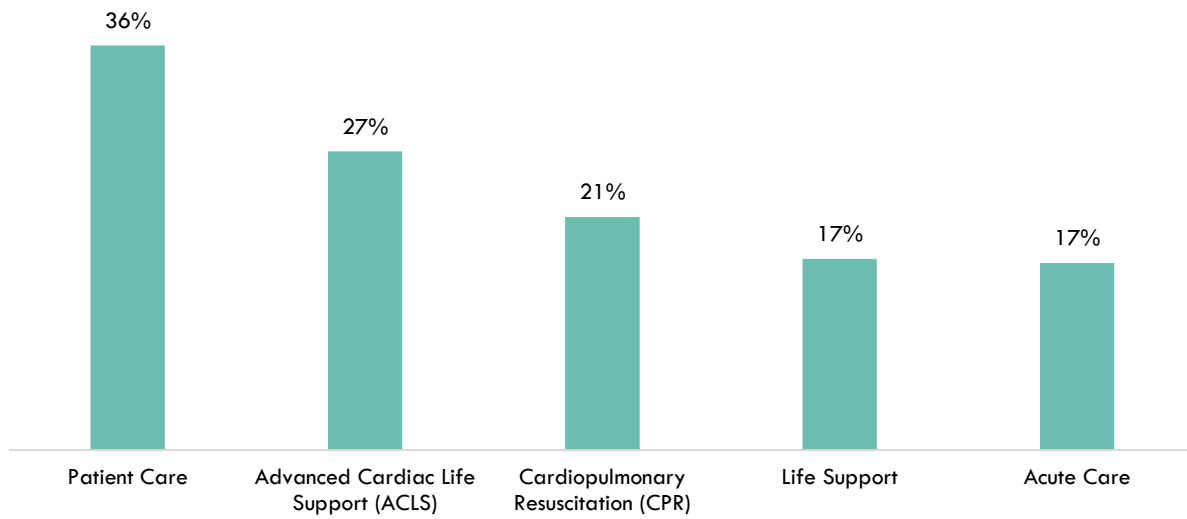


Exhibit 54. Race/ethnicity composition of the health workforce

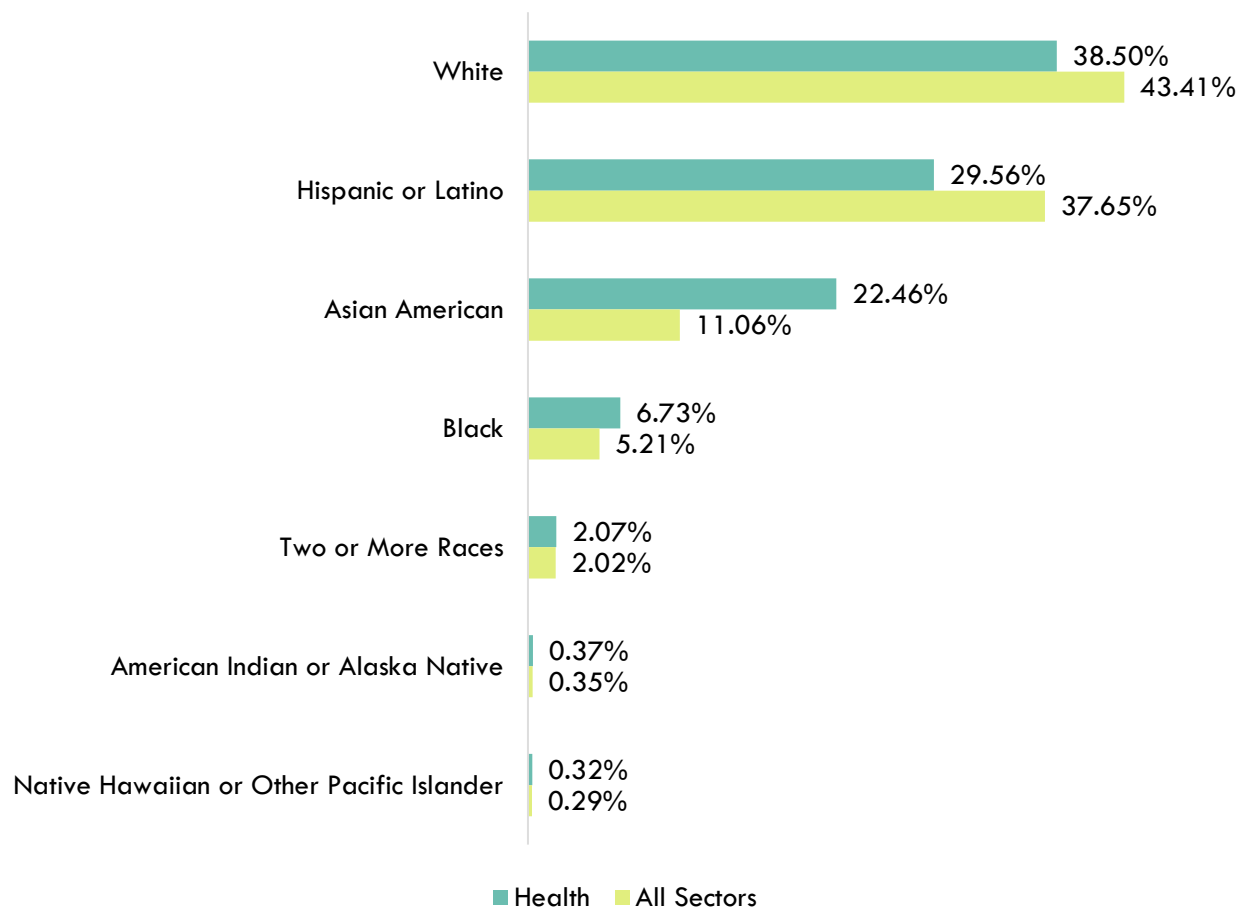


Exhibit 55. Postsecondary supply for the health workforce

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
120100 – Health Occupations, General	Bakersfield		6				-	6
	Columbia	40	2				-	42
	Fresno City		7				1	8
	Modesto		8				-	8
	San Joaquin Delta	74					-	74
	Taft	50					-	50
51.0000 – Health Services/Allied Health/Health Sciences, General	Clovis Adult Education			129			-	129
120800 – Medical Assisting	Cerro Coso	3					-	3
	Modesto	28					55	83
51.0710 – Medical Office Assistant/Specialist	Clovis Adult Education			25			-	25
	San Joaquin Valley College-Visalia	64			152		-	216
	Santa Barbara Business College-Bakersfield				6		-	6
	United Education Institute-UEI College Stockton				34		-	34
120810 – Clinical Medical Assisting	Cerro Coso						9	9
	Fresno City	23					70	93
51.0801 – Medical/Clinical Assistant	Carrington College-Stockton	-			85		-	85
	Clovis Adult Education			26			-	26
	Institute of Technology				140		-	140
	Milan Institute-Bakersfield			11			-	11
	Milan Institute-Fresno			24			-	24
	Milan Institute-Merced			88			-	88
	Milan Institute-Visalia			117			-	117

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
	MTI Business College Inc				14		-	14
	San Joaquin Valley College-Visalia	339			846		-	1,185
	Santa Barbara Business College-Bakersfield	22			7		-	28
	UEI College-Bakersfield				202		-	202
	UEI College-Fresno				199		-	199
	United Education Institute-UEI College Stockton				167		-	167
51.0802 – Clinical/Medical Laboratory Assistant	California Institute of Medical Science			17			-	17
51.0705 – Medical Office Management/Administration	MTI Business College Inc				3		-	3
51.0716 – Medical Administrative/Executive Assistant and Medical Secretary	Carrington College-Stockton				16		-	16
	Milan Institute-Merced			27			-	27
	Milan Institute-Visalia			44			-	44
	MTI Business College Inc				3		-	3
	Stellar Career College			39			-	39
120820 – Administrative Medical Assisting	Cerro Coso						7	7
121000 – Respiratory Care/Therapy	Fresno City	18					-	18
	Modesto	23					-	23
51.0908 – Respiratory Care Therapy/Therapist	San Joaquin Valley College-Visalia	229					-	229
	San Joaquin Delta	16					5	21
043000 – Biotechnology and Biomedical Technology	Merced	0					1	1
120510 – Phlebotomy	Bakersfield						6	6
122100 – Pharmacy Technology	Sequoias						14	14
51.0805 – Pharmacy Technician/Assistant	Carrington College-Stockton	9			24		-	33
	Institute of Technology				13		-	13

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
	San Joaquin Valley College-Visalia	113			83		-	196
	UEI College-Bakersfield				52		-	52
	UEI College-Fresno				59		-	59
122200 – Physical Therapist Assistant	Sequoias	24					-	24
51.0806 – Physical Therapy Technician/Assistant	Institute of Technology	10					-	10
51.3501 – Massage Therapy/Therapeutic Massage	Carrington College-Stockton				11		-	11
	Milan Institute-Bakersfield			21			-	21
	Milan Institute-Fresno			22			-	22
	Milan Institute-Visalia			15			-	15
							-	
122300 – Health Information Technology	Bakersfield	1					-	1
	Fresno City	11					-	11
51.0909 – Surgical Technology/Technologist	San Joaquin Valley College-Visalia	41					-	41
122310 – Health Information Coding	Fresno City						7	7
51.0706 – Health Information/Medical Records Administration/Administrator	Institute of Technology				57		-	57
51.0713 – Medical Insurance Coding Specialist/Coder	San Joaquin Valley College-Visalia	22			47		-	69
	UEI College-Bakersfield				75		-	75
	UEI College-Fresno				56		-	56
51.0714 – Medical Insurance Specialist/Medical Biller	Advanced College-Stockton				1		-	1
	Carrington College-Stockton				10		-	10
		-					-	
	Santa Barbara Business College-Bakersfield	13					-	13
122500 – Radiologic Technology	Bakersfield	21					6	27
	Fresno City	20					-	20
	Merced	16					15	31

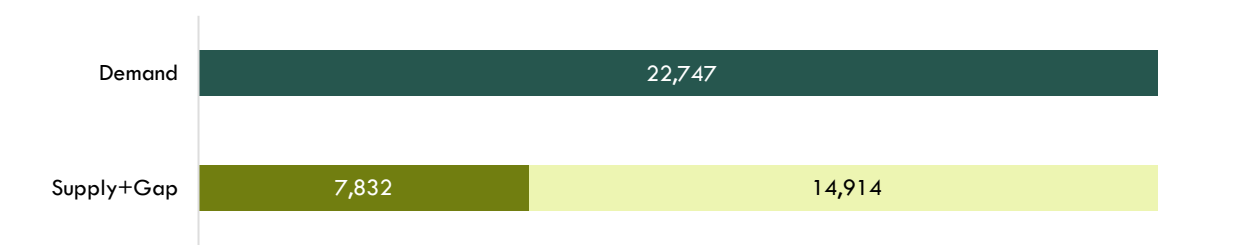
TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
	San Joaquin Delta	1					0	1
122700 – Diagnostic Medical Sonography	Merced						5	5
51.0910 – Diagnostic Medical Sonography/Sonographer and Ultrasound Technician	San Joaquin Valley College-Visalia	17					-	17
122800 – Athletic Training and Sports Medicine	Modesto	9					-	9
	Sequoias	7					-	7
123010 – Registered Nursing	Bakersfield	118					-	118
	Fresno City	197					34	231
	Merced	56					-	56
	Modesto	110					-	110
	Porterville	19					-	19
	Reedley College	11					4	15
	San Joaquin Delta	103					-	103
	Sequoias	85					-	85
	West Hills Lemoore	31					-	31
51.3801 – Registered Nursing/Registered Nurse	San Joaquin Valley College-Visalia	104					-	104
51.3902 – Nursing Assistant/Aide and Patient Care Assistant/Aide	Clovis Adult Education			83			-	83
	Institute of Technology			2			-	2
	Milan Institute-Visalia			40			-	40
123020 – Licensed Vocational Nursing	Bakersfield						20	20
	Cerro Coso	11					16	27
	Merced	21					23	44
	Reedley College	9					17	26

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
51.3901 – Licensed Practical/Vocational Nurse Training	Clovis Adult Education				54		-	54
	San Joaquin Valley College-Visalia	37					-	37
	Santa Barbara Business College-Bakersfield			41			-	41
	Xavier College School of Nursing			64			-	64
				37		122	-	160
51.3999 – Practical Nursing, Vocational Nursing and Nursing Assistants, Other	Institute of Technology							
123030 – Certified Nurse Assistant	Bakersfield						35	35
	Merced						62	62
	Modesto						164	164
	Reedley College						1	1
	Sequoias						70	70
123900 – Psychiatric Technician	Porterville						31	31
	San Joaquin Delta	34					38	72
	West Hills Coalinga	27					53	80
	Reedley College	5					16	21
51.0601 – Dental Assisting/Assistant	Carrington College-Stockton	-			33		-	33
	Milan Institute-Merced			22			-	22
	Milan Institute-Visalia			38			-	38
	San Joaquin Valley College-Visalia				155		-	155
	UEI College-Bakersfield				80		-	80
	UEI College-Fresno				64		-	64
	United Education Institute-UEI College Stockton				55		-	55
	Fresno City	19					-	19
	Taft	18					0	18

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
51.0602 – Dental Hygiene/Hygienist	San Joaquin Valley College-Visalia	65					-	65
125000 – Emergency Medical Services	Bakersfield						129	129
	Cerro Coso						15	15
	Columbia	0					2	3
	Merced						28	28
	Modesto						33	33
	Porterville						63	63
	Sequoias						62	62
125100 – Paramedic	Bakersfield	2					5	7
	Fresno City						1	1
	West Hills Lemoore	3					11	14
130600 – Nutrition, Foods, and Culinary Arts	Bakersfield	4					-	4
	Fresno City	1	3				0	5
	Merced		2				-	2
130620 – Dietetic Services and Management	Bakersfield	1					2	4
	Fresno City						2	2
	Merced						4	4
130630 – Culinary Arts	Bakersfield	17					7	24
	Columbia	6					9	15
	Merced	5					6	11
	Modesto	1					-	1
	San Joaquin Delta	26					26	51
	Sequoias						7	7

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
130900 – Gerontology	Fresno City						4	4
	Modesto						1	1
210400 – Human Services	Bakersfield	31					16	47
	Cerro Coso	11					9	20
	Columbia	2					3	5
	Fresno City	59					62	121
	Merced	8					2	10
	Modesto	17					16	33
	Reedley College						0	0
	San Joaquin Delta						2	2
	Sequoias	12					6	18
	West Hills Lemoore						1	1
210440 – Alcohol and Controlled Substances	Fresno City	16					25	42
	Merced	1					1	2
	Modesto	5					4	9
	Porterville						2	2
	San Joaquin Delta						10	10
51.1009 – Phlebotomy Technician/Phlebotomist	Advanced College-Stockton			3			-	3
	California Institute of Medical Science			6			-	6
TOTAL		2,577	28	797	2,947	122	1,361	7,832

Exhibit 56: Health workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



ICT/DIGITAL MEDIA

Summary

- **Employment and projected demand:** The largest middle-skill occupation is office clerks, general, which will have 3,528 annual openings.
- **Wages:** The highest paid occupation is network and computer systems administrators, \$33.90/hour entry level.
- **Specialized skills:** The top skill is administrative support, followed by scheduling.
- **Race/ethnicity:** Analysis shows overrepresentation of white workers and Asian American workers.
- **Postsecondary supply and gap analysis:** A total of 716 awards are conferred on average each year, and there is a potential shortage of 6,302 workers.

