

Overview of the Middle-Skill STEM Occupation Index

The Texas Workforce Investment Council's (Council) *Middle-Skill STEM Occupation Index* provides analysis and evaluation of current and prospective demographics and occupation benchmarks for the middle-skill science, technology, engineering, and mathematics (STEM) workforce in Texas. Middle-skill occupations are defined by the U.S. Bureau of Labor Statistics (BLS) as jobs requiring workers with more than a high school diploma but less than a postsecondary degree. The first section of the report provides context with a review of the existing literature on middle-skill STEM occupations. This section discusses STEM occupations and the changing American workforce over the last several decades, the role of community colleges in preparing workers for middle-skill employment, and previous Council research on middle-skill occupations in Texas. The second section provides an explanation of the detailed methods used to create the middle-skill STEM occupation index. This section also includes an explanation for obtaining demographic data from Standard Occupational Classification (SOC) system codes. The third section contains the index itself, along with a guide for the report's layout. Included at the end of the report are three appendices detailing the process for identifying middle-skill STEM occupations and guidance for the use of a crosswalk illustrating the steps used to extract demographic data in combination with SOC codes.

This report organizes the available demographic and labor market data on middle-skill STEM occupations into an index. The data for this index was obtained from the 2018 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) files, the latest occupational employment projections from the U.S. Bureau of Labor Statistics, and Texas labor market data produced by the Texas Workforce Commission. With Texas continuing to grow in population, while becoming older and increasingly diverse, research to account for these changes at the workforce level is not yet readily available. Consistent and accurate research on middle-skill STEM occupations also remains limited. Trends on middle skill STEM occupations over the last two decades show that jobs have expanded faster in both high-skill and low-skill positions. Despite competing perspectives on the decline of available middle-skill jobs, these occupations represent a larger share of new openings and replacements compared to low and high-skill occupations. In order to track these changes, the Council established a working definition of middle-skill STEM occupations in 2015 and completed additional work in 2017 that identified third-party, industry-based certifications that are of value to Texas employers and that can positively affect employment outcomes in middle-skill STEM occupations. The index is a companion report to these previous reports and seeks to answer who these workers are by providing the latest available demographic, educational, and occupational characteristics of individuals currently in the middle-skill STEM workforce and the labor force at large.

Establishing current benchmarks will allow replication over several research cycles, during which the content of the report will be updated. Collecting enough data over several years will allow researchers to accurately evaluate trends regarding this sector of the workforce and the effects of short and long-lasting demographic and economic change, such as COVID-19. Additionally, the evolution of the American workforce poses significant challenges to employers seeking to attract high-quality, high-skilled employees that meet the changing needs of industry. As technological advances across all industries continue to increase, the need for further workplace specialization creates several challenges for workers and employers. The current skills gap is widening, and employers are looking to middle-skill workers to fill this gap, especially in STEM occupations. An overview of initial findings from the report is presented on the following pages.

Detailed Methodology for Organizing Worker Characteristics for Middle-Skill STEM Occupations in Texas

The data in this overview consists of 60 occupations classified as middle-skill STEM using a combination of SOC system codes and ACS demographic data. The demographic data was derived from the occupation index that is presented in the final report. However, the data in this overview is presented differently. The levels of educational attainment may be different than those specified as required by the occupation as defined by BLS. For example, several occupations have workers that list a level of educational attainment level at a “Bachelor’s degree or higher.” This does not substitute the “BLS level of education” requirement listed in the occupation index, but merely reflects the level of educational attainment for respondents of the ACS survey. Additionally, unlike the occupation index, the data in this overview has been aggregated into six groups that summarize the demographic characteristics of the middle-skill STEM workforce in Texas.

For the data to be organized into groups in this overview, occupations with the largest number of workers were identified as outliers and removed.¹ The remaining occupations were organized into groups of ten by number of workers, in descending order. Once organized, the groups were named (MSSO 1, MSSO 2, MSSO 3, MSSO 4, MSSO 5, and MSSO 6) and the demographic data for each occupation was aggregated to convey sex, age, race and ethnicity, and educational attainment of the middle-skill STEM workforce in Texas.

