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Examining the Rural College Labor Market

Brandon Genetin and James C. Davis

Abstract

In the last 15 years, changing skill demands among rural employers have elevated the importance of a college education. This report examines trends in the United States' rural college labor force, with a focus on (1) rural college enrollment and degree completion, (2) the location decisions of college students, and (3) composition shifts in degrees awarded to meet the needs of evolving rural industries. We find that since at least 2009, rising rural educational attainment has coincided with shifts in the rural economy away from goods-producing industries and towards service-producing industries that employ higher shares of college-educated workers. Land-grant and nonmetropolitan postsecondary institutions play a critical role in supplying workers for this transition. Nonmetropolitan institutions (excluding community colleges) have a higher percentage of in-State students than their metropolitan counterparts and most graduates tend to remain within the same State as their postsecondary institution. While undergraduate enrollment at nonmetro colleges fell between 2011 and 2023, improved retention and faster completion rates kept the number of degrees awarded constant. In contrast, land-grant institutions increased both enrollment and degrees awarded during this period. An improved understanding of these trends can help stakeholders better align rural college curriculums with local labor market needs in an evolving economy.

Keywords: college labor, degree majors, rural economy, postsecondary institutions, land-grants

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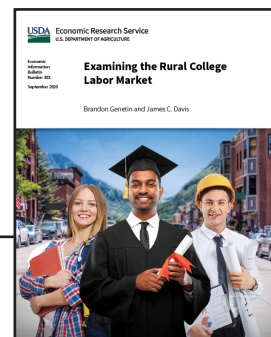
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A report summary from the Economic Research Service

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Key Points

- College graduates represent a growing share of the United States' nonmetropolitan (nonmetro) workforce. In 2019–23 (5-year average statistics), 32 percent of the nonmetro population 25 years and older had either an associate or bachelor's degree. Since 2009–13, the share of the population with associate degrees grew 24 percent, bachelor's degrees 22 percent, and graduate or professional degrees by 28 percent.
- Nonmetro areas have seen a significant reallocation of jobs from goods-producing sectors to service industries, making the rural economy increasingly reliant on college-educated workers. Between 2001 and 2022, industries with the highest proportion of workers holding bachelor's degrees expanded by 17 percent (an addition of 1.5 million jobs). In contrast, industries with lower shares of bachelor's degree holders grew by just 1 percent during the same period. Overall, total employment in rural counties grew 7 percent during the same period.
- Nonmetro postsecondary institutions function as a vital source of college-educated workers for the rural economy, despite declining enrollment. From 2011 to 2023, enrollment at nonmetro institutions (excluding land-grant institutions) declined 23 percent, similar to metropolitan (metro) postsecondary institutions (excluding land-grant institutions). However, due to a decrease in drop-out rates and faster degree completion, the number of bachelor's degrees and associate degrees awarded remained relatively constant.
- Enrollment and degree completion at land-grant institutions grew from 2011 to 2023, contrasting the trends at metro and nonmetro institutions. Undergraduate enrollment at land-grant institutions increased 11 percent while the number of bachelor's degrees awarded at land-grant institutions grew 23 percent and agricultural degrees awarded grew 19 percent.
- Three out of every 10 bachelor's degrees awarded from nonmetro postsecondary institutions in 2023 were in either business and management or health professions. However, the fastest growth for bachelor's degrees was in Science, Technology, Engineering, and Math (STEM) majors such as computer and information science, health professions, and engineering. For associate degrees, the fastest growth was for agriculture and liberal arts and sciences.

Why Does This Matter?

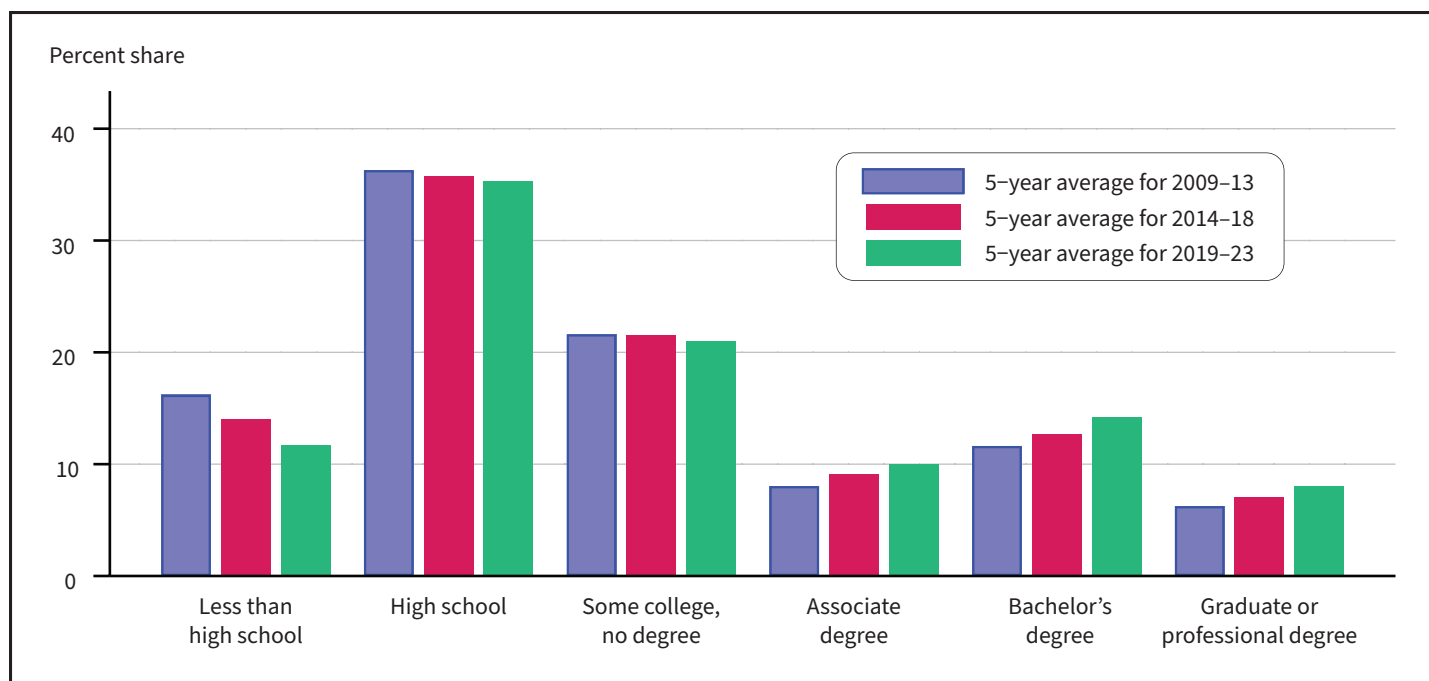
Rural workers have traditionally lagged their urban counterparts in college attendance and graduation rates, with persistent gaps in postsecondary enrollment and degree completion (Wells et al., 2023). Furthermore, postsecondary institutions are sometimes viewed by rural communities as a mechanism for rural brain drain, where rural youth leave to attend college in urban areas

and do not return to rural places (Carr & Kefalas, 2009; Gibbs & Cromartie, 1994; Mills & Hazarika, 2001). Yet the rural economy is changing in ways that make college-educated labor increasingly important: Rural areas are seeing economic growth from rapidly growing industries that increasingly rely on more educated workers. As such, this report provides information on the role of college-educated workers in rural production. For example, rural healthcare employment, an industry with

a high share of college-educated workers, increased 19 percent from 2001 to 2022, whereas manufacturing employment declined 20 percent. Understanding these shifts can help policymakers, educators, and communities align rural education and workforce systems within the changing economic landscape.

A Few More Details

The U.S. nonmetropolitan population age 25 years and older is increasingly more educated



Note: The category “Less than high school” includes “No schooling completed,” “Nursery school,” “Grades 1 through 11,” and “Grade 12–no diploma.” The category “High school” includes both “Regular high school diploma” and “GED or alternative credential.” The category “Some college, no degree” includes both “Some college credit, but less than 1 year of college” and “1 or more years of college credit, no degree.” The category “Graduate or professional degree” includes “Master’s degree,” “Professional degree beyond bachelor’s degree,” and “Doctorate degree.”

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

The figure shows a shift in the distribution of the rural population 25 years and older into higher levels of educational attainment over the 10-year period from 2009–13 to 2019–23. Specifically, the share that did not complete high school declined 4.5 percentage points, that completed high school is down 1 percentage point, and that completed high school and had some college training declined 0.7 percent. On the other hand, the share of the rural population with associates degrees increased 2 percentage points, with bachelor’s degrees 2.5 percentage points, and those that continued their postsecondary education to receive a graduate or professional degree increased a little over 1.5 percentage points.

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

Examining the Rural College Labor Market

Introduction

An increasing number of workers in the nonmetropolitan (nonmetro) labor market have a college education.¹ From 2000 to 2023, the percentage of adults 25 and older who held an associate degree, bachelor's degree, or higher increased from 21 percent to 33 percent (USDA, Economic Research Service (ERS), 2025). This growth in college-educated workers has paralleled substantial changes in the allocation of rural workers across various industries. Increases in automation and technological innovation have decreased the need for manual jobs in agriculture, mining, and manufacturing (Dumont, 2024) while simultaneously spurring growth in industries such as finance, professional services, and healthcare (Davis et al., 2022). These industrial changes reflect a broader shift away from manual and production-based work and towards roles that require higher levels of formal education.

As nonmetro labor markets shift towards industries requiring higher levels of education, the geographic choices of newly college-educated individuals have become increasingly relevant. Much of the literature on the migration decisions of rural college-educated individuals emphasizes the “rural brain-drain” phenomenon, or the outmigration of academically successful youth to metropolitan (metro) areas. This research often highlights how high-achieving rural students often attend college² in metro areas and remain in those areas post-graduation (Sowl et al., 2022; Petrin et al., 2014; Sherman & Sage, 2011; Brooks et al., 2010; Gibbs, 1995). More recent research, however, has expanded the narrative by exploring the underlying factors that influence migration decisions, such as career opportunities, social ties, and institutional characteristics (Sowl et al., 2022; Tieken, 2016; Fiore et al., 2015; Petrin et al., 2014).

While the rise in nonmetro educational attainment reflects broader national trends, it also raises important questions about the alignment between local labor market needs and the supply of educated workers. As rural economies transition toward industries that demand higher levels of formal education, the capacity of nonmetro regions to retain and attract college-educated individuals becomes increasingly critical.

In this context, rural postsecondary institutions play a pivotal role in shaping the educational and economic trajectories of nonmetro regions. These institutions not only serve as accessible entry points for higher education but also act as key contributors to the local workforce pipeline (Norris et al., 2023). Understanding how these institutions influence educational attainment, degree field choices, and labor market outcomes is essential for evaluating the extent to which rural areas are equipped to meet the growing demand for college-educated workers. By examining these rela-

¹ Throughout this report, the terms rural and nonmetro are used interchangeably, as are the terms urban and metro. Unless otherwise stated, counties are designated as nonmetro throughout the report using the 2013 Office of Management and Budget (OMB) metro area definitions as published in the USDA, Economic Research Service (ERS) Rural-Urban Continuum Codes (RUCC). We use the 2013 OMB definition instead of the new 2023 definition because the 2013 definition coincides with the initial period of our data. We thus include counties as nonmetro that grow and are reclassified as metro in the 2023 definition.

² We interchangeably use colleges and postsecondary institutions throughout the report. Both terms include all degree and certificate granting institutions such as colleges, universities, and trade and vocational schools, unless otherwise specifically mentioned.

tionships, this report aims to shed light on the evolving role of rural postsecondary education in supporting economic development and workforce resilience in rural areas.

This report explores several interrelated dimensions of the nonmetro postsecondary landscape and its connection to the rural labor market. Utilizing multiple data sources, we first document trends in nonmetro educational attainment over the past decade and how those changes coincided with shifts in industrial composition within nonmetro areas. The analysis gives particular attention to the growing importance of industries requiring higher levels of formal education. Second, to examine if the flow of college-educated workers is meeting the growing demand for them, we demonstrate how the number of nonmetro college graduates can serve as a proxy for the inflow of college-educated workers into rural labor markets. Though the number of college graduates from local postsecondary institutions is not a direct measure of an area's flow of college-educated workers due to mobility, it is useful to explore the role of rural educational institutions as an important local source for new college-educated workers. Next, we then examine trends in postsecondary enrollment and completion, disaggregating the analysis by sex and race/ethnicity, and comparing nonmetro trends to metro ones. We also investigate emerging patterns in degree field choices, studying which degree fields have become more popular over time and highlighting variations in different credential types. We conduct separate analyses for associate degree majors and certificates, given the outsized role they have for rural college students and nonmetro postsecondary institutions (Koricich et al., 2018).