Exhibit 57: ICT/digital media employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Office Clerks, General	30,827	31,435	608	2%	3,528
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	17,733	17,696	(37)	(0%)	1,843
Executive Secretaries and Executive Administrative Assistants	3,174	2,989	(184)	(6%)	318
Computer User Support Specialists	3,154	3,383	230	7%	265
Computer Occupations, All Other	2,670	2,783	113	4%	206
Graphic Designers	1,292	1,313	21	2%	120
Switchboard Operators, Including Answering Service	1,031	919	(112)	(11%)	101
Network and Computer Systems Administrators	1,328	1,415	88	7%	97
Computer Network Support Specialists	880	929	49	6%	71
Web Developers and Digital Interface Designers	763	818	55	7%	64
Procurement Clerks	615	614	(1)	(0%)	56
TOTAL	63,466	64,294	828	1%	6,670

Exhibit 58: ICT/digital media entry-level wages

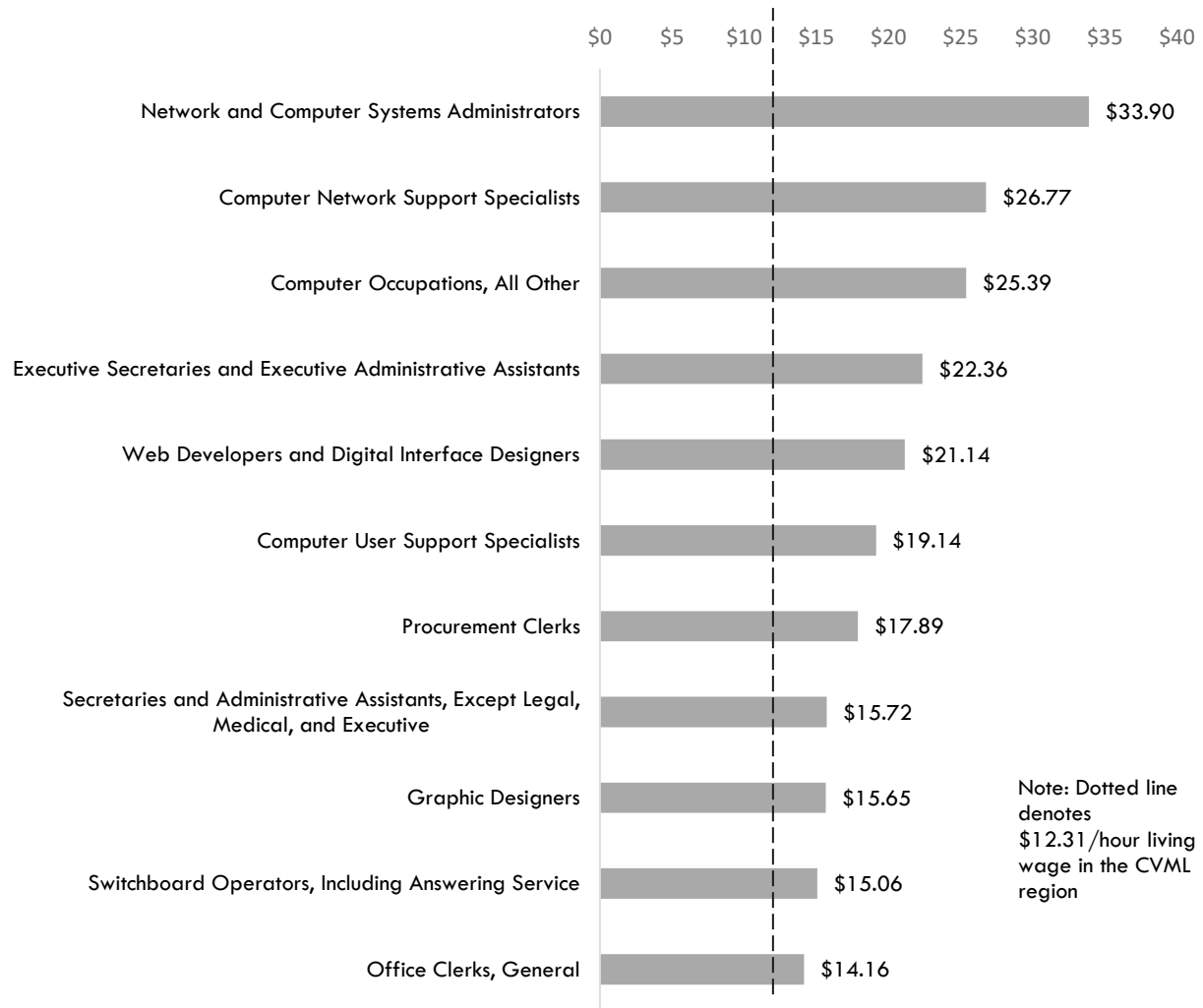


Exhibit 59. Top specialized skills in job postings for ICT/digital media occupations

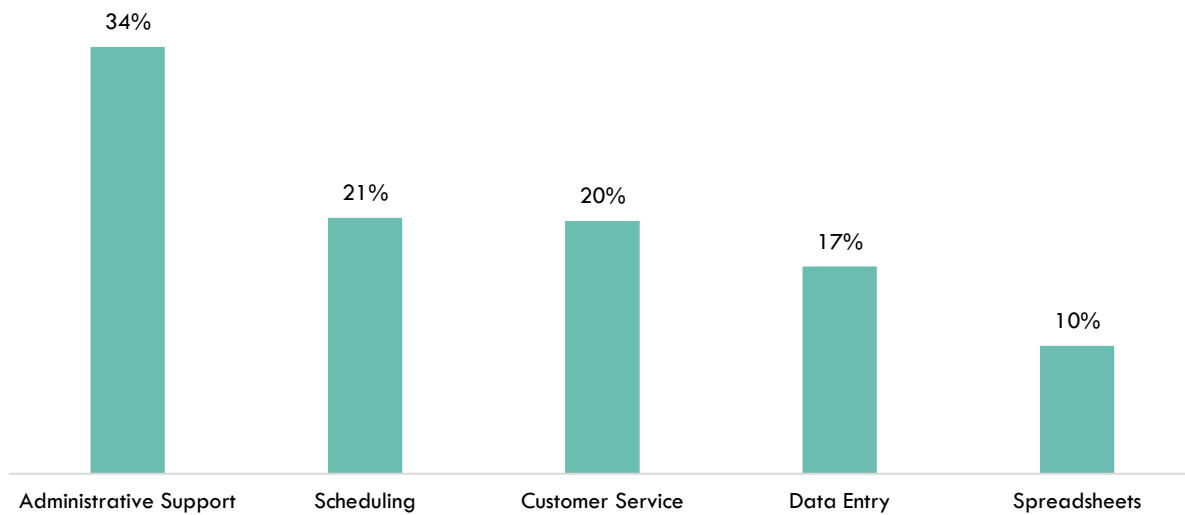


Exhibit 60. Race/ethnicity composition of the ICT/digital media workforce

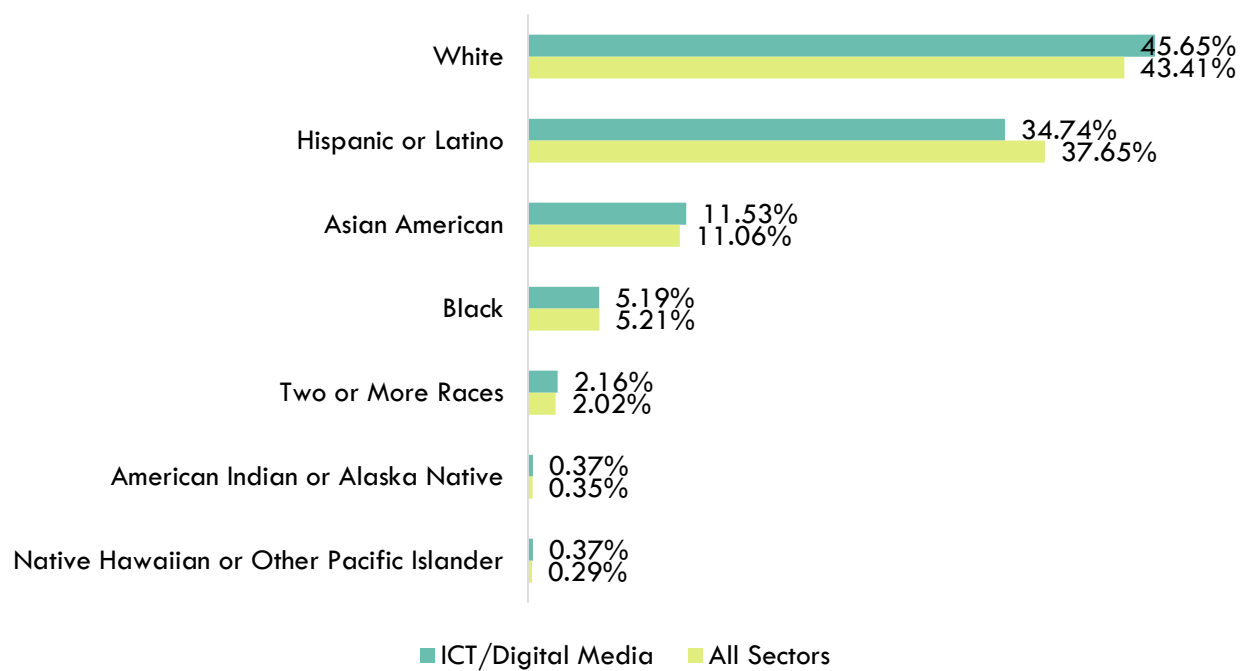


Exhibit 61. Postsecondary supply for the ICT/digital media workforce

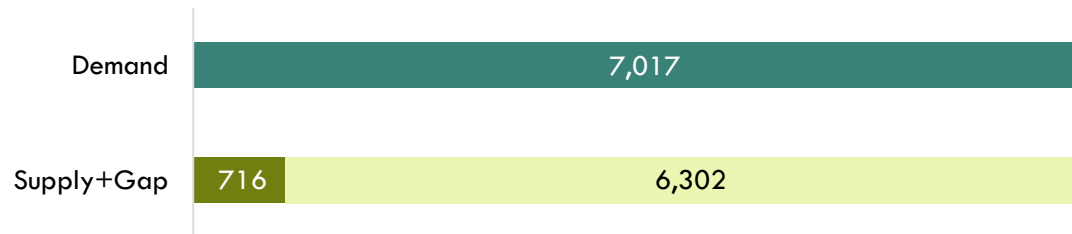
TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
060200 – Journalism	Bakersfield		11	-		11
	Fresno City		16	-		16
	San Joaquin Delta		3	-		3
	Sequoias		4	-		4
060400 – Radio and Television	San Joaquin Delta	10		-		10
060410 – Radio	San Joaquin Delta			1		1
060420 – Television (including combined TV/Film/Video)	San Joaquin Delta			3		3
061400 – Digital Media	Columbia	2		1		2
061410 – Multimedia	Bakersfield			6		6
061430 – Website Design and Development	Bakersfield	1		-		1
	Cerro Coso	3		7		10
	Clovis	1		-		1
	Fresno City			1		1
061460 – Computer Graphics and Digital Imagery	Modesto	22		5		27
103000 – Graphic Art and Design	Bakersfield	4		11		15
	Fresno City	5		5		10
	San Joaquin Delta	13		3		16
	Sequoias	2		12		15
101300 – Commercial Art	Porterville	4		-		4
	Sequoias			1		1
070100 – Information Technology, General	Modesto	2		-		2
	Porterville	2		4		6

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
070200 – Computer Information Systems	Bakersfield	1			-	1
	Cerro Coso	16			40	55
	Clovis				1	1
	Columbia	1			-	1
	Fresno City	7			1	8
	Merced	2			-	2
	Porterville	11			1	12
	Reedley College				32	32
	San Joaquin Delta	15			-	15
	Sequoias	5			2	7
	Taft				2	2
11.0101 – Computer and Information Sciences, General	Milan Institute-Visalia			6	-	6
	Santa Barbara Business College-Bakersfield	5			-	5
11.9999 – Computer and Information Sciences and Support Services, Other	MTI Business College Inc			2	-	2
11.0103 – Information Technology	San Joaquin Valley College-Visalia	12		19	-	31
070210 – Software Applications	Modesto				4	4
	Taft				8	8
	West Hills Coalinga	4			4	8
	West Hills Lemoore	17			15	32
070710 – Computer Programming	Columbia	1			-	1
	Modesto				8	8
	Reedley College	1			4	5
	San Joaquin Delta				1	1

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
	West Hills Lemoore				2	2
070800 – Computer Infrastructure and Support	Bakersfield				5	5
	Fresno City				4	4
	Sequoias				2	2
070810 – Computer Networking	Cerro Coso	9			10	18
	Clovis	2			1	3
	Fresno City	22			22	45
	Modesto				8	8
	Reedley College	4			15	20
	San Joaquin Delta	15			22	37
	Sequoias	1			5	6
	West Hills Lemoore				1	1
11.0901 – Computer Systems Networking and Telecommunications	Institute of Technology			13	-	13
070820 – Computer Support	Clovis	0			0	1
	Reedley College	4			4	8
11.1006 – Computer Support Specialist	San Joaquin Valley College-Visalia	7			-	7
	Santa Barbara Business College-Bakersfield	-			-	-
070900 – World Wide Web Administration	Fresno City	2			1	3
101100 – Photography	Columbia	1			-	1
	Merced	1			-	1
	Modesto	7			-	7
	San Joaquin Delta	4			-	4
101200 – Applied Photography	Bakersfield				6	6

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
	Fresno City	6			25	30
	Merced				1	1
	San Joaquin Delta				2	2
220610 – Geographic Information Systems	Columbia	2			10	12
47.0104 – Computer Installation and Repair Technology/Technician	UEI College-Bakersfield			20	-	20
	UEI College-Fresno			24	-	24
	United Education Institute-UEI College Stockton			12	-	12
TOTAL		255	34	96	330	716

Exhibit 62: ICT/digital media workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



LOGISTICS

Summary

- **Employment and projected demand:** The largest middle-skill occupation is heavy and tractor-trailer truck drivers which will have 4,363 annual openings.
- **Wages:** The highest paid occupation is commercial pilots, \$35.11/hour entry level.
- **Specialized skills:** The top skill is commercial driving, followed by HAZMAT.
- **Race/ethnicity:** Analysis shows overrepresentation of Hispanic or Latino workers and underrepresentation of workers who are white, Asian American, and identify as two or more races.
- **Postsecondary supply and gap analysis:** A total of 604 awards are conferred on average each year, and there is a potential shortage of 6,388 workers.