Detailed Demographic Characteristics for Middle-Skill STEM Occupations in Texas

Male and female representation in the middle-skill workforce varies by occupation, with men overrepresented in occupations such as Web Developers, Chemical Technicians, Surveying and Mapping Technicians, Forest and Conservation Workers, Fallers, and First-Line Supervisors of Farming, Fishing, and Forestry Workers. Women have strong representation as Dental Hygienists, Surgical Technologists, Healthcare Practitioners and Technical Workers, Electrochemical Equipment Assemblers, and Respiratory Therapists. Occupations with near parity regarding sex include: Business Operations Specialists, All Other; Life, Physical, and Social Science Technicians, All Other; Radiologic Technologists; and Dental Laboratory Technicians. Female representation in medical middle-skill STEM occupations is strong, with Registered Nurses making up a large number of workers followed by Licensed Practical and Licensed Vocational Nurses, Dental Assistants, Pharmacy Technicians, Clinical laboratory Technologists and Technicians, and Medical Records and Health Information Specialists.

Generally, middle-skill occupations have been defined by the U.S. Bureau of Labor Statistics as jobs requiring workers with more than a high school diploma but less than a postsecondary degree. In fitting with this definition, the data show most individuals in the middle-skill STEM workforce have an educational attainment of a high school diploma or some college or associate’s degree. Workers also trend younger, with larger concentrations of workers between the ages of 16 to 44 at or above 50 percent. Percentages for workers in the 45 to 64 age group remain relatively consistent across all occupations, with some exceptions. Race and ethnicity breakouts indicate large percentages of White

¹ The occupations that were removed include Registered Nurses; Welding, Soldering, and Brazing workers; and Licensed Practical and Licensed Vocational Nurses.

and Hispanic workers in all occupations, followed by Black or African American, Asian, and workers who answered “Other” on the ACS questionnaire.²

Components of population change, as described in previous Council demographic reports,³ continue to play distinctive roles in transforming the population of Texas. For this reason, establishing current benchmarks will allow replication over several research cycles, during which the content of the report will be updated, and more representative comparisons of population trends can be made.

The data in Figure 1 and Table 1 provide an overview of the demographic characteristics of the middle-skill STEM workforce in Texas. Figure 1 shows demographic and educational characteristics by the six middle-skill STEM groupings of ten occupations (MSSO 1-6). Table one displays the same data at the occupation level. The table is color-coded and occupations are grouped within their respective MSSO group.

² Individuals listed as Other comprise the following race and ethnicity categories: American Indian alone, Alaska Native alone, American Indian and Alaska Native tribes specified; or American Indian or Alaska Native, not specified and no other race, Native Hawaiian and Other Pacific Islander alone, Some Other Race alone, Two or more races.

³ Texas Workforce Investment Council. (2019). *Mature Workers in Texas: A Demographic Study*. (available at <https://gov.texas.gov/uploads/files/organization/twic/Mature-Workers-2019.pdf>)

