

**MANUFACTURING AND HEALTHCARE WORKFORCE PRIORITIES  
FOR KNOX COUNTY**

March 10, 2019

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## Table of Contents

|  |    |
|--|----|
| Summary of Key Findings .....                                      | 1  |
| Introduction .....   | 3  |
| Manufacturing Employment Growth .....                              | 3  |
| Growth and Concentration of Manufacturing Industries .....         | 5  |
| Healthcare Employment Growth .....                                 | 7  |
| Growth and Concentration of Healthcare Industries .....            | 8  |
| Occupational and Skill Needs in Manufacturing and Healthcare ..... | 9  |
| Introduction .....   | 9  |
| Manufacturing Employment Needs .....                               | 10 |
| Skill Needs for Critical Manufacturing Occupations .....           | 12 |
| Healthcare Employment Needs .....                                  | 16 |
| Skill Needs for Critical Healthcare Occupations .....              | 17 |
| Appendix .....   | 24 |

## Table of Figures

|   |   |
|---|---|
| Figure 1: Manufacturing Employment Change, Knox County, Ohio, and U.S., 2001-2017 ..... | 3 |
| Figure 2: Manufacturing Employment Change, Knox County, Ohio, and U.S., 2010-2017 ..... | 5 |
| Figure 3: Healthcare Employment Change, Knox County, Ohio, and U.S., 2001-2017 .....    | 8 |

## Table of Tables

|   |    |
|---|----|
| Table 1: Location Quotients for Offices of Physicians, 2008 and 2017 .....                                  | 9  |
| Table A-1: Knox County Manufacturing Employment by Subsector and Industry Group, 2004-2016 ..               | 24 |
| Table A-2: Knox County Manufacturing Location Quotients by Subsector and Industry Group,<br>2004-2016 ..... | 26 |
| Table A-3: Knox County Healthcare Employment by Subsector and Industry Group, 2004-2016. ....               | 28 |
| Table A-4: Knox County Healthcare Location Quotients by Subsector and Industry Group, 2004-2016             | 29 |
| Table A-5: Manufacturing: 25 Occupations with Greatest Total Need, 2016-2026 .....                          | 30 |
| Table A-6: Manufacturing: Growth and Replacement Need by Occupational Group, 2016-2026 .....                | 31 |
| Table A-7: Healthcare: 25 Occupations with Greatest Total Need, 2016-2026 .....                             | 36 |
| Table A-8: Healthcare: Growth and Replacement Need by Occupational Group, 2016-2026 .....                   | 37 |
| Table A-9: Occupational Needs to Increase Physicians' Office Employment by 50 Percent .....                 | 42 |

# **MANUFACTURING AND HEALTHCARE WORKFORCE PRIORITIES FOR KNOX COUNTY**

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## **Summary of Key Findings**

The goal of this study is to project long-term employment needs for two key industry sectors in Knox County, Ohio, manufacturing and healthcare. These two sectors account for one-third of total county employment.

Manufacturing provided 22 percent of total Knox County employment in 2017, an employment concentration 2.6 times the national average. In contrast to Ohio and U.S. manufacturing, which suffered declines of 19 percent and 16 percent, respectively, between 2001 and 2007, Knox County manufacturing employment experienced a slight net increase. Recession losses were also much less than average. As a result, Knox County employment was 1.1 percent higher in 2017 than in 2001, compared to net losses of 28.2 percent for Ohio and 24.3 percent for the U.S.

The much stronger-than-average long-run employment growth of Knox County manufacturing suggests that manufacturing is an economic driver. Drivers are industries with greater-than-average concentration within an area and with long-term growth that is faster than average. These industries are more likely to benefit the area's economy over the long term, and are most likely to provide their workers stable jobs with career growth potential.

Machinery manufacturing is the largest industry group within manufacturing. Its more than 2,400 jobs accounts for 49 percent of total manufacturing employment. Transportation equipment employs 700 and plastics product manufacturing employs more than 600.

Healthcare employment totals more than 2,400, around 12 percent of total employment. However, this does not include other healthcare positions, such as employees of pharmacies in drugstores and supermarkets. These positions are also included in the occupational analysis.

Knox County healthcare employment tracked the U.S. average after 2001 before increasing rapidly between 2005 and 2011. Employment declines in subsequent years brought net growth between 2001 and 2017 back to the Ohio average.

Employment in healthcare establishments is slightly greater than would be expected in an economy the size of Knox County's. However, employment in residential care facilities is nearly double that which would be expected. In contrast, ambulatory care services, particularly physicians' offices, is far below average. This suggests that too many Knox County residents must either travel outside the county to receive routine medical care or use the emergency room at the hospital. This is a significant public health concern.

Manufacturing occupational projections are derived from 11 industry groups representing 94 percent of total manufacturing employment. The total 10-year need is for more than 4,100 new workers, overwhelmingly to backfill existing positions. Team assemblers account for nearly 11 percent of this total need, with machinists in second place.

Knowledge, skill, and ability requirements are presented for the occupations with the greatest total need. In addition to a basic understanding of production and processing, manufacturing workers need to be able to perform physical tasks and operate within the setting of the overall process. Supervisors need an understanding of the overall process as well as an understanding of how to manage people and the legal labor requirements. They also need to be able to communicate effectively and listen.

A lack of soft skills is a pervasive problem in manufacturing, healthcare, and elsewhere. These include basic math skills, the ability to communicate effectively, the ability to interact appropriately with supervisors, peers, and subordinates, and the ability to maintain focus on the task at hand.

Seven industry groups representing 93 percent of total healthcare employment are used to derive the occupational projections. The total 10-year need is for more than 2,900 new workers, about 12 percent of whom will fill newly-created positions, with 88 percent replacing transitioning workers in existing positions. Personal care aides, a low-skill, entry-level position, represent the greatest occupational need, 14 percent of the total healthcare need. Nursing assistants and registered nurses together account for 20 percent of the total need.

Because of the concern surrounding the underrepresentation of physicians' offices in Knox County, estimates are provided of the total number of new workers required to increase total employment by half over the next 10 years. The total need is for around 145 new workers, including approximately 12 new physicians of various specialties.

The skill profiles for the eight largest occupations with the largest total needs reveal an overriding need for customer service skills. Medical workers need to be able to speak clearly and convey information in understandable terms. They have to listen actively, coordinate their activities with those of others, think critically, reason, and be aware of when problems arise.

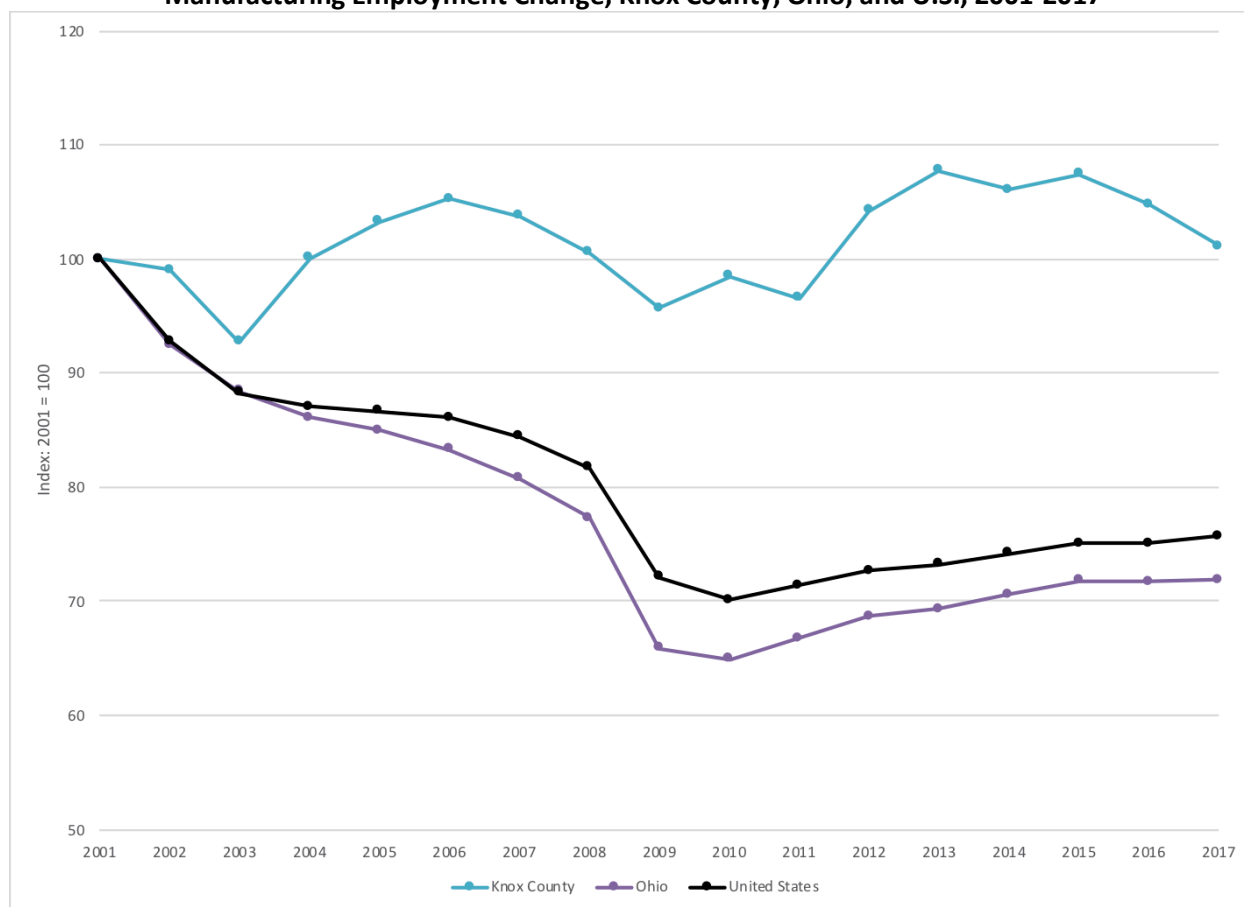
## Introduction

The ultimate purpose of this study is to project long-term employment needs for two key industry sectors in Knox County, Ohio, manufacturing and healthcare. These two sectors account for one-third of total county employment. This paper begins by discussing Knox County manufacturing employment growth and then the employment of individual industries within manufacturing. The following two sections undertake the same employment growth and industry analysis for healthcare. Finally, the key occupations and occupational growth are analyzed for each of the two industries and the skills needed for the key occupations are discussed.

## Manufacturing Employment Growth

Manufacturing is particularly important in the overall makeup of Knox County's economy. The 22 percent of total employment in manufacturing in 2017 is an employment concentration 2.6 times the national average. Figure 1 compares employment change in Knox County, Ohio, and the U.S. from 2001, a recession year. This chart is plotted on an index basis: all employment is set equal to 100 in 2001 and the plot for subsequent years represents percentage differences from 2001. The result is to show cumulative percentage changes from year to year.

**Figure 1**  
**Manufacturing Employment Change, Knox County, Ohio, and U.S., 2001-2017**



**Source:** Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

As is evident in Figure 1, the performance of Knox County's manufacturing employment is very different from state and national averages. After an employment decline from 2001 to 2003, Knox County manufacturers added 559 net new jobs over the next three years, with employment peaking at 4,710 in 2006. In contrast, Ohio and U.S. employment declined steadily through the economic expansion that ended in 2007, with Ohio employment down 19.3 percent and U.S. employment down 15.6 percent. However, this employment decline did not reflect weakness in the manufacturing sector itself. U.S. manufacturing output increased nearly 28 percent between 2001 and 2007, while Ohio output increased 11 percent. Thus, the employment declines were driven not by economic problems in the sector, but rather by the substitution of technology for labor.

In contrast to the employment declines through 2007, the declines from 2007 through 2010 were driven by declining output due to the recession.<sup>1</sup> Here too, though, Knox County's employment performance was much better than average. U.S. manufacturing employment declined 17 percent and Ohio manufacturing employment fell nearly 20 percent, but Knox County lost only 5 percent. Even measuring from the 2006 peak, the decline was only 6.4 percent.

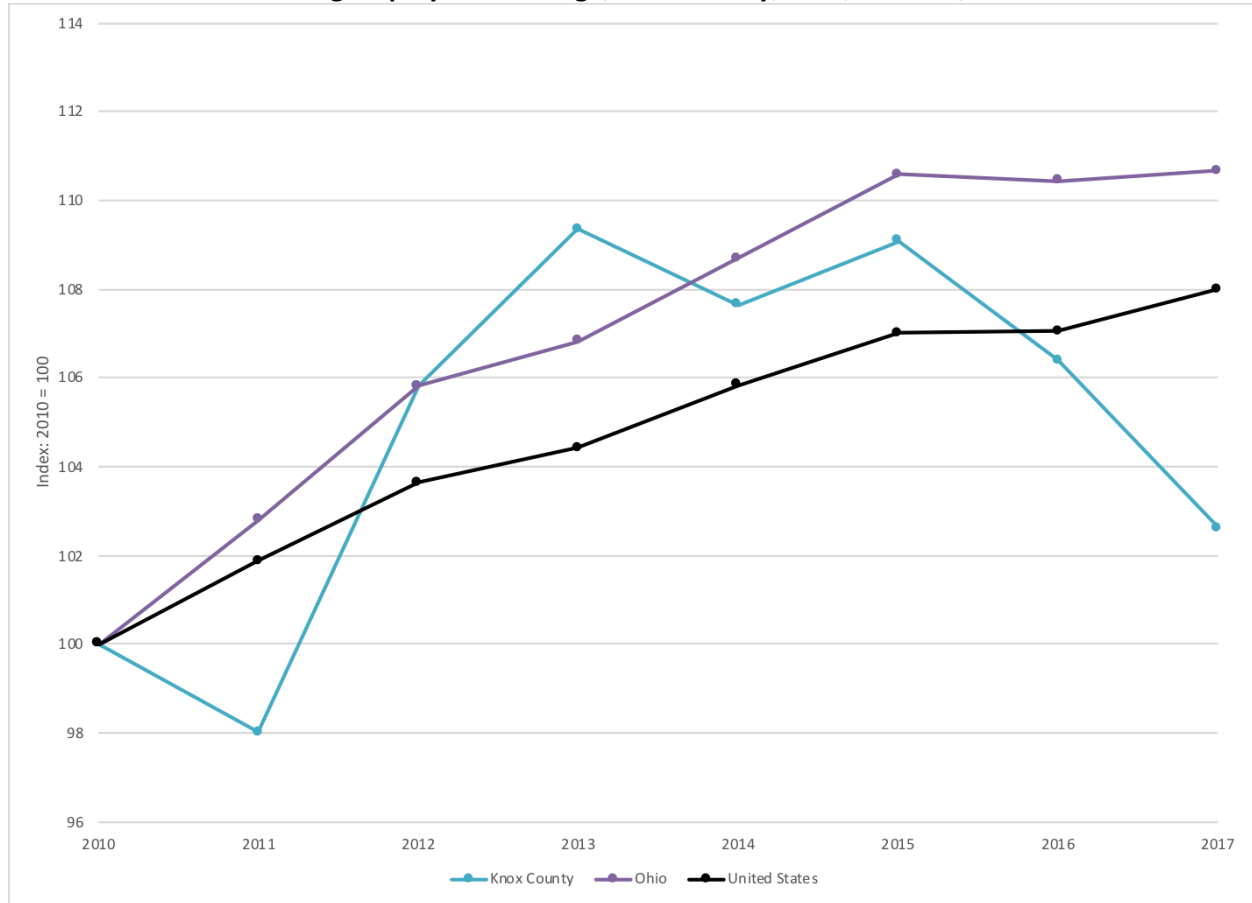
Manufacturing employment has been increasing in Ohio and the U.S. since 2010 – the first sustained employment increases in manufacturing since the early 1990s. This drove Knox County employment to a 1.1 percent net gain for the 16-year period, compared to net losses between 2001 and 2017 of 28.2 percent for Ohio and 24.3 percent for the U.S. Because of the large declines in earlier years, these recent gains are not readily apparent in Figure 1. Consequently, Figure 2 shows comparative growth since 2010. Once again, Knox County's employment growth was unsteady, with declines in 2016 and 2017 totaling 285 jobs. Statewide and national employment growth flattened during those two years, although early indications are that employment growth strengthened somewhat during 2018 as growth in gross domestic product accelerated. Net growth between 2010 and 2017 was 9.3 percent for Ohio and 12.5 percent for Ohio, but 7.7 percent for Knox County.

The much stronger-than-average long-run employment growth of Knox County manufacturing suggests that manufacturing is an economic driver. Economic drivers are industries with greater-than-average concentration within an area and with long-term growth that is faster than average. The implication is that because driver industries are unusually large and growing rapidly in a specific location, there is likely some set of environmental and/or economic characteristics making firms in these industries more competitive than similar firms located elsewhere. These characteristics, such as access to raw materials, suppliers, or transportation, are generally reasonably permanent. Consequently, the list of drivers tends to be very stable over time and through the business cycle. Thus, these industries are likely to benefit the area's economy over the long term, and are most likely to provide their workers stable jobs with career growth potential. However, it is more helpful to identify drivers among detailed industries within manufacturing than to consider the entire sector a driver. This is part of the task of the next section.

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<sup>1</sup> The recession ended in June 2009, but employment growth resumed only in February 2010. Total U.S. employment during 2010 was less than that during 2009.

**Figure 2**  
**Manufacturing Employment Change, Knox County, Ohio, and U.S., 2010-2017**



**Source:** Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

In addition to high concentration and growth, the formal definition of a driver includes the need to be an “export industry.” These are industries creating a net inflow of dollars to the local economy by producing goods or services for markets elsewhere. This inflow of dollars is the only way that local incomes can increase and household living standards can improve. Further, export industries’ growth potential is far greater than that of local industries. The growth rate of local industries is limited in the long run to local population or income growth. In contrast, as long as export industries can identify and develop new markets their growth can continue – limited only by the local area’s ability to support the growing production. Local industries include retail, restaurants, some business services, some medical services, most repair and personal services, and local government. (Obviously, some establishments in many of these industries do rely on customers from outside the area – major outlet malls or restaurants at freeway exits, for example. The question is whether the industry as a whole is primarily inward-facing or outward-facing.)

### **Growth and Concentration of Manufacturing industries**

Table A-1 in the Appendix reports estimated Knox County employment of segments of the manufacturing sector. The classification scheme used for industry employment (the North American Industry Classification System, or NAICS) is a nested system. Broad industry sectors (e.g., manufacturing) are composed of subsectors, which are in turn composed of industry groups; industry groups consist of

detailed industries. For the sake of completeness, Table A-1 lists all manufacturing subsectors, including those with no employment. The indented titles are industry groups within the subsector above. Industry groups are listed only for selected subsectors (details below) and only for industry groups with employment in Knox County. These employment totals are obtained not from the Quarterly Census of Employment and Wages (QCEW) that was used to generate Figures 1 and 2, but rather from the U.S. Census Bureau's County Business Patterns (CBP). Unlike the annual averages available from the QCEW, CBP provides employment totals only for mid-March, with 2016 employment the most recent currently available.

Many of these employment totals are estimates, especially those for the industry groups. In all government databases, employment totals for individual establishments are confidential. Accordingly, employment is not reported in either QCEW or CBP for industries with few establishments or one dominant establishment. The employment of a related classification is usually also suppressed to prevent derivation of that total. However, CBP includes the number of establishments by employment size class for all industries. If all establishments employing between five and nine (for example) are assumed to employ seven, multiplying seven by the number of establishments in that group gives an estimate of their total employment. Summing those totals across size classes yields an estimate of employment for the subsector or industry group. Additionally, subsector employments must sum to the sector total and industry group totals must sum to the related subsector total, so classifications for which employment totals are given provide an additional check on estimated employment. This additional information is the reason for using CBP rather than QCEW in this analysis.

Appendix Table A-2 provides location quotients for manufacturing in total and all subsectors and industry groups listed in Table A-1. The location quotient is a measure of relative concentration. It is calculated as the percentage of total employment within the classification in Knox County divided by the percentage of total employment within that classification nationally. Thus, a location quotient greater than 1.0 indicates a subsector or industry group with greater-than-average concentration, and a location quotient that is increasing over time indicates a subsector or industry group with growth above average. The location quotient for total manufacturing increased from 2.26 in 2004 to 2.99 in 2013 before declining to 2.69 in 2016. The level of the location quotient suggests a relative concentration far greater than average – employment in 2016 2.7 times that which would be expected. The increase in the location quotient over time points to stronger-than-average long-term growth, consistent with Figure 1.