Throughout the analysis, we incorporate data on land-grant institutions. Land-grant institutions were first established by the Morrill Act of 1862, and later in the Morrill Act of 1890 and the Equity in Educational Land-Grant Status Act of 1994, to focus on the teaching of practical agriculture. Although many land-grant universities are physically located in metropolitan areas, their mission remains deeply tied to the rural United States. As partners of the U.S. Department of Agriculture (USDA), they play a central role in conducting research, providing instruction, and extending outreach programs that deliver vital information on farming practices, innovation, food systems, and resource conservation directly to agricultural communities. Importantly, land-grant institutions play a central role in awarding agricultural degrees in the United States today (Croft, 2019), supplying the educated workforce for an industry that is overwhelmingly concentrated in nonmetro counties. Because agriculture is fundamentally rural in both geography and workforce demand, examining land-grant institutions is essential to understanding the broader trends shaping agricultural labor and rural economies.

Data Overview

This report draws on two primary data sources: the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS), which provides estimates of graduates flowing from postsecondary institutions into the workforce, and the U.S. Department of Commerce, Bureau of the Census' American Community Survey (ACS), which offers data on nonmetro populations, their characteristics, and trends over time.

IPEDS is a system of 12 surveys conducted annually and includes every college, university, and technical and vocational institution that participates in Federal student financial aid programs (U.S. Department of Education, National Center for Education Statistics (NCES), 2023). The Higher Education Act of 1965 declared all IPEDS surveys to be mandatory for institutions that participate, or are applicants to participate, in any Federal student financial aid program. While these required surveys report data on enrollments, program completions, graduation rates, faculty and staff, finances, institutional prices, and student financial aid, we only use IPEDS data to generate estimates

for college enrollment, college graduates, dropout rates, completion rates, and degree completion by credential and/or degree. IPEDS also includes the location of each postsecondary institution, data used to classify colleges and universities as located in metro or nonmetro areas based on the county of their location. We define rural postsecondary institutions as any postsecondary institution that resides in a nonmetro county, as determined by the Office of Management and Budget's (OMB) metro area definitions as published in the USDA, Economic Research Service's (ERS) Rural-Urban Continuum Codes (USDA, ERS, 2023). Likewise, urban or metro postsecondary institutions are any postsecondary institutions that reside in a metro county.³

Classification for degree majors, unless otherwise specified, comes from the IPEDS Classification of Instructional Program (CIP) codes. CIP codes allow fields of study to be tracked and compared across postsecondary institutions and time. Codes are separated into two-, four-, and six-digit groupings, with broader categories captured in the two-digit codes and increased specificity with four- and six-digit codes, respectively. CIP codes are updated every 10 years, with 2020 being the most recent update. We utilize U.S. Department of Education, National Center for Education Statistics' crosswalks between the 2010 CIP and 2020 CIP when using longitudinal data to ensure similar CIP codes across time (U.S. Department of Education, National Center for Education Statistics, 2020).

The ACS collects detailed information on social, economic, housing, and demographic characteristics, and institutions are required by law to respond (U.S. Department of Commerce, Bureau of the Census, 2023a). The ACS utilizes a randomly selected sample of roughly 3.5 million addresses each year and is intended to be representative of the U.S. population. The ACS is used to estimate educational attainment, college-educated employment by industry, college-educated employment by occupation, and bachelor's degree majors by occupation. The CIP code to ACS degree code crosswalk used in this report is included in appendix table C.1.

Additional data used for the report include the U.S. Department of Commerce, Bureau of Economic Analysis's (BEA) regional employment estimates, the Department of Labor, Bureau of Labor Statistics' (BLS) Occupational Employment and Wage Statistics (OEWS) data on occupations, and the Census Bureau's Postsecondary Employment Outcomes (PSEO) estimates for distance of college graduates to their first job.

BEA produces employment estimates for local areas with breakdowns by industry (U.S. Department of Commerce, Bureau of Economic Analysis, 2023). These statistics are based primarily on data from BLS and the Internal Revenue Service.

OEWS produces employment and wage statistics annually for 830 occupations (U.S. Department of Labor, Bureau of Labor Statistics, 2023). The estimates are produced at varying geographies such as metro and nonmetro areas and include cross-industry occupational data. The OEWS estimates are constructed from a sample of 1.1 million establishments collected over a 3-year period using the database of businesses reporting to the State unemployment insurance programs. Each year, 2 semiannual panels of approximately 179,000 to 187,000 sampled establishments are contacted, 1 panel in May and the other in November.

PSEO data includes employment outcomes for postsecondary graduates by degree level, degree major, and institution (U.S. Department of Commerce, Bureau of the Census, 2023b). Employment flows are

³ We separately consider metro institutions, nonmetro institutions, and land-grant institutions throughout the report. Analysis of metro institutions is all metro institutions less land-grant institutions in metro counties, unless otherwise stated. Likewise, analysis of nonmetro institutions is all nonmetro institutions less land-grant institutions in nonmetro counties, unless otherwise stated. This categorization allows the three categories to be mutually exclusive.

constructed by the Census Bureau by linking university data on graduates to data on private sector jobs, including measures for in-State and out-of-State job locations, and the industry of the employer.

Land-grant Institutions

Throughout this report, land-grant institutions are reported under two separate subsections. Land-grant postsecondary institutions are supported by USDA under the Morrill Acts of 1862 and 1890, and the Equity in Educational Land-Grant Status Act of 1994. These acts provide funding for agricultural education programs where, among many functions, land-grant institutions both train the agricultural workforce and have a historical connection to rural areas. This report presents separate estimates for land-grant institutions because, while they play a key role in educating rural workers, many are located outside nonmetro areas. Of the original 1862 land-grant institutions, only six are situated in nonmetro counties.⁴

While few are located in nonmetro areas, largely those in States with smaller populations, a primary reason land-grant institutions are in metro areas is because they have grown to become large institutions. The average 1862 land-grant university in 2023 had an enrollment of 33,408 and faculty and staff employment of 13,393 for a total campus population of 46,802. Given the OMB definition for a metro area core is a population of 50,000, for most 1862 land-grant institutions the existence of the institution itself created a metro area around it even if the university retains a historically rural connection. The additional local employment for retail, personal services, public safety, and security and health services necessary to support university students and staff would be enough to elevate the area to metro status. In addition, many 1862 land-grant institutions are “R1 Doctoral Universities”⁵ with very high research activity, according to the Carnegie Classification of Institutions of Higher Education. This allows knowledge spillovers and entrepreneurial spinoffs from these universities to drive local economic growth (Hausman, 2022).

Among 1862 land-grant institutions, 33 percent are in metro areas with a population less than 250,000, 25 percent in metro areas between 250,000 and 1 million people, 32 percent in metro areas of 1 million or more people, and 10 percent in nonmetro areas. Among 1890 land-grant institutions, 30 percent are in metro areas less than 250,000 people, 30 percent in metro areas between 250,000 and 1 million people, 20 percent in metro areas of 1 million or more people, and 20 percent are in nonmetro areas. The 1994 expansion gave land-grant status to several tribal colleges and universities, with most located in nonmetro areas (76 percent), 12 percent in metro areas less than 250,000 people, 6 percent in metro areas between 250,000 and 1 million people, and 6 percent in metro areas of 1 million people or more.

⁴ Nonmetro 1862 land-grant universities include Mississippi State University, University of Wyoming, Washington State University, University of Idaho, Oklahoma State University, and South Dakota State University.

⁵ The 2025 Carnegie Classifications utilize Research Activity Designations that rely on the higher of a 3-year average (FY2021–FY2023) or the most recent year (FY2023) for research spending and research doctorates awarded. Research 1 (R1) institutions average at least \$50 million in annual research and development spending and award at least 70 research doctorates; Research 2 (R2) institutions average at least \$5 million and award at least 20 research doctorates; Research colleges and universities average at least \$2.5 million in research and development spending and are distinct from R1 and R2 institutions.

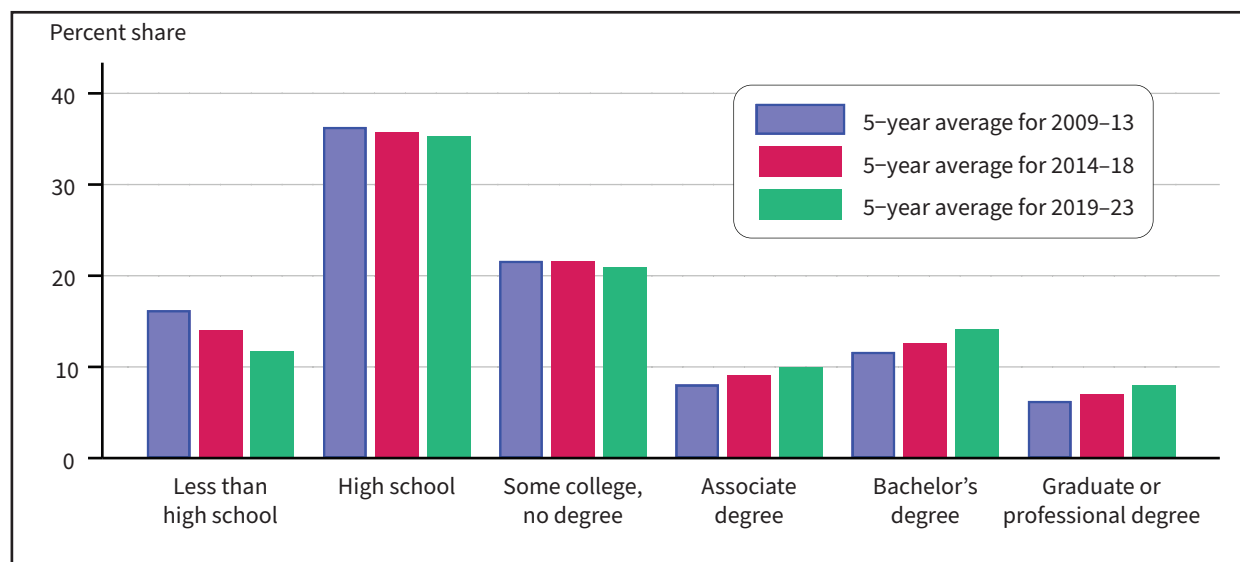
The Changing Rural Labor Force

Educational Attainment

The rural labor force is becoming increasingly more educated. From the 5-year period of 2009–13 to 2019–23,⁶ the nonmetro population 25 years and older was increasingly more likely to hold at least an associate degree. In the latter period, 32 percent of the nonmetro population held college degrees, with 10 percent holding associate degrees, 14 percent holding bachelor’s degrees, and another 8 percent earning a graduate or professional degree (figure 1). Associate degrees, bachelor’s degrees, and advanced degrees all increased by 2 percentage points in 10 years. Conversely, the percentage of people whose educational attainment was less than a high school diploma decreased. During the 2009–13 period, 16 percent of the nonmetro population had an educational attainment of less than a high school diploma. Ten years later, that number decreased 4 percentage points to 12 percent. For context, the decade of 2010–2020 experienced modest population loss in nonmetro areas, followed by renewed population growth during the 2020s (Farrigan et al., 2024). Similar changes in educational attainment occurred in metro areas over the same period, with more people receiving college degrees and fewer individuals holding a high school diploma or less, as shown in appendix figure A.1.

Figure 1

Percent of the U.S. nonmetropolitan population 25 years and over by educational attainment



Note: The category “Less than high school” includes “No schooling completed,” “Nursery school,” “Grades 1 through 11,” and “Grade 12—no diploma.” The category “High school” includes both “Regular high school diploma” and “GED or alternative credential.” The category “Some college, no degree” includes both “Some college credit, but less than 1 year of college” and “1 or more years of college credit, no degree.” The category “Graduate or professional degree” includes “Master’s degree,” “Professional degree beyond bachelor’s degree,” and “Doctorate degree.”