Exhibit 63: Logistics employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Heavy and Tractor-Trailer Truck Drivers	34,382	37,935	3,553	10%	4,363
Shipping, Receiving, and Inventory Clerks	8,107	8,405	298	4%	808
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	6,411	7,170	759	12%	777
Bus Drivers, Transit and Intercity	2,061	2,303	242	12%	298
Transportation, Storage, and Distribution Managers	1,927	2,125	198	10%	176
Logisticians	1,612	1,706	94	6%	158
Commercial Pilots	433	489	55	13%	55
Cargo and Freight Agents	362	442	80	22%	51
TOTAL	55,295	60,574	5,279	10%	6,685

Exhibit 64: Logistics entry-level wages

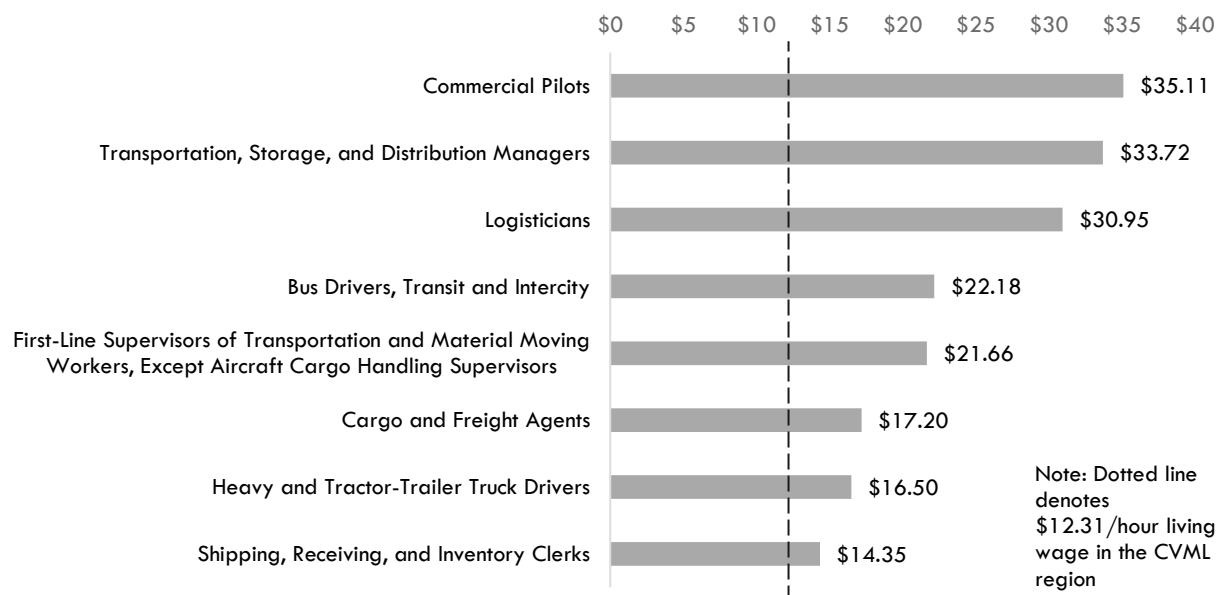


Exhibit 65. Top specialized skills in job postings for logistics occupations

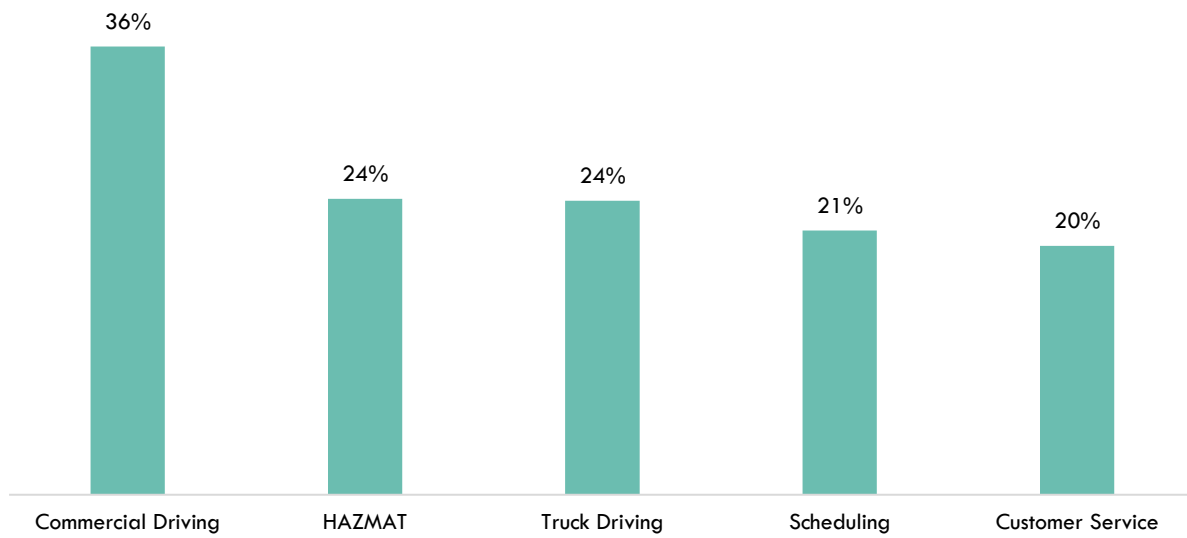


Exhibit 66. Race/ethnicity composition of the logistics workforce

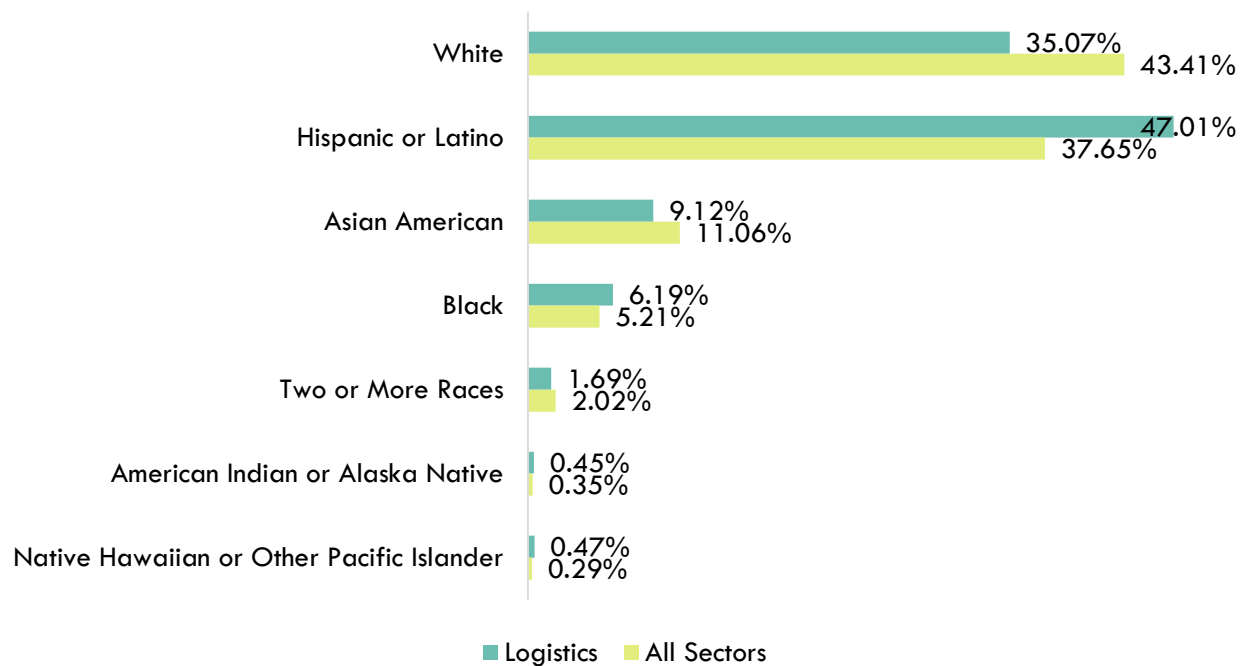
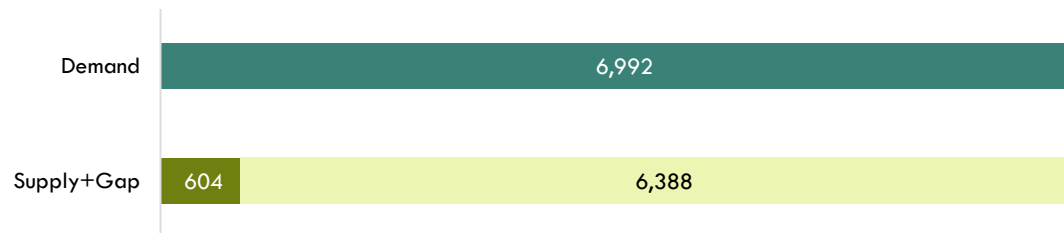


Exhibit 67. Postsecondary supply for the logistics workforce

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Award 2 < 4 Academic Years	Certificates	Subtotal
094700 – Diesel Technology	San Joaquin Delta	2				12	15
094720 – Heavy Equipment Maintenance	San Joaquin Delta	25				18	42
094730 – Heavy Equipment Operation	West Hills Coalinga					4	4
094750 – Truck and Bus Driving	West Hills Coalinga					1	1
49.0205 – Truck and Bus Driver/Commercial Vehicle Operator and Instructor	Advanced Career Institute		489			-	489
095000 – Aeronautical and Aviation Technology	Reedley College	5				10	15
47.0607 – Airframe Mechanics and Aircraft Maintenance Technology/Technician	San Joaquin Valley College-Visalia	33		1	3	-	38
TOTAL		65	489	1	3	45	604

Exhibit 68: Logistics workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region


MECHANICS & WELDING

Summary

- **Employment and projected demand:** The largest middle-skill occupation is maintenance and repair workers, general which will have 1,530 annual openings.
- **Wages:** The highest paid occupation is first-line supervisors of mechanics, installers, and repairers, \$28.28/hour entry level.
- **Specialized skills:** The top skill is repair, followed by welding.
- **Race/ethnicity:** Analysis shows underrepresentation of workers who are Asian American, Black, and identify as two or more races.
- **Postsecondary supply and gap analysis:** A total of 961 awards are conferred on average each year, and there is a potential shortage of 4,534 workers.

Exhibit 69: Mechanics and welding employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Maintenance and Repair Workers, General	15,303	16,182	879	6%	1,530
Automotive Service Technicians and Mechanics	8,164	8,288	123	2%	750
Welders, Cutters, Solderers, and Brazers	4,925	5,051	127	3%	499
Industrial Machinery Mechanics	4,657	5,077	420	9%	473
First-Line Supervisors of Mechanics, Installers, and Repairers	4,600	4,871	271	6%	438
Bus and Truck Mechanics and Diesel Engine Specialists	3,582	3,870	288	8%	364
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	3,497	3,755	258	7%	360
Mobile Heavy Equipment Mechanics, Except Engines	2,270	2,295	25	1%	210
Farm Equipment Mechanics and Service Technicians	1,870	1,891	21	1%	182
Aircraft Mechanics and Service Technicians	1,573	1,766	193	12%	165
Automotive Body and Related Repairers	1,471	1,552	81	5%	143
Control and Valve Installers and Repairers, Except Mechanical Door	669	767	99	15%	73
Maintenance Workers, Machinery	669	707	38	6%	63
TOTAL	53,250	56,073	2,823	5%	5,250

Exhibit 70: Mechanics and welding entry-level wages

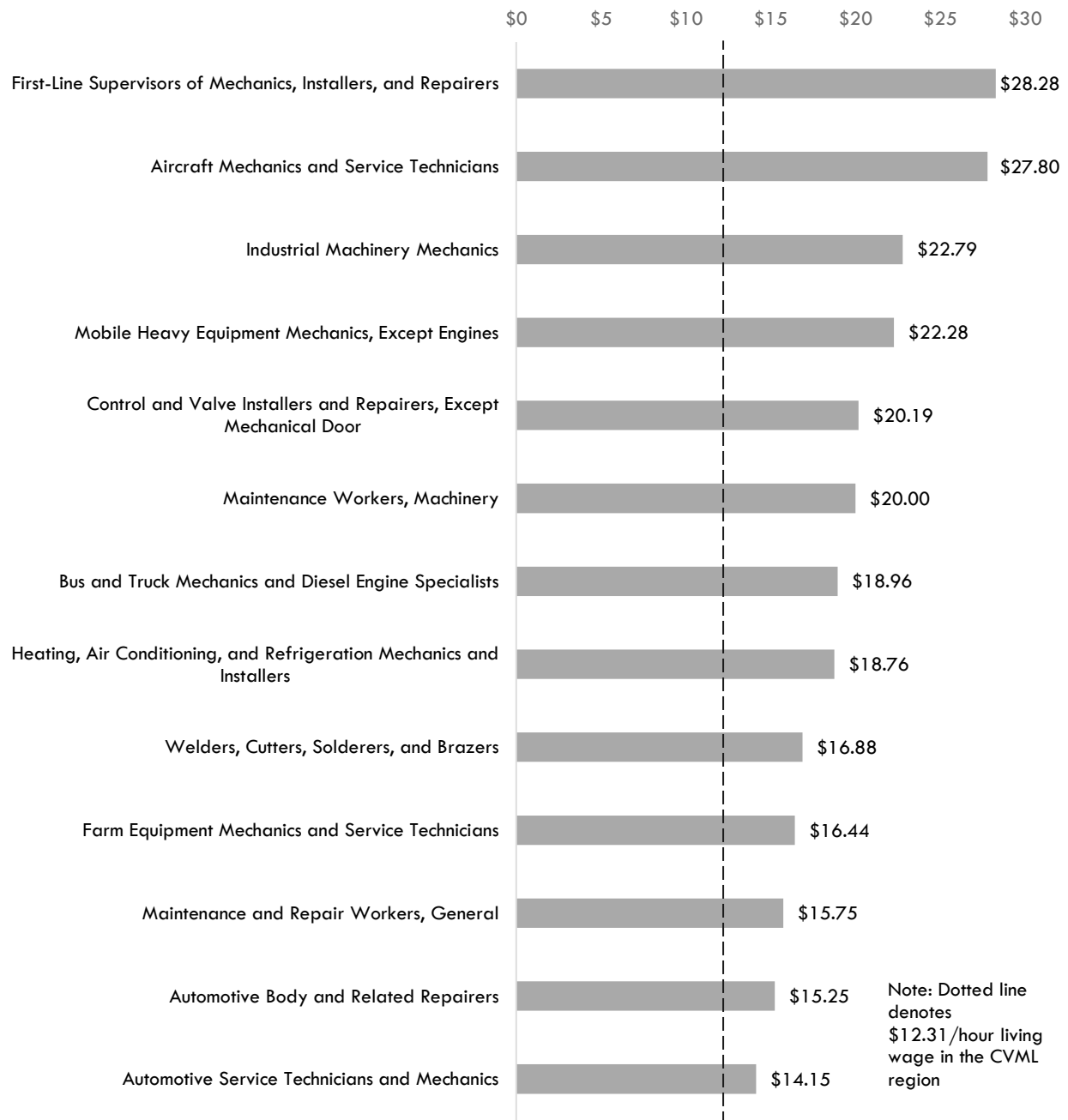


Exhibit 71. Top specialized skills in job postings for mechanics and welding occupations