Subsectors with high concentration and relatively high total employment are those whose occupations will be analyzed later in the report. These are:

- Wood product manufacturing – employment: 87, up from 22 in 2004; location quotient: 1.54, up from 0.29.
- Paper manufacturing – employment: 180, down from 406 in 2004; location quotient: 3.59, down from 6.13.
- Petroleum and coal products manufacturing – employment: 57, down from 75 in 2004; location quotient: 3.78, down from 5.06.
- Plastics and rubber products manufacturing – employment: 637, up from 325 in 2004; location quotient: 5.89, up from 2.51.
- Nonmetallic mineral product manufacturing – employment: 171, up from 149 in 2004; location quotient: 3.10, up from 2.21.
- Fabricated metal product manufacturing – employment: 326, up from 469 in 2004; location quotient: 1.61, down from 2.17.

- Machinery manufacturing – employment: 2,224, up from 1,464 in 2004; location quotient: 14.98, up from 9.44.
- Transportation equipment manufacturing – employment: 692, down from 963 in 2004; location quotient: 3.19, down from 4.16.

The 4,374 employees in these industries comprise 97 percent of total Knox County manufacturing employment. Machinery manufacturing alone is 49 percent. The increasing location quotients mean that wood product manufacturing, petroleum and coal product manufacturing, plastics and rubber product manufacturing, nonmetallic mineral product manufacturing, and machinery manufacturing are drivers. The other subsectors have higher-than-average concentration but slower-than-average growth. These can be thought of as challenged drivers. They should be included in the analysis. The high location quotients mean that the growth of these industries must have been above average at some point, but negative factors emerged that have slowed their growth. A shortage of appropriately trained workforce may be one of those negative factors. Conversations with industry leaders could disclose this and other factors. If these factors were addressed, this could return these industries to driver status and enhance Knox County's economic performance.

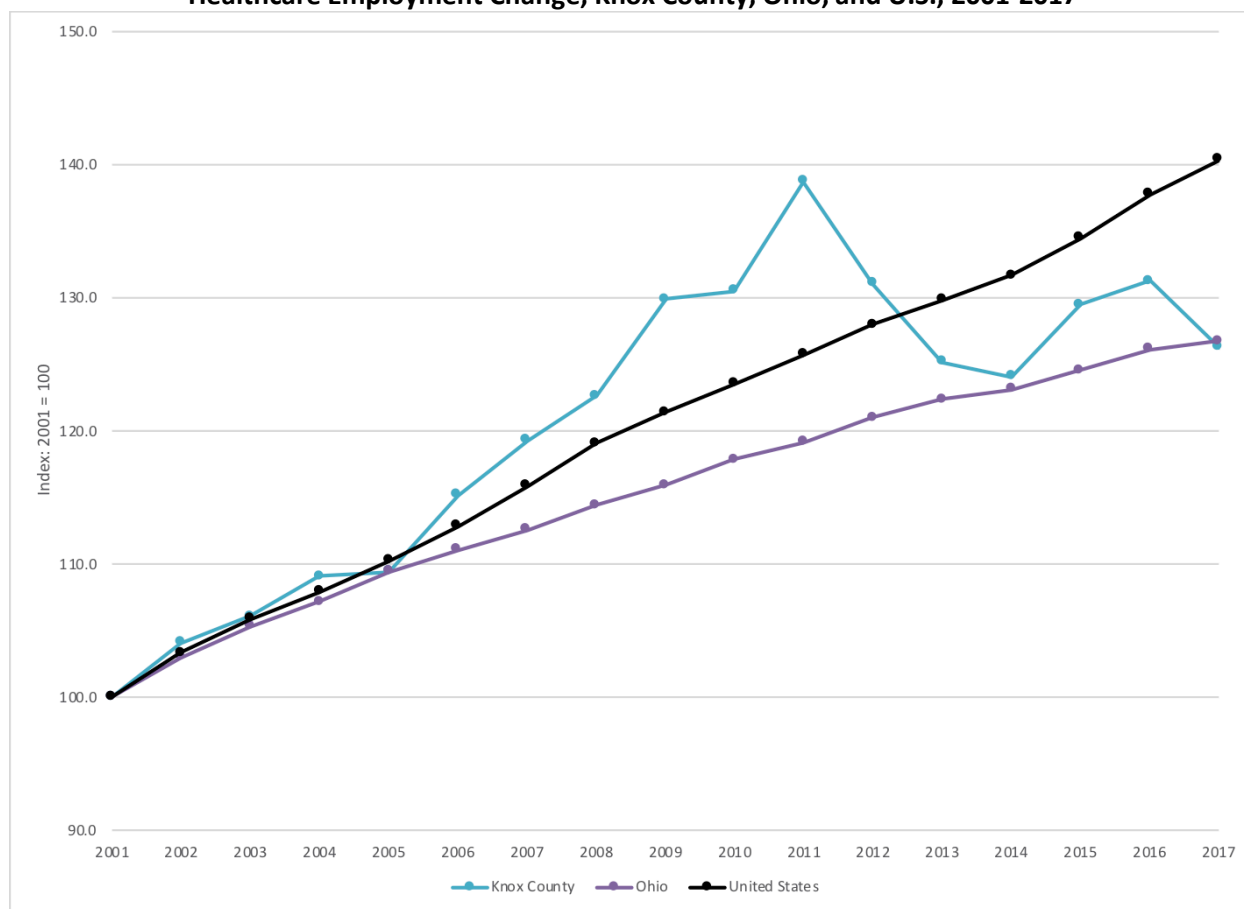
### **Healthcare Employment Growth**

Healthcare, like manufacturing, is an important component of the Knox County economy. This sector employs more than 2,500, more than 12 percent of total employment. This understates healthcare employment, however, because some healthcare workers are employed outside of healthcare establishments. Employees of pharmacies in drugstores and supermarkets are a primary example; nurses in schools and manufacturing plants are another. Healthcare employees in retail establishments will be included in the occupational analysis. Healthcare is important to Knox County and its economy for reasons beyond its employment, however. By curing illness and promoting wellness, healthcare services enhance the region's quality of life and the productivity of its workforce.

Figure 3 charts the employment of healthcare industries beginning in 2001. Unlike the manufacturing employment totals, these totals are estimates. The relevant QCEW sector includes both healthcare and social assistance: child welfare services, senior centers, crisis intervention centers, food banks, vocational rehabilitation services, child day care centers, and the like. These establishments are in their own social assistance subsector, but social assistance employment is suppressed in the QCEW to prevent calculation of the employment of the one hospital in the county. This is true for most years in CBP as well, but the availability of number of establishments by employment size and the disclosure of some of the industry groups allows social assistance employment to be estimated. Employment in the subsector is never more than 15 percent of the healthcare and social assistance total. Each year's percentage is multiplied by the Knox County sector total in the QCEW to estimate healthcare employment. There is no suppression in the U.S. or Ohio employment totals, so U.S. and Ohio healthcare employment is obtained directly from the QCEW.

Knox County healthcare employment tracked the U.S. average before increasing rapidly between 2005 and 2011. During this period, Knox County employment increased approximately 565, or 27 percent – nearly twice the 14 percent national average growth and three times the 9 percent Ohio growth over that period. The employment decline in subsequent years brought net growth between 2001 and 2017 back to the Ohio average. Knox County healthcare employment was 26.2 percent higher in 2017 than in 2001, compared to gains of 26.7 percent for Ohio and 40.3 percent for the U.S. The much slower population growth in Ohio is a key reason for the slower-than-average healthcare employment growth.

**Figure 3**  
**Healthcare Employment Change, Knox County, Ohio, and U.S., 2001-2017**



**Source:** Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics. Knox County totals estimated; see text.

### Growth and Concentration of Healthcare Industries

Appendix Table A-3 shows employment estimates for the subsectors and industry groups within healthcare. Analysis of these totals provides the causes for the rapid employment increase and subsequent decline graphed in Figure 3. The 2005-2011 net gain is 502, somewhat smaller than the 565 from the QCEW estimates. The estimated employment increase of Knox Community Hospital during that period, 447, accounts for most of the gain. Home healthcare services added 121 and community care facilities for the elderly added 106. In contrast, employment in nursing care facilities declined 135 and physicians' offices lost 72 positions. The net decline of 40 positions between 2012 and 2014 was largely due to a correction of earlier growth. The hospital shed 69 positions and community care facilities for the elderly lost 56.

Location quotients are displayed in Table A-4. The location quotient for the sector overall is only 1.07, suggesting that employment in healthcare establishments is only slightly greater than would be expected in an economy the size of Knox County's. However, the location quotients for the subsectors and industry groups show a definite tilt toward residential care facilities, whose employment is nearly double that which would be expected. In contrast, the location quotient for ambulatory care services is

only 0.54, that for physicians' offices is only 0.28, and that for outpatient care centers (e.g., clinics and urgent care centers) is 0.63.

The extremely low location quotients for physicians' offices in particular suggest that too many Knox County residents must either travel outside the county to receive routine medical care or use the emergency room at the hospital. This is a significant public health worry, particularly for those residents lacking dependable transportation. A second point, although certainly not as worrisome, is that the spending and insurance reimbursements of these patients are leaking out of the Knox County economy. Table 1 examines this problem in more detail by showing 2008 and 2017 location quotients for Knox County and the adjacent counties. Knox County's employment and relative concentration have declined by half over the last decade. Among adjoining counties, only Delaware and Richland are marginally above average. Both counties' location quotients increased over the decade, suggesting that they are drawing increasing numbers of patients from other counties. Even so, the low location quotients for the region as a whole suggests that the industry is understaffed throughout the region. Attracting additional medical offices to Knox County would thus seem to be a significant need – an effort that could benefit nearby counties as well.

**Table 1**  
**Location Quotients for Offices of Physicians, 2008 and 2017**

| County    | 2008       |                   | 2017       |                   |
|-----------|------------|-------------------|------------|-------------------|
|           | Employment | Location quotient | Employment | Location quotient |
| Knox      | 195        | 0.60              | 109        | 0.30              |
| Ashland   | 247        | 0.82              | 251        | 0.76              |
| Coshocton | 151        | 0.78              | 87         | 0.48              |
| Delaware  | 744        | 0.64              | 1,596      | 1.01              |
| Holmes    | 95         | 0.34              | 91         | 0.26              |
| Licking   | 672        | 0.74              | 759        | 0.75              |
| Morrow    | 54         | 0.59              | 23         | 0.25              |
| Richland  | 960        | 1.03              | 977        | 1.09              |

**Source:** Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

The county's residential care facilities could be considered a driver in the sense that their high location quotient implies that they draw a significant number of patients from outside the county. The same is true of the hospital, whose location quotient is 1.21. Even so, they cannot be considered drivers to the same degree as the county's manufacturers, whose goods are sold nationally or internationally. Ambulatory health services are primarily community-focused, however, so we should not expect their location quotients to be far above 1.0 – although they certainly should be higher than they are.

## **Occupational and Skill Needs in Manufacturing and Healthcare**

### **Introduction**

Employment can be measured in two different ways. Industry employment refers to where people work regardless of the job they do, and occupational employment refers to the job people do regardless of where they work. All workers at Knox Community Hospital, from the CEO to the night orderly to the groundskeeper, are classified in the general medical and surgical hospitals industry. On the other hand, an accountant at the hospital and an accountant in a manufacturing plant would both be classified in the accountants and auditors occupation but in different industries. These two accountants perform similar

tasks, have similar educational and skill requirements, and may be able to transfer successfully between the hospital and the plant, but their work occurs in different settings. Projecting occupational needs in the manufacturing and healthcare requires a crosstabulation of the number of workers in each occupation within manufacturing and healthcare industries. This crosstab is available only at the national level, so the crosstab must be constructed for Knox County based on the national information.

The analysis is derived from national-level 10-year projections of occupational needs within specific industry groups produced by the U.S. Bureau of Labor Statistics (BLS) and provided in a database called the Industry-Occupation Employment Matrix. These projections include the current employment and projected growth of often more than 100 specific occupations within a given industry between 2016 and 2026. The projections take into account expected shifts in technology and other factors in coming years that are anticipated to alter the relative mix of occupations in the industry. Consequently, expected employment growth can be vastly different among individual occupations within an industry.

These national occupational employment totals and growth rates must be localized to Knox County. The county's 2016 total industry group employment in Tables A-1 and A-3 is multiplied by the percentage of total U.S. industry group employment in each occupation. The ten-year state-level growth projection for the industry group from the Ohio Labor Market Information Bureau (Ohio LMI) is used to obtain the 2026 employment total. This is multiplied by the 2026 occupational employment shares. This process assumes that current and projected staffing patterns in local firms are comparable to firms in the same industry elsewhere. The use of the Ohio LMI projections reflects the differences between projected local growth rates and the projected national industry growth that underlies the occupational growth rates projected by BLS. The result is estimated employment in each occupation for the industry group. These occupational totals are summed across industry groups to derive 2016 and 2026 occupational employment for manufacturing and healthcare in total.

Finally, it is important to reflect the fact that needs for new workers come from two sources: (1) growth needs, resulting from the expansion of the industry and the creation of new positions; and (2) replacement needs, resulting from openings in existing positions as workers vacate those positions for a variety of reasons. The BLS employment projections include annual replacement rates for each occupation. These are used directly in the occupational analyses to obtain annual replacement needs; there is no reason to suspect that turnover in Knox County is faster or slower than it is elsewhere.

Given the array of assumptions implicit in these estimates, they must not be taken literally. Rather, they are meant to identify the occupations and skills that are likely to be in greatest demand by manufacturing and healthcare in coming years. If these demands are not met, the firms within the industries in question will not be able to grow to their potential. Both because these two industry sectors include more than one-third of Knox County's total employment and because of healthcare's impact on workforce productivity, the failure to accommodate these needs would have negative impacts on the local economy as a whole.

### **Manufacturing Employment Needs**

The manufacturing occupational projections are derived from 11 industry groups with relatively high employment and high concentration:

- Veneer, plywood, and engineered wood product manufacturing – estimated employment: 57, location quotient: 5.27.

- Converted paper product manufacturing – estimated employment: 180, location quotient: 5.09.
- Petroleum and coal products manufacturing – estimated employment: 57, location quotient: 3.78.
- Plastics products manufacturing – estimated employment: 637, location quotient: 7.14.
- Cement and concrete product manufacturing – estimated employment: 141, location quotient: 5.78.
- Architectural and structural metal manufacturing – estimated employment: 259, location quotient: 5.18.
- Heating, ventilation, air-conditioning (HVAC) and commercial refrigeration equipment manufacturing – estimated employment: 75, location quotient: 4.10.
- Engine, turbine, and power transmission equipment manufacturing – estimated employment: 632, location quotient: 45.71.
- Other general purpose machinery manufacturing – estimated employment: 1,500, location quotient: 35.35.
- Motor vehicle parts manufacturing – estimated employment: 632, location quotient: 7.83.
- Other transportation equipment manufacturing – estimated employment: 60, location quotient: 12.96.

These 11 industry groups employ more than 4,200 workers in Knox County, 94 percent of total manufacturing employment. While the resulting analysis technically only covers these industry groups, the fact that these groups comprise such a large share of total manufacturing employment suggests that the results effectively prioritize occupational needs for the sector as a whole.

Appendix Table A-5 provides employment needs for the 25 occupations with the greatest total need. Occupations are classified and defined by the Standard Occupational Classification (SOC) system which, like NAICS, is a hierarchical system in which detailed occupations are categorized in 23 broad occupational groups. The SOC code for each occupation is shown in the first column of Table A-5. The first two digits before the dash indicate the occupational group, while the digits after the dash represent successively more detailed occupations. Manufacturing employment in total and in many of the occupations in this list is expected to decline over the decade in Knox County and nationally as the long-term shift from labor to technology continues. However, the need for replacement workers is so great that the 10-year need for new workers across the sector is nearly equal to current employment, and is greater than current employment for some occupations. The point made earlier bears repeating: if these positions are not filled, the efficiency, profitability, and competitiveness of these firms – and the overall Knox County economy – will suffer.

Team assemblers represent the largest share of the current manufacturing workforce at nearly 12 percent, and account for nearly 11 percent of the total need. Growth in this occupation was positive in earlier BLS employment projections, but is sharply negative in the current projection. This illustrates the increasing impact of technology on total manufacturing employment. A second important finding is that a number of these crucial occupations are in groups other than direct production (occupational group 51). This point is elaborated in Table A-6, which reports the projections results by industry group for all 179 occupations. (In order to save space, occupations with fewer than an estimated five workers are grouped into an “other occupations” category at the end of the occupational group.) Production occupations account for 56 percent of total sector employment in 2016 and 53 percent in 2026. The first five occupational groups, management, business and financial operations, computer, and architectural and engineering, comprise slightly more than 18 percent of employment in 2016, rising to 20 percent in 2026. Most of these occupations require a bachelor’s degree; some require an advanced degree. An ongoing challenge is attracting people with degrees to a manufacturing career, given the field’s

undeserved reputation as dirty and dead-end. A similar challenge is posed by the need for workers in the skilled trades – welders, electricians, mechanics, millwrights, etc. The insufficient number of people – particularly young people – attracted to these careers is a national problem. Too often, the young people and their parents and guidance counselors believe that a four-year degree is the one and only path to a successful career, including for individuals not suited to college. However, the skilled trades offer the opportunity to earn annual wages of \$50,000 or more after a training period much shorter than four or five years without the burden of tens of thousands of dollars in college debt. More should be done to convey this message to young people – and again, to their parents and guidance counselors as well – and broaden the availability of internships and apprenticeships.

### **Skill Needs for Critical Manufacturing Occupations**

The seven occupations with the greatest 10-year need in Table A-5 account for nearly one-third of total manufacturing needs. These occupations are profiled below. Each profile begins with the SOC definition of the occupation and then lists the occupation's education requirements and most important skill needs. The BLS Employment Projections database – the source for the national occupational projections underlying the needs analysis in this study – gives typical initial education or training requirements to enter the occupation, the amount of experience required in a related occupation, and the amount of on-the-job training required. The three most common levels of education attained by incumbents in the occupation are given in the Occupational Information Network (O\*NET – [www.onetonline.org](http://www.onetonline.org)) database. It is important to bear in mind that educational expectations for many occupations are increasing over time, so the higher levels of education in these distributions may have become the general requirement for new hires. O\*NET also provides a detailed prioritization of knowledge, skills, and abilities required to perform the job successfully – obtained from a survey of those in the occupation in question. Knowledge is acquired through education, training, and experience. Skills and abilities are less what one learns – although some can be taught to some extent – and more qualities that one possesses. The most important knowledge, skill, and ability requirements for the occupations are listed.

The pervasive knowledge requirement is an understanding of production and processing. Team assemblers need to be able to listen and communicate effectively. They need to have a focus on the needs of the team (service orientation). They, along with other operational workers, need to be able to perform physical tasks and operate within the setting of the overall process (coordination, monitoring, and time management). Supervisors need an understanding of the overall process as well as an understanding of how to manage people and the legal labor requirements. They also need to be able to communicate effectively and listen actively.

Previous discussions with manufacturing leaders have raised the difficulty of filling skilled trades positions such as welders, electricians, and machinists. These discussions have also brought forth the need for Computer Numerical Control (CNC) machine operators, Computer-Assisted Design (CAD) operators, and three-dimensional modeling and design technicians. The rapid automation of the manufacturing process has created these needs and increased the need for technical skills throughout the manufacturing workforce.

Both manufacturing and healthcare leaders (as well as those in many other fields) have pointed to a lack of soft skills among both applicants and incumbent workers. Among these are basic math skills, the ability to communicate effectively, the ability to interact appropriately with supervisors, peers, and subordinates, and the ability to maintain focus on the task at hand. (In a manufacturing setting, a lack of

focus can be dangerous.) One manufacturing CEO pointed out that he looked for either leadership abilities or leadership potential in all applicants. In part this comes from a desire to promote from within. It also arises from the fact that so much of the production process is team-driven and teams need leaders. In general, employers expect to have to train for technical skills, especially those related to the unique aspects of their business, but they do not often want to have to train for soft skills.

#### **51-2092: Team assemblers**

SOC definition: "Work as part of a team having responsibility for assembling an entire product or component of a product. Team assemblers can perform all tasks conducted by the team in the assembly process and rotate through all or most of them rather than being assigned to a specific task on a permanent basis. May participate in making management decisions affecting the work. Includes team leaders who work as part of the team."

##### **Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels:** High school diploma: 86%; Less than high school diploma: 6%; Post-secondary certificate: 4%.

##### **Knowledge**

Production and Processing  
English Language  
Customer and Personal Service  
Mechanical  
Education and Training

##### **Skills**

Coordination  
Monitoring  
Quality Control Analysis  
Active Listening  
Critical Thinking  
Speaking  
Time Management

##### **Abilities**

Manual Dexterity  
Finger Dexterity  
Problem Sensitivity  
Near Vision  
Oral Comprehension  
Arm-Hand Steadiness  
Deductive Reasoning  
Information Ordering  
Control Precision  
Oral Expression

#### **51-4041: Machinists**

SOC definition: "Set up and operate a variety of machine tools to produce precision parts and instruments. Includes precision instrument makers who fabricate, modify, or repair mechanical instruments. May also fabricate and modify parts to make or repair machine tools or maintain industrial machines, applying knowledge of mechanics, mathematics, metal properties, layout, and machining procedures."