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

While nonmetro educational attainment changes from 2013 to 2023 show a gradual trend towards postsecondary degrees, county-level data reveal sharp differences across geographic areas. Figure 2 maps the share of residents with a bachelor’s degree or higher for nonmetro counties. To interpret these differences, we use two USDA, ERS datasets, beginning with the Rural-Urban Continuum Codes

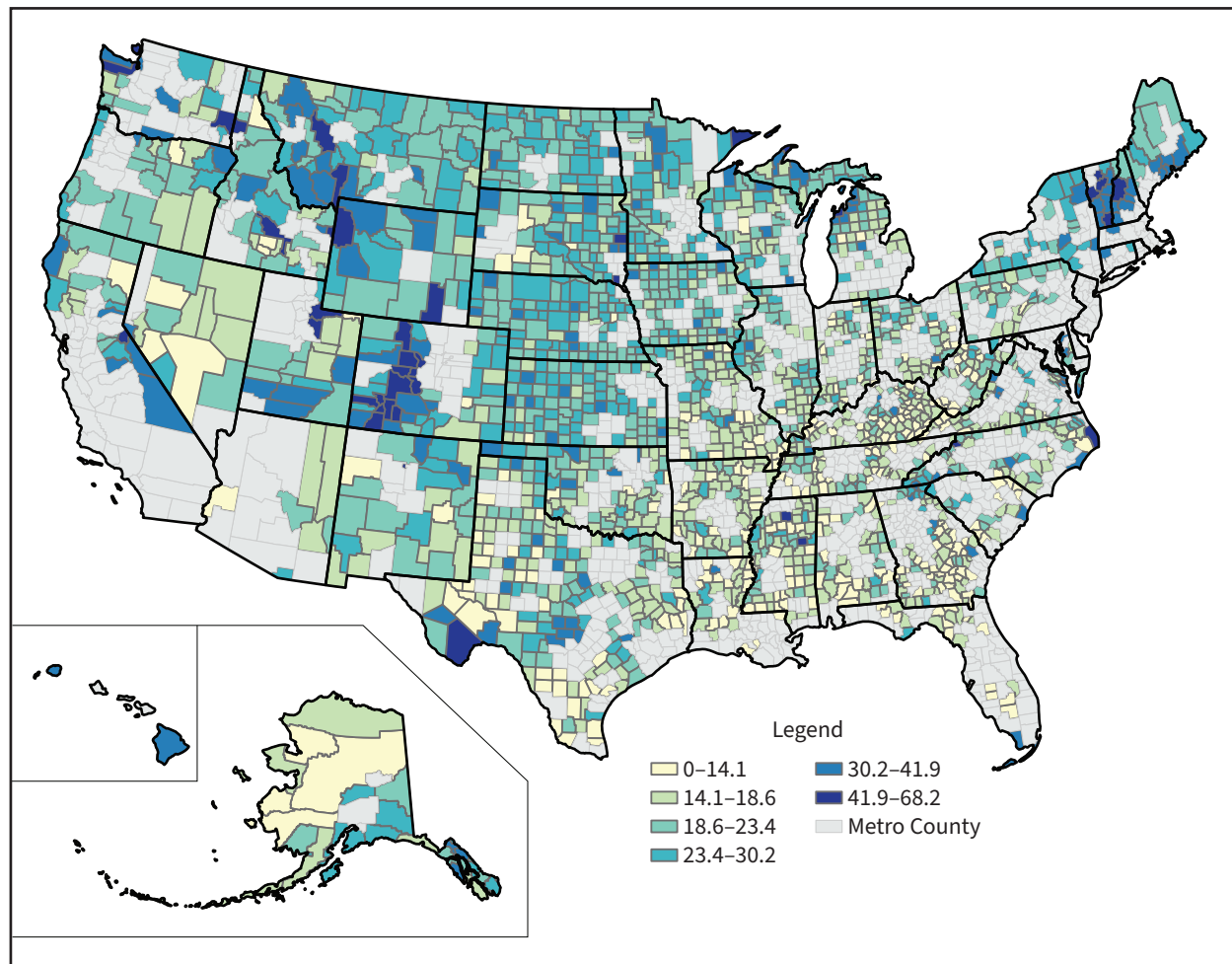
⁶ This report utilizes 5-year ACS data that aggregate responses into estimates available at the county level. The multi-year estimates improve statistical accuracy, avoid cell suppressions to protect respondent privacy, and support the geographies required to define nonmetro areas.

(RUCC), which classify counties by micropolitan size and proximity to metro areas. Nonmetro counties with population cores of 20,000 or more have a higher share of residents with a bachelor's degree or higher (24 percent) than counties with smaller population cores (20 percent). Conversely, nonmetro counties adjacent to a metropolitan area have a lower share of their population with bachelor's degrees, 20 percent, in comparison to a 22 percent share of nonmetro counties that are not adjacent to a metro county.

The USDA, ERS County Typology Codes can also be used to interpret geographic variation in the share of the population that holds bachelor's degrees. The County Typology Codes separate nonmetro counties based on their dominant industrial composition. For nonmetro counties, those with the highest shares of populations holding bachelor's degrees are farming dependent (21 percent), government dependent (24 percent), and recreation dependent counties (31 percent). Recreation dependent counties are also often retirement destinations, where some of the college-educated population are retirees. The nonmetro counties with lower shares of bachelor's degrees include mining dependent (17 percent), manufacturing dependent (19 percent), and diversified counties not dependent on any one sector (20 percent).

Figure 2

Percent of the U.S. nonmetropolitan population 25 years and over with a bachelor's degree by county

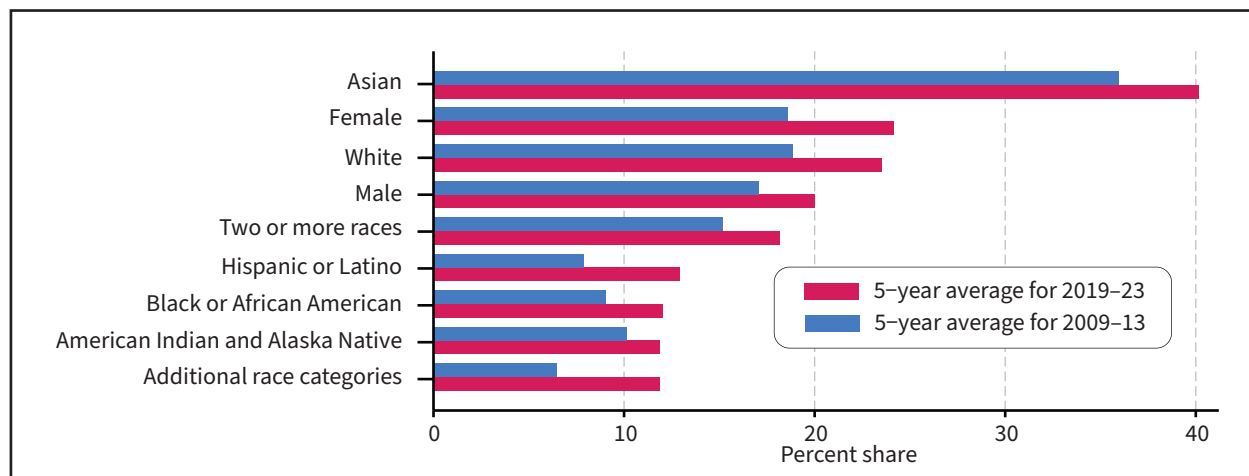


Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2023 5-year American Community Survey (ACS) data.

Increases in rural educational attainment occurred across all sex, race, and ethnicity subgroups, though at differing rates. In 2019–23, 40 percent of the Asian population held a bachelor’s degree, up slightly from 36 percent a decade earlier. Among White populations, the share with bachelor’s degrees rose from 19 to 24 percent, while those identifying as two or more races increased from 15 to 18 percent. Hispanic or Latino populations experienced one of the largest gains, increasing 5 percentage points from 8 to 13 percent over the decade, compared to a 3-percentage point increase for Black or African American populations and a 2-percentage point increase for American Indian or Alaska Natives. Other racial groups, including Native Hawaiian, Pacific Islander, and survey write-in categories also showed growth, doubling from 6 percent in 2009–13 to 12 percent in 2019–23. Differences by sex remained pronounced, as females not only held bachelor’s degrees at higher rates than males but also experienced faster growth. Over the decade, the share of females with a bachelor’s degree increased by 5 percentage points (19 to 24 percent), compared to a 3-percentage-point increase among males (17 to 20 percent). Similar analysis of the metro population is found in appendix figure A.2, with larger shares of people holding bachelor’s degrees across all subgroups. These findings align with previous research showing that females continue to outpace males in college graduation and educational attainment (Goldin et al., 2006; DiPrete & Buchmann, 2006; Charles & Luoh, 2003).

Figure 3

Percent of the U.S. nonmetropolitan population 25 years and over with bachelor’s degrees by subgroups



Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

Industry Realignment

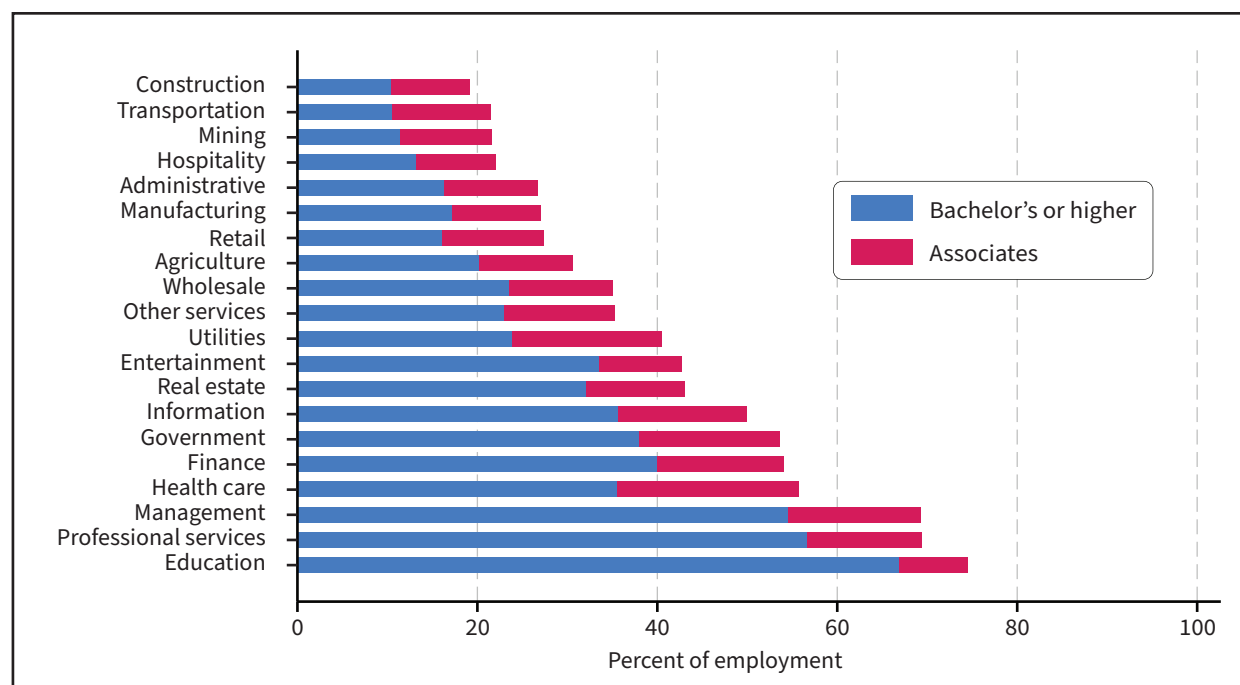
This section presents analysis by industry. Analysis was also done by occupational groups and produced similar results. The associated analysis is found in appendix figures B.1–B.3. As the rural workforce becomes more educated, the rural economy also shifts away from industries that hire fewer college-educated workers and instead towards industries with higher shares of workers with associate and bachelor’s degrees. Rural firms have traditionally employed fewer workers with postsecondary education than urban employers, in part because of rural production’s traditional specialization in industries that produce and distribute goods such as manufacturing, retail, and agriculture. As seen in figure 4, these industries typically employ fewer college-educated workers.

A shift in rural jobs towards industries with higher shares of college-educated workers resulted in a modest reallocation of the workforce. In part, this relative shift is because of increased labor productivity in these industries (Davis et al., 2022), as firms required fewer workers to produce a given level of output due to technological change. Davis et al. (2022) showed that rural manufacturing output grew 20 percent from 2001 to 2020 while manufacturing employment declined throughout this period. Manufacturing employment also declined due to import competition (Acemoglu et al., 2016; Fort et al., 2018) and offshoring (Bernard & Fort, 2015) yet experienced some recovery since the financial recession of 2008–09. Similarly, agricultural output grew 70 percent from 2001 to 2020 while employment in the industry also declined over the same period (Davis et al., 2022).⁷

These trends have resulted in a reallocation of jobs into more rapidly growing industries such as healthcare, education, and professional services. Autor and Salomons (2018) documented these trends more broadly across countries, finding aggregate employment grew in all countries from 1970 to 2007, even as relative employment fell in the industries experiencing the fastest productivity growth. For the U.S. rural economy, the reallocation trends have favored employment growth in industries that tend to employ more workers with postsecondary education.

Figure 4

Percent of college-educated workers by industry in nonmetropolitan areas, 2021



Note: Nonmetropolitan (nonmetro) workers are defined as either “not in metro area” for place of work or “metro status indeterminable” for place of work for nonmetro and indeterminable places of residence (indeterminable is due to privacy suppression in the public data). The Integrated Public Use Microdata Sample (IPUMS) derives place-of-work codes based on the metropolitan (metro) status of the place of work as directly identified in the source microdata as well as by using other available geographic information such as place-of-work county groups or Public Use Microdata Areas (PUMA). The 2021 data from U.S. Department of Commerce, Bureau of Economic Analysis show nonmetro employment to be 24 million. The 2021 American Community Survey (ACS) nonmetro employment (weighted estimate) is 24 million as defined, where some metro workplaces in the outer suburbs of metro areas near the metro/nonmetro classification boundary are included. Limiting the place of work to “not in metro area” includes 11 million rural workers, only half of the total and not necessarily representative of rural employment overall.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data, harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

⁷ For more information see the USDA, ERS Farm Labor topic web page.