Figure 1. Demographic Characteristics of the Middle-Skill Occupation Workforce

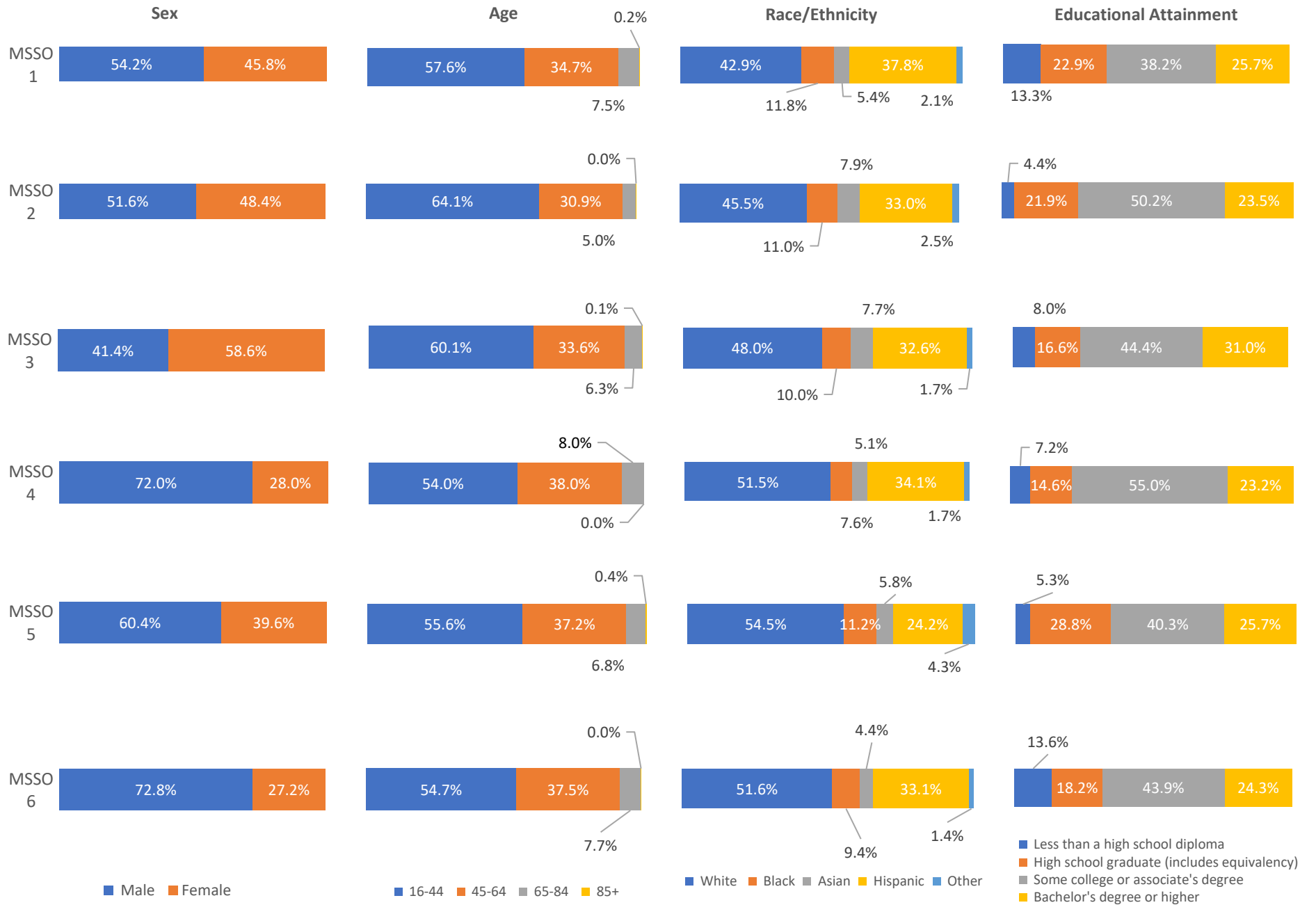


Table 1. Detailed Demographic Characteristics for Middle-Skill STEM Occupations in Texas

Occupation Title	Total	Male	Female	16-44	45-64	65-84	85+	White	Black	Asian	Hispanic	Other	Less than a high school diploma	High school graduate (includes equivalency)	Some college or associate degree	Bachelor's degree or higher
Middle-Skill STEM Occupations Group 1 (MSSO 1)																
Automotive Service Technicians and Mechanics	92,232	98%	2%	60%	35%	5%	0%	38%	5%	2%	54%	1%	26%	36%	33%	5%
Electricians	79,438	99%	1%	62%	33%	5%	0%	42%	5%	1%	52%	1%	17%	39%	37%	6%
Computer User Support Specialists	66,962	80%	20%	59%	34%	7%	0%	50%	15%	11%	19%	5%	1%	11%	45%	44%
First-Line Supervisors of Food Preparation and Serving Workers	65,532	38%	62%	66%	29%	5%	0%	39%	15%	3%	41%	3%	14%	38%	39%	9%
Electrical and Electronics Repairers, Commercial and Industrial Equipment	60,728	11%	89%	84%	15%	1%	0%	24%	12%	2%	60%	1%	2%	28%	59%	11%
Operating Engineers and Other Construction Equipment Operators	47,391	97%	3%	56%	36%	8%	0%	39%	8%	0%	51%	1%	37%	46%	15%	2%
Farmers, Ranchers, and Other Agricultural Managers	44,901	85%	15%	30%	41%	27%	2%	80%	1%	1%	16%	2%	13%	27%	27%	33%
Engineering Technicians, Except Drafters, All Other	41,388	83%	17%	54%	40%	7%	0%	46%	7%	7%	36%	3%	5%	16%	55%	24%
Pharmacy Technicians	35,826	25%	75%	77%	21%	2%	0%	34%	18%	11%	36%	2%	1%	20%	60%	19%
Dental Assistants	32,277	15%	85%	76%	20%	4%	0%	44%	9%	4%	40%	2%	0%	35%	55%	9%