##### **Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Long-term.
- **Most common training/education levels:** Post-secondary certificate: 50%; High school diploma: 34%; Associate's degree: 5%.

##### **Knowledge**

Mathematics  
Mechanical  
Production and Processing  
English Language  
Design

##### **Skills**

Operation Monitoring  
Critical Thinking  
Operation and Control  
Active Listening  
Coordination  
Monitoring  
Reading Comprehension

##### **Abilities**

Arm-Hand Steadiness  
Manual Dexterity  
Control Precision  
Finger Dexterity  
Multi-limb Coordination  
Near Vision  
Information Ordering  
Problem Sensitivity  
Reaction Time  
Selective Attention

**51-4121.06: Welders, cutters, and welder fitters (sub-occupation of Welders, cutters, solderers, and brazers)**

O\*NET definition: "Use hand-welding or flame-cutting equipment to weld or join metal components or to fill holes, indentations, or seams of fabricated metal products."

**Education/training characteristics (for overall occupation):**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels (for sub-occupation):** Post-secondary certificate: 41%; High school diploma: 40%; Some college, no degree: 13%.

**Knowledge**

Production and Processing  
Design  
Administration and Management  
Mechanical  
Mathematics  
Customer and Personal Service  
English Language  
Engineering and Technology

**Skills**

Critical Thinking  
Operation and Control  
Monitoring  
Reading Comprehension  
Active Listening  
Judgment and Decision Making  
Operation Monitoring  
Speaking  
Coordination  
Mathematics

**Abilities**

Arm-Hand Steadiness  
Near Vision  
Control Precision  
Multi-limb Coordination  
Problem Sensitivity  
Visualization  
Manual Dexterity  
Depth Perception  
Information Ordering  
Selective Attention

**51-4121.06: Solderers and brazers (sub-occupation of Welders, cutters, solderers, and brazers)**

O\*NET definition: "Braze or solder together components to assemble fabricated metal parts, using soldering iron, torch, or welding machine and flux."

**Education/training characteristics (for overall occupation):**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels (for sub-occupation):** High school diploma: 45%; Less than high school diploma: 38%; Post-secondary certificate: 11%.

**Knowledge**

Production and Processing

**Skills**

Quality Control Analysis  
Monitoring  
Active Listening  
Operation Monitoring  
Critical Thinking  
Time Management

**Abilities**

Near Vision  
Finger Dexterity  
Arm-Hand Steadiness  
Manual Dexterity

**51-1011: First-line supervisors of production and operating workers**

SOC definition: "Directly supervise and coordinate the activities of production and operating workers, such as inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators."

**Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** Less than five years.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** High school diploma: 44%; Bachelor's degree: 23%; Some college, no degree: 14%.

**Knowledge**

Production and Processing  
Mechanical  
Administration and Management  
Personnel and Human Resources  
Engineering and Technology  
Computers and Electronics  
English Language  
Education and Training

**Skills**

Active Listening  
Speaking  
Coordination  
Critical Thinking  
Management of Personnel  
Resources  
Reading Comprehension  
Time Management  
Judgment and Decision Making  
Monitoring  
Social Perceptiveness

**Abilities**

Deductive Reasoning  
Oral Comprehension  
Oral Expression  
Problem Sensitivity  
Written Comprehension  
Speech Clarity  
Speech Recognition  
Inductive Reasoning  
Written Expression  
Category Flexibility

**53-7062: Laborers and freight, stock, and material movers, hand**

SOC definition: "Manually move freight, stock, or other materials or perform other general labor. Includes all manual laborers not elsewhere classified."

**Education/training characteristics:**

- **Typical entry-level education:** No formal education credential.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Short-term.
- **Most common training/education levels:** High school diploma: 70%; Less than high school diploma: 19%; Some college, no degree: 5%.

**Knowledge**

English Language  
Mathematics

**Skills**

Coordination  
Critical Thinking  
Operation and Control

**Abilities**

Static Strength  
Multi-limb Coordination  
Trunk Strength  
Control Precision  
Manual Dexterity  
Near Vision  
Oral Comprehension  
Stamina  
Deductive Reasoning

**41-4012: Sales representatives, wholesale and manufacturing, except technical and scientific products**

SOC definition: "Sell goods for wholesalers or manufacturers to businesses or groups of individuals. Work requires substantial knowledge of items sold."

**Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels:** Bachelor's degree: 77%; High school diploma: 22%.

**Knowledge**

Sales and Marketing  
Customer and Personal Service  
English Language  
Administration and Management

**Skills**

Active Listening  
Speaking  
Persuasion  
Social Perceptiveness  
Critical Thinking  
Negotiation  
Reading Comprehension  
Service Orientation  
Active Learning  
Coordination

**Abilities**

Oral Comprehension  
Oral Expression  
Speech Clarity  
Speech Recognition  
Written Comprehension  
Written Expression  
Problem Sensitivity  
Deductive Reasoning  
Near Vision  
Category Flexibility

**51-9061: Inspectors, testers, sorters, samplers, and weighers**

SOC definition: "Inspect, test, sort, sample, or weigh nonagricultural raw materials or processed, machined, fabricated, or assembled parts or products for defects, wear, and deviations from specifications. May use precision measuring instruments and complex test equipment."

**Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels:** High school diploma: 52%; Less than high school diploma: 14%; Post-secondary certificate: 14%.

**Knowledge**

Production and Processing  
Mathematics  
English Language

**Skills**

Quality Control Analysis  
Active Listening  
Critical Thinking  
Monitoring  
Reading Comprehension  
Speaking  
Coordination  
Judgment and Decision Making  
Operation Monitoring

**Abilities**

Oral Comprehension  
Oral Expression  
Near Vision  
Flexibility of Closure  
Problem Sensitivity  
Written Comprehension  
Deductive Reasoning  
Category Flexibility  
Inductive Reasoning  
Information Ordering

**Healthcare Employment Needs**

The healthcare employment projections are based on the information for seven industry groups:

- Offices of physicians – estimated employment: 103, location quotient: 0.28.
- Offices of dentists – estimated employment: 150, location quotient: 1.13.
- Home healthcare services – estimated employment: 154, location quotient: 0.75.
- General medical and surgical hospitals – estimated employment: 1,015, location quotient: 1.21.
- Nursing care facilities – estimated employment: 398, location quotient: 1.66.

- Residential intellectual and developmental disability facilities – estimated employment: 276, location quotient: 2.52.
- Continuing care retirement communities and assisted living facilities for the elderly – estimated employment: 282, location quotient: 2.07.

The estimated employment of these seven industry groups totals nearly 2,400, approximately 94 percent of total healthcare employment.

Table A-7 ranks the total need of the 25 occupations with the greatest 10-year need. Unlike manufacturing, healthcare employment growth is expected to be significantly positive as the aging population requires more healthcare services. Nevertheless, replacement needs account for the bulk of the total need. The two occupations with the greatest need, personal care aides and nursing assistants, comprise 28 percent of the total need across the sector. These are entry-level positions with relatively high turnover, but can be the first rung of a career ladder leading to higher-level positions in healthcare. It is also worth noting that physicians do not appear on this list. The greatest need is for support staff, both within healthcare occupations (occupational groups 29 and 31) and elsewhere. As in manufacturing, if these needs are not met, healthcare establishments will not be able to operate efficiently. Here, however, the result could be untreated illnesses and negative healthcare outcomes.

A comprehensive view of employment needs by occupational group is in Table A-8. The healthcare practitioners (group 29) and healthcare support (group 31) occupations together account for 60 percent of total employment. Personal care and office and administrative support occupations are 11 percent each. Personal care is expected to rise to 12.5 percent by 2026 and administrative support is expected to decline slightly. Other occupations are widely distributed among the occupational groups.

The concern was raised earlier that physicians' offices are significantly underrepresented in the Knox County economy, which could pose a public health threat. Accordingly, Table A-9 presents the occupations ranked by total need that would increase employment in physicians' offices by one-half over the next decade. This need is in addition to those in Tables A-7 and A-8. In addition to nurses, nurse practitioners (who can diagnose and treat illness and prescribe medication), medical assistants, and support staff, this expansion would require approximately 12 new physicians of various specialties. Please note that although the net employment change would be 52, the need to fill vacancies arising over the decade would increase the total 10-year need to about 145 new workers. Also note that this increase would bring the county's location quotient only to about 0.45, all else equal. The needs are approximately linear, though, so the requirements created by doubling the employment from its 2016 level rather than increasing it by 50 percent, for example, could be estimated by multiplying the 10-year needs in Table A-9 by two.

### **Skill Needs for Critical Healthcare Occupations**

Profiles of the eight occupations with the largest total needs in Table A-7 are below, including several nursing sub-occupations. The eight occupations account for 55 percent of the total 10-year need across the healthcare sector.

Not surprisingly, an understanding of customer service and a service orientation appears throughout these profiles. In many cases, knowledge of psychology is also important. People in these occupations need to be able to speak clearly and convey information in understandable terms. They have to listen actively, coordinate their activities with those of others, think critically, reason, and be aware of when

problems arise. As in manufacturing, soft skills are considered to be nearly as important in healthcare as are technical skills, and are not as present in applicants or incumbents as often as employers would like. In addition, computer skills are becoming far more important with the increasing emphasis on electronic health records. These skills are not as emphasized in nursing training as they should be, according to some industry leaders, and some nurses are not adequately equipped to deal with the technology.

### **39-9021: Personal care aides**

SOC definition: "Assist the elderly, convalescents, or persons with disabilities with daily living activities at the person's home or in a care facility. Duties performed at a place of residence may include keeping house (making beds, doing laundry, washing dishes) and preparing meals. May provide assistance at non-residential care facilities. May advise families, the elderly, convalescents, and persons with disabilities regarding such things as nutrition, cleanliness, and household activities."

#### **Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Short-term.
- **Most common training/education levels:** High school diploma: 54%; Less than high school: 17%; Some college, no degree: 17%.

#### **Knowledge**

Customer and Personal Service  
English Language  
Psychology

#### **Skills**

Service Orientation  
Social Perceptiveness  
Active Listening  
Speaking  
Monitoring  
Coordination  
Critical Thinking  
Instructing  
Judgment and Decision Making  
Time Management

#### **Abilities**

Oral Comprehension  
Oral Expression  
Problem Sensitivity  
Deductive Reasoning  
Near Vision  
Speech Clarity  
Written Comprehension  
Inductive Reasoning  
Information Ordering  
Speech Recognition

### **31-1014: Nursing Assistants**

SOC definition: "Provide basic patient care under direction of nursing staff. Perform duties such as feed, bathe, dress, groom, or move patients, or change linens. May transfer or transport patients. Includes nursing care attendants, nursing aides, and nursing attendants."

#### **Education/training characteristics:**

- **Typical entry-level education:** Postsecondary nondegree award.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** High school diploma: 60%; Postsecondary certificate: 25%; Some college, no degree: 8%.

#### **Knowledge**

Customer and Personal Service  
English Language  
Psychology  
Medicine and Dentistry  
Public Safety and Security  
Education and Training  
Therapy and Counseling

#### **Skills**

Service Orientation  
Active Listening  
Social Perceptiveness  
Coordination  
Monitoring  
Speaking  
Critical Thinking  
Reading Comprehension  
Judgment and Decision Making  
Time Management

#### **Abilities**

Oral Comprehension  
Problem Sensitivity  
Near Vision  
Oral Expression  
Speech Recognition  
Written Comprehension  
Speech Clarity  
Static Strength  
Deductive Reasoning  
Inductive Reasoning

### 29-1141: Registered nurses

SOC definition: "Provide advanced nursing care for patients with acute conditions such as heart attacks, respiratory distress syndrome, or shock. May care for pre- and post-operative patients or perform advanced, invasive diagnostic or therapeutic procedures."

#### Education/training characteristics:

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Associate degree: 66%; Bachelor's degree: 23%; Some college, no degree: 11%.

#### Knowledge

Medicine and Dentistry  
Customer and Personal Service  
Psychology  
English Language  
Education and Training  
Therapy and Counseling  
Mathematics  
Biology  
Sociology and Anthropology  
Computers and Electronics

#### Skills

Active Listening  
Social Perceptiveness  
Service Orientation  
Speaking  
Coordination  
Critical Thinking  
Reading Comprehension  
Judgment and Decision Making  
Monitoring  
Writing

#### Abilities

Oral Comprehension  
Oral Expression  
Problem Sensitivity  
Deductive Reasoning  
Inductive Reasoning  
Written Comprehension  
Speech Clarity  
Speech Recognition  
Information Ordering  
Near Vision

### 29-1141.01: Acute care nurses (sub-occupation of Registered nurses)

O\*NET definition: "Provide advanced nursing care for patients with acute conditions such as heart attacks, respiratory distress syndrome, or shock. May care for pre- and post-operative patients or perform advanced, invasive diagnostic or therapeutic procedures."

#### Education/training characteristics (for overall occupation):

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Associate degree: 50%; Bachelor's degree: 39%; Master's degree: 7%.

#### Knowledge

Medicine and Dentistry  
Customer and Personal Service  
English Language  
Education and Training  
Psychology  
Therapy and Counseling  
Mathematics  
Biology  
Sociology and Anthropology

#### Skills

Active Listening  
Critical Thinking  
Monitoring  
Reading Comprehension  
Service Orientation  
Social Perceptiveness  
Speaking  
Active Learning  
Complex Problem Solving  
Coordination

#### Abilities

Oral Comprehension  
Problem Sensitivity  
Deductive Reasoning  
Inductive Reasoning  
Information Ordering  
Oral Expression  
Speech Clarity  
Written Comprehension  
Near Vision  
Speech Recognition

**29-1141.02: Advanced practice psychiatric nurses (sub-occupation of Registered nurses)**

O\*NET definition: "Provide advanced nursing care for patients with psychiatric disorders. May provide psychotherapy under the direction of a psychiatrist."

**Education/training characteristics (for overall occupation):**

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Master's degree: 66%; Post-master's certificate: 24%; Professional degree: 7%.

**Knowledge**

Therapy and Counseling  
Psychology  
English Language  
Medicine and Dentistry  
Education and Training  
Customer and Personal Service  
Sociology and Anthropology  
Biology  
Law and Government  
Philosophy and Theology

**Skills**

Active Listening  
Social Perceptiveness  
Critical Thinking  
Reading Comprehension  
Speaking  
Active Learning  
Judgment and Decision Making  
Service Orientation  
Writing  
Complex Problem Solving

**Abilities**

Problem Sensitivity  
Oral Comprehension  
Oral Expression  
Deductive Reasoning  
Inductive Reasoning  
Speech Clarity  
Written Comprehension  
Written Expression  
Information Ordering  
Speech Recognition

**29-1141.03: Critical care nurses (sub-occupation of Registered nurses)**

O\*NET definition: "Provide advanced nursing care for patients in critical or coronary care units."

**Education/training characteristics (for overall occupation):**

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Associate degree: 45%; Bachelor's degree: 45%; Some college, no degree: 5%.

**Knowledge**

Medicine and Dentistry  
Psychology  
Biology  
English Language  
Customer and Personal Service  
Education and Training  
Mathematics  
Sociology and Anthropology  
Therapy and Counseling  
Computers and Electronics

**Skills**

Active Listening  
Service Orientation  
Critical Thinking  
Monitoring  
Reading Comprehension  
Social Perceptiveness  
Speaking  
Active Learning  
Coordination  
Complex Problem Solving

**Abilities**

Deductive Reasoning  
Inductive Reasoning  
Oral Comprehension  
Oral Expression  
Problem Sensitivity  
Speech Clarity  
Information Ordering  
Speech Recognition  
Written Comprehension  
Near Vision

**29-1141.04: Clinical nurse specialists (sub-occupation of Registered nurses)**

O\*NET definition: "Plan, direct, or coordinate the daily patient care activities in a clinical practice. Ensure adherence to established clinical policies, protocols, regulations, and standards."

**Education/training characteristics (for overall occupation):**

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Master's degree: 88%; Post-master's certificate: 8%; Doctoral degree: 4%.

**Knowledge**

Education and Training  
Medicine and Dentistry  
English Language  
Customer and Personal Service  
Psychology  
Biology  
Therapy and Counseling  
Mathematics  
Sociology and Anthropology  
Administration and Management

**Skills**

Speaking  
Active Learning  
Active Listening  
Coordination  
Critical Thinking  
Reading Comprehension  
Service Orientation  
Social Perceptiveness  
Instructing  
Judgment and Decision Making

**Abilities**

Oral Expression  
Oral Comprehension  
Problem Sensitivity  
Deductive Reasoning  
Inductive Reasoning  
Speech Clarity  
Written Comprehension  
Written Expression  
Speech Recognition  
Information Ordering

**31-1011: Home health aides**

SOC definition: "Provide routine individualized healthcare such as changing bandages and dressing wounds, and applying topical medications to the elderly, convalescents, or persons with disabilities at the patient's home or in a care facility. Monitor or report changes in health status. May also provide personal care such as bathing, dressing, and grooming of patient."

**Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Short-term.
- **Most common training/education levels:** High school diploma: 63%; Postsecondary certificate: 21%; Associate degree: 9%.

**Knowledge**

Customer and Personal Service  
English Language

**Skills**

Active Listening  
Service Orientation  
Social Perceptiveness  
Critical Thinking  
Monitoring  
Reading Comprehension  
Instructing  
Persuasion  
Speaking  
Time Management

**Abilities**

Oral Expression  
Oral Comprehension  
Problem Sensitivity  
Near Vision  
Inductive Reasoning  
Deductive Reasoning  
Information Ordering  
Speech Clarity  
Speech Recognition  
Written Expression

**29-2061: Licensed practical and licensed vocational nurses**

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

**Education/training characteristics:**

- **Typical entry-level education:** Bachelor's degree.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** None.
- **Most common training/education levels:** Postsecondary certificate: 43%; Some college, no degree: 35%; Associate degree: 20%.

**Knowledge**

Medicine and Dentistry  
Customer and Personal Service  
Psychology  
English Language  
Therapy and Counseling  
Mathematics  
Education and Training  
Administration and Management  
Chemistry  
Law and Government

**Skills**

Service Orientation  
Active Listening  
Coordination  
Monitoring  
Reading Comprehension  
Social Perceptiveness  
Speaking  
Time Management  
Critical Thinking  
Judgment and Decision Making

**Abilities**

Oral Comprehension  
Oral Expression  
Problem Sensitivity  
Speech Clarity  
Written Comprehension  
Speech Recognition  
Near Vision  
Deductive Reasoning  
Inductive Reasoning  
Information Ordering

**37-2012: Maids and housekeeping cleaners**

SOC definition: "Perform any combination of light cleaning duties to maintain private households or commercial establishments, such as hotels and hospitals, in a clean and orderly manner. Duties may include making beds, replenishing linens, cleaning rooms and halls, and vacuuming."

**Education/training characteristics:**

- **Typical entry-level education:** No formal educational credential.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Short-term.
- **Most common training/education levels:** High school diploma: 64%; Less than high school: 35%; Bachelor's degree: 1%.

**Knowledge**

Customer and Personal Service  
English Language

**Skills**

Service Orientation  
Coordination

**Abilities**

Extent Flexibility  
Trunk Strength  
Stamina  
Information Ordering  
Near Vision  
Oral Comprehension  
Problem Sensitivity

**43-6013: Medical secretaries**

SOC definition: "Perform secretarial duties using specific knowledge of medical terminology and hospital, clinic, or laboratory procedures. Duties may include scheduling appointments, billing patients, and compiling and recording medical charts, reports, and correspondence."

**Education/training characteristics:**

- **Typical entry-level education:** High school diploma or equivalent.
- **Work experience in a related occupation:** None.
- **Typical on-the-job training:** Moderate-term.
- **Most common training/education levels:** Some college, no degree: 41%; High school diploma: 37%; Postsecondary certificate: 20%.