The industries that employ the most college-educated workers in nonmetro areas are education, professional services, management, healthcare, finance, and government (figure 4). Industries that employ the fewest workers with either associate degrees or bachelor's degrees are construction, transportation, mining, hospitality, manufacturing, and administrative industries such as temporary help services, call centers, landscaping services, and waste collection. Overall employment share by industry can be found in appendix figure A.3.

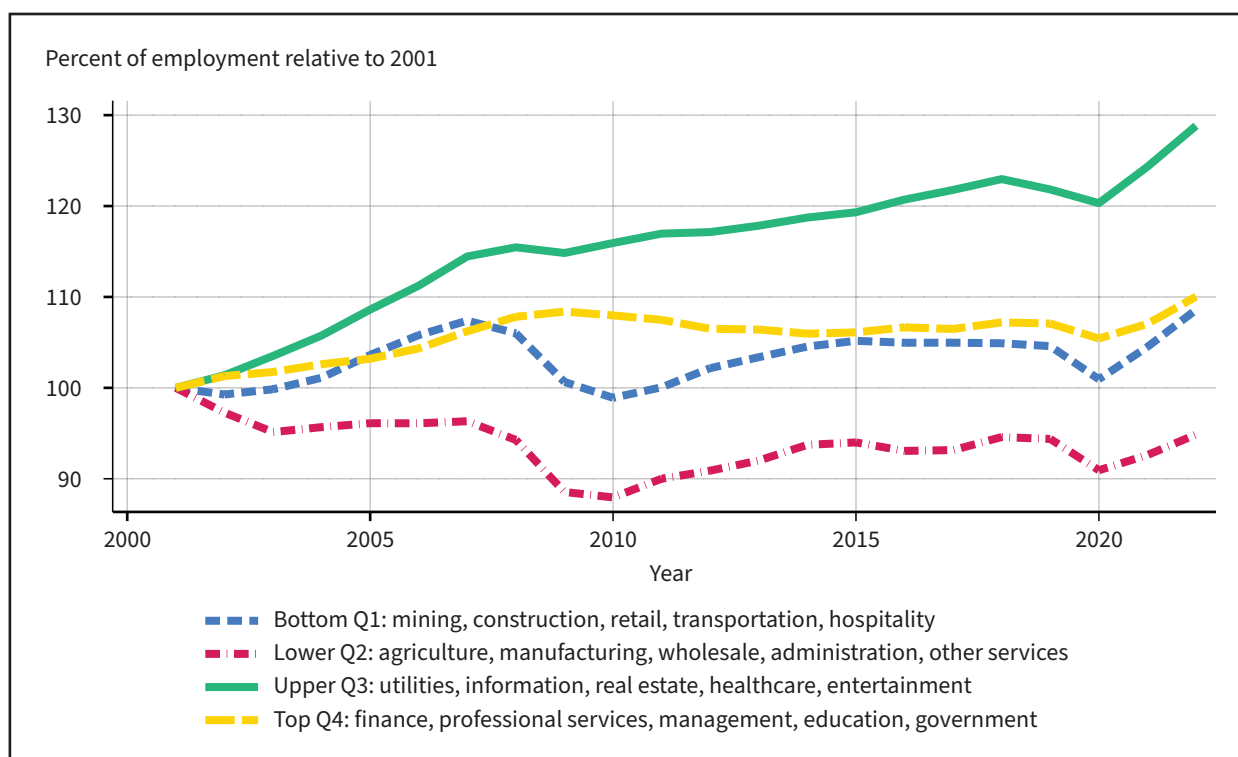
For clarity and to highlight the main trends in worker reallocation across industries, we group industries into quartiles based on their share of workers with a bachelor's degree. Appendix figure A.4 shows employment for each of these four groups and lists the set of industries within each grouping. The bottom 25 percent (quartile 1) includes industries with the lowest share of workers who have bachelor's degrees and the top 25 percent (quartile 4) includes the industries with the highest shares. Industries employing the largest number of people (agriculture, manufacturing, wholesale, administration, and other service sectors) belong to the lower quartile 2, employing 7.2 million workers in 2022. The next largest group is the bottom 25 percent (quartile 1). This group employed 7.1 million workers in 2022 and includes mining, construction, retail, transportation, and hospitality. The top quartile (quartile 4) includes industries such as finance, professional services, management, education, and government, which combined employed 5.9 million workers in 2022 (appendix figure A.4).

During the last two decades, these quartiles have experienced differential growth. Industries that tend to employ more workers with postsecondary education are growing faster in rural areas than the larger traditional industries that require fewer college-educated workers. While our discussion focuses on industry groupings, specific industry growth rates can be found in appendix figure A.5. As seen in figure 5, quartile 2 experienced a 5-percent employment decline from 2001 to 2022 (392,000 workers). Quartile 3 industries grew 29 percent over the same period, increasing by 918,000 workers, while quartiles 1 and 2 together increased employment by 167,000 workers. This represents a growth of 1 percent, lower than the rural economy's total employment growth (7 percent). Conversely, the top half of the distribution of industries with higher college education shares added 1.5 million jobs, a growth of 17 percent. The results show a relative employment shift out of industries that employ fewer college-educated workers into industries that have more workers with bachelor's degrees.⁸

⁸ The shift toward industries with higher shares of college-educated workers may also represent a shift toward more economically resilient sectors. In this sense, the rural workforce could be becoming better insulated against recessionary pressures. While this possibility is beyond the scope of the current analysis, it may be an avenue for future research.

Figure 5

Employment growth in U.S. nonmetropolitan areas by quartile for industries ranked by the share of workers with bachelor's degrees



Note: The chart shows U.S. nonmetropolitan employment by industry quartile (Q) over time, relative to 2001. Industries are grouped into quartiles based on the share of workers with bachelor's degrees in each 2-digit NAICS classification, calculated using 2021 1-year ACS data. Metropolitan areas are defined (geographically delineated) by the Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

Source: USDA, Economic Research Service (ERS) using U.S. Department of Commerce, Bureau of Economic Analysis Regional Data for Total Full-Time and Part-Time Employment (CAEMP25N) 2001–22 data; and U.S. Department of Commerce, Bureau of the Census, 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data, harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

The increase in college-educated workers in the rural labor force, combined with the industrial shift towards industries that require higher levels of formal education, necessitates an examination of the inflow of college workers into the labor force. To do this, we next examine how college graduates from nonmetro postsecondary institutions can be used as an imperfect, but practical, proxy for the flow of new college-educated labor.

The Location Decisions of College Students

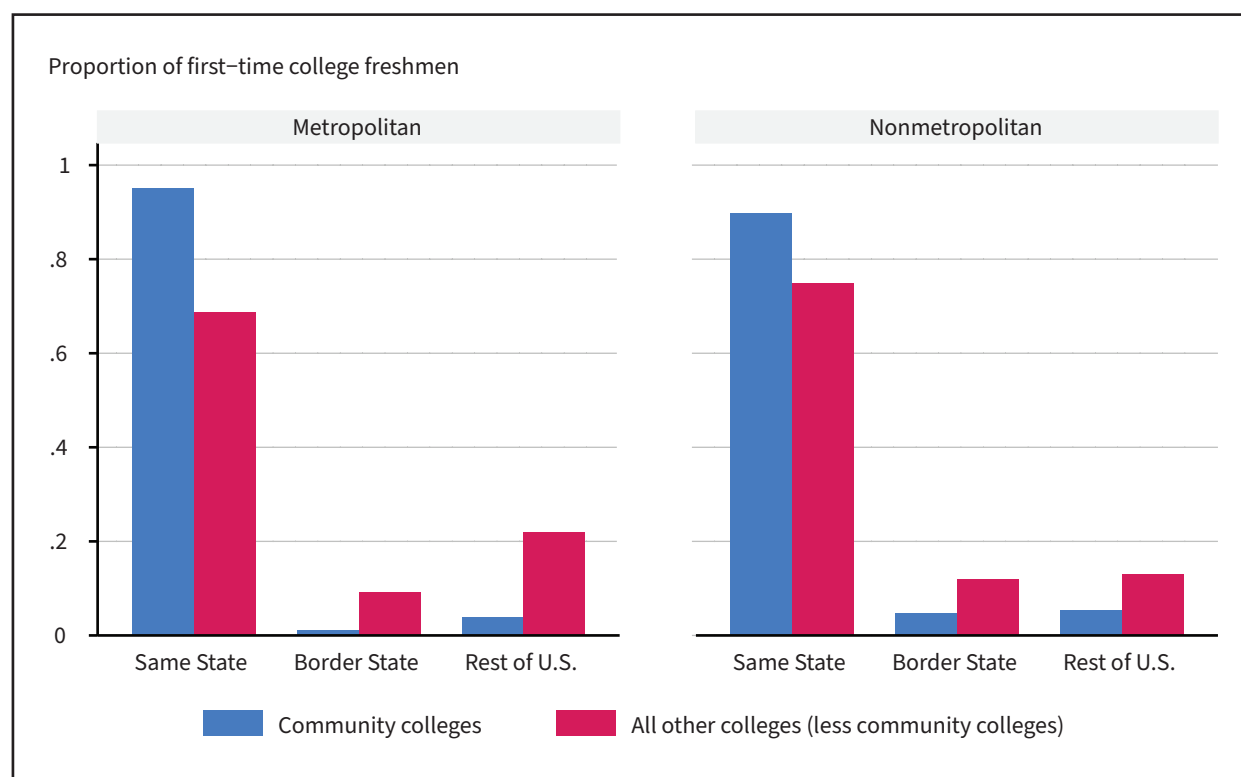
We first examine who attends nonmetro postsecondary institutions and find that the institutions primarily serve individuals from their own State. In 2023, 90 percent of first-time college freshmen at nonmetro community colleges were from that State.⁹ Community colleges in metro areas have a higher percentage of in-State students as compared to nonmetro community colleges (95 percent

⁹ We utilize the National Center for Education Statistics' Integrated Postsecondary Education Data System to identify community colleges and follow the definition provided by the U.S. Department of Education. A postsecondary institution is considered a community college if it is publicly controlled and either awards only associate degrees and certificates or awards associate degrees, certificates, and bachelor's degrees, but less than 50 percent of the credentials it awarded in the prior school year were bachelor's degrees. Tribal colleges and universities chartered by Tribal governments are also considered to be community colleges if they meet either of the above criteria.

versus 90 percent), with slightly more students in nonmetro postsecondary institutions coming from a border state (5 percent versus 4 percent). When considering all other nonmetro postsecondary institutions, the percentage of first-time college freshmen attending a school in their State of residence was 75 percent (figure 6). Excluding community colleges, nonmetro institutions have a higher percentage of in-State students than their metro counterparts (75 percent versus 69 percent), as well as students coming from border States (12 percent versus 9 percent), but have a smaller percentage of students coming from the rest of the United States (13 percent versus 22 percent).