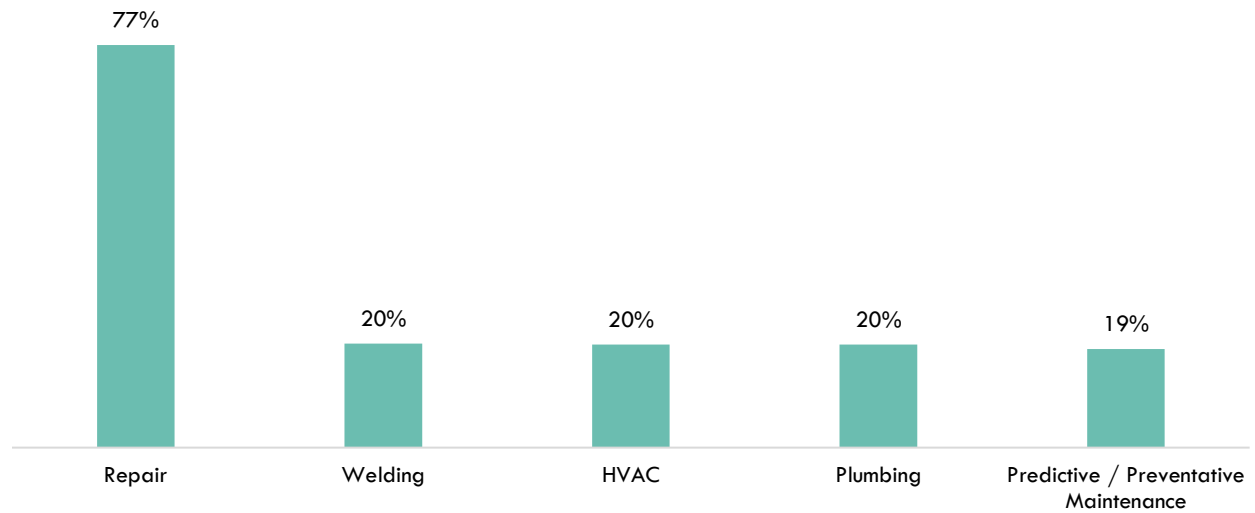


Exhibit 72. Race/ethnicity composition of the mechanics and welding workforce

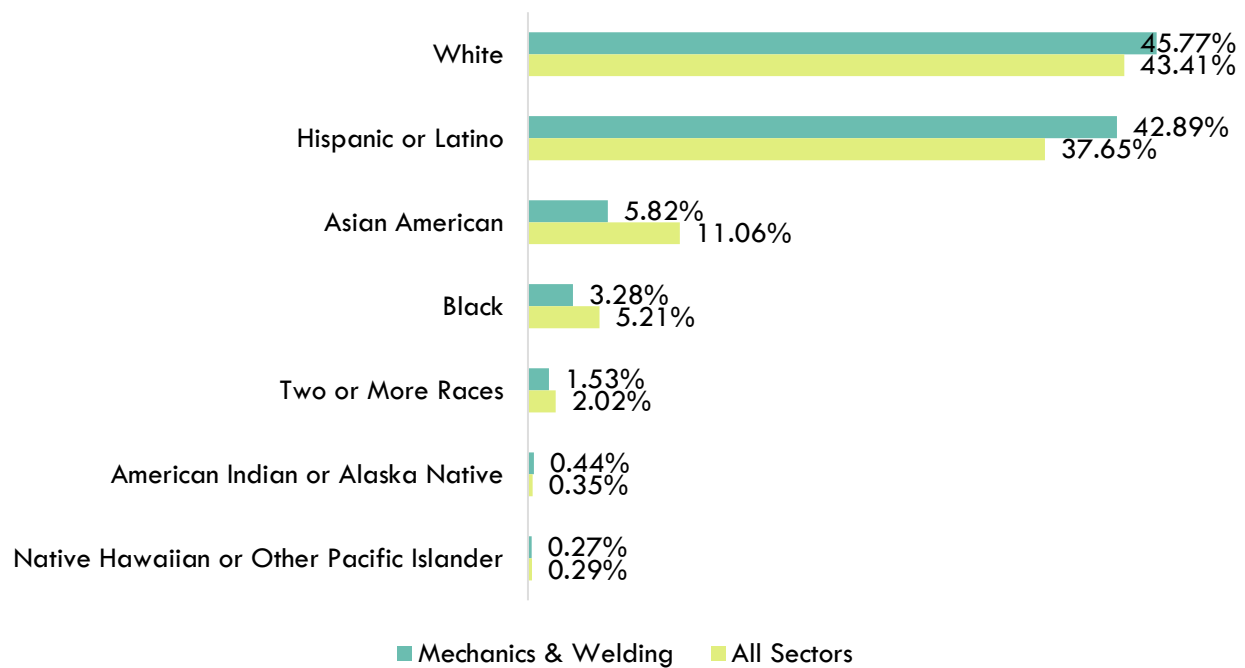
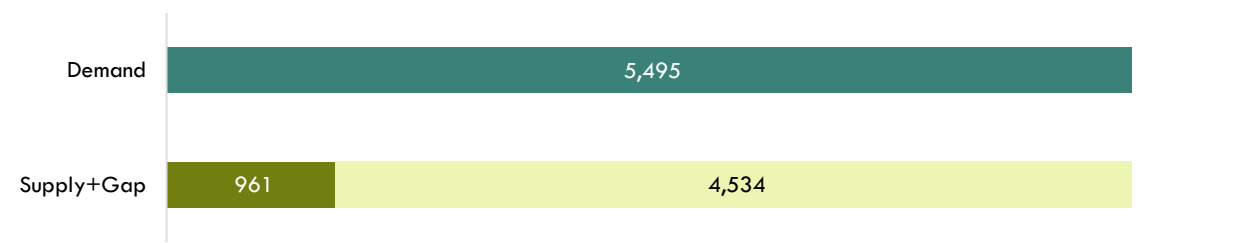


Exhibit 73. Postsecondary supply for the mechanics and welding workforce

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Noncredit	Subtotal
094800 – Automotive Technology	Bakersfield	10			100	-	111
	Columbia	2			20	-	22
	Fresno City	12			1	6	19
	Merced	8			70	-	78
	Modesto	7			20	-	27
	Reedley College	9			43	-	51
	San Joaquin Delta	10			55	-	65
	Sequoias	6			38	-	43
47.0604 – Automobile/Automotive Mechanics Technology/Technician	UEI College-Bakersfield			55	-	-	55
15.0406 – Automation Engineer Technology/Technician	Institute of Technology	10			-	-	10
094900 – Automotive Collision Repair	Fresno City	2			6	12	20
	Merced				1	-	1
	Modesto	3			29	-	33
	San Joaquin Delta				26	-	26
15.0613 – Manufacturing Engineering Technology/Technician	Milan Institute-Bakersfield West	1		-	-	-	1
15.0903 – Petroleum Technology/Technician	Milan Institute-Bakersfield West			6	-	-	6
095650 – Welding Technology	Bakersfield	8			58	-	67
	Cerro Coso	6			27	-	33
	Columbia				1	-	1
	Fresno City	7			22	-	29
	Merced	4			48	-	53
	Modesto	4			11	-	15
	Porterville				10	-	10
	Reedley College	4			27	-	30
	San Joaquin Delta				26	-	26
	Sequoias	8			15	-	23
	Taft	1			6	-	7
	West Hills Coalinga				6	-	6
48.0508 – Welding Technology/Welder	Advanced Career Institute		89		-	-	89
	Institute of Technology			3	-	-	3
TOTAL		123	89	64	666	18	961

Exhibit 74: Mechanics and welding workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



PUBLIC SAFETY

Summary

- **Employment and projected demand:** The largest middle-skill occupation is correctional officers and jailers which will have 1,074 annual openings.
- **Wages:** The highest paid occupation is first-line supervisors of correctional officers, \$42.68/hour entry level.
- **Specialized skills:** The top skill is CPR, followed by public health and safety.
- **Race/ethnicity:** Analysis shows overrepresentation of Black workers and underrepresentation of white, Hispanic or Latino, and Asian American workers.
- **Postsecondary supply and gap analysis:** A total of 1,967 awards are conferred on average each year, and there is a potential shortage of 932 workers.

Exhibit 75: Public safety employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
Correctional Officers and Jailers	12,028	12,115	87	1%	1,074
Police and Sheriffs Patrol Officers	7,142	7,632	489	7%	592
Firefighters	4,023	4,280	257	6%	316
Emergency Medical Technicians and Paramedics	2,685	3,117	432	16%	259
Public Safety Telecommunicators	972	1,061	89	9%	104
First-Line Supervisors of Correctional Officers	1,241	1,278	36	3%	95
Private Detectives and Investigators	852	881	29	3%	78
Miscellaneous First-Line Supervisors, Protective Service Workers	635	663	28	4%	66
Detectives and Criminal Investigators	743	809	66	9%	61
TOTAL	30,321	31,835	1,514	5%	2,645

Exhibit 76: Public safety entry-level wages



Exhibit 77. Top specialized skills in job postings for public safety occupations

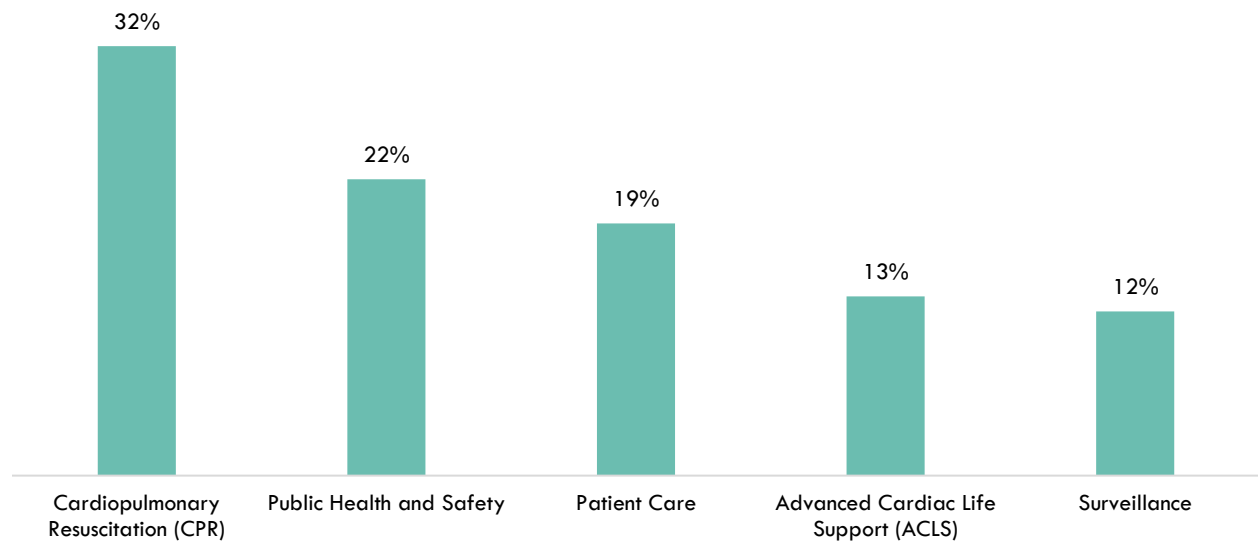


Exhibit 78. Race/ethnicity composition of the public safety workforce

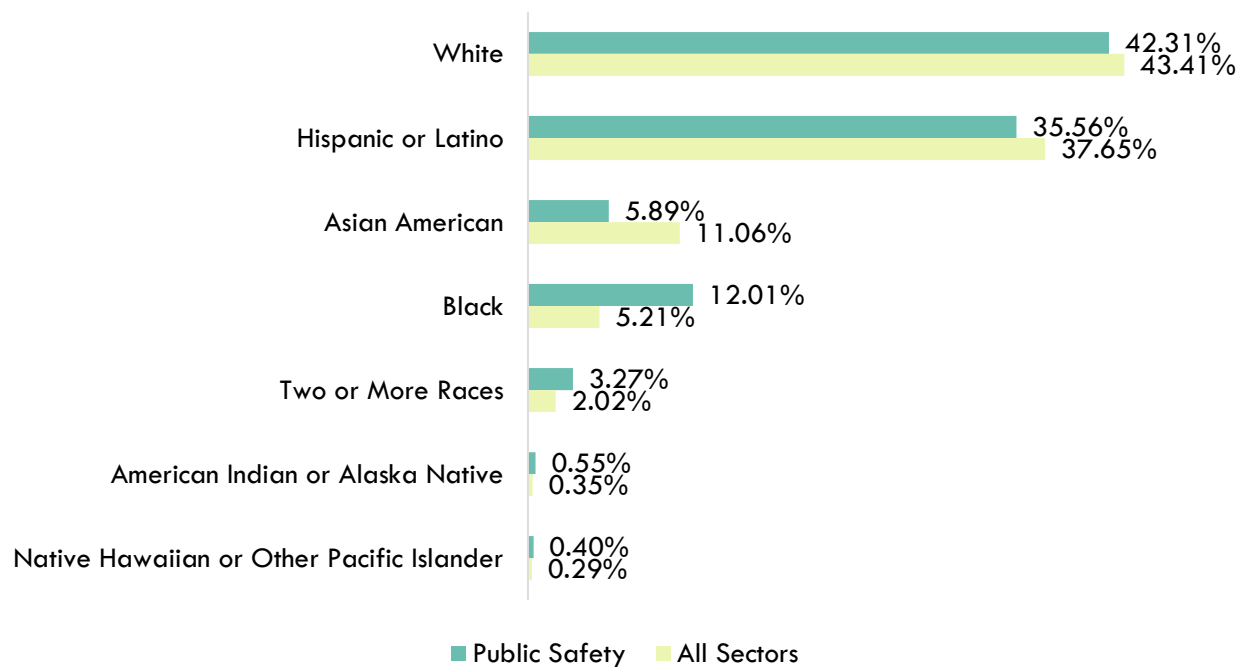


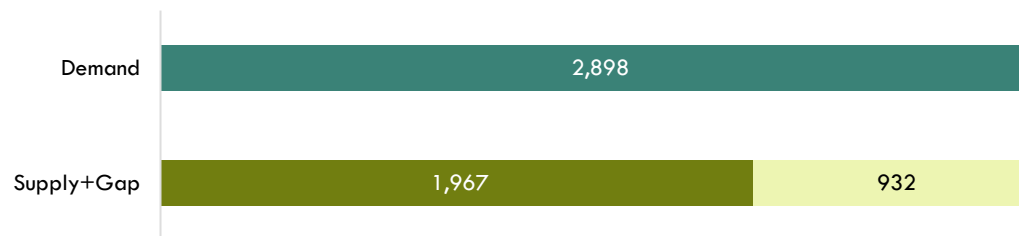
Exhibit 79. Postsecondary supply for the public safety workforce

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
210500 – Administration of Justice	Bakersfield	54	116	-		170
	Cerro Coso		14	-		14
	Clovis	1	34	2		37
	Fresno City	13	133	26		173
	Merced	24	78	3		104
	Modesto	25	75	0		101
	Porterville	1	46	12		58
	Reedley College	6	66	29		101
	San Joaquin Delta	34	59	8		101
	Sequoias	11	86	-		97
	Taft	19	22	-		41
	West Hills Coalinga	2	19	-		21
	West Hills Lemoore	23	43	-		67
	Bakersfield	2		-		2
	Fresno City	3		5		8
210510 – Corrections	Reedley College	5		13		18
	San Joaquin Delta	4		3		7
	Sequoias	3		-		3
	Taft	0		1		1
	West Hills Coalinga	5		-		5
	West Hills Lemoore	10		3		13
	Bakersfield					
	Fresno City					
43.0102 – Corrections	San Joaquin Valley College-Visalia	181		1	-	182

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
43.0103 – Criminal Justice/Law Enforcement Administration	Humphreys University-Stockton and Modesto Campuses	10			-	10
43.0107 – Criminal Justice/Police Science	Institute of Technology	44			-	44
43.0109 – Security and Loss Prevention Services	Carrington College-Stockton	4	12		-	16
	Santa Barbara Business College-Bakersfield	22			-	22
	UEI College-Bakersfield		23		-	23
	UEI College-Fresno		63		-	63
210540 – Forensics, Evidence, and Investigation	Fresno City	2			3	5
210550 – Police Academy	Fresno City				28	28
210550 – Police Academy	San Joaquin Delta	7			72	79
	Sequoias				96	96
130200 – Interior Design and Merchandising	San Joaquin Delta	6			0	6
213300 – Fire Technology	Bakersfield	25			8	32
	Columbia	15			30	44
	Fresno City	9			1	10
	Merced	7			2	9
	Modesto	18			8	26
	Porterville				4	4
	Sequoias	8			1	9
	Bakersfield	3			0	3
	Porterville				18	18
213350 – Fire Academy	Fresno City				24	24
	Modesto				17	17
	Sequoias				42	42

TOP/CIP Code – Title	College	Associate Degree	Associate for Transfer Degree	Award 1 < 2 Academic Years	Certificates	Subtotal
219900 – Other Public and Protective Services	Porterville	10			-	10
TOTAL		617	792	99	459	1,967

Exhibit 80: Public safety workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



RETAIL, HOSPITALITY & TOURISM

Summary

- **Employment and projected demand:** The largest middle-skill occupation is first-line supervisors of retail sales workers which will have 1,500 annual openings.
- **Wages:** The highest paid occupation is food service managers, \$15.96/hour entry level.
- **Specialized skills:** The top skill is retail industry knowledge, followed by scheduling.
- **Race/ethnicity:** Analysis shows overrepresentation of Hispanic or Latino, and Asian American workers and underrepresentation of white and Black workers.
- **Postsecondary supply and gap analysis:** A total of 6,508 awards are conferred on average each year, and there is a potential shortage of 1,547 workers.