**Knowledge**

Customer and Personal Service  
English Language  
Clerical  
Computers and Electronics  
Administration and Management

**Skills**

Speaking  
Active Listening  
Service Orientation  
Reading Comprehension  
Coordination  
Social Perceptiveness  
Time Management  
Writing  
Complex Problem Solving  
Critical Thinking

**Abilities**

Oral Comprehension  
Oral Expression  
Speech Clarity  
Speech Recognition  
Written Comprehension  
Near Vision  
Written Expression  
Deductive Reasoning  
Inductive Reasoning  
Information Ordering

## Appendix

**Table A-1**  
**Knox County Manufacturing Employment by Subsector and Industry Group, 2004-2016**

| Subsector/industry group   | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2012         | 2013         | 2014         | 2015         | 2016         |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Manufacturing</b>   | <b>4,462</b> | <b>4,699</b> | <b>4,979</b> | <b>4,839</b> | <b>4,523</b> | <b>4,269</b> | <b>4,350</b> | <b>4,538</b> | <b>4,739</b> | <b>4,875</b> | <b>4,729</b> | <b>4,522</b> | <b>4,498</b> |
| Food manufacturing   | 30           | 15           | 49           | 17           | 17           | 22           | 30           | 15           | 17           | 17           | 17           | 15           | 15           |
| Beverage and tobacco product manufacturing                         | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Textile mills  | 15           | 15           | 7            | 15           | 0            | 2            | 7            | 9            | 2            | 2            | 2            | 2            | 2            |
| Textile product mills  | 19           | 17           | 17           | 15           | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Apparel manufacturing  | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Leather and allied product manufacturing                           | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Wood product manufacturing   | 22           | 31           | 45           | 50           | 86           | 53           | 51           | 54           | 61           | 66           | 70           | 69           | 87           |
| Sawmills and wood preservation                                     | 0            | 7            | 10           | 10           | 12           | 9            | 9            | 9            | 9            | 12           | 12           | 5            | 13           |
| Veneer, plywood, and engineered wood product manufacturing         | 15           | 17           | 28           | 33           | 54           | 26           | 24           | 33           | 40           | 42           | 43           | 52           | 57           |
| Other wood product manufacturing                                   | 7            | 7            | 7            | 7            | 20           | 18           | 18           | 12           | 12           | 12           | 15           | 12           | 17           |
| Paper manufacturing  | 406          | 402          | 438          | 273          | 203          | 226          | 164          | 186          | 167          | 168          | 161          | 162          | 180          |
| Converted paper product manufacturing                              | 406          | 402          | 438          | 273          | 203          | 226          | 164          | 186          | 167          | 168          | 161          | 162          | 180          |
| Printing and related support activities                            | 144          | 120          | 120          | 20           | 56           | 19           | 22           | 34           | 34           | 28           | 28           | 25           | 38           |
| Petroleum and coal products manufacturing                          | 75           | 75           | 110          | 75           | 75           | 62           | 75           | 90           | 75           | 75           | 75           | 63           | 57           |
| Petroleum and coal products manufacturing                          | 75           | 75           | 110          | 75           | 75           | 62           | 75           | 90           | 75           | 75           | 75           | 63           | 57           |
| Chemical manufacturing   | 2            | 2            | 2            | 2            | 7            | 4            | 7            | 2            | 4            | 2            | 2            | 7            | 2            |
| Plastics and rubber products manufacturing                         | 325          | 340          | 312          | 250          | 317          | 231          | 351          | 335          | 462          | 509          | 574          | 583          | 637          |
| Plastics product manufacturing                                     | 323          | 338          | 310          | 250          | 317          | 231          | 351          | 335          | 462          | 509          | 574          | 583          | 637          |
| Rubber product manufacturing                                       | 2            | 2            | 2            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Nonmetallic mineral product manufacturing                          | 149          | 194          | 297          | 386          | 339          | 262          | 241          | 200          | 196          | 182          | 177          | 156          | 171          |
| Glass and glass product manufacturing                              | 2            | 2            | 2            | 2            | 2            | 2            | 2            | 2            | 2            | 2            | 2            | 0            | 0            |
| Cement and concrete product mfg.                                   | 147          | 192          | 295          | 354          | 307          | 230          | 209          | 168          | 164          | 150          | 145          | 117          | 141          |
| Other nonmetallic mineral product mfg.                             | 0            | 0            | 0            | 30           | 30           | 30           | 30           | 30           | 30           | 30           | 30           | 39           | 30           |
| Primary metal manufacturing  | 90           | 90           | 90           | 90           | 75           | 61           | 75           | 75           | 75           | 35           | 35           | 0            | 0            |
| Fabricated metal product manufacturing                             | 469          | 453          | 512          | 565          | 463          | 417          | 382          | 385          | 224          | 229          | 199          | 179          | 326          |
| Forging and stamping   | 102          | 92           | 78           | 125          | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Architectural and structural metals mfg.                           | 219          | 184          | 213          | 150          | 184          | 161          | 159          | 145          | 97           | 97           | 108          | 108          | 259          |
| Spring and wire product manufacturing                              | 0            | 0            | 0            | 0            | 14           | 10           | 11           | 10           | 15           | 7            | 7            | 0            | 0            |
| Machine shops; turned product; and screw, nut & bolt manufacturing | 98           | 122          | 136          | 193          | 251          | 239          | 205          | 223          | 105          | 118          | 77           | 64           | 59           |
| Other fabricated metal product mfg.                                | 50           | 55           | 85           | 97           | 14           | 7            | 7            | 7            | 7            | 7            | 7            | 7            | 8            |
| Machinery manufacturing  | 1,464        | 1,651        | 1,719        | 1,806        | 1,767        | 2,014        | 2,133        | 2,365        | 2,502        | 2,501        | 2,356        | 2,368        | 2,224        |

| Subsector/industry group  | 2004 | 2005  | 2006 | 2007 | 2008 | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  |
|---|------|-------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| Agriculture, construction, and mining machinery manufacturing   | 0    | 0     | 0    | 0    | 0    | 0     | 0     | 70    | 0     | 0     | 0     | 0     | 0     |
| Industrial machinery manufacturing                              | 2    | 2     | 7    | 7    | 7    | 2     | 2     | 2     | 2     | 4     | 4     | 4     | 2     |
| Commercial and service industry machinery manufacturing         | 0    | 0     | 0    | 15   | 0    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| HVAC and commercial refrigeration equipment manufacturing       | 90   | 60    | 60   | 60   | 55   | 45    | 70    | 70    | 70    | 70    | 75    | 75    | 75    |
| Metalworking machinery manufacturing                            | 0    | 0     | 0    | 0    | 0    | 0     | 0     | 0     | 2     | 7     | 7     | 15    | 15    |
| Engine, turbine, and power transmission equipment manufacturing | 910  | 775   | 820  | 850  | 950  | 1,250 | 1,300 | 1,400 | 1,175 | 1,175 | 1,100 | 674   | 632   |
| Other general purpose machinery mfg.                            | 462  | 814   | 832  | 874  | 755  | 717   | 761   | 893   | 1,253 | 1,245 | 1,170 | 1,600 | 1,500 |
| Computer and electronic product mfg.                            | 22   | 24    | 15   | 15   | 50   | 22    | 9     | 17    | 9     | 2     | 2     | 9     | 4     |
| Electrical equipment, appliance, and component manufacturing    | 180  | 163   | 163  | 331  | 219  | 169   | 110   | 203   | 205   | 195   | 160   | 35    | 42    |
| Transportation equipment manufacturing                          | 963  | 1,018 | 990  | 857  | 797  | 661   | 655   | 523   | 686   | 839   | 841   | 826   | 692   |
| Motor vehicle body and trailer mfg.                             | 0    | 0     | 0    | 0    | 0    | 0     | 0     | 0     | 0     | 2     | 7     | 0     | 0     |
| Motor vehicle parts manufacturing                               | 773  | 828   | 815  | 727  | 671  | 515   | 543   | 523   | 616   | 727   | 727   | 728   | 632   |
| Aerospace product and parts manufacturing                       | 2    | 0     | 0    | 0    | 0    | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |
| Other transportation equipment mfg.                             | 190  | 190   | 175  | 130  | 126  | 146   | 112   | 0     | 70    | 110   | 107   | 98    | 60    |
| Furniture and related product manufacturing                     | 43   | 45    | 51   | 46   | 45   | 37    | 38    | 20    | 16    | 21    | 21    | 17    | 17    |
| Miscellaneous manufacturing                                     | 44   | 44    | 42   | 26   | 7    | 7     | 7     | 7     | 4     | 4     | 9     | 6     | 4     |

Indented titles are industry groups that are components of the subsector above.

**Source:** County Business Patterns, U.S. Census Bureau. Some totals estimated by Regionomics; see text.

Table A-2

## Knox County Manufacturing Location Quotients by Subsector and Industry Group, 2004-2016

| Subsector/industry group   | 2004        | 2005        | 2006        | 2007        | 2008        | 2009        | 2010        | 2011        | 2012        | 2013        | 2014        | 2015        | 2016        |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Manufacturing</b>   | <b>2.26</b> | <b>2.36</b> | <b>2.48</b> | <b>2.54</b> | <b>2.41</b> | <b>2.53</b> | <b>2.75</b> | <b>2.84</b> | <b>2.97</b> | <b>2.99</b> | <b>2.83</b> | <b>2.67</b> | <b>2.69</b> |
| Food manufacturing   | 0.14        | 0.07        | 0.23        | 0.08        | 0.08        | 0.11        | 0.14        | 0.07        | 0.08        | 0.08        | 0.08        | 0.07        | 0.07        |
| Beverage and tobacco product manufacturing                         | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Textile mills  | 0.47        | 0.49        | 0.25        | 0.64        | 0.00        | 0.11        | 0.44        | 0.56        | 0.13        | 0.13        | 0.13        | 0.13        | 0.14        |
| Textile product mills  | 0.78        | 0.71        | 0.74        | 0.69        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Apparel manufacturing  | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Leather and allied product manufacturing                           | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Wood product manufacturing   | 0.29        | 0.38        | 0.53        | 0.66        | 1.22        | 0.95        | 1.00        | 1.08        | 1.25        | 1.30        | 1.31        | 1.25        | 1.54        |
| Sawmills and wood preservation                                     | 0.00        | 0.41        | 0.57        | 0.62        | 0.81        | 0.74        | 0.79        | 0.78        | 0.82        | 1.09        | 1.03        | 0.41        | 1.06        |
| Veneer, plywood, and engineered wood product mfg.                  | 0.93        | 1.00        | 1.53        | 2.12        | 3.95        | 2.50        | 2.54        | 3.68        | 4.71        | 4.50        | 4.30        | 5.11        | 5.27        |
| Other wood product manufacturing                                   | 0.16        | 0.15        | 0.14        | 0.16        | 0.48        | 0.54        | 0.60        | 0.41        | 0.41        | 0.39        | 0.47        | 0.37        | 0.51        |
| Paper manufacturing  | 6.13        | 6.07        | 6.73        | 4.49        | 3.43        | 4.09        | 3.09        | 3.53        | 3.29        | 3.28        | 3.13        | 3.17        | 3.59        |
| Converted paper product manufacturing                              | 9.05        | 8.97        | 9.82        | 6.47        | 4.88        | 5.88        | 4.45        | 5.08        | 4.74        | 4.70        | 4.48        | 4.53        | 5.09        |
| Printing and related support activities                            | 1.50        | 1.25        | 1.27        | 0.22        | 0.62        | 0.24        | 0.30        | 0.49        | 0.51        | 0.42        | 0.42        | 0.38        | 0.59        |
| Petroleum and coal products manufacturing                          | 5.06        | 5.06        | 7.25        | 5.07        | 5.03        | 4.26        | 5.17        | 6.29        | 5.36        | 5.32        | 5.03        | 4.22        | 3.78        |
| Petroleum and coal products manufacturing                          | 5.06        | 5.06        | 7.25        | 5.07        | 5.03        | 4.26        | 5.17        | 6.29        | 5.36        | 5.32        | 5.03        | 4.22        | 3.78        |
| Chemical manufacturing   | 0.02        | 0.02        | 0.02        | 0.02        | 0.06        | 0.04        | 0.07        | 0.02        | 0.04        | 0.02        | 0.02        | 0.06        | 0.02        |
| Plastics and rubber products manufacturing                         | 2.51        | 2.58        | 2.35        | 2.04        | 2.69        | 2.30        | 3.61        | 3.37        | 4.64        | 4.98        | 5.42        | 5.41        | 5.89        |
| Plastics product manufacturing                                     | 3.07        | 3.13        | 2.84        | 2.47        | 3.27        | 2.81        | 4.39        | 4.12        | 5.66        | 6.07        | 6.61        | 6.57        | 7.14        |
| Rubber product manufacturing                                       | 0.08        | 0.08        | 0.08        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Nonmetallic mineral product manufacturing                          | 2.21        | 2.83        | 4.18        | 5.72        | 5.18        | 4.75        | 4.81        | 4.06        | 3.98        | 3.60        | 3.37        | 2.89        | 3.10        |
| Glass and glass product manufacturing                              | 0.13        | 0.13        | 0.13        | 0.14        | 0.14        | 0.15        | 0.17        | 0.17        | 0.17        | 0.16        | 0.16        | 0.00        | 0.00        |
| Cement and concrete product manufacturing                          | 4.88        | 6.08        | 8.79        | 11.18       | 10.04       | 9.15        | 9.31        | 7.80        | 7.80        | 6.94        | 6.40        | 4.98        | 5.78        |
| Other nonmetallic mineral product manufacturing                    | 0.00        | 0.00        | 0.00        | 2.53        | 2.58        | 3.06        | 3.27        | 3.25        | 3.06        | 2.96        | 2.84        | 3.57        | 2.75        |
| Primary metal manufacturing  | 1.40        | 1.37        | 1.36        | 1.43        | 1.21        | 1.11        | 1.46        | 1.38        | 1.33        | 0.62        | 0.61        | 0.00        | 0.00        |
| Fabricated metal product manufacturing                             | 2.17        | 2.04        | 2.22        | 2.52        | 2.03        | 2.05        | 2.06        | 1.99        | 1.14        | 1.13        | 0.95        | 0.85        | 1.61        |
| Forging and stamping   | 5.96        | 5.01        | 4.07        | 7.03        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Architectural and structural metals manufacturing                  | 4.13        | 3.38        | 3.65        | 2.63        | 3.17        | 3.17        | 3.53        | 3.21        | 2.15        | 2.06        | 2.22        | 2.17        | 5.18        |
| Spring and wire product manufacturing                              | 0.00        | 0.00        | 0.00        | 0.00        | 1.95        | 1.67        | 1.94        | 1.75        | 2.66        | 1.25        | 1.23        | 0.00        | 0.00        |
| Machine shops; turned product; and screw, nut & bolt manufacturing | 1.90        | 2.23        | 2.39        | 3.42        | 4.36        | 4.63        | 4.33        | 4.31        | 1.91        | 2.10        | 1.35        | 1.13        | 1.10        |
| Other fabricated metal product manufacturing                       | 1.30        | 1.42        | 2.12        | 2.50        | 0.34        | 0.18        | 0.20        | 0.19        | 0.19        | 0.19        | 0.18        | 0.18        | 0.21        |
| Machinery manufacturing  | 9.44        | 10.21       | 10.35       | 11.11       | 10.71       | 13.44       | 15.78       | 16.83       | 16.78       | 16.36       | 15.15       | 15.07       | 14.98       |
| Agriculture, construction, and mining machinery mfg.               | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 2.66        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| Industrial machinery manufacturing                                 | 0.10        | 0.10        | 0.36        | 0.38        | 0.38        | 0.12        | 0.14        | 0.14        | 0.14        | 0.28        | 0.27        | 0.26        | 0.13        |
| Commercial & service industry machinery mfg.                       | 0.00        | 0.00        | 0.00        | 1.10        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        | 0.00        |
| HVAC & commercial refrigeration equipment mfg.                     | 4.33        | 2.77        | 2.71        | 2.78        | 2.57        | 2.33        | 4.08        | 3.90        | 3.86        | 3.73        | 4.01        | 3.99        | 4.10        |

| Subsector/industry group  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011   | 2012  | 2013  | 2014  | 2015  | 2016  |
|---|-------|-------|-------|-------|-------|-------|-------|--------|-------|-------|-------|-------|-------|
| Metalworking machinery manufacturing                            | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 0.10  | 0.33  | 0.33  | 0.70  | 0.71  |
| Engine, turbine, and power transmission equipment manufacturing | 72.72 | 55.51 | 55.75 | 58.03 | 60.22 | 84.64 | 98.85 | 101.11 | 77.19 | 79.42 | 73.69 | 44.64 | 45.71 |
| Other general purpose machinery manufacturing                   | 11.72 | 20.05 | 20.12 | 21.45 | 17.63 | 18.45 | 21.34 | 24.17  | 31.07 | 29.94 | 27.37 | 36.74 | 35.35 |
| Computer and electronic product manufacturing                   | 0.14  | 0.16  | 0.10  | 0.10  | 0.34  | 0.16  | 0.07  | 0.13   | 0.07  | 0.02  | 0.02  | 0.08  | 0.04  |
| Electrical equipment, appliance, and component manufacturing    | 2.88  | 2.62  | 2.64  | 5.70  | 3.78  | 3.21  | 2.30  | 4.21   | 4.26  | 4.06  | 3.25  | 0.70  | 0.85  |
| Transportation equipment manufacturing                          | 4.16  | 4.26  | 4.14  | 3.81  | 3.64  | 3.58  | 3.74  | 2.91   | 3.65  | 4.24  | 4.05  | 3.84  | 3.19  |
| Motor vehicle body and trailer manufacturing                    | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 0.00  | 0.12  | 0.37  | 0.00  | 0.00  |
| Motor vehicle parts manufacturing                               | 7.87  | 8.45  | 8.63  | 8.57  | 8.33  | 8.23  | 9.26  | 8.41   | 9.35  | 10.28 | 9.70  | 9.23  | 7.83  |
| Aerospace product and parts manufacturing                       | 0.04  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  | 0.00   | 0.00  | 0.00  | 0.00  | 0.00  | 0.00  |
| Other transportation equipment manufacturing                    | 32.80 | 28.91 | 26.44 | 19.47 | 20.18 | 22.66 | 19.95 | 0.00   | 14.06 | 22.75 | 22.80 | 21.27 | 12.96 |
| Furniture and related product manufacturing                     | 0.54  | 0.56  | 0.64  | 0.62  | 0.64  | 0.66  | 0.75  | 0.41   | 0.33  | 0.43  | 0.40  | 0.32  | 0.32  |
| Miscellaneous manufacturing                                     | 0.44  | 0.44  | 0.42  | 0.27  | 0.08  | 0.08  | 0.09  | 0.09   | 0.05  | 0.05  | 0.11  | 0.08  | 0.05  |

Indented titles are industry groups that are components of the subsector above.

**Source:** Calculated from County Business Patterns, U.S. Census Bureau, and Quarterly Census of Employment and Wages, U.S. Bureau of Labor Statistics.

**Table A-3**  
**Knox County Healthcare Employment by Subsector and Industry Group, 2004-2016**

| Subsector/industry group                                 | 2004         | 2005         | 2006         | 2007         | 2008         | 2009         | 2010         | 2011         | 2012         | 2013         | 2014         | 2015         | 2016         |
|--|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Healthcare</b>  | <b>2,165</b> | <b>2,099</b> | <b>2,127</b> | <b>2,262</b> | <b>2,248</b> | <b>2,416</b> | <b>2,423</b> | <b>2,556</b> | <b>2,601</b> | <b>2,519</b> | <b>2,561</b> | <b>2,499</b> | <b>2,553</b> |
| Ambulatory health care services                          | 621          | 537          | 549          | 575          | 617          | 617          | 615          | 656          | 586          | 603          | 628          | 548          | 567          |
| Offices of physicians                                    | 227          | 205          | 197          | 194          | 191          | 183          | 144          | 151          | 133          | 112          | 97           | 100          | 103          |
| Offices of dentists                                      | 130          | 125          | 122          | 131          | 124          | 128          | 131          | 133          | 138          | 141          | 155          | 141          | 150          |
| Offices of other health practitioners                    | 58           | 65           | 70           | 63           | 82           | 85           | 73           | 76           | 70           | 75           | 73           | 77           | 72           |
| Outpatient care centers                                  | 91           | 60           | 60           | 78           | 79           | 77           | 75           | 91           | 69           | 78           | 80           | 85           | 86           |
| Medical and diagnostic laboratories                      | 5            | 2            | 2            | 2            | 2            | 2            | 0            | 0            | 0            | 0            | 2            | 2            | 2            |
| Home health care services                                | 65           | 55           | 63           | 107          | 139          | 142          | 192          | 205          | 176          | 197          | 221          | 143          | 154          |
| Other ambulatory health care services                    | 45           | 25           | 35           | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0            |
| Hospitals  | 503          | 525          | 601          | 702          | 733          | 776          | 753          | 843          | 972          | 884          | 903          | 943          | 1,015        |
| Nursing and residential care facilities                  | 1,041        | 1,037        | 977          | 985          | 898          | 1,023        | 1,055        | 1,057        | 1,043        | 1,032        | 1,030        | 1,008        | 971          |
| Nursing care facilities                                  | 615          | 609          | 677          | 612          | 410          | 532          | 587          | 515          | 474          | 458          | 453          | 437          | 398          |
| Residential mental health and substance abuse facilities | 135          | 97           | 86           | 133          | 90           | 95           | 90           | 75           | 134          | 149          | 196          | 288          | 276          |
| Community care facilities for the elderly                | 271          | 316          | 179          | 217          | 363          | 361          | 343          | 396          | 422          | 410          | 366          | 269          | 282          |
| Other residential care facilities                        | 20           | 15           | 35           | 23           | 35           | 35           | 35           | 71           | 13           | 15           | 15           | 14           | 15           |

Indented titles are industry groups that are components of the subsector above.