Figure 6

State residence of first-time college freshmen (2023)



Note: First-time college freshmen includes all students who have no prior postsecondary experience attending any institution for the first time at the undergraduate level. The number includes students enrolled in the fall term who attended college for the first time in the prior summer term and students who entered with advanced standing such as college credits or a postsecondary formal award earned before graduation from high school. Of the 1,271 community colleges, 754 had resident data with 236 of 425 nonmetropolitan community colleges included. There were 2,191 institutions in the “All other colleges” category, 441 of which are nonmetropolitan postsecondary institutions. Numbers may be skewed by postsecondary institutions that primarily provide online learning.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

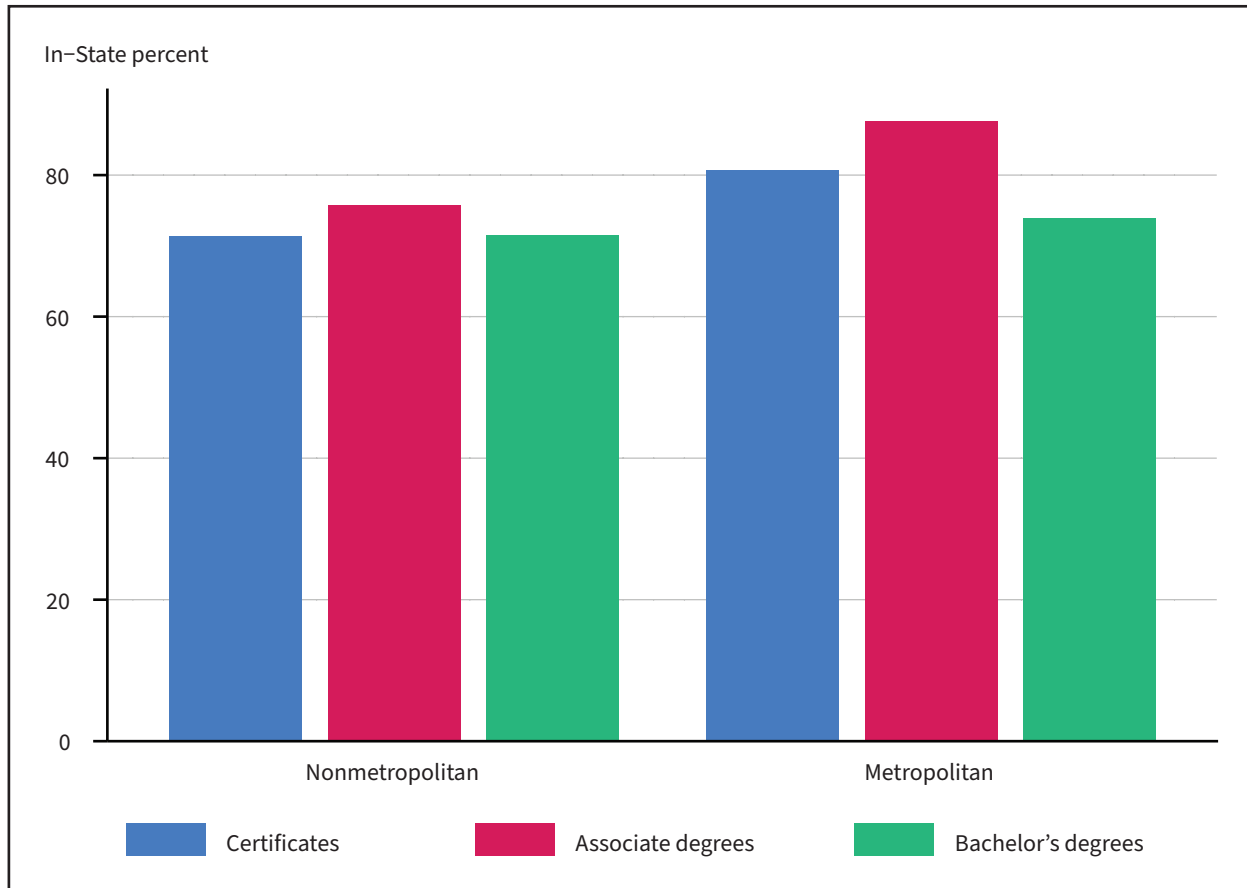
Our analysis also indicates that most graduates remain within the same State as the postsecondary institution. Utilizing 2023 PSEO data from the Census Bureau,¹⁰ we find that 72 percent of graduates with a bachelor’s degree worked in the same State as their nonmetro postsecondary institution within the first year after graduating. For workers with associate degrees, the percentage was a little higher at 76 percent. Recipients of training certificates from nonmetro postsecondary institutions also tended to stay within that State, with 72 percent working jobs within the same State in the first year since receiving their certification (figure 7). For metro postsecondary institutions, graduates also

¹⁰ We link postsecondary institutions in the PSEO to IPEDS and thus know the location of the college. However, the published PSEO data do not include metro and nonmetro job status.

tended to stay within the State with higher propensities (74 percent) than graduates of nonmetro postsecondary institutions. For associate degrees, the within-State percentage for metro graduates was 88 percent, slightly larger than the 81 percent for metro workers who received certificates within the last year. These results suggest that earlier literature arguing for a rural brain drain could be overstated. PSEO data do not distinguish between metro and nonmetro job location. However, at a minimum, graduates who work in their home State may have taken jobs in their nonmetro place of origin, and those that chose a first job in a metro area may still maintain connections with their place of origin, thus increasing the chances of taking a nonmetro job at some later time.

Figure 7

In-State share of employed college graduates in first year after graduation, 2023



Note: Percent of graduates with given degree or certificate employed within the same State as their postsecondary institution in the first year after graduation.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, Postsecondary Employment Outcomes (PSEO).

The results of figure 7 are consistent with an analysis by Sowl et al. (2022) who utilized data from the National Longitudinal Study of Adolescent to Adult Health to determine what factors contribute to a rural student returning to the rural area after attending college more than 50 miles away from their home. In their statistical analysis, they show that of the rural students who went to college more than 50 miles away, 78 percent return to the same State as their childhood address, 41 percent return to the same county, and 18 percent return to the same Census tract (Sowl et al., 2022). Presumably, students who attend college locally or even regionally will stay in rural areas at higher percentages given existing social and family ties, community connectedness, and familiarity with the local job market. Thus, while not without limitations, the number of college graduates from nonmetro postsecondary

institutions serves as a useful proxy for the inflow of college-educated workers into the rural labor market. Use of this proxy allows us to examine trends in enrollment and degree completions at these institutions the last 10–15 years, as it provides insight into whether current and future graduate flows are meeting the increasing demand for workers with higher levels of formal education.

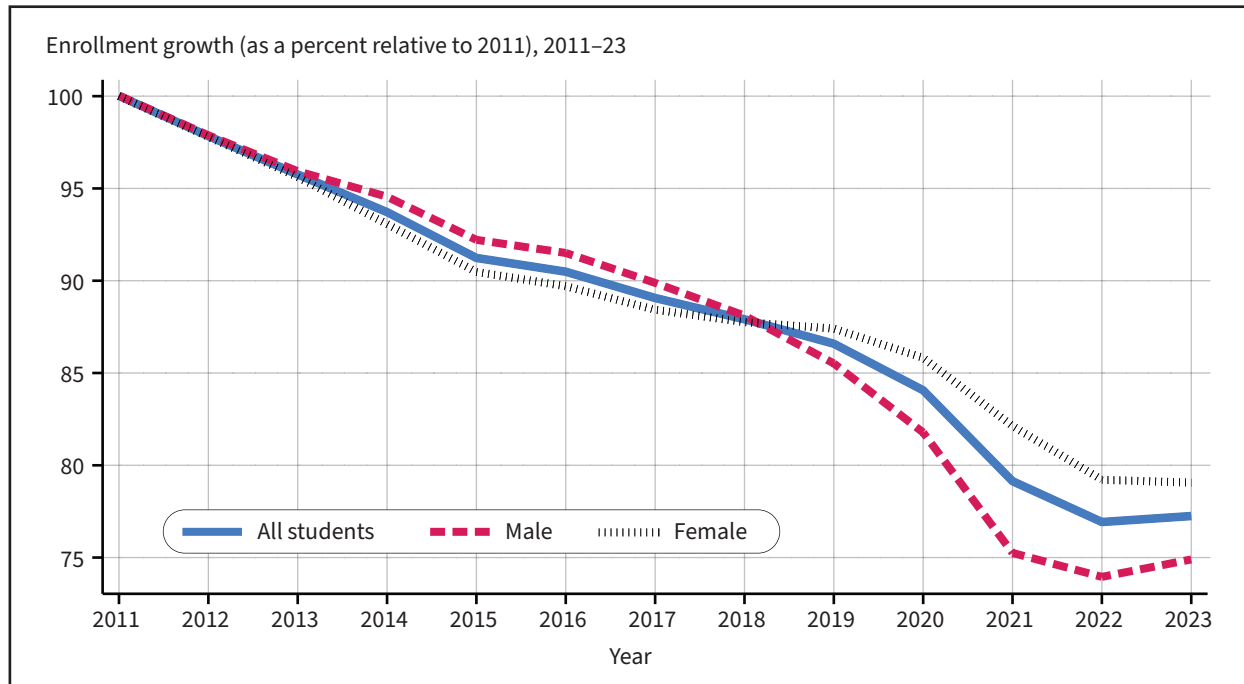
Rural College Enrollment and Degree Completion

Enrollment

Having established that rural college graduates are a key component of rural labor markets, we now turn to enrollment and completion trends at nonmetro institutions to better understand how this potential workforce is developing. IPEDS data indicated that nonmetro postsecondary institutions (excluding land-grant institutions) enrolled 2.2 million students in undergraduate programs in 2023, equivalent to 13 percent of the metro total (17.2 million students). Additionally, nonmetro postsecondary institutions awarded more than 370,000 associate, bachelor's, master's, and advanced degrees in 2023, while their metro counterparts (excluding land-grant institutions) awarded 3.3 million associate, bachelor's, master's, and advanced degrees.

Overall, undergraduate enrollment significantly declined in the last decade. Nonmetro undergraduate enrollment in 2023 decreased 23 percent from its 2011 level. In absolute terms, this represented a decrease of 640,000 students. Female and male undergraduate enrollment experienced similar patterns of decline from 2011 to 2013, decreasing to 95 percent of their respective 2011 levels in 2013 (figure 8). Male and female enrollment diverged after 2013. While female undergraduate enrollment declined at a faster pace than their male counterparts from 2013 to 2018, male undergraduate enrollment declined 13 percentage points from 2018 to 2023, slightly larger than the 9-percentage point decline for females during the same period. By 2023, male and female undergraduate enrollment was at 75 percent and 79 percent of their 2011 levels, respectively. Graduate enrollment in nonmetro counties did not experience the same decline as undergraduates, increasing 9 percent over the same time period. However, overall enrollment still decreased to 80 percent of the 2011 total, as graduate students comprised only 1 out of every 10 students enrolled at nonmetro institutions (appendix figure A.6).

Figure 8

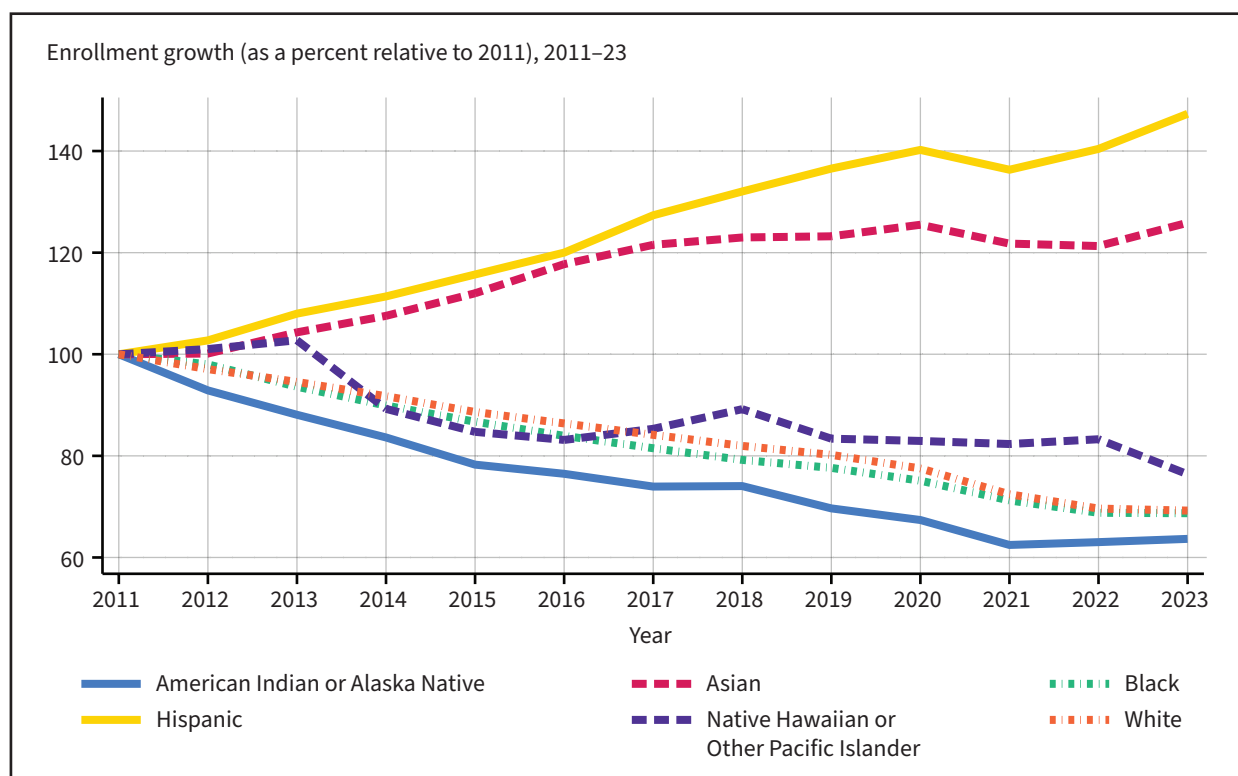
U.S. nonmetropolitan 12-month undergraduate enrollment, by sex (relative to 2011)

Note: Undergraduate students include all students enrolled in a 4- or 5-year bachelor's degree program, an associate degree program, or a vocational or technical program below the baccalaureate.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Separating enrollment by race or ethnicity produced divergent results, particularly when compared to the associated 18–24 year-old populations. Many racial subgroups experienced steep declines relative to their 2011 enrollment, such as Black (69 percent of 2011 level) and American Indian and Alaska Natives (64 percent). Compared to the changes in the 18–24 year-old population in nonmetro counties, American Indian and Alaska Natives saw a larger decrease in their enrollment than they did in their subpopulation (83 percent of 2011 level), while Black enrollment decreased less than the decline in population (63 percent). White, the largest subgroup, declined to 69 percent of its 2011 enrollment total, a decrease of more than 622,000 students and a steeper decline than the decline in their 18–24 year-old population (77 percent). Conversely, enrollment for Asian (126 percent) and Hispanic (147 percent) subgroups increased relative to their 2011 enrollment and outpaced both 18–24 year-old population subgroups (107 percent and 88 percent, respectively). By 2023, the Hispanic population surpassed the Black population as the second-largest racial subgroup in nonmetro institutions, 255,000 to 222,000 students. This represents a significant change from a decade prior, when Black student enrollment was almost double that of Hispanics, 324,000 to 174,000.