Exhibit 81: Retail, hospitality, and tourism employment and occupational projections

OCCUPATION	2020 JOBS	2025 JOBS	5-YEAR CHANGE	5-YEAR % CHANGE	ANNUAL OPENINGS
First-Line Supervisors of Retail Sales Workers	14,182	14,526	344	2%	1,500
Cooks, Restaurant	8,781	9,734	953	11%	1,372
First-Line Supervisors of Food Preparation and Serving Workers	7,641	8,437	796	10%	1,258
Hairdressers, Hairstylists, and Cosmetologists	6,206	6,268	62	1%	730
Cooks, Institution and Cafeteria	2,624	2,892	268	10%	409
Self-Enrichment Teachers	3,242	3,413	171	5%	385
Food Service Managers	3,366	3,502	136	4%	373
Exercise Trainers and Group Fitness Instructors	2,056	2,033	(23)	(1%)	339
Manicurists and Pedicurists	2,382	2,340	(42)	(2%)	268
First-Line Supervisors of Housekeeping and Janitorial Workers	1,786	2,005	219	12%	239
Chefs and Head Cooks	1,485	1,557	72	5%	188
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	1,601	1,698	97	6%	177
Musicians and Singers	1,266	1,285	20	2%	144
Barbers	826	939	113	14%	108
Photographers	899	870	(29)	(3%)	84
Skincare Specialists	506	555	49	10%	64
TOTAL	58,849	62,055	3,206	5%	7,637

Exhibit 82: Retail, hospitality, and tourism entry-level wages

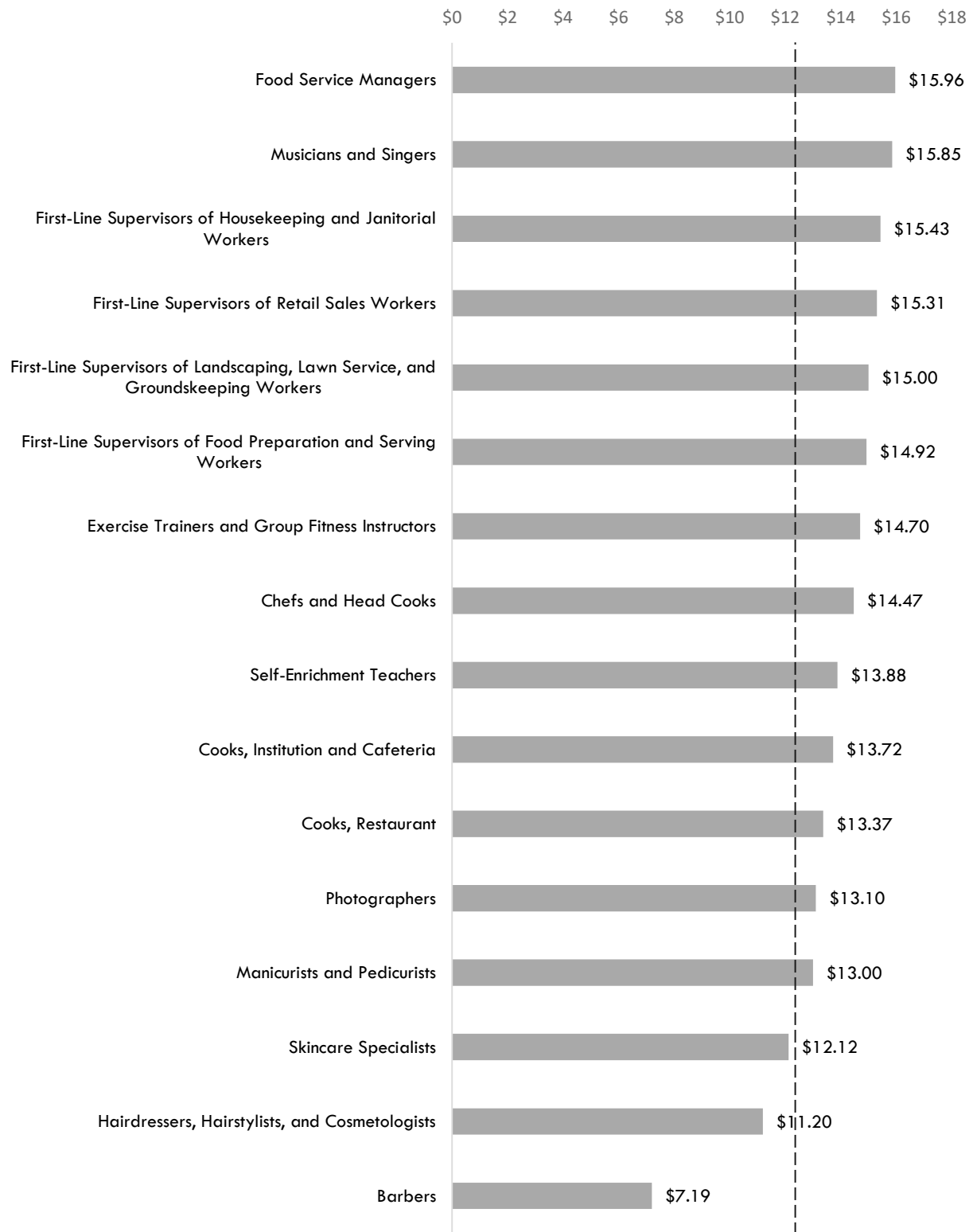


Exhibit 83. Top specialized skills in job postings for retail, hospitality, and tourism occupations

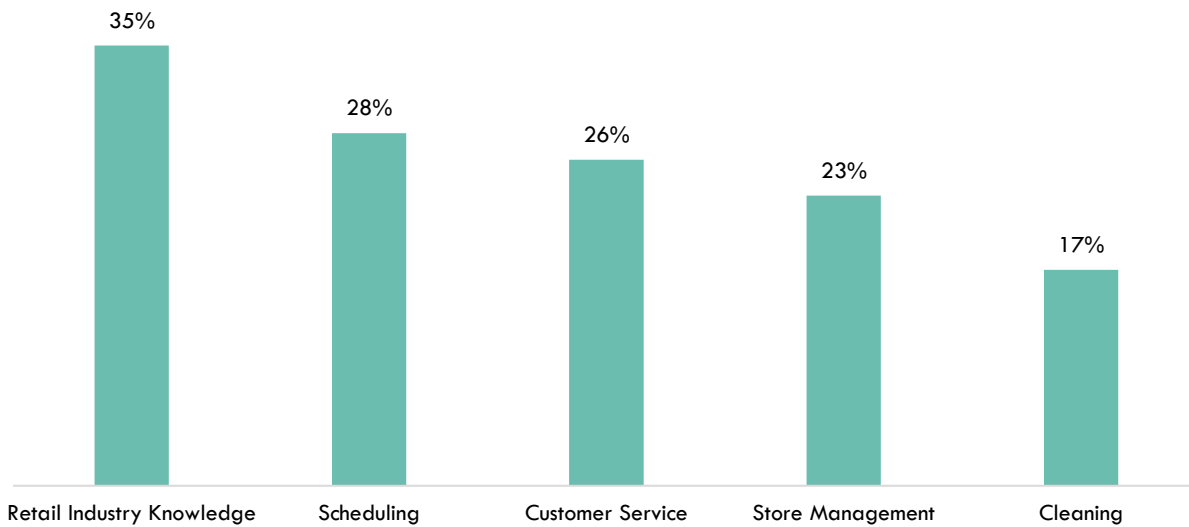


Exhibit 84. Race/ethnicity composition of the retail, hospitality, and tourism workforce

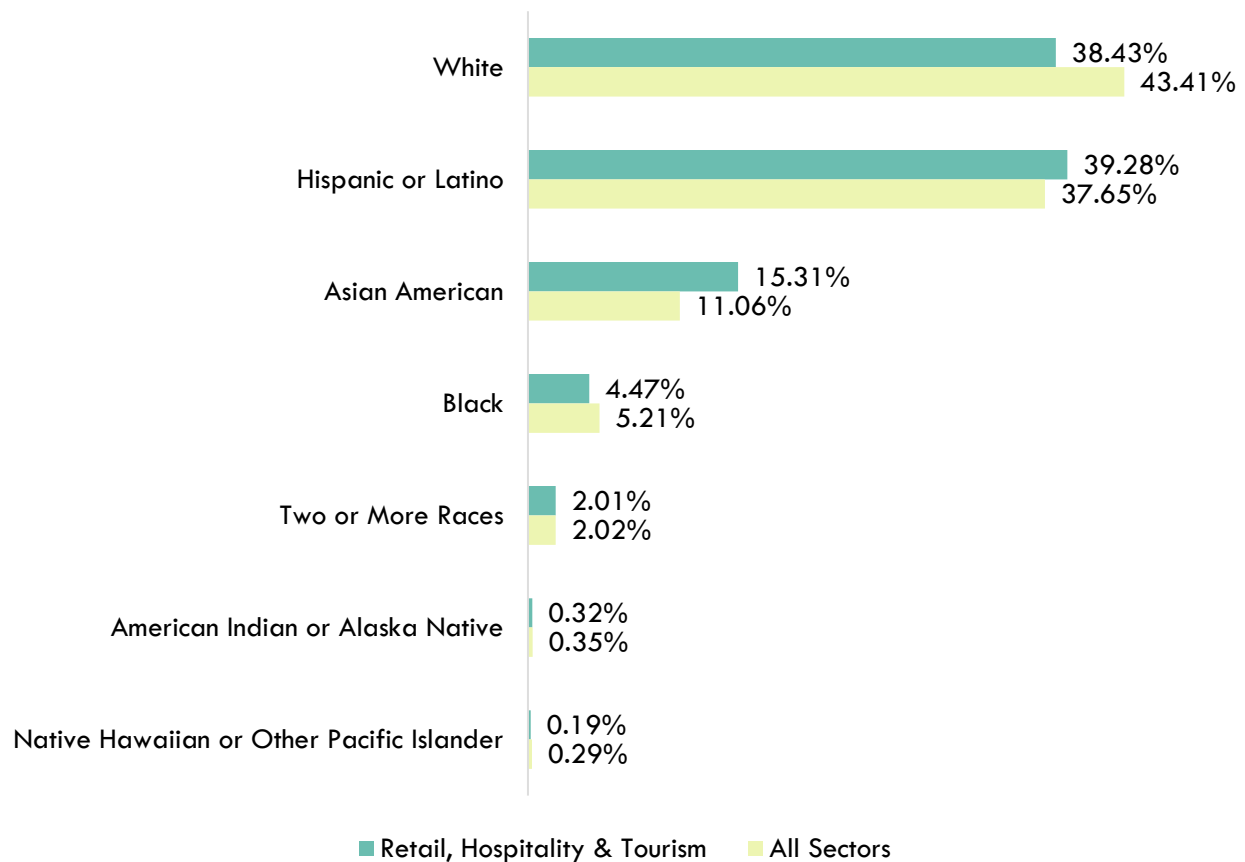


Exhibit 85. Postsecondary supply for the retail, hospitality, and tourism workforce

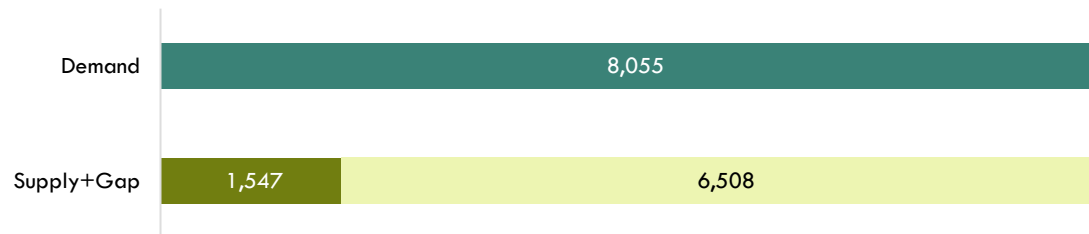
TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Subtotal
130700 – Hospitality	Columbia				1	1
130710 – Restaurant and Food Services and Management	Columbia	2			19	20
	Fresno City	2			2	4
	West Hills Lemoore				34	34
130720 – Lodging Management	Columbia	1			3	1
	West Hills Lemoore				2	2
	West Hills Lemoore	3			-	3
100500 – Commercial Music	Bakersfield				10	10
	Fresno City	2			6	8
	Modesto				5	5
	Sequoias				4	4
	Fresno City	2			-	2
100600 – Technical Theater	Modesto				1	1
	San Joaquin Delta	2			1	3
12.0401 – Cosmetology/Cosmetologist, General	Adrian's College of Beauty Turlock			45	-	45
	California Beauty School			20	-	20
	California College of Barbering and Cosmetology			9	-	9
	Estes Institute of Cosmetology Arts and Science			26	-	26
	Lawrence & Company College of Cosmetology			43	-	43
	Lyle's College of Beauty			19	-	19
	Lyle's College of Beauty			20	-	20
	Milan Institute-Bakersfield			97	-	97

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Subtotal
	Milan Institute-Fresno			56	-	56
	Milan Institute-Merced			27	-	27
	North Adrian's College of Beauty Inc			52	-	52
	Paul Mitchell the School-Fresno			122	-	122
	Paul Mitchell the School-Modesto			96	-	96
	Princess Institute of Beauty			7	-	7
	Sierra College of Beauty			31	-	31
12.0402 – Barbering/Barber	California College of Barbering and Cosmetology			12	-	12
	Lawrence & Company College of Cosmetology			1	-	1
	Milan Institute-Bakersfield			4	-	4
	Milan Institute-Fresno			23	-	23
	Milan Institute-Merced			7	-	7
	North Adrian's College of Beauty Inc	8	6	-	-	14
	Paul Mitchell the School-Fresno		6	-	-	6
	Paul Mitchell the School-Modesto		29	-	-	29
	Sierra College of Beauty		11	-	-	11
300700 – Cosmetology and Barbering	Sequoias				1	1
12.0409 – Aesthetician/Esthetician and Skin Care Specialist	Adrian's College of Beauty Turlock	5		-	-	5
	California Beauty School	25		-	-	25
	California College of Barbering and Cosmetology	16		-	-	16
	Lawrence & Company College of Cosmetology	7		-	-	7
	Lyle's College of Beauty	8		-	-	8
	Milan Institute-Bakersfield	53		-	-	53

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Subtotal
	Milan Institute-Fresno	98			-	98
	North Adrian's College of Beauty Inc	17			-	17
	Paul Mitchell the School-Modesto	59			-	59
	Princess Institute of Beauty	1			-	1
	Sierra College of Beauty	9			-	9
12.0410 – Nail Technician/Specialist and Manicurist	Adrian's College of Beauty Turlock	10			-	10
	California Beauty School	11			-	11
	California College of Barbering and Cosmetology	13			-	13
	Estes Institute of Cosmetology Arts and Science	18			-	18
	Lawrence & Company College of Cosmetology	6			-	6
	Lyle's College of Beauty	14			-	14
	Lyle's College of Beauty	25			-	25
	Paul Mitchell the School-Modesto	21			-	21
	Princess Institute of Beauty	1			-	1
	Sierra College of Beauty	4			-	4
12.0413 – Cosmetology, Barber/Styling, and Nail Instructor	California College of Barbering and Cosmetology	2			-	2
12.0501 – Baking and Pastry Arts/Baker/Pastry Chef	Institute of Technology			43	-	43
12.0503 – Culinary Arts/Chef Training	Institute of Technology	49	13	9	-	71
12.9999 – Personal and Culinary Services, Other	Institute of Technology			28	-	28
130310 – Fashion Design	San Joaquin Delta	5			2	7
	Sequoias	5			2	7
130320 – Fashion Merchandising	Fresno City	3			2	5
	San Joaquin Delta	2			1	3

TOP/CIP Code – Title	College	Associate Degree	Award < 1 Academic Year	Award 1 < 2 Academic Years	Certificates	Subtotal
	Sequoias	4			2	5
TOTAL		81	444	849	97	1,547

Exhibit 86: Retail, hospitality, and tourism workforce demand (annual job openings), postsecondary supply of students (awards), and additional students needed to fill the gap in the region



CONCLUSION & RECOMMENDATIONS

In the CVML region, the 11 sectors detailed in this study are projected to offer nearly 99,880 annual openings each year for middle-skill occupations, those requiring more education and training than a high school diploma, but less than a bachelor's degree. By comparison, postsecondary institutions in the region are conferring 22,264 awards on average each year, an increase from the previous year's analysis which shows a total of 21,780 awards on average each year. A comparison between workforce demand and the number of awards being earned in the region shows a potential undersupply of 77,616 workers in the region.⁴ Exhibit 87 shows how the health sector, the business and entrepreneurship sector, and the energy, construction, and utilities sector have the greatest workforce demand in terms of annual job openings.