Source: 2018 American Community Survey 1-Year Public Use Microdata Sample Files

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Middle-Skill STEM Occupations Group 2 (MSSO 2)																
Business Operations Specialists, All Other	31,406	47%	53%	57%	36%	7%	0%	50%	11%	10%	25%	4%	3%	10%	35%	52%
Wind Turbine Service Technicians	29,972	94%	6%	66%	30%	4%	0%	49%	10%	1%	39%	1%	19%	43%	32%	7%
Medical and Clinical Laboratory Technicians	29,365	34%	66%	66%	28%	6%	0%	42%	13%	12%	31%	1%	4%	12%	41%	43%
Radio, Cellular, and Tower Equipment Installers and Repairers	22,596	87%	13%	53%	38%	9%	0%	45%	8%	6%	37%	3%	7%	30%	47%	16%
Life, Physical, and Social Science Technicians, All Other	21,066	51%	49%	73%	20%	8%	0%	49%	7%	16%	24%	4%	5%	12%	48%	35%
Aircraft Mechanics and Service Technicians	20,477	95%	5%	47%	49%	4%	0%	55%	8%	4%	30%	3%	3%	26%	56%	15%
Radiologic Technologists	18,672	41%	59%	64%	33%	3%	0%	48%	7%	6%	35%	4%	1%	5%	74%	21%
Computer, Automated Teller, and Office Machine Repairers	18,511	93%	7%	56%	39%	4%	0%	51%	8%	11%	26%	3%	3%	21%	58%	18%
Medical Records and Health Information Technicians	16,668	10%	90%	53%	41%	6%	0%	41%	17%	6%	35%	1%	1%	22%	60%	17%
Hearing Aid Specialists	14,406	37%	63%	69%	24%	6%	0%	46%	5%	11%	35%	3%	0%	20%	42%	37%

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Middle-Skill STEM Occupations Group 3 (MSSO 3)																
Dental Hygienists	13,748	8%	92%	59%	33%	8%	0%	56%	1%	11%	30%	1%	1%	10%	51%	39%
Veterinary Technologists and Technicians	12,365	11%	89%	84%	16%	0%	0%	72%	10%	0%	16%	3%	4%	11%	48%	37%
Respiratory Therapists	12,137	41%	59%	41%	51%	8%	0%	41%	16%	4%	39%	0%	2%	1%	73%	25%
Drafters, All Other	12,055	73%	27%	61%	33%	6%	0%	55%	6%	4%	35%	0%	1%	5%	67%	28%
Healthcare Practitioners and Technical Workers, All Other	11,859	29%	71%	58%	35%	6%	1%	53%	10%	6%	28%	2%	4%	12%	15%	68%
Food Batchmakers	11,633	24%	76%	57%	31%	12%	0%	28%	11%	1%	59%	1%	29%	37%	25%	10%
Electromechanical Equipment Assemblers	11,478	53%	47%	51%	43%	6%	0%	17%	11%	40%	31%	1%	26%	43%	23%	8%
Chemical Plant and System Operators	10,716	96%	4%	53%	43%	4%	0%	49%	15%	0%	35%	1%	21%	22%	49%	8%
Surgical Technologists	9,296	36%	64%	54%	39%	7%	0%	56%	9%	1%	33%	0%	2%	18%	64%	17%
Web Developers	9,052	63%	37%	71%	24%	5%	0%	56%	21%	3%	14%	6%	0%	4%	32%	63%