**Source:** County Business Patterns, U.S. Census Bureau. Some totals estimated by Regionomics; see text.

**Table A-4**  
**Knox County Healthcare Location Quotients by Subsector and Industry Group, 2004-2016**

| Subsector/industry group                                 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|--|------|------|------|------|------|------|------|------|------|------|------|------|------|
| <b>Healthcare</b>  | 1.12 | 1.05 | 1.03 | 1.10 | 1.07 | 1.12 | 1.10 | 1.15 | 1.17 | 1.11 | 1.10 | 1.06 | 1.07 |
| Ambulatory health care services                          | 0.81 | 0.68 | 0.66 | 0.69 | 0.73 | 0.70 | 0.68 | 0.71 | 0.64 | 0.63 | 0.64 | 0.54 | 0.54 |
| Offices of physicians                                    | 0.78 | 0.69 | 0.63 | 0.63 | 0.61 | 0.57 | 0.44 | 0.46 | 0.42 | 0.34 | 0.28 | 0.28 | 0.28 |
| Offices of dentists                                      | 1.14 | 1.09 | 1.01 | 1.11 | 1.03 | 1.05 | 1.06 | 1.07 | 1.11 | 1.11 | 1.18 | 1.07 | 1.13 |
| Offices of other health practitioners                    | 0.74 | 0.80 | 0.81 | 0.72 | 0.90 | 0.90 | 0.74 | 0.74 | 0.65 | 0.66 | 0.62 | 0.64 | 0.59 |
| Outpatient care centers                                  | 0.97 | 0.62 | 0.59 | 0.78 | 0.81 | 0.77 | 0.72 | 0.85 | 0.64 | 0.67 | 0.66 | 0.66 | 0.63 |
| Medical and diagnostic laboratories                      | 0.16 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.05 | 0.05 |
| Home health care services                                | 0.53 | 0.41 | 0.44 | 0.73 | 0.94 | 0.89 | 1.12 | 1.13 | 1.00 | 1.07 | 1.16 | 0.71 | 0.75 |
| Other ambulatory health care services                    | 1.36 | 0.70 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Hospitals  | 0.67 | 0.68 | 0.76 | 0.90 | 0.91 | 0.95 | 0.92 | 1.02 | 1.17 | 1.05 | 1.07 | 1.13 | 1.21 |
| Nursing and residential care facilities                  | 2.50 | 2.40 | 2.22 | 2.26 | 2.00 | 2.22 | 2.24 | 2.24 | 2.21 | 2.13 | 2.05 | 2.00 | 1.92 |
| Nursing care facilities                                  | 2.65 | 2.56 | 2.80 | 2.60 | 1.80 | 2.27 | 2.47 | 2.16 | 1.95 | 1.88 | 1.85 | 1.79 | 1.66 |
| Residential mental health and substance abuse facilities | 1.79 | 1.21 | 1.06 | 1.67 | 1.03 | 1.04 | 0.96 | 0.80 | 1.41 | 1.49 | 1.81 | 2.64 | 2.52 |
| Community care facilities for the elderly                | 3.15 | 3.49 | 1.90 | 2.22 | 3.25 | 3.16 | 2.89 | 3.30 | 3.62 | 3.39 | 2.85 | 2.03 | 2.07 |
| Other residential care facilities                        | 0.89 | 0.65 | 1.49 | 1.05 | 1.61 | 1.62 | 1.66 | 3.47 | 0.71 | 0.73 | 0.77 | 0.73 | 0.79 |

Indented titles are industry groups that are components of the subsector above.

**Source:** County Business Patterns, U.S. Census Bureau. Some totals estimated by Regionomics; see text.

**Table A-5**  
**Manufacturing: 25 Occupations with Greatest Total Need, 2016-2026**

| SOC code | Occupation  | 2016 empl.   | Pct. of total | 2026 empl.   | Pct. of total | Chng.       | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need   |
|----------|---|--------------|---------------|--------------|---------------|-------------|--------------|-----------------|---------------|---------------|----------------|
| 00-0000  | <b>Total, all occupations</b>   | <b>4,265</b> | <b>100.0%</b> | <b>4,140</b> | <b>100.0%</b> | <b>-125</b> | <b>-2.9%</b> | <b>-12.5</b>    | <b>428.3</b>  | <b>415.8</b>  | <b>4,157.9</b> |
| 51-2092  | Team assemblers   | 503          | 11.8%         | 421          | 10.2%         | -82         | -16.2%       | -8.2            | 53.1          | 44.9          | 449.5          |
| 51-4041  | Machinists  | 222          | 5.2%          | 229          | 5.5%          | 7           | 3.2%         | 0.7             | 22.6          | 23.3          | 232.5          |
| 51-4121  | Welders, cutters, solderers, and brazers  | 161          | 0.6%          | 168          | 0.6%          | 6           | 3.8%         | 0.6             | 17.3          | 17.9          | 178.8          |
| 51-1011  | First-line supervisors of production and operating workers                                | 160          | 3.7%          | 162          | 3.9%          | 2           | 1.4%         | 0.2             | 15.5          | 15.7          | 156.8          |
| 53-7062  | Laborers and freight, stock, and material movers, hand                                    | 98           | 2.3%          | 99           | 2.4%          | 1           | 1.2%         | 0.1             | 13.2          | 13.4          | 133.7          |
| 41-4012  | Sales representatives, wholesale & mfg., except technical and scientific products         | 104          | 2.4%          | 106          | 2.6%          | 2           | 2.1%         | 0.2             | 10.5          | 10.7          | 106.7          |
| 51-9061  | Inspectors, testers, sorters, samplers, and weighers                                      | 117          | 2.7%          | 96           | 2.3%          | -21         | -17.7%       | -2.1            | 12.6          | 10.5          | 104.8          |
| 51-9198  | Helpers--production workers   | 64           | 1.5%          | 65           | 1.6%          | 1           | 1.0%         | 0.1             | 9.6           | 9.6           | 96.3           |
| 51-4072  | Molding, coremaking, and casting machine setters, operators, and tenders, metal & plastic | 103          | 2.4%          | 88           | 2.1%          | -15         | -14.2%       | -1.5            | 10.7          | 9.2           | 92.2           |
| 17-2112  | Industrial engineers  | 91           | 2.1%          | 113          | 2.7%          | 22          | 23.8%        | 2.2             | 6.5           | 8.7           | 86.8           |
| 51-4031  | Cutting, punching, and press machine setters, operators, and tenders, metal and plastic   | 84           | 2.0%          | 78           | 1.9%          | -7          | -7.9%        | -0.7            | 9.1           | 8.4           | 84.1           |
| 17-2141  | Mechanical engineers  | 108          | 2.5%          | 120          | 2.9%          | 12          | 11.1%        | 1.2             | 7.1           | 8.3           | 82.8           |
| 51-4011  | Computer-controlled machine tool operators, metal and plastic                             | 80           | 1.9%          | 82           | 2.0%          | 2           | 2.7%         | 0.2             | 7.9           | 8.1           | 81.4           |
| 49-9041  | Industrial machinery mechanics  | 74           | 1.7%          | 82           | 2.0%          | 8           | 10.9%        | 0.8             | 6.6           | 7.5           | 74.6           |
| 43-5071  | Shipping, receiving, and traffic clerks   | 75           | 1.8%          | 73           | 1.8%          | -2          | -2.2%        | -0.2            | 7.3           | 7.2           | 71.5           |
| 49-9071  | Maintenance and repair workers, general   | 68           | 1.6%          | 69           | 1.7%          | 1           | 1.9%         | 0.1             | 6.6           | 6.7           | 67.1           |
| 51-4081  | Multiple machine tool setters, operators, and tenders, metal and plastic                  | 64           | 1.5%          | 62           | 1.5%          | -2          | -3.2%        | -0.2            | 6.6           | 6.4           | 64.3           |
| 43-4051  | Customer service representatives  | 48           | 1.1%          | 49           | 1.2%          | 1           | 2.3%         | 0.1             | 6.1           | 6.2           | 62.4           |
| 11-1021  | General and operations managers   | 72           | 1.7%          | 73           | 1.8%          | 1           | 1.7%         | 0.1             | 5.8           | 5.9           | 59.1           |
| 53-3032  | Heavy and tractor-trailer truck drivers   | 58           | 1.4%          | 56           | 1.4%          | -2          | -3.4%        | -0.2            | 6.0           | 5.8           | 57.8           |
| 53-7064  | Packers and packagers, hand   | 38           | 0.9%          | 38           | 0.9%          | 0           | -0.8%        | 0.0             | 5.6           | 5.6           | 56.1           |
| 51-2031  | Engine and other machine assemblers   | 72           | 1.7%          | 59           | 1.4%          | -13         | -17.6%       | -1.3            | 6.6           | 5.3           | 52.9           |
| 43-5061  | Production, planning, and expediting clerks   | 49           | 1.2%          | 51           | 1.2%          | 1           | 3.0%         | 0.1             | 5.0           | 5.1           | 51.5           |
| 53-7051  | Industrial truck and tractor operators  | 45           | 1.1%          | 45           | 1.1%          | 0           | 0.3%         | 0.0             | 5.0           | 5.0           | 50.0           |
| 51-2099  | Assemblers and fabricators, all other   | 56           | 1.3%          | 46           | 1.1%          | -9          | -17.1%       | -0.9            | 5.8           | 4.9           | 48.9           |

**Table A-6**  
**Manufacturing: Growth and Replacement Need by Occupational Group, 2016-2026**

| SOC code       | Occupation   | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.     | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|--|------------|---------------|------------|---------------|-----------|--------------|-----------------|---------------|---------------|--------------|
| <b>11-0000</b> | <b>Management occupations</b>                                  | <b>229</b> | <b>5.7%</b>   | <b>235</b> | <b>6.0%</b>   | <b>6</b>  | <b>2.5%</b>  | <b>0.6</b>      | <b>17.4</b>   | <b>17.9</b>   | <b>179.2</b> |
| 11-1011        | Chief executives   | 6          | 0.1%          | 5          | 0.1%          | -1        | -13.9%       | -0.1            | 0.4           | 0.3           | 2.9          |
| 11-1021        | General and operations managers                                | 72         | 1.7%          | 73         | 1.8%          | 1         | 1.7%         | 0.1             | 5.8           | 5.9           | 59.1         |
| 11-2021        | Marketing managers   | 5          | 0.1%          | 5          | 0.1%          | 0         | 4.3%         | 0.0             | 0.4           | 0.4           | 4.2          |
| 11-2022        | Sales managers   | 19         | 0.4%          | 20         | 0.5%          | 1         | 3.1%         | 0.1             | 1.6           | 1.7           | 16.8         |
| 11-3031        | Financial managers   | 13         | 0.3%          | 15         | 0.4%          | 1         | 10.1%        | 0.1             | 1.0           | 1.2           | 11.5         |
| 11-3051        | Industrial production managers                                 | 55         | 1.3%          | 57         | 1.4%          | 1         | 2.5%         | 0.1             | 3.9           | 4.0           | 40.1         |
| 11-3061        | Purchasing managers  | 8          | 0.2%          | 8          | 0.2%          | 0         | 4.7%         | 0.0             | 0.6           | 0.7           | 6.5          |
| 11-3121        | Human resources managers                                       | 6          | 0.1%          | 6          | 0.1%          | 0         | 4.5%         | 0.0             | 0.4           | 0.5           | 4.7          |
| 11-9041        | Architectural and engineering managers                         | 29         | 0.7%          | 30         | 0.7%          | 1         | 1.9%         | 0.1             | 2.0           | 2.1           | 20.8         |
| 11-9199        | Managers, all other  | 7          | 0.2%          | 8          | 0.2%          | 0         | 3.5%         | 0.0             | 0.5           | 0.5           | 5.3          |
|                | Other occupations  | 9          | 0.2%          | 9          | 0.2%          | 0         | 3.4%         | 0.0             | 0.7           | 0.7           | 7.3          |
| <b>13-0000</b> | <b>Business and financial operations occupations</b>           | <b>147</b> | <b>3.6%</b>   | <b>146</b> | <b>3.7%</b>   | <b>-1</b> | <b>-0.7%</b> | <b>-0.1</b>     | <b>13.1</b>   | <b>13.0</b>   | <b>129.8</b> |
| 13-1023        | Purchasing agents, except wholesale, retail, and farm products | 42         | 1.0%          | 38         | 0.9%          | -4        | -8.9%        | -0.4            | 3.4           | 3.0           | 30.2         |
| 13-1051        | Cost estimators  | 9          | 0.2%          | 9          | 0.2%          | 0         | 3.1%         | 0.0             | 0.9           | 0.9           | 9.1          |
| 13-1071        | Human resources specialists                                    | 16         | 0.4%          | 15         | 0.4%          | 0         | -2.6%        | 0.0             | 1.5           | 1.4           | 14.3         |
| 13-1081        | Logisticians   | 9          | 0.2%          | 10         | 0.2%          | 0         | 1.9%         | 0.0             | 0.9           | 0.9           | 9.2          |
| 13-1111        | Management analysts  | 5          | 0.1%          | 5          | 0.1%          | 0         | 3.3%         | 0.0             | 0.4           | 0.4           | 4.4          |
| 13-1151        | Training and development specialists                           | 6          | 0.1%          | 6          | 0.1%          | 0         | 4.2%         | 0.0             | 0.6           | 0.6           | 5.8          |
| 13-1161        | Market research analysts and marketing specialists             | 10         | 0.2%          | 11         | 0.3%          | 1         | 12.0%        | 0.1             | 1.0           | 1.1           | 10.9         |
| 13-1199        | Business operations specialists, all other                     | 16         | 0.4%          | 17         | 0.4%          | 0         | 3.0%         | 0.0             | 1.5           | 1.5           | 15.0         |
| 13-2011        | Accountants and auditors                                       | 31         | 0.7%          | 32         | 0.8%          | 1         | 3.3%         | 0.1             | 2.8           | 2.9           | 28.8         |
|                | Other occupations  | 3          | 0.1%          | 2          | 0.1%          | 0         | -15.9%       | 0.0             | 0.3           | 0.2           | 2.1          |
| <b>15-0000</b> | <b>Computer and mathematical occupations</b>                   | <b>37</b>  | <b>0.9%</b>   | <b>36</b>  | <b>0.9%</b>   | <b>-1</b> | <b>-2.0%</b> | <b>-0.1</b>     | <b>2.3</b>    | <b>2.3</b>    | <b>22.5</b>  |
| 15-1121        | Computer systems analysts                                      | 7          | 0.2%          | 7          | 0.2%          | 0         | 0.9%         | 0.0             | 0.4           | 0.4           | 4.4          |
| 15-1132        | Software developers, applications                              | 8          | 0.2%          | 9          | 0.2%          | 0         | 4.6%         | 0.0             | 0.5           | 0.6           | 5.7          |
| 15-1142        | Network and computer systems administrators                    | 10         | 0.2%          | 9          | 0.2%          | 0         | -4.4%        | 0.0             | 0.6           | 0.5           | 5.4          |
| 15-1151        | Computer user support specialists                              | 5          | 0.1%          | 5          | 0.1%          | 0         | 4.3%         | 0.0             | 0.3           | 0.4           | 3.7          |
|                | Other occupations  | 7          | 0.2%          | 6          | 0.1%          | -1        | -13.2%       | -0.1            | 0.4           | 0.3           | 3.3          |
| <b>17-0000</b> | <b>Architecture and engineering occupations</b>                | <b>325</b> | <b>8.1%</b>   | <b>361</b> | <b>9.3%</b>   | <b>36</b> | <b>11.2%</b> | <b>3.6</b>      | <b>23.5</b>   | <b>27.1</b>   | <b>271.2</b> |
| 17-2071        | Electrical engineers   | 20         | 0.5%          | 20         | 0.5%          | 1         | 4.1%         | 0.1             | 1.3           | 1.3           | 13.4         |
| 17-2112        | Industrial engineers   | 91         | 2.1%          | 113        | 2.7%          | 22        | 23.8%        | 2.2             | 6.5           | 8.7           | 86.8         |
| 17-2141        | Mechanical engineers   | 108        | 2.5%          | 120        | 2.9%          | 12        | 11.1%        | 1.2             | 7.1           | 8.3           | 82.8         |
| 17-2199        | Engineers, all other   | 12         | 0.3%          | 12         | 0.3%          | 0         | 3.7%         | 0.0             | 0.8           | 0.8           | 8.1          |

| SOC code       | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.      | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|---|------------|---------------|------------|---------------|------------|--------------|-----------------|---------------|---------------|--------------|
| 17-3013        | Mechanical drafters   | 26         | 0.6%          | 27         | 0.7%          | 1          | 2.4%         | 0.1             | 2.2           | 2.3           | 23.1         |
| 17-3023        | Electrical and electronics engineering technicians                                  | 9          | 0.2%          | 8          | 0.2%          | 0          | -3.6%        | 0.0             | 0.7           | 0.7           | 7.0          |
| 17-3026        | Industrial engineering technicians  | 19         | 0.4%          | 19         | 0.5%          | 0          | 2.6%         | 0.0             | 1.6           | 1.6           | 16.4         |
| 17-3027        | Mechanical engineering technicians  | 19         | 0.5%          | 20         | 0.5%          | 1          | 3.6%         | 0.1             | 1.7           | 1.8           | 17.5         |
| 17-3029        | Engineering technicians, except drafters, all other                                 | 6          | 0.1%          | 6          | 0.2%          | 0          | 2.5%         | 0.0             | 0.5           | 0.5           | 5.5          |
|                | Other occupations   | 15         | 0.4%          | 15         | 0.4%          | 0          | -1.5%        | 0.0             | 1.1           | 1.1           | 10.6         |
| <b>19-0000</b> | <b>Life, physical, and social science occupations</b>                               | <b>3</b>   | <b>0.1%</b>   | <b>2</b>   | <b>0.1%</b>   | <b>0</b>   | <b>-4.3%</b> | <b>0.0</b>      | <b>0.2</b>    | <b>0.2</b>    | <b>2.1</b>   |
|                | Other occupations   | 3          | 0.1%          | 2          | 0.1%          | 0          | -4.3%        | 0.0             | 0.2           | 0.2           | 2.1          |
| <b>27-0000</b> | <b>Arts, design, entertainment, sports, and media occupations</b>                   | <b>7</b>   | <b>0.2%</b>   | <b>7</b>   | <b>0.2%</b>   | <b>0</b>   | <b>2.2%</b>  | <b>0.0</b>      | <b>0.7</b>    | <b>0.7</b>    | <b>6.9</b>   |
|                | Other occupations   | 7          | 0.2%          | 7          | 0.2%          | 0          | 2.2%         | 0.0             | 0.7           | 0.7           | 6.9          |
| <b>29-0000</b> | <b>Healthcare practitioners and technical occupations</b>                           | <b>2</b>   | <b>0.0%</b>   | <b>2</b>   | <b>0.0%</b>   | <b>0</b>   | <b>3.2%</b>  | <b>0.0</b>      | <b>0.1</b>    | <b>0.1</b>    | <b>0.8</b>   |
| 29-9011        | Occupational health and safety specialists  | 2          | 0.0%          | 2          | 0.0%          | 0          | 3.2%         | 0.0             | 0.1           | 0.1           | 0.8          |
| <b>37-0000</b> | <b>Building and grounds cleaning and maintenance occupations</b>                    | <b>13</b>  | <b>0.3%</b>   | <b>14</b>  | <b>0.3%</b>   | <b>0</b>   | <b>2.4%</b>  | <b>0.0</b>      | <b>1.7</b>    | <b>1.8</b>    | <b>17.5</b>  |
| 37-2011        | Janitors and cleaners, except maids and housekeeping cleaners                       | 13         | 0.3%          | 14         | 0.3%          | 0          | 2.4%         | 0.0             | 1.7           | 1.8           | 17.5         |
| <b>41-0000</b> | <b>Sales and related occupations</b>  | <b>116</b> | <b>2.9%</b>   | <b>119</b> | <b>3.0%</b>   | <b>3</b>   | <b>2.2%</b>  | <b>0.3</b>      | <b>11.7</b>   | <b>12.0</b>   | <b>119.8</b> |
| 41-1012        | First-line supervisors of non-retail sales workers                                  | 4          | 0.1%          | 4          | 0.1%          | 0          | 0.7%         | 0.0             | 0.4           | 0.4           | 3.6          |
| 41-4012        | Sales representatives, wholesale and mfg., except technical and scientific products | 104        | 2.4%          | 106        | 2.6%          | 2          | 2.1%         | 0.2             | 10.5          | 10.7          | 106.7        |
| 41-9031        | Sales engineers   | 9          | 0.2%          | 9          | 0.2%          | 0          | 4.8%         | 0.0             | 0.9           | 0.9           | 9.4          |
| <b>43-0000</b> | <b>Office and administrative support occupations</b>                                | <b>373</b> | <b>9.2%</b>   | <b>362</b> | <b>9.3%</b>   | <b>-11</b> | <b>-3.0%</b> | <b>-1.1</b>     | <b>40.2</b>   | <b>39.1</b>   | <b>390.5</b> |
| 43-1011        | First-line supervisors of office and administrative support workers                 | 22         | 0.5%          | 22         | 0.5%          | 1          | 2.5%         | 0.1             | 2.1           | 2.2           | 21.8         |
| 43-3031        | Bookkeeping, accounting, and auditing clerks  | 35         | 0.8%          | 33         | 0.8%          | -2         | -6.7%        | -0.2            | 3.8           | 3.5           | 35.2         |
| 43-4051        | Customer service representatives  | 48         | 1.1%          | 49         | 1.2%          | 1          | 2.3%         | 0.1             | 6.1           | 6.2           | 62.4         |
| 43-4151        | Order clerks  | 8          | 0.2%          | 7          | 0.2%          | -1         | -15.5%       | -0.1            | 0.9           | 0.7           | 7.3          |
| 43-4171        | Receptionists and information clerks  | 6          | 0.1%          | 5          | 0.1%          | -1         | -10.5%       | -0.1            | 0.7           | 0.6           | 6.4          |
| 43-5061        | Production, planning, and expediting clerks   | 49         | 1.2%          | 51         | 1.2%          | 1          | 3.0%         | 0.1             | 5.0           | 5.1           | 51.5         |
| 43-5071        | Shipping, receiving, and traffic clerks   | 75         | 1.8%          | 73         | 1.8%          | -2         | -2.2%        | -0.2            | 7.3           | 7.2           | 71.5         |
| 43-5081        | Stock clerks and order fillers  | 31         | 0.7%          | 32         | 0.8%          | 1          | 3.1%         | 0.1             | 4.0           | 4.1           | 41.1         |
| 43-6011        | Executive secretaries and executive administrative assistants                       | 5          | 0.1%          | 4          | 0.1%          | -1         | -18.2%       | -0.1            | 0.5           | 0.4           | 4.2          |
| 43-6014        | Secretaries and administrative assistants, except legal, medical, and executive     | 31         | 0.7%          | 27         | 0.6%          | -4         | -13.9%       | -0.4            | 3.1           | 2.6           | 26.3         |