Exhibit 87: Comparison between workforce demand (annual job openings) and postsecondary supply of students (awards) for each sector showing gaps in the number of workers to fill openings

Sector	Demand (Annual Openings)	Supply (Average Annual Awards)	Gap
Health	22,747	7,833	14,914
Business & Entrepreneurship	18,688	3,415	15,273
Energy, Construction & Utilities	8,733	1,370	7,363
Education	8,327	2,341	5,986
Retail, Hospitality & Tourism	8,055	1,547	6,508
Agriculture, Water & Environmental Technologies	7,092	1,180	5,912
ICT/Digital Media	7,017	716	6,302
Logistics	6,992	604	6,388
Mechanics & Welding	5,495	961	4,534
Advanced Manufacturing	3,837	332	3,504
Public Safety	2,898	1,967	932
TOTAL	99,880	22,264	77,616

The three sectors with the greatest number of annual openings also have the largest potential gaps in workforce supply in the region:

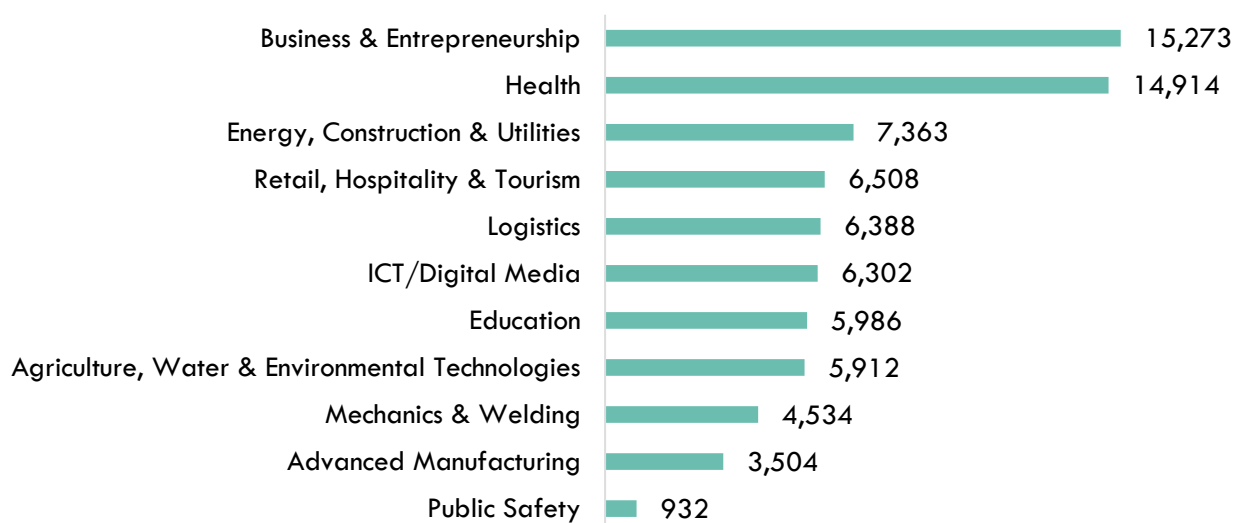
- Business and entrepreneurship, a shortage of 15,273 workers
- Health, a shortage of 14,914 workers
- Energy, construction, and utilities, a shortage of 7,363 workers

⁴ While the retail, hospitality, and tourism sector appears to be another area of need, it is important to keep in mind that many occupations in this sector have been hard hit by the economic fallout from Covid-19. The job projection algorithms used by Emsi are not able to adequately take into account the impact of Covid-19. Given that this sector has been decimated by substantial job losses in recent months, it is important to consider that some economists speculate a portion of these job losses will be permanent.

Several sectors with programs that have a low number of awards also have proportionally large undersupplies: advanced manufacturing (332 average awards and an undersupply of 3,502 workers, translating to 10 times as much demand as supply); logistics (604 awards and an undersupply of 6,388, 10 times as much demand as supply); and ICT/digital media (716 awards and an undersupply of 6,302, 9 times as much demand as supply). While these potential workforce shortages are smaller in terms of overall number than the business and entrepreneurship sector and the health sector, these sectors still play a critical role in fueling the regional economy and intersect with other fields of work of regional importance, such as business and agriculture.

On average each year, the greatest number of awards are being conferred by programs in the health sector (7,833 awards), business and entrepreneurship sector (3,415 awards), and education sector (2,341 awards). The fewest awards are being conferred in advanced manufacturing (332 awards) and logistics (604 awards). Based on this comparison, the community colleges may want to consider expanded program offerings in areas in which supply is comparatively low: advanced manufacturing, logistics, ICT/digital media, and mechanics and welding.

Exhibit 88: Sectors with the largest gaps between workforce demand (annual job openings) and postsecondary supply of students (awards)



Regionally, the business sector leads all other sectors in terms of number of anticipated job openings, accounting for nearly 19% of projected workforce demand in the region. The business sector contains several occupations that are projected to have the most annual openings across all sectors in the region. Business occupations expected to be in high demand are:

- General and operations managers, 1,559 annual openings
- Project management specialists and business operations specialists, all other, 1,386 annual openings
- First-line supervisors of office and administrative support workers, 1,297 annual openings

The health sector also appears to have a substantial undersupply of workers. Health occupations expected to be in high demand are:

- Registered nurses, 2,074 annual openings
- Social and human service assistants, 832 annual openings
- Licensed practical and licensed vocational nurses, 680 annual openings

One sector that particularly warrants attention due to its substantial supply gap is energy, construction, and utilities. This sector is expected to offer 8,733 annual openings, but postsecondary institutions in the region confer only 1,370 awards on average each year. Energy, construction, and utilities occupations projected to be in high demand are:

- Electricians, 916 annual openings
- First-line supervisors of construction trades and extraction workers, 610 annual openings
- Plumbers, pipefitters, and steamfitters, 498 annual openings

Future planning efforts by community colleges should take into consideration the 15 occupations with the most annual openings in the region across all sectors. Some sectors contain more than one of these occupations due to strong projected growth projections or large employment size for these occupations. These occupations are highlighted to bring attention to the fact that there are certain sectors with more job opportunities than others. To demonstrate this, each occupation with the most annual openings is listed along with the sector in which it occurs. For example, the education sector contains three of these occupations, as does the business and entrepreneurship sector and the retail, hospitality, and tourism sector.

1. **Logistics:** Heavy and tractor-trailer truck drivers, 4,363 annual openings
2. **ICT/Digital Media:** Office clerks, general, 3,528 annual openings
3. **Education:** Teaching assistants, except postsecondary, 2,555 annual openings
4. **Agriculture, Water & Environmental Technologies:** Farmers, ranchers, and other agricultural managers, 2,188 annual openings
5. **Health Care:** Registered nurses, 2,074 annual openings
6. **Education:** Childcare workers, 1,956 annual openings
7. **ICT/Digital Media:** Secretaries and administrative assistants, except legal, medical, and executive, 1,843 annual openings
8. **Education:** Substitute teachers, short-term, 1,610 annual openings
9. **Business & Entrepreneurship:** General and operations managers, 1,559 annual openings
10. **Mechanics & Welding:** Maintenance and repair workers, general, 1,530 annual openings
11. **Retail, Hospitality & Tourism:** First-line supervisors of retail sales workers, 1,500 annual openings
12. **Business & Entrepreneurship:** Project management specialists and business operations specialists, all other, 1,386 annual openings
13. **Retail, Hospitality & Tourism:** Cooks, restaurant, 1,372 annual openings
14. **Business & Entrepreneurship:** First-line supervisors of office and administrative support workers, 1,297 annual openings
15. **Retail, Hospitality & Tourism:** First-line supervisors of food preparation and serving workers, 1,258 annual openings

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Finally, in previous years, the CVML Center of Excellence has highlighted supervisory positions as a training area of need in the region. There appears to be continued strong projected demand for many types of supervisory positions. Many of these positions typically pay higher wages and can help improve students' standards of living.

Supervisory positions with the highest entry-level wages are in the mechanics and welding sector; energy, construction, and utilities sector; advanced manufacturing sector, and global trade sector. Occupations to note include:

- First-line supervisors of construction trades and extraction workers, with an entry-level wage above \$25/hour and more than 600 annual openings
- First-line supervisors of transportation and material moving workers, except aircraft cargo handling supervisors with an entry-level wage above \$21/hour and nearly 780 annual openings
- First-line supervisors of mechanics, installers, and repairers with an entry-level wage above \$28/hour and nearly 440 annual openings

APPENDIX A: METHODOLOGY & DATA SOURCES

Data Sources

Labor market and educational supply data compiled in this report derive from a variety of sources. Data were drawn from external sources, including the Economic Modeling Specialists, Inc., the California Community Colleges Chancellor's Office Management Information Systems Data Mart and the National Center for Educational Statistics (NCES) Integrated Postsecondary Education Data System (IPEDS). Below is the summary of the data sources found in this study.

Data Type	Source
Labor Market Information/Population Estimates and Projections/Educational Attainment	Economic Modeling Specialists, Intl. (EMSI). EMSI occupational employment data are based on final EMSI industry data and final EMSI staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates also affected by county-level EMSI earnings by industry: economicmodeling.com .
Typical Education Level and On-the-job Training	Bureau of Labor Statistics (BLS) uses a system to assign categories for entry-level education and typical on-the-job training to each occupation for which BLS publishes projections data: www.bls.gov/emp/ep_education_tech.htm .
Labor Force, Employment and Unemployment Estimates	California Employment Development Department, Labor Market Information Division, labormarketinfo.edd.ca.gov
Job Posting and Skills Data	Burning Glass, http://www.burning-glass.com/
Additional Education Requirements/Employer Preferences	The O*NET Job Zone database includes over 900 occupations as well as information on skills, abilities, knowledges, work activities and interests associated with specific occupations: www.onetonline.org

Key Terms and Concepts

Annual Job Openings: Annual openings are calculated by dividing the number of years in the projection period by total job openings.

Education Attainment Level: The highest education attainment level of workers age 25 years or older.

Employment Estimate: The total number of workers currently employed.

Employment Projections: Projections of employment are calculated by a proprietary Economic Modeling Specialists, Intl. (EMSI) formula that includes historical employment and economic indicators along with national, state and local trends.

Living Wage: The cost of living in a specific community or subregion for one adult and no children. The cost increases with the addition of children.

Occupation: An occupation is a grouping of job titles that have a similar set of activities or tasks that employees perform.

Percent Change: Rate of growth or decline in the occupation for the projected period; this does not factor in replacement openings.

Race and Ethnicity: The federal government tracks several racial categories (White, Black or African American, Asian, etc.) but only two ethnic categories, Hispanic and Non-Hispanic. There may be some overlap between race and ethnicity unless the two characteristics are clearly separated, e.g., “White non-Hispanic,” “White Hispanic,” and “Non-white Hispanic.”

Replacements: Estimate of job openings resulting from workers retiring or otherwise permanently leaving an occupation. Workers entering an occupation often need training. These replacement needs, added to job openings due to growth, may be used to assess the minimum number of workers who will need to be trained for an occupation.

Total Job Openings (New + Replacements): Sum of projected growth (new jobs) and replacement needs. When an occupation is expected to lose jobs or retain the current employment level, number of openings will equal replacements.

Typical Education Requirement: represents the typical education level most workers need to enter an occupation.

Typical On-The-Job Training: indicates the typical on-the-job training needed to attain competency in the skills needed in the occupation.

Wages Family Compositions: The living wage calculator estimates the living wage needed to support families. For single adult families, the adult is assumed to be employed full time. For two adult families where both adults are in the labor force, both adults are assumed to be employed full time. For two adult families where one adult is not in the labor force, one of the adults is assumed to be employed full time while the other non-wage-earning adult provides full-time childcare for the family’s children. Full-time work is assumed to be year-round, 40 hours per week for 52 weeks, per adult. Families with one child are assumed to have a ‘young child’ (4 years old). Families with two children are assumed to have a ‘young child’ and a ‘child’ (9 years old). Families with three children are assumed to have a ‘young child,’ a ‘child,’ and a ‘teenager’ (15 years old).