Figure 9

U.S. nonmetropolitan 12-month undergraduate enrollment, by race/ethnicity (relative to 2011)

Note: Advanced degrees are grouped from the IPEDS' classifications of "Doctor's degree–other," "Doctor's degree–professional practice," and "Doctor's degree–research/scholarship" which include doctoral degrees of professional practice (such as chiropractic, dentistry, law, and medicine) and of research (such as Ph.D., Ed.D., D.M.A., and D.Sc.).

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Degree Completion

Despite declining undergraduate enrollment, the number of undergraduate degrees awarded at nonmetro institutions remained relatively constant during the last decade.¹¹ While some fluctuations exist, nonmetro institutions awarded 1,500 less bachelor's degrees in 2023 than they did in 2011, a 1-percent decrease. The number of associate degrees awarded also experienced a slight decline, decreasing 1 percent from 2011 to 2023, representing 1,300 less associate degrees completed annually. Eighty-three percent of all associate degrees from nonmetro institutions came from community colleges, with the same percentage for their metro counterparts. Though undergraduate enrollment decreased by 23 percent and the 18–24 year-old population decreased 10 percent from 2011 to 2023, undergraduate degree completion only declined by 1 percent during the same period. Conversely, graduate degrees saw significant growth, awarding 15,000 more master's degrees annually (32 percent increase) and 2,800 more advanced degrees (56 percent increase). Growth rates for all degree types from 2011 to 2023 can be found in appendix figure A.7.

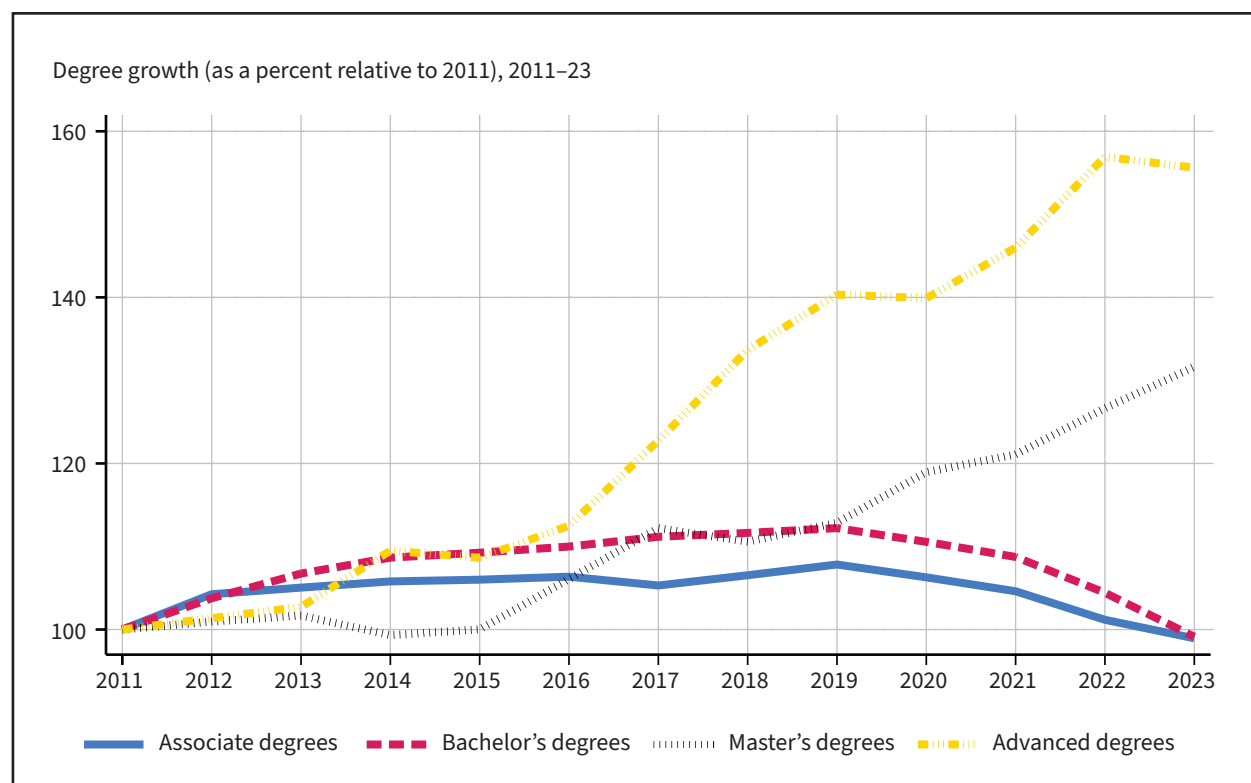
¹¹ Although college enrollment has declined, the rural population continues to become more educated. Two factors help explain this. First, degree completion has remained relatively steady, and the evidence so far does not indicate declines in attainment. Since enrollment declines have been ongoing since at least 2011, and most students complete their degrees within 5 years, we would likely have seen a drop in degree completions already if enrollment and degree completion were closely linked. Second, younger cohorts are substantially more educated than older ones. As older cohorts age and are eventually replaced by younger cohorts, the overall level of educational attainment continues to rise.

Additionally, drop-out rates declined in nonmetro counties. The percentage of each student cohort who did not receive a bachelor's degree and were no longer enrolled 6 years after matriculation decreased from 34 percent in 2011 to 29 percent in 2023. Thus, over time fewer students enrolled at nonmetro postsecondary institutions. However, of those that did enroll, a higher percentage completed their degrees. During the same period, the time taken to complete a bachelor's degree decreased. Four-year graduation rates increased from 32 percent of the cohort in 2011 to 40 percent in 2023, while 5-year graduation rates decreased from 15 percent to 12 percent over the same period. Taken together, the data suggest the decline in nonmetro student enrollment is (1) partially due to students completing their bachelor's degrees quicker and (2) concentrated among those who are not likely to complete their degrees at all. While the enrollment decline negatively impacted the financial outlook of postsecondary institutions, the decline seemingly had no significant impact on the flow of college-educated labor. Instead, the results suggest more efficient labor-market sorting among high school graduates as they consider their employment and college enrollment options.

These increases in completion and retention rates are well-documented, though the exact reason for the increase varies. While some research has found increases in community college retention rates over the 21st century (Monaghan & Sommers, 2021), others suggest more efficient sorting of students by schools (Archibald et al., 2015). Research by Denning et al. (2022) found the increase in completion rates to be largely explained by grade inflation. Moreover, other factors, such as student characteristics, institutional resources, and institutions poorly explain any changes in graduation rates. While we do not explore causal explanations for increased completion rates, our analysis adds to the growing literature detailing these changes.

Figure 10

Distribution of nonmetropolitan degrees, by award level (relative to 2011)



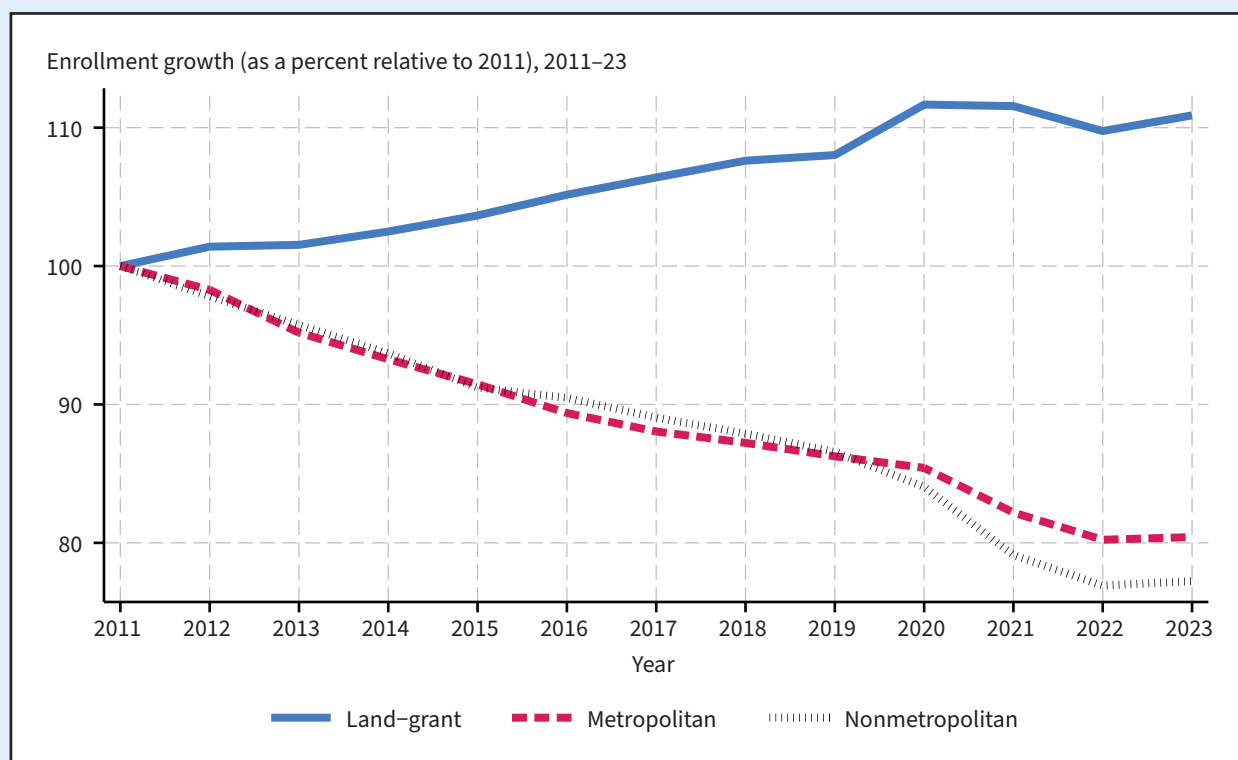
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Land-Grant Enrollment and Degree Completion

Land-grant institutions saw a sizeable increase in the number of undergraduate students in the last decade. From 2011 to 2023, undergraduate enrollment at land-grant institutions increased 11 percent, slightly down from its peak growth of 12 percent in 2020. This increase represents a growth of more than 163,000 students and starkly contrasts the decline in enrollment in both metro and nonmetro institutions. From 2011 to 2023, the change in enrollment at land-grant institutions outpaced metro and nonmetro institutions by 30 percentage points.

Box figure 1

U.S. undergraduate 12-month college enrollment (relative to 2011)



Note: Land-grant, metropolitan, and nonmetropolitan categories are mutually exclusive.