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Middle-Skill STEM Occupations Group 4 (MSSO 4)																
Medical Equipment Repairers	8,908	91%	9%	32%	52%	15%	0%	54%	11%	4%	28%	4%	4%	10%	72%	14%
Broadcast Technicians	8,212	88%	12%	57%	36%	7%	0%	51%	11%	7%	30%	1%	4%	13%	49%	35%
Chemical Technicians	7,880	67%	33%	59%	37%	4%	0%	48%	6%	5%	38%	3%	3%	17%	45%	36%
Emergency Medical Technicians and Paramedics	7,724	71%	29%	73%	27%	0%	0%	60%	1%	1%	37%	0%	2%	10%	74%	15%
Surveying and Mapping Technicians	7,699	88%	12%	68%	26%	5%	0%	64%	0%	0%	34%	2%	13%	37%	41%	9%
Physical Therapist Assistants	7,431	28%	72%	71%	28%	0%	0%	52%	9%	3%	32%	3%	2%	2%	63%	33%
Transportation Inspectors	7,121	87%	13%	49%	39%	12%	0%	54%	15%	0%	30%	0%	10%	23%	52%	15%
Diagnostic Medical Sonographers	6,747	27%	73%	57%	42%	2%	0%	48%	11%	12%	28%	1%	0%	2%	55%	44%
First-Line Supervisors of Farming, Fishing, and Forestry Workers	6,344	92%	8%	29%	56%	15%	0%	52%	0%	3%	44%	1%	28%	28%	27%	17%
Dental Laboratory Technicians	6,235	44%	56%	62%	24%	13%	0%	43%	0%	10%	45%	1%	13%	20%	54%	13%

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Middle-Skill STEM Occupations Group 5 (MSSO 5)																
Computer Numerically Controlled Tool Operators and Programmers	5,987	98%	2%	63%	33%	4%	0%	44%	13%	8%	33%	3%	20%	30%	37%	12%
Chemical Processing Machine Setters, Operators, and Tenders	5,166	91%	9%	66%	30%	4%	0%	68%	8%	0%	21%	2%	5%	25%	49%	21%
Geological and Petroleum Technicians	5,038	71%	29%	50%	38%	12%	0%	60%	3%	15%	18%	4%	3%	12%	34%	51%
Opticians, Dispensing	4,867	17%	83%	76%	16%	6%	2%	61%	0%	2%	30%	7%	13%	23%	42%	22%
Architectural and Civil Drafters	4,372	71%	29%	68%	25%	5%	2%	56%	6%	8%	31%	0%	0%	10%	53%	38%
Cardiovascular Technologists and Technicians	4,140	39%	61%	53%	38%	9%	0%	45%	32%	5%	16%	2%	0%	30%	30%	40%
Occupational Therapy Assistants	3,847	14%	86%	51%	44%	5%	0%	66%	9%	3%	19%	3%	2%	16%	64%	19%
Millwrights	3,600	100%	0%	25%	70%	5%	0%	77%	15%	4%	4%	0%	8%	54%	29%	9%
Power Plant Operators	3,545	80%	20%	53%	34%	13%	0%	55%	13%	3%	23%	7%	3%	49%	41%	7%
Electrical and Electronic Equipment Mechanics, Installers, and Repairers	3,391	52%	3%	37%	18%	1%	0%	35%	3%	3%	14%	0%	2%	12%	29%	12%

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Middle-Skill STEM Occupations Group 6 (MSSO 6)																
Electronic Home Entertainment Equipment Installers and Repairers	3,357	100%	0%	44%	44%	12%	0%	38%	15%	6%	33%	7%	11%	41%	31%	17%
Magnetic Resonance Imaging Technologists	3,335	68%	32%	66%	27%	7%	0%	60%	9%	6%	22%	3%	0%	5%	58%	37%
Hazardous Materials Removal Workers	3,158	80%	20%	50%	36%	14%	0%	25%	27%	0%	48%	0%	41%	23%	31%	5%
Agricultural and Food Science Technicians	2,639	57%	43%	57%	35%	9%	0%	25%	0%	4%	68%	3%	22%	28%	13%	37%
Tool and Die Makers	2,052	98%	2%	7%	79%	14%	0%	56%	0%	11%	26%	7%	24%	23%	51%	2%
Fallers	2,013	98%	2%	59%	27%	14%	0%	84%	15%	0%	1%	1%	17%	55%	27%	2%
Avionics Technicians	1,759	100%	0%	68%	25%	7%	0%	44%	0%	4%	53%	0%	4%	24%	68%	4%
Radiation Therapists	1,487	34%	66%	58%	36%	6%	0%	67%	24%	0%	10%	0%	0%	0%	63%	37%
Prepress Technicians and Workers	976	52%	48%	46%	54%	0%	0%	34%	0%	21%	45%	0%	0%	25%	47%	28%
Forest and Conservation Workers	925	88%	12%	100%	0%	0%	0%	50%	2%	0%	48%	0%	52%	2%	34%	12%

Source: 2018 American Community Survey 1-Year Public Use Microdata Sample Files