APPENDIX B: WAGES FOR ALL OCCUPATIONS IN ALL INDUSTRIES

Exhibit B1: Advanced manufacturing wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Industrial Production Managers	\$36.86	\$46.79	\$97,320.92
First-Line Supervisors of Production and Operating Workers	\$23.04	\$30.51	\$63,466.98
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	\$27.35	\$35.42	\$73,681.44
Stationary Engineers and Boiler Operators	\$28.88	\$36.66	\$76,259.78
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	\$18.11	\$22.56	\$46,927.43
Computer Numerically Controlled Tool Operators	\$16.65	\$21.18	\$44,059.24
Machinists	\$15.90	\$20.83	\$43,322.29
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	\$15.27	\$19.51	\$40,578.27
Printing Press Operators	\$15.47	\$20.27	\$42,165.05
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	\$15.42	\$18.56	\$38,611.31
Cutting and Slicing Machine Setters, Operators, and Tenders	\$15.18	\$18.46	\$38,393.38
Mixing and Blending Machine Setters, Operators, and Tenders	\$15.02	\$17.54	\$36,479.87
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	\$15.06	\$18.82	\$39,150.86
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	\$14.66	\$17.43	\$36,255.48
Inspectors, Testers, Sorters, Samplers, and Weighers	\$14.52	\$17.81	\$37,051.96
Packaging and Filling Machine Operators and Tenders	\$13.80	\$15.59	\$32,434.19
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	\$13.64	\$15.90	\$33,080.98

Exhibit B2: Agriculture, water, and environmental technologies wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	\$21.82	\$31.12	\$64,720.88
Compliance Officers	\$26.68	\$34.40	\$71,545.26
Cost Estimators	\$24.78	\$34.08	\$70,880.91
Buyers and Purchasing Agents	\$21.97	\$29.32	\$60,978.48
Farmers, Ranchers, and Other Agricultural Managers	\$17.75	\$30.94	\$64,361.77
Agricultural Inspectors	\$17.20	\$21.47	\$44,662.41
First-Line Supervisors of Farming, Fishing, and Forestry Workers	\$16.64	\$20.19	\$41,998.35
Life, Physical, and Social Science Technicians, All Other	\$19.62	\$28.13	\$58,503.89
Environmental Science and Protection Technicians, Including Health	\$17.32	\$21.13	\$43,948.06
Pest Control Workers	\$15.47	\$18.87	\$39,244.88
Agricultural and Food Science Technicians	\$16.36	\$19.72	\$41,027.80
Biological Technicians	\$15.99	\$18.64	\$38,778.49
Veterinary Technologists and Technicians	\$15.79	\$18.16	\$37,770.70

2021 LABOR MARKET OVERVIEW: CENTRAL VALLEY/MOTHER LODGE REGION

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Forest and Conservation Technicians	\$15.20	\$17.43	\$36,263.78
Pesticide Handlers, Sprayers, and Applicators, Vegetation	\$14.28	\$17.26	\$35,890.76
Agricultural Equipment Operators	\$13.85	\$15.24	\$31,693.95
Forest and Conservation Workers	\$13.42	\$16.50	\$34,320.05
Veterinary Assistants and Laboratory Animal Caretakers	\$13.13	\$14.69	\$30,565.18
Animal Trainers	\$12.01	\$14.68	\$30,543.98

Exhibit B3: Business and entrepreneurship wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
General and Operations Managers	\$32.62	\$45.32	\$94,274.63
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	\$32.07	\$43.23	\$89,923.18
Training and Development Specialists	\$24.58	\$29.89	\$62,170.73
Human Resources Specialists	\$23.03	\$29.71	\$61,798.46
Real Estate Brokers	\$23.62	\$39.58	\$82,323.77
First-Line Supervisors of Office and Administrative Support Workers	\$21.84	\$27.59	\$57,389.86
Project Management Specialists and Business Operations Specialists, All Other	\$21.59	\$32.02	\$66,598.98
Claims Adjusters, Examiners, and Investigators	\$21.87	\$31.87	\$66,280.70
Eligibility Interviewers, Government Programs	\$19.87	\$24.14	\$50,201.89
Loan Officers	\$20.64	\$29.09	\$60,505.75
Paralegals and Legal Assistants	\$19.14	\$24.16	\$50,248.69
Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	\$18.88	\$35.39	\$73,605.78
Court, Municipal, and License Clerks	\$18.96	\$21.76	\$45,264.33
Payroll and Timekeeping Clerks	\$18.64	\$23.62	\$49,137.82
Production, Planning, and Expediting Clerks	\$17.40	\$21.51	\$44,743.18
Insurance Claims and Policy Processing Clerks	\$17.43	\$20.62	\$42,895.26
Fundraisers	\$17.92	\$25.21	\$52,442.20
First-Line Supervisors of Non-Retail Sales Workers	\$17.25	\$27.82	\$57,872.38
Legal Secretaries and Administrative Assistants	\$17.58	\$23.36	\$48,598.87
Loan Interviewers and Clerks	\$17.03	\$20.67	\$42,997.07
Interviewers, Except Eligibility and Loan	\$16.97	\$20.24	\$42,093.11
Tax Examiners and Collectors, and Revenue Agents	\$16.98	\$22.02	\$45,795.20
Insurance Sales Agents	\$16.75	\$23.39	\$48,647.23
Advertising Sales Agents	\$16.81	\$25.75	\$53,563.72
Human Resources Assistants, Except Payroll and Timekeeping	\$16.68	\$20.04	\$41,681.30
Bookkeeping, Accounting, and Auditing Clerks	\$16.23	\$20.65	\$42,951.75
Information and Record Clerks, All Other	\$16.55	\$20.16	\$41,922.66
Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel	\$16.29	\$23.34	\$48,538.14
Property, Real Estate, and Community Association Managers	\$16.28	\$26.07	\$54,226.39
Real Estate Sales Agents	\$16.20	\$26.77	\$55,686.14
Billing and Posting Clerks	\$15.94	\$18.57	\$38,623.51

2021 LABOR MARKET OVERVIEW: CENTRAL VALLEY/MOTHER LODGE REGION

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Bill and Account Collectors	\$15.66	\$18.62	\$38,737.10
Order Clerks	\$15.21	\$18.74	\$38,984.50
Meeting, Convention, and Event Planners	\$15.79	\$22.68	\$47,176.23
Data Entry Keyers	\$14.59	\$16.29	\$33,883.35
First-Line Supervisors of Personal Service and Entertainment and Recreation Workers, Except Gambling Services	\$14.41	\$18.08	\$37,610.75
Reservation and Transportation Ticket Agents and Travel Clerks	\$14.41	\$17.50	\$36,403.36
Customer Service Representatives	\$14.27	\$16.54	\$34,413.41
Tellers	\$14.21	\$16.14	\$33,562.38
Sales and Related Workers, All Other	\$14.12	\$16.07	\$33,418.99
Receptionists and Information Clerks	\$13.52	\$15.11	\$31,431.44
Tax Preparers	\$13.70	\$19.39	\$40,332.91

Exhibit B4: Education wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Interpreters and Translators	\$19.12	\$24.66	\$51,299.64
Library Technicians	\$18.18	\$21.70	\$45,139.98
Education and Childcare Administrators, Preschool and Daycare	\$17.91	\$24.92	\$51,835.12
Substitute Teachers, Short-Term	\$15.96	\$17.90	\$37,236.72
Teaching Assistants, Postsecondary	\$14.55	\$16.55	\$34,415.08
Directors, Religious Activities and Education	\$14.61	\$19.06	\$39,647.92
Teaching Assistants, Except Postsecondary	\$13.97	\$16.30	\$33,897.37
Preschool Teachers, Except Special Education	\$14.13	\$16.49	\$34,299.49
Library Assistants, Clerical	\$13.56	\$16.29	\$33,890.02
Recreation Workers	\$13.29	\$14.35	\$29,848.67
Childcare Workers	\$12.21	\$13.31	\$27,691.77

Exhibit B5: Energy, construction, and utilities wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Telecommunications Line Installers and Repairers	\$38.28	\$44.80	\$93,189.14
Administrative Services and Facilities Managers	\$34.15	\$44.02	\$91,560.20
Power Plant Operators	\$37.96	\$49.08	\$102,080.58
Occupational Health and Safety Specialists	\$31.43	\$39.17	\$81,483.88
Electrical and Electronic Engineering Technologists and Technicians	\$30.29	\$39.44	\$82,030.29
Electrical Power-Line Installers and Repairers	\$30.78	\$44.27	\$92,079.31
Telecommunications Equipment Installers and Repairers, Except Line Installers	\$27.17	\$31.06	\$64,595.54
Construction and Building Inspectors	\$27.42	\$36.87	\$76,684.97
Civil Engineering Technologists and Technicians	\$26.73	\$33.11	\$68,867.01
First-Line Supervisors of Construction Trades and Extraction Workers	\$25.79	\$34.92	\$72,639.80
Operating Engineers and Other Construction Equipment Operators	\$23.41	\$29.13	\$60,597.82
Water and Wastewater Treatment Plant and System Operators	\$23.46	\$29.36	\$61,071.68

2021 LABOR MARKET OVERVIEW: CENTRAL VALLEY/MOTHER LODE REGION

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Stonemasons	\$21.11	\$28.36	\$58,990.71
Electricians	\$20.95	\$29.19	\$60,717.26
Architectural and Civil Drafters	\$21.02	\$25.43	\$52,901.92
Construction Managers	\$20.56	\$36.14	\$75,175.32
Plumbers, Pipefitters, and Steamfitters	\$19.72	\$27.11	\$56,394.21
Structural Iron and Steel Workers	\$20.02	\$27.73	\$57,684.94
Sheet Metal Workers	\$18.65	\$26.74	\$55,619.56
Brickmasons and Blockmasons	\$18.33	\$27.36	\$56,918.21
Glaziers	\$17.66	\$21.34	\$44,389.26
Carpenters	\$16.34	\$22.81	\$47,435.18
Solar Photovoltaic Installers	\$17.06	\$21.40	\$44,508.18
Security and Fire Alarm Systems Installers	\$17.07	\$21.93	\$45,610.12
Structural Metal Fabricators and Fitters	\$15.94	\$19.85	\$41,293.12
Industrial Truck and Tractor Operators	\$15.94	\$18.41	\$38,293.33
Computer, Automated Teller, and Office Machine Repairers	\$15.32	\$19.16	\$39,844.99
Installation, Maintenance, and Repair Workers, All Other	\$14.71	\$18.42	\$38,308.14

Exhibit B6: Health care wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Dental Hygienists	\$41.03	\$45.71	\$95,074.56
Registered Nurses	\$39.05	\$47.66	\$99,129.06
Diagnostic Medical Sonographers	\$38.61	\$47.80	\$99,434.09
Radiologic Technologists and Technicians	\$33.45	\$39.75	\$82,671.16
Psychiatric Technicians	\$27.15	\$31.18	\$64,844.28
Physical Therapist Assistants	\$25.17	\$33.33	\$69,322.07
Respiratory Therapists	\$23.96	\$32.17	\$66,921.93
Surgical Technologists	\$23.95	\$29.35	\$61,052.83
Licensed Practical and Licensed Vocational Nurses	\$23.06	\$27.37	\$56,937.60
Clinical Laboratory Technologists and Technicians	\$21.73	\$27.39	\$56,961.62
Medical Equipment Preparers	\$19.77	\$25.07	\$52,149.18
Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers,	\$20.47	\$26.40	\$54,917.75
Health Education Specialists	\$19.40	\$25.37	\$52,772.32
Phlebotomists	\$17.85	\$20.74	\$43,133.34
Social Science Research Assistants	\$17.27	\$22.21	\$46,197.63
Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	\$16.86	\$20.92	\$43,507.91
Pharmacy Technicians	\$16.66	\$20.56	\$42,758.83
Social and Human Service Assistants	\$16.15	\$18.81	\$39,132.86
Healthcare Support Workers, All Other	\$16.43	\$20.47	\$42,586.66
Community Health Workers	\$16.23	\$21.49	\$44,706.72
Opticians, Dispensing	\$15.75	\$18.53	\$38,537.85
Ambulance Drivers and Attendants, Except Emergency Medical Technicians	\$15.69	\$18.96	\$39,446.03

2021 LABOR MARKET OVERVIEW: CENTRAL VALLEY/MOTHER LODE REGION

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Dental Assistants	\$15.51	\$18.21	\$37,876.05
Medical Assistants	\$14.46	\$16.70	\$34,742.94
Medical Secretaries and Administrative Assistants	\$14.97	\$17.69	\$36,794.91
Nursing Assistants	\$14.05	\$15.63	\$32,519.47
Medical Transcriptionists	\$14.34	\$19.60	\$40,762.12
Pharmacy Aides	\$13.76	\$15.17	\$31,556.49
Orderlies	\$13.46	\$14.99	\$31,177.72
Home Health and Personal Care Aides	\$13.02	\$13.20	\$27,452.99
Physical Therapist Aides	\$13.21	\$14.40	\$29,947.85
Massage Therapists	\$12.66	\$17.06	\$35,494.07

Exhibit B7: ICT/digital media wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Network and Computer Systems Administrators	\$33.90	\$42.33	\$88,044.13
Computer Occupations, All Other	\$25.39	\$37.55	\$78,107.15
Computer Network Support Specialists	\$26.77	\$32.95	\$68,531.73
Executive Secretaries and Executive Administrative Assistants	\$22.36	\$28.04	\$58,329.08
Web Developers and Digital Interface Designers	\$21.14	\$29.22	\$60,772.93
Computer User Support Specialists	\$19.14	\$24.81	\$51,595.90
Procurement Clerks	\$17.89	\$22.00	\$45,755.97
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	\$15.72	\$19.62	\$40,810.74
Graphic Designers	\$15.65	\$22.48	\$46,755.46
Switchboard Operators, Including Answering Service	\$15.06	\$18.53	\$38,537.50
Office Clerks, General	\$14.16	\$17.21	\$35,791.60

Exhibit B8: Logistics wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Transportation, Storage, and Distribution Managers	\$33.72	\$44.49	\$92,549.58
Commercial Pilots	\$35.11	\$51.39	\$106,885.90
Logisticians	\$30.95	\$40.17	\$83,548.66
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	\$21.66	\$27.72	\$57,665.13
Bus Drivers, Transit and Intercity	\$22.18	\$28.13	\$58,504.08
Cargo and Freight Agents	\$17.20	\$20.37	\$42,363.85
Heavy and Tractor-Trailer Truck Drivers	\$16.50	\$21.58	\$44,881.49
Shipping, Receiving, and Inventory Clerks	\$14.35	\$16.54	\$34,409.56

Exhibit B9: Mechanics and welding wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
First-Line Supervisors of Mechanics, Installers, and Repairers	\$28.28	\$36.82	\$76,595.34
Aircraft Mechanics and Service Technicians	\$27.80	\$32.86	\$68,351.86
Industrial Machinery Mechanics	\$22.79	\$28.41	\$59,088.47
Mobile Heavy Equipment Mechanics, Except Engines	\$22.28	\$28.17	\$58,583.70
Control and Valve Installers and Repairers, Except Mechanical Door	\$20.19	\$29.15	\$60,635.42
Maintenance Workers, Machinery	\$20.00	\$24.22	\$50,381.53
Bus and Truck Mechanics and Diesel Engine Specialists	\$18.96	\$24.24	\$50,418.38
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	\$18.76	\$26.21	\$54,523.20
Welders, Cutters, Solderers, and Brazers	\$16.88	\$20.50	\$42,646.06
Maintenance and Repair Workers, General	\$15.75	\$20.64	\$42,925.49
Farm Equipment Mechanics and Service Technicians	\$16.44	\$20.89	\$43,458.22
Automotive Body and Related Repairers	\$15.25	\$21.17	\$44,033.37
Automotive Service Technicians and Mechanics	\$14.15	\$20.04	\$41,675.30

Exhibit B10: Public safety wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
First-Line Supervisors of Correctional Officers	\$42.68	\$49.25	\$102,440.43
Detectives and Criminal Investigators	\$40.20	\$47.17	\$98,121.37
Correctional Officers and Jailers	\$34.45	\$43.72	\$90,932.17
Police and Sheriffs Patrol Officers	\$32.09	\$41.49	\$86,301.47
Firefighters	\$23.87	\$31.15	\$64,800.63
Private Detectives and Investigators	\$23.47	\$36.57	\$76,056.90
Public Safety Telecommunicators	\$20.42	\$26.52	\$55,163.25
Miscellaneous First-Line Supervisors, Protective Service Workers	\$20.15	\$29.13	\$60,581.67
Emergency Medical Technicians and Paramedics	\$14.33	\$18.51	\$38,502.42

Exhibit B11: Retail, hospitality, and tourism wages

Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Food Service Managers	\$15.96	\$21.71	\$45,150.08
First-Line Supervisors of Retail Sales Workers	\$15.31	\$19.19	\$39,920.91
Musicians and Singers	\$15.85	\$23.12	\$48,089.54
First-Line Supervisors of Housekeeping and Janitorial Workers	\$15.43	\$21.29	\$44,284.21
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	\$15.00	\$23.24	\$48,333.78
First-Line Supervisors of Food Preparation and Serving Workers	\$14.92	\$18.37	\$38,203.76
Exercise Trainers and Group Fitness Instructors	\$14.70	\$23.85	\$49,600.42
Self-Enrichment Teachers	\$13.88	\$17.42	\$36,224.87
Chefs and Head Cooks	\$14.47	\$22.37	\$46,523.66
Cooks, Restaurant	\$13.37	\$14.78	\$30,744.06
Cooks, Institution and Cafeteria	\$13.72	\$15.76	\$32,787.36

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Occupation	Entry-Level Wage	Median Wage	Median Annual Salary
Manicurists and Pedicurists	\$13.00	\$13.17	\$27,395.89
Photographers	\$13.10	\$23.11	\$48,070.14
Skincare Specialists	\$12.12	\$14.00	\$29,110.83
Hairdressers, Hairstylists, and Cosmetologists	\$11.20	\$14.96	\$31,120.47
Barbers	\$7.19	\$11.92	\$24,784.35