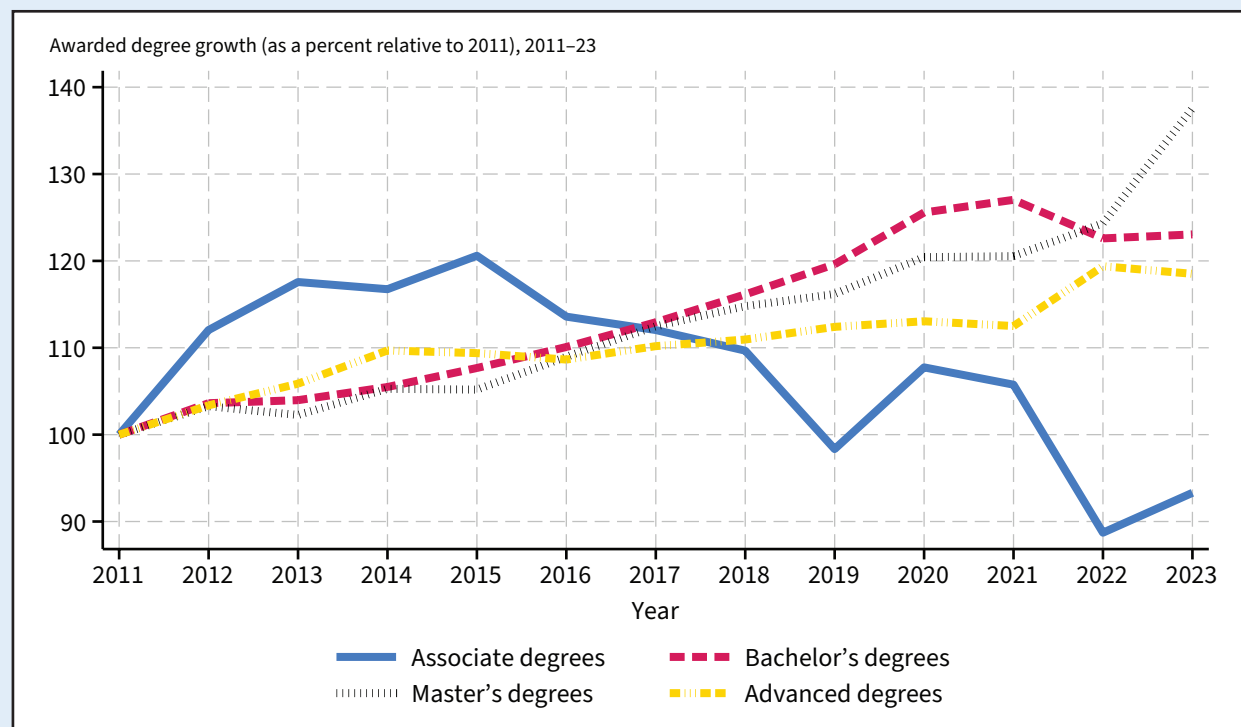
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

While annual degree completion remained steady, or grew slightly among nonmetro institutions, the number of degrees conferred increased rapidly among land-grant institutions. Between 2011 and 2023, the number of bachelor's degrees awarded annually increased by 68,000, while master's degrees grew by 29,000. Though master's degrees represent only a fraction of degrees awarded, the increase corresponds to a growth of 38 percent over the last decade, outpacing bachelor's degree growth (23 percent). Advanced degrees awarded also experienced growth during the same period, awarding 6,000 more from 2011 to 2023, a growth of 19 percent. Conversely, land-grant universities awarded slightly more associate degrees in the first half of the decade but experienced a decline from 2015 onward. The large variation in associate degree growth is largely caused by incremental changes in the overall small number of associate degrees awarded. By 2023, the number of completed associate degrees at land-grant institutions equaled 4 percent of all master's degrees awarded and only 1 percent of all bachelor's degrees. Associate degree programs tend not to be a focus for land-grant institutions.

Continued on next page ►

Box figure 2

Degrees awarded over time at land-grant institutions (relative to 2011)



Note: Advanced degrees are grouped from the IPEDS' classifications of "Doctor's degree–other," "Doctor's degree–professional practice," and "Doctor's degree–research/scholarship" which include doctoral degrees of professional practice (such as chiropractic, dentistry, law, and medicine) and of research (such as Ph.D., Ed.D., D.M.A., and D.Sc.).

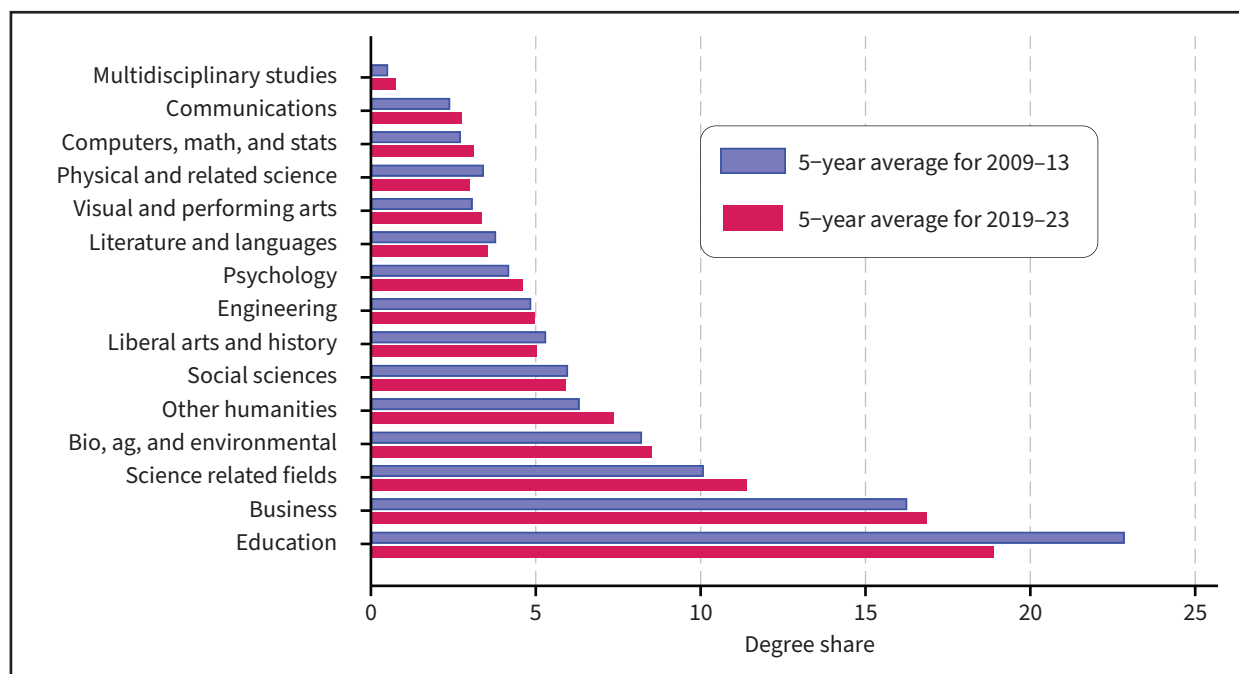
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Degree Major Trends

Bachelor's Degrees Held by the Rural Population

While the total number of completed degrees has remained relatively consistent over the last decade, there have been noticeable changes in what degree majors the rural college-educated labor force held. Education, the largest degree major held by the nonmetro population, also experienced the largest decline of 17 percent from 2009–13 to 2019–23. In contrast, business degrees increased (4-percent growth), as did science and related fields (13-percent growth) and biology, agriculture, and environmental (4-percent growth). Other growing degree majors included other humanities (17 percent), engineering (2 percent), psychology (10 percent), visual and performing arts (9 percent), computers, math, and statistics (14 percent), communications (14 percent), and multidisciplinary studies (44 percent growth).

Figure 11

Percent of total bachelor's degree fields reported in the U.S. nonmetro population, 2009–13 and 2019–23

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

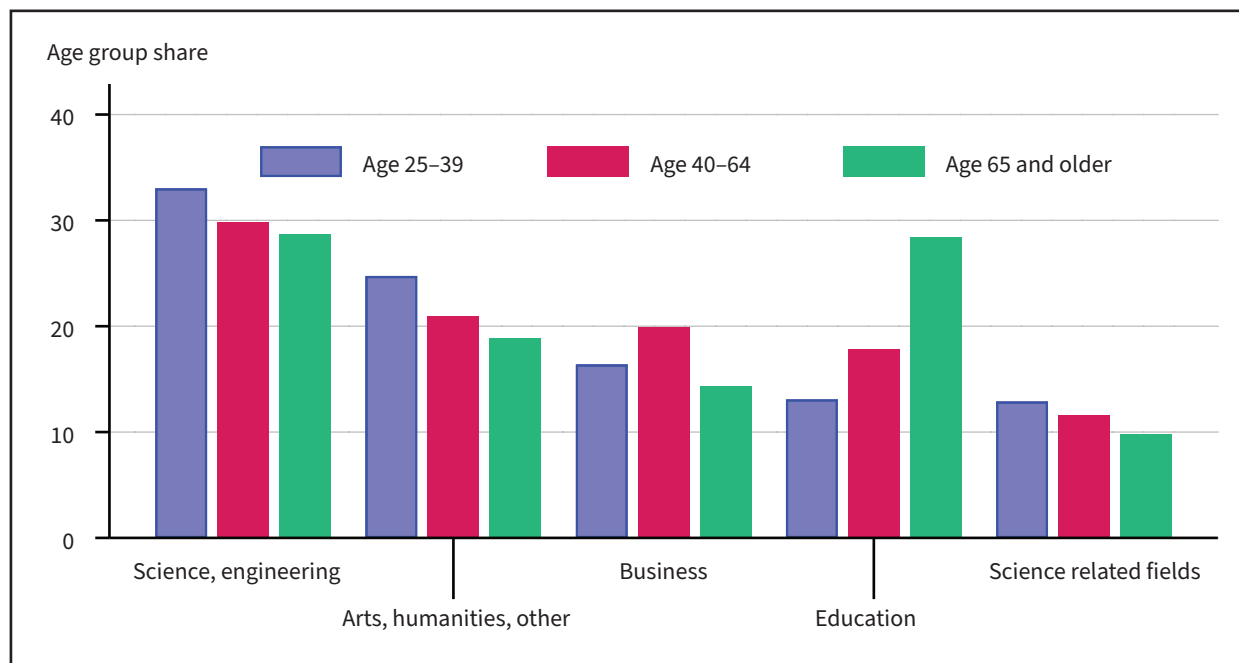
As new students attended and finished college, their preferences shifted from previous cohorts. Shown in figure 12,¹² the college-educated population aged 65 and older were more likely to have chosen an education major in college than younger cohorts aged 25–39. The 65 and older population would have attended college, for example, in the 1960s and 1970s, while the youngest cohorts matriculated in the new millennium. Even by the 1980s and 1990s, education was chosen less often for a degree major than by prior students, as shown for the cohort of nonmetro college graduates aged 40–64.

As education majors have become less prevalent, science and engineering steadily increased in popularity over time. Comparing nonmetro college graduates across age cohorts, the youngest, aged 25–39, chose majors in science and engineering 15 percent more often than those aged 65 and older. The youngest cohorts also chose arts, humanities, and other majors 31 percent more than the older cohort, and science related fields 30 percent more often. Business majors rose and then backed off some in popularity as 40–64 year olds were 39 percent more likely in 2019–23 to hold a business degree in comparison to those 65 and older. However, 25–39 year olds were 18 percent less likely to choose a business major than those 40–64 years old.

¹² The degree groupings are combined in figure 12 as available in the published ACS data table that includes cross tabulations by age groups.

Figure 12

Percent of bachelor's degree fields for the U.S. nonmetro population 25 years and over, 2019–23



Note: Percent of the primary field of study for the U.S. nonmetropolitan population 25 years and over by age group and field of degree summary category.

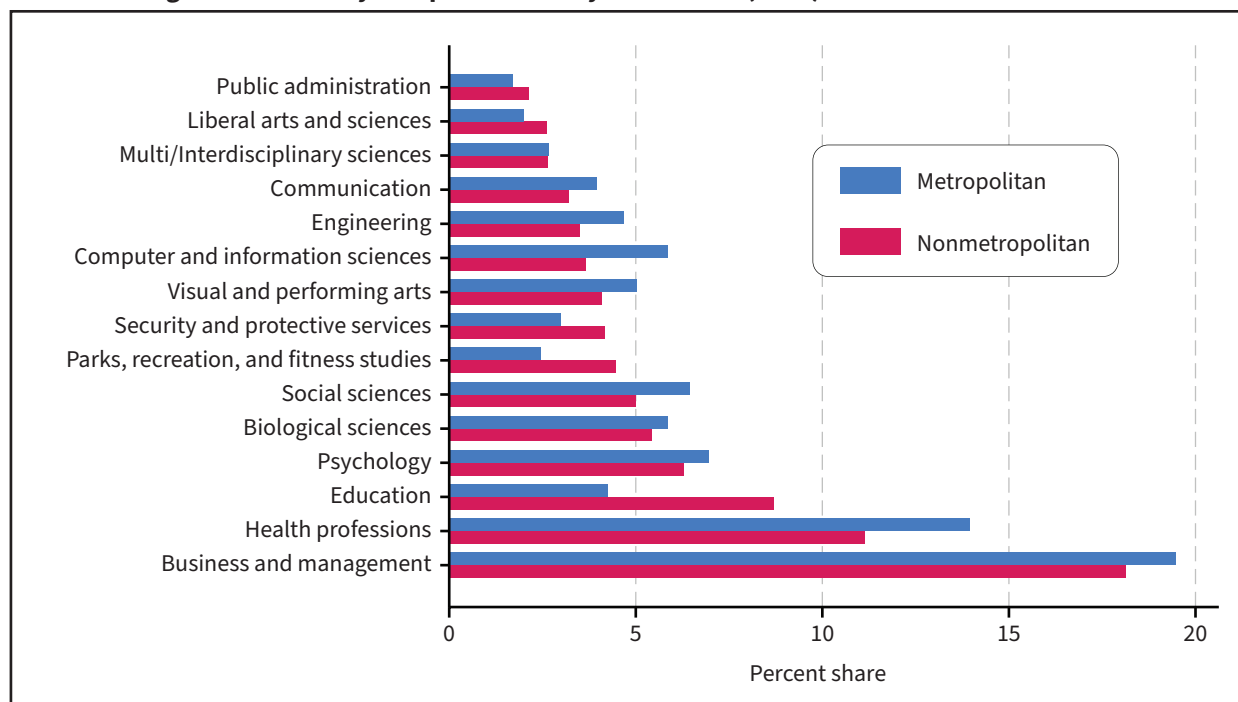
Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2023 5-year American Community Survey (ACS) data.