| SOC code       | Occupation  | 2016 empl.   | Pct. of total | 2026 empl.   | Pct. of total | Chng.       | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need   |
|----------------|---|--------------|---------------|--------------|---------------|-------------|--------------|-----------------|---------------|---------------|----------------|
| 43-9061        | Office clerks, general  | 46           | 1.1%          | 42           | 1.0%          | -4          | -7.8%        | -0.4            | 5.1           | 4.8           | 47.6           |
|                | Other occupations   | 16           | 0.4%          | 16           | 0.4%          | -1          | -3.4%        | -0.1            | 1.6           | 1.5           | 15.4           |
| <b>47-0000</b> | <b>Construction and extraction occupations</b>  | <b>59</b>    | <b>1.5%</b>   | <b>60</b>    | <b>1.5%</b>   | <b>1</b>    | <b>2.3%</b>  | <b>0.1</b>      | <b>6.2</b>    | <b>6.4</b>    | <b>63.5</b>    |
| 47-2111        | Electricians  | 16           | 0.4%          | 16           | 0.4%          | 0           | 2.3%         | 0.0             | 1.8           | 1.8           | 17.9           |
| 47-2211        | Sheet metal workers   | 19           | 0.5%          | 20           | 0.5%          | 1           | 4.5%         | 0.1             | 2.0           | 2.1           | 21.3           |
|                | Other occupations   | 24           | 0.6%          | 24           | 0.6%          | 0           | 0.4%         | 0.0             | 2.4           | 2.4           | 24.4           |
| <b>49-0000</b> | <b>Installation, maintenance, and repair occupations</b>                                | <b>208</b>   | <b>5.2%</b>   | <b>221</b>   | <b>5.7%</b>   | <b>12</b>   | <b>5.9%</b>  | <b>1.2</b>      | <b>19.5</b>   | <b>20.7</b>   | <b>207.0</b>   |
| 49-1011        | First-line supervisors of mechanics, installers, and repairers                          | 17           | 0.4%          | 17           | 0.4%          | 0           | 2.5%         | 0.0             | 1.4           | 1.5           | 14.7           |
| 49-2094        | Electrical and electronics repairers, commercial and industrial equipment               | 6            | 0.1%          | 6            | 0.1%          | 0           | 4.0%         | 0.0             | 0.5           | 0.5           | 5.4            |
| 49-9041        | Industrial machinery mechanics  | 74           | 1.7%          | 82           | 2.0%          | 8           | 10.9%        | 0.8             | 6.6           | 7.5           | 74.6           |
| 49-9043        | Maintenance workers, machinery  | 18           | 0.4%          | 20           | 0.5%          | 2           | 10.8%        | 0.2             | 1.9           | 2.1           | 21.3           |
| 49-9044        | Millwrights   | 7            | 0.2%          | 8            | 0.2%          | 1           | 14.5%        | 0.1             | 0.7           | 0.8           | 8.0            |
| 49-9071        | Maintenance and repair workers, general   | 68           | 1.6%          | 69           | 1.7%          | 1           | 1.9%         | 0.1             | 6.6           | 6.7           | 67.1           |
| 49-9099        | Installation, maintenance, and repair workers, all other                                | 5            | 0.1%          | 5            | 0.1%          | 0           | -7.9%        | 0.0             | 0.5           | 0.4           | 4.1            |
|                | Other occupations   | 13           | 0.3%          | 13           | 0.3%          | 0           | -2.3%        | 0.0             | 1.2           | 1.2           | 11.8           |
| <b>51-0000</b> | <b>Production occupations</b>   | <b>2,251</b> | <b>55.7%</b>  | <b>2,076</b> | <b>53.1%</b>  | <b>-175</b> | <b>-7.8%</b> | <b>-17.5</b>    | <b>235.1</b>  | <b>217.6</b>  | <b>2,176.1</b> |
| 51-1011        | First-line supervisors of production and operating workers                              | 160          | 3.7%          | 162          | 3.9%          | 2           | 1.4%         | 0.2             | 15.5          | 15.7          | 156.8          |
| 51-2022        | Electrical and electronic equipment assemblers  | 43           | 1.0%          | 36           | 0.9%          | -7          | -16.4%       | -0.7            | 4.6           | 3.9           | 38.6           |
| 51-2023        | Electromechanical equipment assemblers  | 18           | 0.4%          | 15           | 0.4%          | -3          | -15.4%       | -0.3            | 1.9           | 1.6           | 16.3           |
| 51-2031        | Engine and other machine assemblers   | 72           | 1.7%          | 59           | 1.4%          | -13         | -17.6%       | -1.3            | 6.6           | 5.3           | 52.9           |
| 51-2041        | Structural metal fabricators and fitters  | 41           | 1.0%          | 34           | 0.8%          | -7          | -16.9%       | -0.7            | 4.1           | 3.4           | 33.7           |
| 51-2091        | Fiberglass laminators and fabricators   | 13           | 0.3%          | 13           | 0.3%          | 0           | 0.6%         | 0.0             | 1.5           | 1.5           | 14.6           |
| 51-2092        | Team assemblers   | 503          | 11.8%         | 421          | 10.2%         | -82         | -16.2%       | -8.2            | 53.1          | 44.9          | 449.5          |
| 51-2099        | Assemblers and fabricators, all other   | 56           | 1.3%          | 46           | 1.1%          | -9          | -17.1%       | -0.9            | 5.8           | 4.9           | 48.9           |
| 51-4011        | Computer-controlled machine tool operators, metal and plastic                           | 80           | 1.9%          | 82           | 2.0%          | 2           | 2.7%         | 0.2             | 7.9           | 8.1           | 81.4           |
| 51-4012        | Computer numerically controlled machine tool programmers, metal and plastic             | 11           | 0.3%          | 12           | 0.3%          | 1           | 12.4%        | 0.1             | 1.1           | 1.3           | 12.7           |
| 51-4021        | Extruding and drawing machine setters, operators, and tenders, metal and plastic        | 42           | 1.0%          | 35           | 0.8%          | -7          | -16.0%       | -0.7            | 3.8           | 3.2           | 31.6           |
| 51-4022        | Forging machine setters, operators, and tenders, metal and plastic                      | 5            | 0.1%          | 4            | 0.1%          | -1          | -19.5%       | -0.1            | 0.5           | 0.4           | 3.8            |
| 51-4031        | Cutting, punching, and press machine setters, operators, and tenders, metal and plastic | 84           | 2.0%          | 78           | 1.9%          | -7          | -7.9%        | -0.7            | 9.1           | 8.4           | 84.1           |

| SOC code | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng. | Pct. chng. | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------|---|------------|---------------|------------|---------------|-------|------------|-----------------|---------------|---------------|--------------|
| 51-4032  | Drilling and boring machine tool setters, operators, and tenders, metal and plastic                       | 6          | 0.1%          | 5          | 0.1%          | -2    | -28.3%     | -0.2            | 0.6           | 0.4           | 4.0          |
| 51-4033  | Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic | 30         | 0.7%          | 27         | 0.7%          | -2    | -8.0%      | -0.2            | 3.0           | 2.8           | 27.7         |
| 51-4034  | Lathe and turning machine tool setters, operators, and tenders, metal and plastic                         | 19         | 0.5%          | 18         | 0.4%          | -2    | -9.8%      | -0.2            | 1.8           | 1.6           | 16.2         |
| 51-4035  | Milling and planing machine setters, operators, and tenders, metal and plastic                            | 7          | 0.2%          | 5          | 0.1%          | -1    | -21.2%     | -0.1            | 0.6           | 0.5           | 4.8          |
| 51-4041  | Machinists  | 222        | 5.2%          | 229        | 5.5%          | 7     | 3.2%       | 0.7             | 22.6          | 23.3          | 232.5        |
| 51-4072  | Molding, coremaking, and casting machine setters, operators, and tenders, metal & plastic                 | 103        | 2.4%          | 88         | 2.1%          | -15   | -14.2%     | -1.5            | 10.7          | 9.2           | 92.2         |
| 51-4081  | Multiple machine tool setters, operators, and tenders, metal and plastic                                  | 64         | 1.5%          | 62         | 1.5%          | -2    | -3.2%      | -0.2            | 6.6           | 6.4           | 64.3         |
| 51-4111  | Tool and die makers   | 28         | 0.7%          | 26         | 0.6%          | -2    | -7.7%      | -0.2            | 2.5           | 2.3           | 23.3         |
| 51-4121  | Welders, cutters, solderers, and brazers  | 161        | 0.6%          | 168        | 0.6%          | 6     | 3.8%       | 0.6             | 17.3          | 17.9          | 178.8        |
| 51-4122  | Welding, soldering, and brazing machine setters, operators, and tenders                                   | 21         | 0.5%          | 18         | 0.4%          | -3    | -13.2%     | -0.3            | 2.0           | 1.8           | 17.5         |
| 51-4191  | Heat treating equipment setters, operators, and tenders, metal and plastic                                | 6          | 0.1%          | 4          | 0.1%          | -1    | -26.2%     | -0.1            | 0.5           | 0.4           | 3.7          |
| 51-5112  | Printing press operators  | 13         | 0.3%          | 13         | 0.3%          | -1    | -4.6%      | -0.1            | 1.4           | 1.3           | 13.0         |
| 51-6031  | Sewing machine operators  | 7          | 0.2%          | 7          | 0.2%          | 0     | 2.3%       | 0.0             | 0.8           | 0.8           | 7.9          |
| 51-6091  | Extruding and forming machine setters, operators & tenders, synthetic and glass fibers                    | 5          | 0.1%          | 5          | 0.1%          | 0     | -2.7%      | 0.0             | 0.6           | 0.6           | 5.6          |
| 51-7042  | Woodworking machine setters, operators, and tenders, except sawing  | 7          | 0.2%          | 7          | 0.2%          | 0     | -1.0%      | 0.0             | 0.7           | 0.7           | 7.4          |
| 51-8093  | Petroleum pump system operators, refinery operators, and gaugers  | 11         | 0.2%          | 10         | 0.2%          | -1    | -5.3%      | -0.1            | 1.0           | 0.9           | 9.5          |
| 51-9023  | Mixing and blending machine setters, operators, and tenders   | 13         | 0.3%          | 13         | 0.3%          | 0     | -3.6%      | 0.0             | 1.5           | 1.4           | 14.0         |
| 51-9032  | Cutting and slicing machine setters, operators, and tenders   | 12         | 0.3%          | 12         | 0.3%          | 0     | -3.6%      | 0.0             | 1.3           | 1.3           | 12.8         |
| 51-9041  | Extruding, forming, pressing, and compacting machine setters, operators, and tenders                      | 19         | 0.5%          | 19         | 0.5%          | 0     | -2.1%      | 0.0             | 2.3           | 2.2           | 22.3         |
| 51-9061  | Inspectors, testers, sorters, samplers, and weighers  | 117        | 2.7%          | 96         | 2.3%          | -21   | -17.7%     | -2.1            | 12.6          | 10.5          | 104.8        |
| 51-9111  | Packaging and filling machine operators and tenders   | 22         | 0.5%          | 22         | 0.5%          | 0     | -1.6%      | 0.0             | 2.5           | 2.5           | 24.9         |

| SOC code       | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.     | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|---|------------|---------------|------------|---------------|-----------|--------------|-----------------|---------------|---------------|--------------|
| 51-9121        | Coating, painting, and spraying machine setters, operators, and tenders | 36         | 0.8%          | 37         | 0.9%          | 1         | 2.7%         | 0.1             | 3.8           | 3.9           | 38.7         |
| 51-9191        | Adhesive bonding machine operators and tenders                          | 8          | 0.2%          | 7          | 0.2%          | 0         | -2.8%        | 0.0             | 0.8           | 0.8           | 7.9          |
| 51-9195        | Molders, shapers, and casters, except metal and plastic                 | 11         | 0.3%          | 11         | 0.3%          | 0         | -4.0%        | 0.0             | 1.1           | 1.1           | 10.8         |
| 51-9196        | Paper goods machine setters, operators, and tenders                     | 40         | 0.9%          | 38         | 0.9%          | -2        | -5.8%        | -0.2            | 3.9           | 3.7           | 37.1         |
| 51-9198        | Helpers--production workers   | 64         | 1.5%          | 65         | 1.6%          | 1         | 1.0%         | 0.1             | 9.6           | 9.6           | 96.3         |
| 51-9199        | Production workers, all other   | 29         | 0.7%          | 29         | 0.7%          | 0         | 1.4%         | 0.0             | 3.2           | 3.3           | 32.8         |
|                | Other occupations   | 43         | 1.0%          | 39         | 0.9%          | -4        | -9.3%        | -0.4            | 4.4           | 4.0           | 40.3         |
| <b>53-0000</b> | <b>Transportation &amp; material moving occupations</b>                 | <b>268</b> | <b>6.6%</b>   | <b>267</b> | <b>6.8%</b>   | <b>-1</b> | <b>-0.5%</b> | <b>-0.1</b>     | <b>33.3</b>   | <b>33.1</b>   | <b>331.1</b> |
| 53-1021        | First-line supervisors of helpers, laborers, and material movers, hand  | 6          | 0.1%          | 6          | 0.1%          | 0         | 1.2%         | 0.0             | 0.6           | 0.6           | 5.7          |
| 53-3032        | Heavy and tractor-trailer truck drivers                                 | 58         | 1.4%          | 56         | 1.4%          | -2        | -3.4%        | -0.2            | 6.0           | 5.8           | 57.8         |
| 53-3033        | Light truck or delivery services drivers                                | 7          | 0.2%          | 7          | 0.2%          | 0         | -1.6%        | 0.0             | 0.7           | 0.7           | 7.2          |
| 53-7051        | Industrial truck and tractor operators                                  | 45         | 1.1%          | 45         | 1.1%          | 0         | 0.3%         | 0.0             | 5.0           | 5.0           | 50.0         |
| 53-7062        | Laborers and freight, stock, and material movers, hand                  | 98         | 2.3%          | 99         | 2.4%          | 1         | 1.2%         | 0.1             | 13.2          | 13.4          | 133.7        |
| 53-7063        | Machine feeders and offbearers  | 11         | 0.2%          | 10         | 0.2%          | 0         | -3.0%        | 0.0             | 1.4           | 1.4           | 13.7         |
| 53-7064        | Packers and packagers, hand   | 38         | 0.9%          | 38         | 0.9%          | 0         | -0.8%        | 0.0             | 5.6           | 5.6           | 56.1         |
|                | Other occupations   | 7          | 0.2%          | 6          | 0.2%          | 0         | -2.6%        | 0.0             | 0.7           | 0.7           | 6.9          |

**Note:** Displayed numerical and percentage changes may not equal computed changes because of rounding of employment estimates.

**Table A-7**  
**Healthcare: 25 Occupations with Greatest Total Need, 2016-2026**

| SOC code | Occupation  | 2016 empl.   | Pct. of total | 2026 empl.   | Pct. of total | Chng.      | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need   |
|----------|---|--------------|---------------|--------------|---------------|------------|--------------|-----------------|---------------|---------------|----------------|
| 00-0000  | <b>Total, all occupations</b>   | <b>2,553</b> | <b>100.0%</b> | <b>2,912</b> | <b>100.0%</b> | <b>359</b> | <b>14.2%</b> | <b>35.9</b>     | <b>258.3</b>  | <b>294.2</b>  | <b>2,941.7</b> |
| 39-9021  | Personal care aides   | 208          | 8.8%          | 279          | 10.3%         | 71         | 34.1%        | 7.1             | 34.1          | 41.2          | 412.2          |
| 31-1014  | Nursing assistants  | 293          | 12.3%         | 313          | 11.5%         | 20         | 6.8%         | 2.0             | 33.6          | 35.6          | 355.9          |
| 29-1141  | Registered nurses   | 353          | 14.9%         | 399          | 14.7%         | 45         | 12.8%        | 4.5             | 18.8          | 23.3          | 233.4          |
| 31-1011  | Home health aides   | 125          | 5.3%          | 177          | 6.5%          | 51         | 41.0%        | 5.1             | 16.8          | 21.9          | 219.2          |
| 29-2061  | Licensed practical & licensed vocational nurses                                 | 115          | 4.8%          | 118          | 4.3%          | 3          | 3.0%         | 0.3             | 8.1           | 8.5           | 84.9           |
| 37-2012  | Maids and housekeeping cleaners   | 52           | 2.2%          | 57           | 2.1%          | 5          | 9.5%         | 0.5             | 7.1           | 7.6           | 75.6           |
| 43-6013  | Medical secretaries   | 52           | 2.2%          | 60           | 2.2%          | 8          | 15.2%        | 0.8             | 5.9           | 6.7           | 66.8           |
| 31-9091  | Dental assistants   | 50           | 2.1%          | 56           | 2.1%          | 6          | 12.6%        | 0.6             | 5.7           | 6.3           | 63.1           |
| 35-3041  | Food servers, nonrestaurant   | 35           | 1.5%          | 40           | 1.5%          | 5          | 13.4%        | 0.5             | 5.4           | 5.9           | 59.1           |
| 43-4171  | Receptionists and information clerks  | 38           | 1.6%          | 43           | 1.6%          | 5          | 12.6%        | 0.5             | 5.3           | 5.8           | 57.5           |
| 31-9092  | Medical assistants  | 38           | 1.6%          | 47           | 1.7%          | 8          | 22.2%        | 0.8             | 4.5           | 5.3           | 53.1           |
| 35-2012  | Cooks, institution and cafeteria  | 32           | 1.4%          | 36           | 1.3%          | 4          | 11.8%        | 0.4             | 4.8           | 5.1           | 51.4           |
| 43-9061  | Office clerks, general  | 40           | 1.7%          | 41           | 1.5%          | 1          | 1.8%         | 0.1             | 4.7           | 4.8           | 47.8           |
| 29-2052  | Pharmacy technicians  | 50           | 2.1%          | 56           | 2.1%          | 7          | 13.3%        | 0.7             | 4.1           | 4.7           | 47.3           |
| 11-9111  | Medical and health services managers  | 35           | 1.5%          | 39           | 1.4%          | 4          | 12.8%        | 0.4             | 2.8           | 3.3           | 32.7           |
| 39-9032  | Recreation workers  | 18           | 0.7%          | 20           | 0.7%          | 2          | 10.1%        | 0.2             | 3.1           | 3.3           | 32.5           |
| 37-2011  | Janitors and cleaners, except maids and housekeeping cleaners                   | 21           | 0.9%          | 23           | 0.8%          | 2          | 9.9%         | 0.2             | 2.8           | 3.0           | 30.3           |
| 39-9041  | Residential advisors  | 14           | 0.6%          | 17           | 0.6%          | 4          | 26.0%        | 0.4             | 2.6           | 2.9           | 29.3           |
| 29-2021  | Dental hygienists   | 32           | 1.3%          | 36           | 1.3%          | 4          | 12.6%        | 0.4             | 2.0           | 2.4           | 24.0           |
| 35-2021  | Food preparation workers  | 14           | 0.6%          | 14           | 0.5%          | 0          | 2.8%         | 0.0             | 2.3           | 2.3           | 23.4           |
| 43-1011  | First-line supervisors of office and administrative support workers             | 21           | 0.9%          | 23           | 0.8%          | 1          | 6.6%         | 0.1             | 2.2           | 2.3           | 23.0           |
| 49-9071  | Maintenance and repair workers, general   | 20           | 0.8%          | 22           | 0.8%          | 2          | 12.3%        | 0.2             | 2.0           | 2.3           | 22.8           |
| 43-6014  | Secretaries and administrative assistants, except legal, medical, and executive | 21           | 0.9%          | 20           | 0.7%          | -1         | -2.8%        | -0.1            | 2.2           | 2.1           | 21.2           |
| 43-3021  | Billing and posting clerks  | 18           | 0.8%          | 20           | 0.7%          | 2          | 10.9%        | 0.2             | 1.9           | 2.1           | 20.7           |
| 35-3021  | Combined food preparation and serving workers, including fast food              | 10           | 0.4%          | 11           | 0.4%          | 1          | 8.1%         | 0.1             | 1.9           | 1.9           | 19.3           |

**Note:** Displayed numerical and percentage changes may not equal computed changes because of rounding of employment estimates.