APPENDIX C: EDUCATIONAL ATTAINMENT FOR THE TOP OCCUPATIONS IN EACH SECTOR

Exhibit C1: Advanced manufacturing educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Industrial Production Managers	Bachelor's degree	5 years or more	None	29.8%
First-Line Supervisors of Production and Operating Workers	High school diploma or equivalent	Less than 5 years	None	35.3%
Calibration Technologists and Technicians and Engineering Technologists and Technicians, Except Drafters, All Other	Associate degree	None	None	50.7%
Stationary Engineers and Boiler Operators	High school diploma or equivalent	None	Long-term	38.2%
Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	34.5%
Computer Numerically Controlled Tool Operators	High school diploma or equivalent	None	Moderate-term	42.5%
Machinists	High school diploma or equivalent	None	Long-term	41.2%
Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	28.6%
Printing Press Operators	High school diploma or equivalent	None	Moderate-term on-the-job training	32.9%
Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	27.8%
Cutting and Slicing Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	20.9%
Mixing and Blending Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	28.5%
Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	High school diploma or equivalent	None	Moderate-term	26.2%
Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	High school diploma or equivalent	None	Moderate-term	37.0%
Inspectors, Testers, Sorters, Samplers, and Weighers	High school diploma or equivalent	None	Moderate-term	38.0%
Packaging and Filling Machine Operators and Tenders	High school diploma or equivalent	None	Moderate-term	21.1%
Weighers, Measurers, Checkers, and Samplers, Recordkeeping	High school diploma or equivalent	None	Short-term	35.9%

Exhibit C2: Agriculture, water, and environmental technologies educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	High school diploma or equivalent	None	Moderate-term	32.1%
Compliance Officers	Bachelor's degree	None	Moderate-term	25.5%
Cost Estimators	Bachelor's degree	None	Moderate-term on-the-job training	37.4%
Buyers and Purchasing Agents	Bachelor's degree	None	Moderate-term	33.6%
Farmers, Ranchers, and Other Agricultural Managers	High school diploma or equivalent	5 years or more	None	30.2%
Agricultural Inspectors	Bachelor's degree	None	Moderate-term	41.1%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	High school diploma or equivalent	Less than 5 years	None	21.9%
Life, Physical, and Social Science Technicians, All Other	Associate degree	None	None	36.6%
Environmental Science and Protection Technicians, Including Health	Associate degree	None	None	33.0%
Pest Control Workers	High school diploma or equivalent	None	Moderate-term	35.9%
Agricultural and Food Science Technicians	Associate degree	None	Moderate-term	40.5%
Biological Technicians	Bachelor's degree	None	None	29.4%
Veterinary Technologists and Technicians	Associate degree	None	None	56.9%
Forest and Conservation Technicians	Associate degree	None	None	37.1%
Pesticide Handlers, Sprayers, and Applicators, Vegetation	High school diploma or equivalent	None	Moderate-term	32.8%
Agricultural Equipment Operators	No formal educational credential	None	Moderate-term	14.9%
Forest and Conservation Workers	High school diploma or equivalent	None	Moderate-term	24.4%
Veterinary Assistants and Laboratory Animal Caretakers	High school diploma or equivalent	None	Short-term	44.0%
Animal Trainers	High school diploma or equivalent	None	Moderate-term	32.0%

Exhibit C3: Business and entrepreneurship educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
General and Operations Managers	Bachelor's degree	5 years or more	None	34.3%
Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	Bachelor's degree	None	Moderate-term	32.1%
Training and Development Specialists	Bachelor's degree	Less than 5 years	None	31.0%
Human Resources Specialists	Bachelor's degree	None	None	24.6%
Real Estate Brokers	High school diploma or equivalent	Less than 5 years	None	35.0%
First-Line Supervisors of Office and Administrative Support Workers	High school diploma or equivalent	Less than 5 years	None	41.4%
Project Management Specialists and Business Operations Specialists, All Other	Bachelor's degree	None	None	22.2%
Claims Adjusters, Examiners, and Investigators	High school diploma or equivalent	None	Long-term	33.8%

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Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Eligibility Interviewers, Government Programs	High school diploma or equivalent	None	Moderate-term	40.2%
Loan Officers	Bachelor's degree	None	Moderate-term	32.3%
Paralegals and Legal Assistants	Associate degree	None	None	43.2%
Personal Service Managers, All Other; Entertainment and Recreation Managers, Except Gambling; and Managers, All Other	Bachelor's degree	Less than 5 years	None	24.8%
Court, Municipal, and License Clerks	High school diploma or equivalent	None	Long-term	44.4%
Payroll and Timekeeping Clerks	High school diploma or equivalent	None	Moderate-term	50.0%
Production, Planning, and Expediting Clerks	High school diploma or equivalent	None	Moderate-term	39.8%
Insurance Claims and Policy Processing Clerks	High school diploma or equivalent	None	Moderate-term	45.2%
Fundraisers	Bachelor's degree	None	None	9.2%
First-Line Supervisors of Non-Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	33.0%
Legal Secretaries and Administrative Assistants	High school diploma or equivalent	None	Moderate-term	53.2%
Loan Interviewers and Clerks	High school diploma or equivalent	None	Short-term	45.6%

Exhibit C4: Energy, construction, and utilities educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Telecommunications Line Installers and Repairers	High school diploma or equivalent	None	Long-term	46.3%
Administrative Services and Facilities Managers	Bachelor's degree	Less than 5 years	None	34.8%
Power Plant Operators	High school diploma or equivalent	None	Long-term	49.3%
Occupational Health and Safety Specialists	Bachelor's degree	None	None	34.3%
Electrical and Electronic Engineering Technologists and Technicians	Associate degree	None	None	64.2%
Electrical Power-Line Installers and Repairers	High school diploma or equivalent	None	Long-term	47.4%
Telecommunications Equipment Installers and Repairers, Except Line Installers	Postsecondary nondegree award	None	Moderate-term	53.0%
Construction and Building Inspectors	High school diploma or equivalent	5 years or more	Moderate-term	40.5%
Civil Engineering Technologists and Technicians	Associate degree	None	None	50.7%
First-Line Supervisors of Construction Trades and Extraction Workers	High school diploma or equivalent	5 years or more	None	29.2%
Operating Engineers and Other Construction Equipment Operators	High school diploma or equivalent	None	Moderate-term	24.5%
Water and Wastewater Treatment Plant and System Operators	High school diploma or equivalent	None	Long-term	47.0%
Stonemasons	High school diploma or equivalent	None	Apprenticeship	19.2%
Electricians	High school diploma or equivalent	None	Apprenticeship	45.8%

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Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Architectural and Civil Drafters	Associate degree	None	None	53.4%
Construction Managers	Bachelor's degree	None	Moderate-term	31.5%
Plumbers, Pipefitters, and Steamfitters	High school diploma or equivalent	None	Apprenticeship	32.9%
Structural Iron and Steel Workers	High school diploma or equivalent	None	Apprenticeship	35.7%
Sheet Metal Workers	High school diploma or equivalent	None	Apprenticeship	32.3%
Brickmasons and Blockmasons	High school diploma or equivalent	None	Apprenticeship	19.2%

Exhibit C5: Education sector's educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Interpreters and Translators	Bachelor's degree	None	None	35.5%
Library Technicians	Postsecondary nondegree award	None	None	25.9%
Education and Childcare Administrators, Preschool and Daycare	Bachelor's degree	Less than 5 years	None	11.4%
Substitute Teachers, Short-Term	Bachelor's degree	None	None	25.4%
Teaching Assistants, Postsecondary	Bachelor's degree	None	None	38.6%
Directors, Religious Activities and Education	Bachelor's degree	Less than 5 years	None	24.2%
Teaching Assistants, Except Postsecondary	Some college, no degree	None	None	38.6%
Preschool Teachers, Except Special Education	Associate degree	None	None	31.6%
Library Assistants, Clerical	High school diploma or equivalent	None	Short-term	37.0%
Recreation Workers	High school diploma or equivalent	None	Short-term	35.7%
Childcare Workers	High school diploma or equivalent	None	Short-term	35.1%

Exhibit C6: Health educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Dental Hygienists	Associate degree	None	None	60.1%
Registered Nurses	Bachelor's degree	None	None	33.3%
Diagnostic Medical Sonographers	Associate degree	None	None	46.4%
Radiologic Technologists and Technicians	Associate degree	None	None	66.6%
Psychiatric Technicians	Postsecondary nondegree award	Less than 5 years	Short-term	37.6%
Physical Therapist Assistants	Associate degree	None	None	60.2%
Respiratory Therapists	Associate degree	None	None	65.0%
Surgical Technologists	Postsecondary nondegree award	None	None	72.6%
Licensed Practical and Licensed Vocational Nurses	Postsecondary nondegree award	None	None	73.3%

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Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Clinical Laboratory Technologists and Technicians	Bachelor's degree	None	None	39.2%
Medical Equipment Preparers	High school diploma or equivalent	None	Moderate-term	43.2%
Health Information Technologists, Medical Registrars, Surgical Assistants, and Healthcare Practitioners and Technical Workers,	Postsecondary nondegree award	None	None	20.2%
Health Education Specialists	Bachelor's degree	None	None	26.7%
Phlebotomists	Postsecondary nondegree award	None	None	59.7%
Social Science Research Assistants	Bachelor's degree	None	None	37.1%
Medical Dosimetrists, Medical Records Specialists, and Health Technologists and Technicians, All Other	Postsecondary nondegree award	None	None	46.8%
Pharmacy Technicians	High school diploma or equivalent	None	Moderate-term	53.7%
Social and Human Service Assistants	High school diploma or equivalent	None	Short-term	34.4%
Healthcare Support Workers, All Other	High school diploma or equivalent	None	None	43.2%
Community Health Workers	High school diploma or equivalent	None	Short-term	26.7%

Exhibit C7: ICT/digital media educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Network and Computer Systems Administrators	Bachelor's degree	None	None	37.4%
Computer Occupations, All Other	Bachelor's degree	None	Moderate-term	27.2%
Computer Network Support Specialists	Associate degree	None	None	39.2%
Executive Secretaries and Executive Administrative Assistants	High school diploma or equivalent	Less than 5 years	None	41.0%
Web Developers and Digital Interface Designers	Associate degree	None	None	23.4%
Computer User Support Specialists	Some college, no degree	None	None	39.2%
Procurement Clerks	High school diploma or equivalent	None	Moderate-term	38.5%
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	High school diploma or equivalent	None	Short-term	45.9%
Graphic Designers	Bachelor's degree	None	None	26.5%
Switchboard Operators, Including Answering Service	High school diploma or equivalent	None	Short-term	49.0%
Office Clerks, General	High school diploma or equivalent	None	Short-term	45.2%

Exhibit C8: Logistics educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Transportation, Storage, and Distribution Managers	High school diploma or equivalent	5 years or more	None	34.7%
Commercial Pilots	High school diploma or equivalent	None	Moderate-term	22.0%
Logisticians	Bachelor's degree	None	None	35.9%
First-Line Supervisors of Transportation and Material Moving Workers, Except Aircraft Cargo Handling Supervisors	High school diploma or equivalent	Less than 5 years	None	39.4%
Bus Drivers, Transit and Intercity	High school diploma or equivalent	None	Moderate-term	39.5%
Cargo and Freight Agents	High school diploma or equivalent	None	Short-term	40.7%
Heavy and Tractor-Trailer Truck Drivers	Postsecondary nondegree award	None	Short-term	29.8%
Shipping, Receiving, and Inventory Clerks	High school diploma or equivalent	None	Short-term	33.8%

Exhibit C9: Mechanics and welding educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
First-Line Supervisors of Mechanics, Installers, and Repairers	High school diploma or equivalent	Less than 5 years	None	41.7%
Aircraft Mechanics and Service Technicians	Postsecondary nondegree award	None	None	58.4%
Industrial Machinery Mechanics	High school diploma or equivalent	None	Long-term	40.9%
Mobile Heavy Equipment Mechanics, Except Engines	High school diploma or equivalent	None	Long-term	35.2%
Control and Valve Installers and Repairers, Except Mechanical Door	High school diploma or equivalent	None	Moderate-term	48.4%
Maintenance Workers, Machinery	High school diploma or equivalent	None	Long-term	30.2%
Bus and Truck Mechanics and Diesel Engine Specialists	High school diploma or equivalent	None	Long-term	36.4%
Heating, Air Conditioning, and Refrigeration Mechanics and Installers	Postsecondary nondegree award	None	Long-term	44.0%
Welders, Cutters, Solderers, and Brazers	High school diploma or equivalent	None	Moderate-term	32.2%
Maintenance and Repair Workers, General	High school diploma or equivalent	None	Moderate-term	37.6%
Farm Equipment Mechanics and Service Technicians	High school diploma or equivalent	None	Long-term	35.2%
Automotive Body and Related Repairers	High school diploma or equivalent	None	Long-term	26.2%
Automotive Service Technicians and Mechanics	Postsecondary nondegree award	None	Short-term	35.7%

Exhibit C10: Public safety educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
First-Line Supervisors of Correctional Officers	High school diploma or equivalent	Less than 5 years	None	42.4%
Detectives and Criminal Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	32.0%
Correctional Officers and Jailers	High school diploma or equivalent	None	Moderate-term	49.3%
Police and Sheriffs Patrol Officers	High school diploma or equivalent	None	Moderate-term	46.4%
Firefighters	Postsecondary nondegree award	None	Long-term	59.4%
Private Detectives and Investigators	High school diploma or equivalent	Less than 5 years	Moderate-term	32.7%
Public Safety Telecommunicators	High school diploma or equivalent	None	Moderate-term	54.0%
Miscellaneous First-Line Supervisors, Protective Service Workers	High school diploma or equivalent	Less than 5 years	None	37.8%
Emergency Medical Technicians and Paramedics	Postsecondary nondegree award	None	None	66.6%

Exhibit C11: Retail, hospitality, and tourism educational attainment

Occupation	Typical Entry-level Education	Work Experience Required	Typical On-The-Job Training	Current Population Survey (CPS)
Food Service Managers	High school diploma or equivalent	Less than 5 years	None	35.8%
First-Line Supervisors of Retail Sales Workers	High school diploma or equivalent	Less than 5 years	None	38.8%
Musicians and Singers	No formal educational credential	None	Long-term	27.9%
First-Line Supervisors of Housekeeping and Janitorial Workers	High school diploma or equivalent	Less than 5 years	None	31.0%
First-Line Supervisors of Landscaping, Lawn Service, and Groundskeeping Workers	High school diploma or equivalent	Less than 5 years	None	31.0%
First-Line Supervisors of Food Preparation and Serving Workers	High school diploma or equivalent	Less than 5 years	None	36.7%
Exercise Trainers and Group Fitness Instructors	High school diploma or equivalent	None	Short-term	28.6%
Self-Enrichment Teachers	High school diploma or equivalent	Less than 5 years	None	25.4%
Chefs and Head Cooks	High school diploma or equivalent	5 years or more	None	35.8%
Cooks, Restaurant	No formal educational credential	Less than 5 years	Moderate-term	24.3%
Cooks, Institution and Cafeteria	No formal educational credential	None	Short-term	24.3%
Manicurists and Pedicurists	Postsecondary nondegree award	None	None	23.5%
Photographers	High school diploma or equivalent	None	Moderate-term	34.0%
Skincare Specialists	Postsecondary nondegree award	None	None	51.8%
Hairdressers, Hairstylists, and Cosmetologists	Postsecondary nondegree award	None	None	43.0%
Barbers	Postsecondary nondegree award	None	None	34.9%