**Table A-8**  
**Healthcare: Growth and Replacement Need by Occupational Group, 2016-2026**

| SOC code       | Occupation   | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.    | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|--|------------|---------------|------------|---------------|----------|--------------|-----------------|---------------|---------------|--------------|
| <b>11-0000</b> | <b>Management occupations</b>                                  | <b>63</b>  | <b>2.7%</b>   | <b>72</b>  | <b>2.6%</b>   | <b>9</b> | <b>13.6%</b> | <b>0.9</b>      | <b>5.2</b>    | <b>6.1</b>    | <b>60.8</b>  |
| 11-1021        | General and operations managers                                | 12         | 0.5%          | 14         | 0.5%          | 2        | 17.7%        | 0.2             | 1.0           | 1.2           | 12.3         |
| 11-3011        | Administrative services managers                               | 3          | 0.1%          | 3          | 0.1%          | 0        | 9.6%         | 0.0             | 0.3           | 0.3           | 2.9          |
| 11-3021        | Computer and information systems managers                      | 2          | 0.1%          | 2          | 0.1%          | 0        | 8.7%         | 0.0             | 0.1           | 0.1           | 1.4          |
| 11-3031        | Financial managers   | 2          | 0.1%          | 2          | 0.1%          | 0        | 17.7%        | 0.0             | 0.1           | 0.2           | 1.8          |
| 11-9111        | Medical and health services managers                           | 35         | 1.5%          | 39         | 1.4%          | 4        | 12.8%        | 0.4             | 2.8           | 3.3           | 32.7         |
| 11-9151        | Social and community service managers                          | 4          | 0.2%          | 5          | 0.2%          | 1        | 19.5%        | 0.1             | 0.4           | 0.5           | 4.6          |
| 11-9199        | Managers, all other  | 2          | 0.1%          | 3          | 0.1%          | 0        | 8.7%         | 0.0             | 0.2           | 0.2           | 1.9          |
|                | Other occupations  | 3          | 0.1%          | 4          | 0.1%          | 0        | 7.0%         | 0.0             | 0.3           | 0.3           | 3.3          |
| <b>13-0000</b> | <b>Business and financial operations occupations</b>           | <b>27</b>  | <b>1.1%</b>   | <b>29</b>  | <b>1.1%</b>   | <b>3</b> | <b>10.7%</b> | <b>0.3</b>      | <b>2.5</b>    | <b>2.8</b>    | <b>27.9</b>  |
| 13-1023        | Purchasing agents, except wholesale, retail, and farm products | 2          | 0.1%          | 2          | 0.1%          | 0        | -0.4%        | 0.0             | 0.2           | 0.2           | 1.6          |
| 13-1071        | Human resources specialists                                    | 6          | 0.3%          | 7          | 0.2%          | 1        | 8.7%         | 0.1             | 0.6           | 0.7           | 6.7          |
| 13-1111        | Management analysts  | 2          | 0.1%          | 2          | 0.1%          | 0        | 17.7%        | 0.0             | 0.2           | 0.2           | 2.0          |
| 13-1151        | Training and development specialists                           | 2          | 0.1%          | 3          | 0.1%          | 0        | 12.1%        | 0.0             | 0.2           | 0.3           | 2.6          |
| 13-1161        | Market research analysts and marketing specialists             | 2          | 0.1%          | 3          | 0.1%          | 0        | 21.9%        | 0.0             | 0.2           | 0.3           | 2.7          |
| 13-1199        | Business operations specialists, all other                     | 4          | 0.2%          | 4          | 0.2%          | 0        | 11.2%        | 0.0             | 0.4           | 0.4           | 4.0          |
| 13-2011        | Accountants and auditors                                       | 5          | 0.2%          | 5          | 0.2%          | 1        | 10.5%        | 0.1             | 0.4           | 0.5           | 5.0          |
|                | Other occupations  | 4          | 0.1%          | 4          | 0.1%          | 0        | 8.7%         | 0.0             | 0.3           | 0.3           | 3.3          |
| <b>15-0000</b> | <b>Computer and mathematical occupations</b>                   | <b>13</b>  | <b>0.6%</b>   | <b>14</b>  | <b>0.5%</b>   | <b>1</b> | <b>7.4%</b>  | <b>0.1</b>      | <b>0.9</b>    | <b>1.0</b>    | <b>10.0</b>  |
| 15-1121        | Computer systems analysts                                      | 5          | 0.2%          | 5          | 0.2%          | 0        | 5.2%         | 0.0             | 0.3           | 0.3           | 3.3          |
| 15-1142        | Network and computer systems administrators                    | 2          | 0.1%          | 2          | 0.1%          | 0        | 1.4%         | 0.0             | 0.1           | 0.1           | 1.5          |
| 15-1151        | Computer user support specialists                              | 3          | 0.1%          | 3          | 0.1%          | 0        | 8.7%         | 0.0             | 0.2           | 0.2           | 2.3          |
|                | Other occupations  | 3          | 0.1%          | 4          | 0.1%          | 0        | 13.6%        | 0.0             | 0.2           | 0.3           | 2.9          |
| <b>19-0000</b> | <b>Life, physical, and social science occupations</b>          | <b>5</b>   | <b>0.2%</b>   | <b>6</b>   | <b>0.2%</b>   | <b>1</b> | <b>10.2%</b> | <b>0.1</b>      | <b>0.4</b>    | <b>0.5</b>    | <b>4.9</b>   |
| 19-1042        | Medical scientists, except epidemiologists                     | 2          | 0.1%          | 2          | 0.1%          | 0        | 8.7%         | 0.0             | 0.2           | 0.2           | 1.7          |
| 19-3031        | Clinical, counseling, and school psychologists                 | 3          | 0.1%          | 3          | 0.1%          | 0        | 11.7%        | 0.0             | 0.2           | 0.2           | 2.1          |
| 19-4099        | Life, physical, and social science technicians, all other      | 1          | 0.0%          | 1          | 0.0%          | 0        | 8.7%         | 0.0             | 0.1           | 0.1           | 1.0          |
| <b>21-0000</b> | <b>Community and social service occupations</b>                | <b>52</b>  | <b>2.2%</b>   | <b>61</b>  | <b>2.2%</b>   | <b>9</b> | <b>17.7%</b> | <b>0.9</b>      | <b>5.9</b>    | <b>6.8</b>    | <b>68.5</b>  |
| 21-1011        | Substance abuse and behavioral disorder counselors             | 2          | 0.1%          | 2          | 0.1%          | 0        | 13.0%        | 0.0             | 0.2           | 0.2           | 2.5          |
| 21-1014        | Mental health counselors                                       | 4          | 0.2%          | 4          | 0.2%          | 1        | 22.6%        | 0.1             | 0.4           | 0.5           | 4.9          |
| 21-1015        | Rehabilitation counselors                                      | 5          | 0.2%          | 6          | 0.2%          | 1        | 27.3%        | 0.1             | 0.6           | 0.7           | 7.1          |
| 21-1021        | Child, family, and school social workers                       | 2          | 0.1%          | 2          | 0.1%          | 0        | 20.0%        | 0.0             | 0.2           | 0.2           | 2.0          |

| SOC code       | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.     | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|---|------------|---------------|------------|---------------|-----------|--------------|-----------------|---------------|---------------|--------------|
| 21-1022        | Healthcare social workers   | 16         | 0.7%          | 18         | 0.7%          | 2         | 12.3%        | 0.2             | 1.7           | 1.9           | 19.1         |
| 21-1023        | Mental health & substance abuse social workers                    | 4          | 0.2%          | 5          | 0.2%          | 1         | 20.2%        | 0.1             | 0.5           | 0.6           | 5.7          |
| 21-1029        | Social workers, all other   | 2          | 0.1%          | 2          | 0.1%          | 0         | 12.8%        | 0.0             | 0.2           | 0.3           | 2.5          |
| 21-1091        | Health educators  | 2          | 0.1%          | 3          | 0.1%          | 0         | 8.7%         | 0.0             | 0.3           | 0.3           | 3.3          |
| 21-1093        | Social and human service assistants                               | 13         | 0.5%          | 15         | 0.6%          | 3         | 21.1%        | 0.3             | 1.6           | 1.9           | 19.1         |
| 21-1099        | Community & social service specialists, all other                 | 2          | 0.1%          | 2          | 0.1%          | 0         | 19.7%        | 0.0             | 0.2           | 0.2           | 2.3          |
|                | Other occupations   | 2          | 0.1%          | 3          | 0.1%          | 1         | 26.3%        | 0.1             | 0.3           | 0.3           | 3.3          |
| <b>27-0000</b> | <b>Arts, design, entertainment, sports, and media occupations</b> | <b>2</b>   | <b>0.1%</b>   | <b>2</b>   | <b>0.1%</b>   | <b>0</b>  | <b>8.7%</b>  | <b>0.0</b>      | <b>0.2</b>    | <b>0.2</b>    | <b>2.3</b>   |
|                | Other occupations   | 2          | 0.1%          | 2          | 0.1%          | 0         | 8.7%         | 0.0             | 0.2           | 0.2           | 2.3          |
| <b>29-0000</b> | <b>Healthcare practitioners and technical occupations</b>         | <b>872</b> | <b>36.7%</b>  | <b>966</b> | <b>35.6%</b>  | <b>95</b> | <b>10.9%</b> | <b>9.5</b>      | <b>49.1</b>   | <b>58.6</b>   | <b>586.1</b> |
| 29-1021        | Dentists, general   | 16         | 0.7%          | 18         | 0.7%          | 2         | 12.5%        | 0.2             | 0.4           | 0.7           | 6.5          |
| 29-1031        | Dietitians and nutritionists                                      | 4          | 0.2%          | 4          | 0.2%          | 0         | 4.4%         | 0.0             | 0.3           | 0.3           | 2.8          |
| 29-1051        | Pharmacists   | 37         | 1.6%          | 39         | 1.5%          | 2         | 5.1%         | 0.2             | 1.6           | 1.8           | 18.1         |
| 29-1061        | Anesthesiologists   | 2          | 0.1%          | 2          | 0.1%          | 0         | 10.4%        | 0.0             | 0.0           | 0.1           | 0.6          |
| 29-1062        | Family and general practitioners                                  | 12         | 0.5%          | 13         | 0.5%          | 1         | 9.4%         | 0.1             | 0.3           | 0.4           | 4.3          |
| 29-1063        | Internists, general   | 2          | 0.1%          | 3          | 0.1%          | 0         | 10.1%        | 0.0             | 0.1           | 0.1           | 0.9          |
| 29-1065        | Pediatricians, general  | 2          | 0.1%          | 2          | 0.1%          | 0         | 9.9%         | 0.0             | 0.0           | 0.1           | 0.6          |
| 29-1067        | Surgeons  | 2          | 0.1%          | 3          | 0.1%          | 0         | 10.1%        | 0.0             | 0.1           | 0.1           | 0.9          |
| 29-1069        | Physicians and surgeons, all other                                | 30         | 1.3%          | 33         | 1.2%          | 3         | 9.8%         | 0.3             | 0.8           | 1.1           | 11.2         |
| 29-1071        | Physician assistants  | 6          | 0.2%          | 8          | 0.3%          | 2         | 30.6%        | 0.2             | 0.4           | 0.5           | 5.4          |
| 29-1122        | Occupational therapists   | 8          | 0.4%          | 9          | 0.3%          | 1         | 8.8%         | 0.1             | 0.4           | 0.5           | 4.9          |
| 29-1123        | Physical therapists   | 15         | 0.6%          | 17         | 0.6%          | 2         | 13.9%        | 0.2             | 0.7           | 0.9           | 8.6          |
| 29-1126        | Respiratory therapists  | 18         | 0.8%          | 22         | 0.8%          | 4         | 23.4%        | 0.4             | 0.9           | 1.4           | 13.5         |
| 29-1127        | Speech-language pathologists                                      | 4          | 0.2%          | 5          | 0.2%          | 0         | 8.7%         | 0.0             | 0.2           | 0.3           | 2.7          |
| 29-1141        | Registered nurses   | 353        | 14.9%         | 399        | 14.7%         | 45        | 12.8%        | 4.5             | 18.8          | 23.3          | 233.4        |
| 29-1171        | Nurse practitioners   | 15         | 0.6%          | 19         | 0.7%          | 4         | 25.8%        | 0.4             | 0.8           | 1.2           | 12.0         |
| 29-2011        | Medical and clinical laboratory technologists                     | 15         | 0.6%          | 17         | 0.6%          | 1         | 9.6%         | 0.1             | 1.0           | 1.1           | 11.3         |
| 29-2012        | Medical and clinical laboratory technicians                       | 12         | 0.5%          | 13         | 0.5%          | 1         | 8.3%         | 0.1             | 0.8           | 0.9           | 8.7          |
| 29-2021        | Dental hygienists   | 32         | 1.3%          | 36         | 1.3%          | 4         | 12.6%        | 0.4             | 2.0           | 2.4           | 24.0         |
| 29-2031        | Cardiovascular technologists and technicians                      | 6          | 0.2%          | 6          | 0.2%          | 0         | 8.7%         | 0.0             | 0.3           | 0.4           | 3.5          |
| 29-2032        | Diagnostic medical sonographers                                   | 7          | 0.3%          | 8          | 0.3%          | 1         | 20.1%        | 0.1             | 0.4           | 0.5           | 5.0          |
| 29-2033        | Nuclear medicine technologists                                    | 2          | 0.1%          | 2          | 0.1%          | 0         | 8.7%         | 0.0             | 0.1           | 0.1           | 1.3          |
| 29-2034        | Radiologic technologists  | 23         | 1.0%          | 26         | 0.9%          | 2         | 9.6%         | 0.2             | 1.2           | 1.5           | 14.7         |
| 29-2035        | Magnetic resonance imaging technologists                          | 3          | 0.1%          | 3          | 0.1%          | 0         | 8.7%         | 0.0             | 0.2           | 0.2           | 1.8          |
| 29-2041        | Emergency medical technicians and paramedics                      | 15         | 0.6%          | 16         | 0.6%          | 1         | 9.8%         | 0.1             | 0.9           | 1.0           | 10.4         |
| 29-2051        | Dietetic technicians  | 5          | 0.2%          | 6          | 0.2%          | 0         | 6.5%         | 0.0             | 0.4           | 0.5           | 4.5          |

| SOC code       | Occupation   | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.     | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|--|------------|---------------|------------|---------------|-----------|--------------|-----------------|---------------|---------------|--------------|
| 29-2052        | Pharmacy technicians   | 50         | 2.1%          | 56         | 2.1%          | 7         | 13.3%        | 0.7             | 4.1           | 4.7           | 47.3         |
| 29-2053        | Psychiatric technicians  | 3          | 0.1%          | 4          | 0.1%          | 1         | 16.0%        | 0.1             | 0.3           | 0.3           | 3.3          |
| 29-2054        | Respiratory therapy technicians                                    | 2          | 0.1%          | 1          | 0.0%          | -1        | -54.7%       | -0.1            | 0.1           | 0.0           | 0.0          |
| 29-2055        | Surgical technologists   | 12         | 0.5%          | 13         | 0.5%          | 1         | 8.8%         | 0.1             | 1.0           | 1.1           | 11.0         |
| 29-2061        | Licensed practical & licensed vocational nurses                    | 115        | 4.8%          | 118        | 4.3%          | 3         | 3.0%         | 0.3             | 8.1           | 8.5           | 84.9         |
| 29-2071        | Medical records and health information technicians                 | 20         | 0.8%          | 22         | 0.8%          | 2         | 8.5%         | 0.2             | 1.2           | 1.4           | 14.1         |
| 29-2099        | Health technologists and technicians, all other                    | 8          | 0.3%          | 9          | 0.3%          | 1         | 10.7%        | 0.1             | 0.5           | 0.6           | 6.1          |
| 29-9099        | Healthcare practitioners and technical workers, all other          | 2          | 0.1%          | 2          | 0.1%          | 0         | 8.7%         | 0.0             | 0.1           | 0.1           | 1.3          |
|                | Other occupations  | 11         | 0.5%          | 12         | 0.4%          | 1         | 8.7%         | 0.1             | 0.5           | 0.6           | 6.2          |
| <b>31-0000</b> | <b>Healthcare support occupations</b>                              | <b>559</b> | <b>23.5%</b>  | <b>648</b> | <b>23.9%</b>  | <b>90</b> | <b>16.1%</b> | <b>9.0</b>      | <b>66.8</b>   | <b>75.8</b>   | <b>758.2</b> |
| 31-1011        | Home health aides  | 125        | 5.3%          | 177        | 6.5%          | 51        | 41.0%        | 5.1             | 16.8          | 21.9          | 219.2        |
| 31-1013        | Psychiatric aides  | 5          | 0.2%          | 7          | 0.2%          | 1         | 24.4%        | 0.1             | 0.7           | 0.8           | 8.0          |
| 31-1014        | Nursing assistants   | 293        | 12.3%         | 313        | 11.5%         | 20        | 6.8%         | 2.0             | 33.6          | 35.6          | 355.9        |
| 31-1015        | Orderlies  | 6          | 0.3%          | 6          | 0.2%          | 0         | 7.2%         | 0.0             | 0.7           | 0.7           | 7.3          |
| 31-2011        | Occupational therapy assistants                                    | 3          | 0.1%          | 3          | 0.1%          | 0         | 5.2%         | 0.0             | 0.4           | 0.4           | 3.7          |
| 31-2021        | Physical therapist assistants                                      | 7          | 0.3%          | 8          | 0.3%          | 1         | 14.4%        | 0.1             | 0.9           | 1.0           | 9.6          |
| 31-2022        | Physical therapist aides   | 2          | 0.1%          | 2          | 0.1%          | 0         | 3.8%         | 0.0             | 0.3           | 0.3           | 2.8          |
| 31-9091        | Dental assistants  | 50         | 2.1%          | 56         | 2.1%          | 6         | 12.6%        | 0.6             | 5.7           | 6.3           | 63.1         |
| 31-9092        | Medical assistants   | 38         | 1.6%          | 47         | 1.7%          | 8         | 22.2%        | 0.8             | 4.5           | 5.3           | 53.1         |
| 31-9093        | Medical equipment preparers  | 5          | 0.2%          | 6          | 0.2%          | 0         | 9.0%         | 0.0             | 0.7           | 0.7           | 7.4          |
| 31-9094        | Medical transcriptionists  | 4          | 0.2%          | 3          | 0.1%          | -1        | -23.9%       | -0.1            | 0.4           | 0.3           | 3.3          |
| 31-9095        | Pharmacy aides   | 4          | 0.2%          | 4          | 0.1%          | 0         | -8.9%        | 0.0             | 0.6           | 0.5           | 5.3          |
| 31-9097        | Phlebotomists  | 9          | 0.4%          | 10         | 0.4%          | 1         | 12.5%        | 0.1             | 0.9           | 1.1           | 10.6         |
| 31-9099        | Healthcare support workers, all other                              | 7          | 0.3%          | 7          | 0.3%          | 1         | 10.0%        | 0.1             | 0.8           | 0.9           | 9.0          |
| <b>33-0000</b> | <b>Protective service occupations</b>                              | <b>9</b>   | <b>0.4%</b>   | <b>10</b>  | <b>0.4%</b>   | <b>1</b>  | <b>6.2%</b>  | <b>0.1</b>      | <b>1.2</b>    | <b>1.3</b>    | <b>12.6</b>  |
| 33-1099        | First-line supervisors of protective service workers, all other    | 0          | 0.0%          | 1          | 0.0%          | 0         | 8.7%         | 0.0             | 0.0           | 0.1           | 0.5          |
| 33-9032        | Security guards  | 9          | 0.4%          | 9          | 0.3%          | 1         | 6.0%         | 0.1             | 1.2           | 1.2           | 12.1         |
| <b>35-0000</b> | <b>Food preparation and serving related occupations</b>            | <b>113</b> | <b>4.7%</b>   | <b>126</b> | <b>4.6%</b>   | <b>13</b> | <b>11.8%</b> | <b>1.3</b>      | <b>18.2</b>   | <b>19.5</b>   | <b>195.2</b> |
| 35-1012        | First-line supervisors of food preparation and serving workers     | 7          | 0.3%          | 7          | 0.3%          | 0         | 6.0%         | 0.0             | 1.0           | 1.0           | 10.4         |
| 35-2012        | Cooks, institution and cafeteria                                   | 32         | 1.4%          | 36         | 1.3%          | 4         | 11.8%        | 0.4             | 4.8           | 5.1           | 51.4         |
| 35-2021        | Food preparation workers   | 14         | 0.6%          | 14         | 0.5%          | 0         | 2.8%         | 0.0             | 2.3           | 2.3           | 23.4         |
| 35-3021        | Combined food preparation and serving workers, including fast food | 10         | 0.4%          | 11         | 0.4%          | 1         | 8.1%         | 0.1             | 1.9           | 1.9           | 19.3         |
| 35-3031        | Waiters and waitresses   | 5          | 0.2%          | 6          | 0.2%          | 1         | 28.6%        | 0.1             | 1.0           | 1.2           | 11.9         |

| SOC code       | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.     | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|---|------------|---------------|------------|---------------|-----------|--------------|-----------------|---------------|---------------|--------------|
| 35-3041        | Food servers, nonrestaurant   | 35         | 1.5%          | 40         | 1.5%          | 5         | 13.4%        | 0.5             | 5.4           | 5.9           | 59.1         |
| 35-9011        | Dining room and cafeteria attendants and bartender helpers          | 4          | 0.2%          | 4          | 0.2%          | 1         | 15.2%        | 0.1             | 0.7           | 0.7           | 7.2          |
| 35-9021        | Dishwashers   | 4          | 0.2%          | 5          | 0.2%          | 1         | 17.2%        | 0.1             | 0.7           | 0.8           | 7.7          |
|                | Other occupations   | 2          | 0.1%          | 3          | 0.1%          | 1         | 24.2%        | 0.1             | 0.4           | 0.5           | 4.7          |
| <b>37-0000</b> | <b>Building and grounds cleaning and maintenance occupations</b>    | <b>78</b>  | <b>3.3%</b>   | <b>86</b>  | <b>3.2%</b>   | <b>8</b>  | <b>9.7%</b>  | <b>0.8</b>      | <b>10.5</b>   | <b>11.3</b>   | <b>112.6</b> |
| 37-1011        | First-line supervisors of housekeeping and janitorial workers       | 4          | 0.2%          | 5          | 0.2%          | 0         | 8.6%         | 0.0             | 0.5           | 0.5           | 5.3          |
| 37-2011        | Janitors and cleaners, except maids and housekeeping cleaners       | 21         | 0.9%          | 23         | 0.8%          | 2         | 9.9%         | 0.2             | 2.8           | 3.0           | 30.3         |
| 37-2012        | Maids and housekeeping cleaners                                     | 52         | 2.2%          | 57         | 2.1%          | 5         | 9.5%         | 0.5             | 7.1           | 7.6           | 75.6         |
| 37-3011        | Landscaping and groundskeeping workers                              | 1          | 0.0%          | 1          | 0.0%          | 0         | 20.2%        | 0.0             | 0.1           | 0.2           | 1.6          |
| <b>39-0000</b> | <b>Personal care and service occupations</b>                        | <b>259</b> | <b>10.9%</b>  | <b>340</b> | <b>12.5%</b>  | <b>81</b> | <b>31.2%</b> | <b>8.1</b>      | <b>42.0</b>   | <b>50.1</b>   | <b>501.3</b> |
| 39-1021        | First-line supervisors of personal service workers                  | 14         | 0.6%          | 18         | 0.7%          | 4         | 25.4%        | 0.4             | 1.5           | 1.9           | 18.6         |
| 39-9011        | Childcare workers   | 2          | 0.1%          | 3          | 0.1%          | 0         | 19.4%        | 0.0             | 0.4           | 0.4           | 4.2          |
| 39-9021        | Personal care aides   | 208        | 8.8%          | 279        | 10.3%         | 71        | 34.1%        | 7.1             | 34.1          | 41.2          | 412.2        |
| 39-9032        | Recreation workers  | 18         | 0.7%          | 20         | 0.7%          | 2         | 10.1%        | 0.2             | 3.1           | 3.3           | 32.5         |
| 39-9041        | Residential advisors  | 14         | 0.6%          | 17         | 0.6%          | 4         | 26.0%        | 0.4             | 2.6           | 2.9           | 29.3         |
|                | Other occupations   | 3          | 0.1%          | 3          | 0.1%          | 0         | 17.8%        | 0.0             | 0.4           | 0.5           | 4.6          |
| <b>41-0000</b> | <b>Sales and related occupations</b>                                | <b>3</b>   | <b>0.1%</b>   | <b>4</b>   | <b>0.2%</b>   | <b>1</b>  | <b>20.1%</b> | <b>0.1</b>      | <b>0.5</b>    | <b>0.6</b>    | <b>6.1</b>   |
|                | Other occupations   | 3          | 0.1%          | 4          | 0.2%          | 1         | 20.1%        | 0.1             | 0.5           | 0.6           | 6.1          |
| <b>43-0000</b> | <b>Office and administrative support occupations</b>                | <b>259</b> | <b>10.9%</b>  | <b>275</b> | <b>10.1%</b>  | <b>17</b> | <b>6.5%</b>  | <b>1.7</b>      | <b>29.9</b>   | <b>31.6</b>   | <b>315.8</b> |
| 43-1011        | First-line supervisors of office and administrative support workers | 21         | 0.9%          | 23         | 0.8%          | 1         | 6.6%         | 0.1             | 2.2           | 2.3           | 23.0         |
| 43-2011        | Switchboard operators, including answering service                  | 3          | 0.1%          | 2          | 0.1%          | -1        | -21.5%       | -0.1            | 0.3           | 0.3           | 2.6          |
| 43-3011        | Bill and account collectors   | 4          | 0.2%          | 4          | 0.1%          | 0         | -1.4%        | 0.0             | 0.4           | 0.4           | 3.9          |
| 43-3021        | Billing and posting clerks  | 18         | 0.8%          | 20         | 0.7%          | 2         | 10.9%        | 0.2             | 1.9           | 2.1           | 20.7         |
| 43-3031        | Bookkeeping, accounting, and auditing clerks                        | 11         | 0.5%          | 12         | 0.4%          | 0         | 1.5%         | 0.0             | 1.3           | 1.3           | 12.8         |
| 43-3051        | Payroll and timekeeping clerks                                      | 2          | 0.1%          | 2          | 0.1%          | 0         | -5.1%        | 0.0             | 0.2           | 0.1           | 1.5          |
| 43-4051        | Customer service representatives                                    | 11         | 0.5%          | 13         | 0.5%          | 1         | 11.9%        | 0.1             | 1.5           | 1.6           | 16.4         |
| 43-4071        | File clerks   | 2          | 0.1%          | 2          | 0.1%          | 0         | -14.0%       | 0.0             | 0.2           | 0.2           | 2.1          |
| 43-4111        | Interviewers, except eligibility and loan                           | 15         | 0.6%          | 16         | 0.6%          | 1         | 4.2%         | 0.1             | 1.8           | 1.8           | 18.4         |
| 43-4171        | Receptionists and information clerks                                | 38         | 1.6%          | 43         | 1.6%          | 5         | 12.6%        | 0.5             | 5.3           | 5.8           | 57.5         |
| 43-5081        | Stock clerks and order fillers                                      | 5          | 0.2%          | 6          | 0.2%          | 0         | 6.9%         | 0.0             | 0.7           | 0.7           | 7.4          |
| 43-6011        | Executive secretaries and executive administrative assistants       | 4          | 0.2%          | 3          | 0.1%          | -1        | -18.9%       | -0.1            | 0.4           | 0.3           | 3.0          |

| SOC code       | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng.    | Pct. chng.   | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------------|---|------------|---------------|------------|---------------|----------|--------------|-----------------|---------------|---------------|--------------|
| 43-6013        | Medical secretaries   | 52         | 2.2%          | 60         | 2.2%          | 8        | 15.2%        | 0.8             | 5.9           | 6.7           | 66.8         |
| 43-6014        | Secretaries and administrative assistants, except legal, medical, and executive | 21         | 0.9%          | 20         | 0.7%          | -1       | -2.8%        | -0.1            | 2.2           | 2.1           | 21.2         |
| 43-9061        | Office clerks, general  | 40         | 1.7%          | 41         | 1.5%          | 1        | 1.8%         | 0.1             | 4.7           | 4.8           | 47.8         |
| 43-9199        | Office and administrative support workers, all other                            | 2          | 0.1%          | 2          | 0.1%          | 0        | 19.6%        | 0.0             | 0.2           | 0.2           | 2.1          |
|                | Other occupations   | 9          | 0.4%          | 9          | 0.3%          | 0        | -4.4%        | 0.0             | 0.9           | 0.9           | 8.7          |
| <b>47-0000</b> | <b>Construction and extraction occupations</b>                                  | <b>2</b>   | <b>0.1%</b>   | <b>3</b>   | <b>0.1%</b>   | <b>0</b> | <b>8.7%</b>  | <b>0.0</b>      | <b>0.2</b>    | <b>0.3</b>    | <b>2.6</b>   |
|                | Other occupations   | 2          | 0.1%          | 3          | 0.1%          | 0        | 8.7%         | 0.0             | 0.2           | 0.3           | 2.6          |
| <b>49-0000</b> | <b>Installation, maintenance, and repair occupations</b>                        | <b>24</b>  | <b>1.0%</b>   | <b>27</b>  | <b>1.0%</b>   | <b>3</b> | <b>11.8%</b> | <b>0.3</b>      | <b>2.4</b>    | <b>2.7</b>    | <b>26.9</b>  |
| 49-1011        | First-line supervisors of mechanics, installers, and repairers                  | 2          | 0.1%          | 3          | 0.1%          | 0        | 9.9%         | 0.0             | 0.2           | 0.2           | 2.4          |
| 49-9071        | Maintenance and repair workers, general   | 20         | 0.8%          | 22         | 0.8%          | 2        | 12.3%        | 0.2             | 2.0           | 2.3           | 22.8         |
|                | Other occupations   | 2          | 0.1%          | 2          | 0.1%          | 0        | 8.7%         | 0.0             | 0.2           | 0.2           | 1.7          |
| <b>51-0000</b> | <b>Production occupations</b>   | <b>11</b>  | <b>0.5%</b>   | <b>12</b>  | <b>0.4%</b>   | <b>1</b> | <b>4.8%</b>  | <b>0.1</b>      | <b>1.5</b>    | <b>1.5</b>    | <b>15.3</b>  |
| 51-6011        | Laundry and dry-cleaning workers  | 9          | 0.4%          | 10         | 0.4%          | 0        | 3.6%         | 0.0             | 1.3           | 1.3           | 12.9         |
|                | Other occupations   | 2          | 0.1%          | 2          | 0.1%          | 0        | 10.6%        | 0.0             | 0.2           | 0.2           | 2.4          |
| <b>53-0000</b> | <b>Transportation and material moving occupations</b>                           | <b>5</b>   | <b>0.2%</b>   | <b>6</b>   | <b>0.2%</b>   | <b>0</b> | <b>6.4%</b>  | <b>0.0</b>      | <b>0.6</b>    | <b>0.7</b>    | <b>6.6</b>   |
| 53-3041        | Taxi drivers and chauffeurs   | 3          | 0.1%          | 2          | 0.1%          | 0        | -7.4%        | 0.0             | 0.3           | 0.2           | 2.4          |
|                | Other occupations   | 3          | 0.1%          | 3          | 0.1%          | 1        | 20.5%        | 0.1             | 0.4           | 0.4           | 4.2          |

**Note:** Displayed numerical and percentage changes may not equal computed changes because of rounding of employment estimates.

**Table A-9**  
**Occupational Needs to Increase Physicians' Office Employment by 50 Percent**

| SOC code | Occupation  | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng. | Pct. chng. | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------|---|------------|---------------|------------|---------------|-------|------------|-----------------|---------------|---------------|--------------|
| 00-0000  | Total, all occupations  | 103        | 100.0%        | 155        | 100.0%        | 52    | 50.0%      | 5.2             | 9.4           | 14.6          | 145.5        |
| 31-9092  | Medical assistants  | 15         | 14.4%         | 24         | 15.6%         | 9     | 62.3%      | 0.9             | 2.0           | 3.0           | 29.6         |
| 43-4171  | Receptionists and information clerks  | 8          | 8.0%          | 12         | 7.8%          | 4     | 47.6%      | 0.4             | 1.3           | 1.7           | 17.0         |
| 43-6013  | Medical secretaries   | 7          | 7.1%          | 11         | 7.4%          | 4     | 54.8%      | 0.4             | 1.0           | 1.4           | 14.0         |
| 29-1141  | Registered nurses   | 8          | 7.8%          | 12         | 7.7%          | 4     | 47.5%      | 0.4             | 0.5           | 0.9           | 8.8          |
| 43-3021  | Billing and posting clerks  | 4          | 3.7%          | 6          | 3.7%          | 2     | 47.5%      | 0.2             | 0.5           | 0.6           | 6.5          |
| 29-1069  | Physicians and surgeons, all other  | 7          | 6.3%          | 10         | 6.2%          | 3     | 47.6%      | 0.3             | 0.2           | 0.5           | 5.2          |
| 29-2061  | Licensed practical & licensed vocational nurses                                 | 4          | 3.7%          | 6          | 3.7%          | 2     | 47.5%      | 0.2             | 0.3           | 0.5           | 5.1          |
| 43-9061  | Office clerks, general  | 3          | 3.0%          | 4          | 2.6%          | 1     | 32.7%      | 0.1             | 0.4           | 0.5           | 5.1          |
| 43-1011  | First-line supervisors of office and administrative support workers             | 3          | 2.7%          | 4          | 2.6%          | 1     | 43.5%      | 0.1             | 0.3           | 0.4           | 4.5          |
| 29-1171  | Nurse practitioners   | 3          | 2.7%          | 5          | 3.2%          | 2     | 77.0%      | 0.2             | 0.2           | 0.4           | 4.0          |
| 29-1071  | Physician assistants  | 2          | 2.4%          | 4          | 2.8%          | 2     | 77.1%      | 0.2             | 0.2           | 0.4           | 3.7          |
| 11-9111  | Medical and health services managers  | 2          | 1.5%          | 3          | 1.8%          | 1     | 80.4%      | 0.1             | 0.2           | 0.3           | 2.8          |
| 43-4051  | Customer service representatives  | 1          | 1.2%          | 2          | 1.2%          | 1     | 47.8%      | 0.1             | 0.2           | 0.3           | 2.6          |
| 29-1062  | Family and general practitioners  | 3          | 3.1%          | 5          | 3.1%          | 2     | 47.7%      | 0.2             | 0.1           | 0.3           | 2.6          |
| 43-6014  | Secretaries and administrative assistants, except legal, medical, and executive | 2          | 1.7%          | 2          | 1.4%          | 0     | 25.3%      | 0.0             | 0.2           | 0.3           | 2.5          |
| 29-2071  | Medical records and health information technicians                              | 2          | 1.5%          | 2          | 1.5%          | 1     | 47.4%      | 0.1             | 0.1           | 0.2           | 1.9          |
| 29-2034  | Radiologic technologists  | 2          | 1.6%          | 2          | 1.6%          | 1     | 47.4%      | 0.1             | 0.1           | 0.2           | 1.8          |
| 29-2057  | Ophthalmic medical technicians  | 1          | 1.2%          | 2          | 1.1%          | 1     | 47.6%      | 0.1             | 0.1           | 0.2           | 1.7          |
| 43-3031  | Bookkeeping, accounting, and auditing clerks                                    | 1          | 0.9%          | 1          | 0.8%          | 0     | 32.7%      | 0.0             | 0.1           | 0.2           | 1.5          |
| 31-1014  | Nursing assistants  | 1          | 0.8%          | 1          | 0.8%          | 0     | 47.3%      | 0.0             | 0.1           | 0.2           | 1.5          |
| 29-1067  | Surgeons  | 1          | 1.3%          | 2          | 1.3%          | 1     | 47.3%      | 0.1             | 0.0           | 0.1           | 1.1          |
| 43-4071  | File clerks   | 1          | 0.7%          | 1          | 0.5%          | 0     | 18.0%      | 0.0             | 0.1           | 0.1           | 1.0          |
| 29-1063  | Internists, general   | 1          | 1.2%          | 2          | 1.2%          | 1     | 47.7%      | 0.1             | 0.0           | 0.1           | 1.0          |
| 29-1151  | Nurse anesthetists  | 1          | 0.9%          | 1          | 0.8%          | 0     | 47.2%      | 0.0             | 0.1           | 0.1           | 0.9          |
| 43-3011  | Bill and account collectors   | 1          | 0.6%          | 1          | 0.5%          | 0     | 32.6%      | 0.0             | 0.1           | 0.1           | 0.9          |
| 29-2012  | Medical and clinical laboratory technicians                                     | 1          | 0.8%          | 1          | 0.7%          | 0     | 35.8%      | 0.0             | 0.1           | 0.1           | 0.9          |
| 29-1061  | Anesthesiologists   | 1          | 1.0%          | 2          | 1.0%          | 1     | 47.5%      | 0.1             | 0.0           | 0.1           | 0.9          |
| 13-1199  | Business operations specialists, all other                                      | 1          | 0.5%          | 1          | 0.5%          | 0     | 47.1%      | 0.0             | 0.1           | 0.1           | 0.8          |
| 11-1021  | General and operations managers   | 1          | 0.5%          | 1          | 0.5%          | 0     | 47.7%      | 0.0             | 0.1           | 0.1           | 0.8          |
| 29-2032  | Diagnostic medical sonographers   | 1          | 0.6%          | 1          | 0.6%          | 0     | 62.3%      | 0.0             | 0.0           | 0.1           | 0.7          |
| 31-9094  | Medical transcriptionists   | 1          | 0.5%          | 1          | 0.4%          | 0     | 4.5%       | 0.0             | 0.1           | 0.1           | 0.7          |
| 29-1065  | Pediatricians, general  | 1          | 0.8%          | 1          | 0.8%          | 0     | 47.4%      | 0.0             | 0.0           | 0.1           | 0.6          |

| SOC code | Occupation                                    | 2016 empl. | Pct. of total | 2026 empl. | Pct. of total | Chng. | Pct. chng. | Avg.ann. growth | Avg.ann. repl | Tot.ann. need | 10-year need |
|----------|---|------------|---------------|------------|---------------|-------|------------|-----------------|---------------|---------------|--------------|
| 29-2011  | Medical and clinical laboratory technologists | 1          | 0.5%          | 1          | 0.5%          | 0     | 35.5%      | 0.0             | 0.0           | 0.1           | 0.6          |
| 29-1064  | Obstetricians and gynecologists               | 1          | 0.6%          | 1          | 0.6%          | 0     | 47.1%      | 0.0             | 0.0           | 0.1           | 0.5          |
|          | Other occupations                             | 15         | 14.3%         | 21         | 13.7%         | 6     | 44.0%      | 0.6             | 0.5           | 1.2           | 11.8         |

**Note:** Displayed numerical and percentage changes may not equal computed changes because of rounding of employment estimates.