Bachelor's Degrees Awarded by Postsecondary Institutions

Changes in the bachelor's degrees held by the rural workforce were heavily influenced by the bachelor's degrees awarded by nonmetro postsecondary institutions over the last decade. The popularity of certain degree majors reflected the broad changes in degrees held between different age cohorts.

Business and management degrees were the most common fields for both metro and nonmetro postsecondary institutions in 2023 (figure 13). Approximately 18 percent of bachelor's degrees awarded from nonmetro institutions were business and management degrees, compared to 20 percent of all metro degrees. Bachelor's degrees in health professions were the second most popular field for students, comprising 14 percent and 11 percent of total metro and nonmetro bachelor's degrees, respectively. Bachelor's degrees in education encompassed a larger share of nonmetro bachelor's degrees (9 percent) than metro bachelor's degrees (4 percent), with education being the third most popular bachelor's degree field in nonmetro institutions, compared to the ninth most popular at metro institutions. Overall, bachelor's degrees at nonmetro institutions focused more on the fields of education; parks, recreation, and fitness; security and protective services; liberal arts and sciences; and public administration while metro institutions had larger shares of business and management, health professions, psychology, biological sciences, social sciences, computer and information sciences, and engineering.

Figure 13

Bachelor's degrees awarded by U.S. postsecondary institutions (2023)

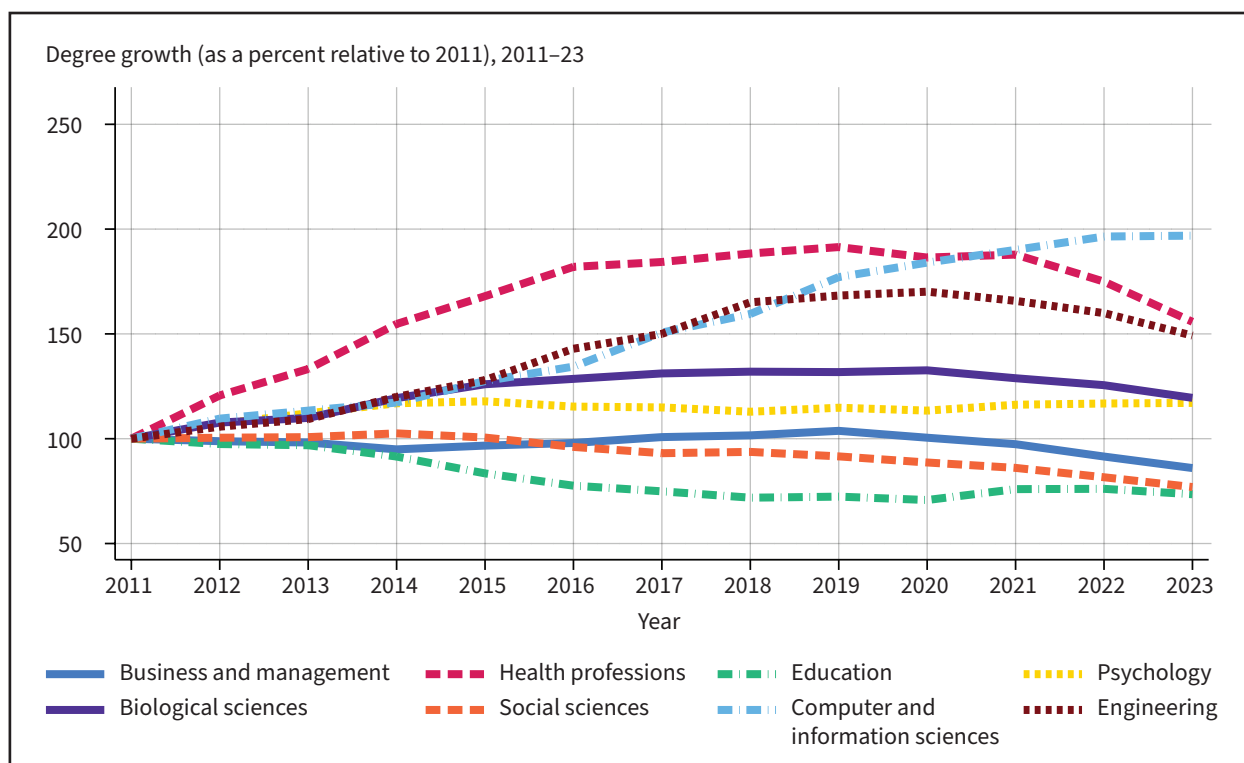
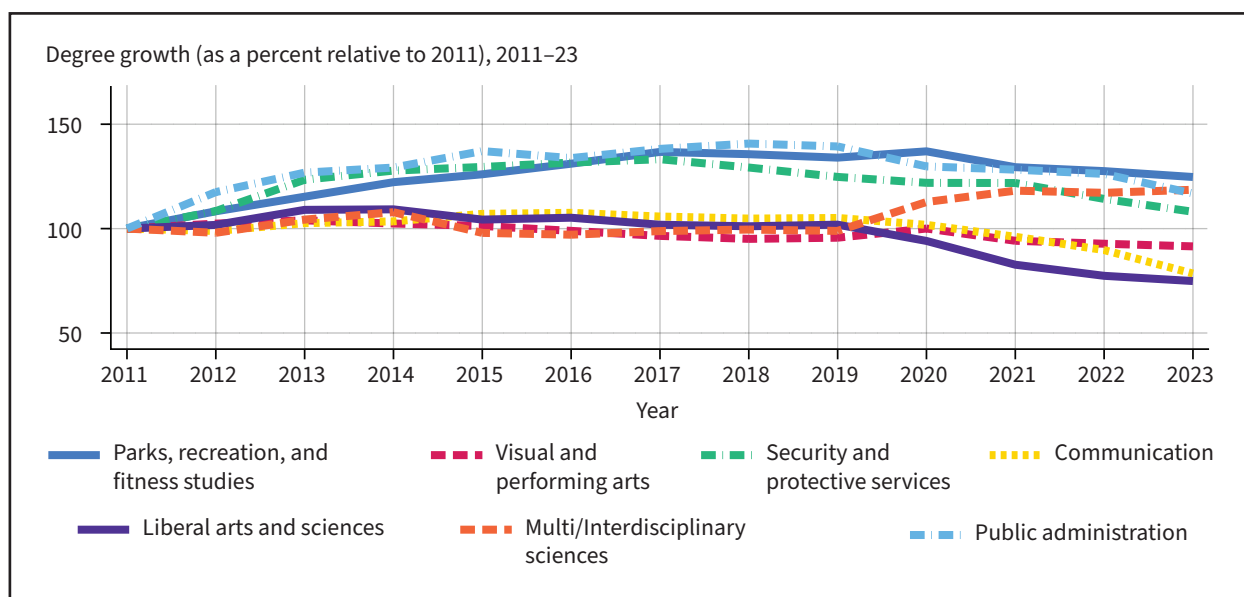
Note: A degree major category is excluded if it produces less than 2 percent of all bachelor's degrees in nonmetropolitan counties. Degree major categories are grouped according to their two-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available through the National Center for Education Statistics' website. Counties are designated as nonmetropolitan using the 2023 Office of Management and Budget (OMB) metro area definitions as published in the USDA, Economic Research Service Rural-Urban Continuum Codes (RUCC).

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

The eight largest bachelor's degree fields at nonmetro postsecondary institutions saw varying degrees of growth in the last 12 years. The amount of business and management degrees awarded, the largest degree field, remained relatively constant from 2011 through 2021. However, by 2023, there were 32,000 business bachelor's degrees awarded, a decrease of 14 percent from 2011. The second largest degree group, health professions, increased 88 percent from 2011 to 2021, then decreased slightly on an annual basis until 2023 for a final 56-percent increase from its 2011 total. Computer science degrees saw the largest annual increase in bachelor's degrees awarded, increasing 97 percent from 2011 to 2023. Conversely, bachelor's degrees in education and social sciences decreased to 74 and 77 percent of their annual 2011 levels, respectively. Degrees awarded beyond the eight largest categories remained steady or experienced some amount of growth, except for communication, visual and performing arts, and liberal arts and sciences degrees which decreased to 79 percent, 92 percent, and 75 percent of their 2011 levels, respectively. Meanwhile, other degrees experienced some form of annual increases from 2011 to 2023, ranging from an 8-percent increase with security and protective services to a 25-percent increase with parks, recreation, and fitness studies.¹³

¹³ It is possible that the fastest growing degrees are growing because they correspond to the fastest growing industries. Yet degree majors do not map one for one to industries or occupations, making it difficult to accurately measure the relationship.

Figure 14

Bachelor's degree growth in U.S. nonmetropolitan counties, 2011–23**(a) Largest degree fields****(b) Smallest degree fields**

Note: The 15-degree major categories were taken from figure 13 in this report and sorted according to their share of nonmetropolitan bachelor's degrees awarded in 2023. The largest eight degree categories were included in panel (a), while the smallest degree categories, according to share, were included in panel (b). A list of all Classification of Instructional Programs (CIP) codes is available through the National Center for Education Statistics' website. Counties are designated as nonmetropolitan using the 2023 Office of Management and Budget (OMB) metro area definitions as published in the USDA, Economic Research Service (ERS) Rural-Urban Continuum Codes (RUCC).

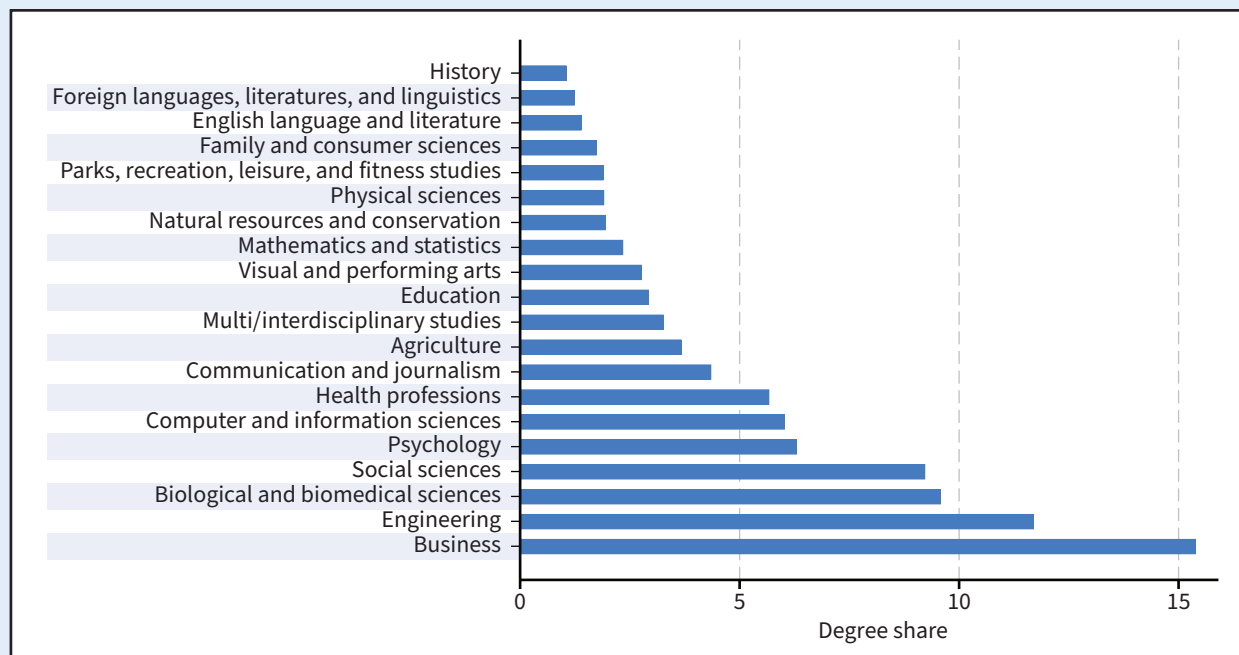
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Land-grants and Agricultural Degrees

In 2023, 20 separate degree fields comprised more than 1 percent of all bachelor's degrees awarded at land-grant institutions. Approximately one in four bachelor's degrees awarded were in business (15 percent) and engineering (12 percent) fields, while biological and biomedical sciences (10 percent), social sciences (9 percent), and psychology (6 percent) rounded out the top five. Roughly 4 percent of bachelor's degrees were in the agricultural field, representing 13,000 bachelor's degrees earned at land-grant institutions. This was almost double the share of agricultural degrees at nonmetro institutions (2 percent) and four times the percent from metro institutions (1 percent).

Box figure 3

Distribution of bachelor's degrees at U.S. land-grant institutions (2023)



Note: Only bachelor's degrees are included in the analysis. A degree major category is excluded if it produces less than 1 percent of all bachelor's degrees at land-grant institutions. Degree major categories are grouped according to their two-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available at the National Center for Education Statistics' website.

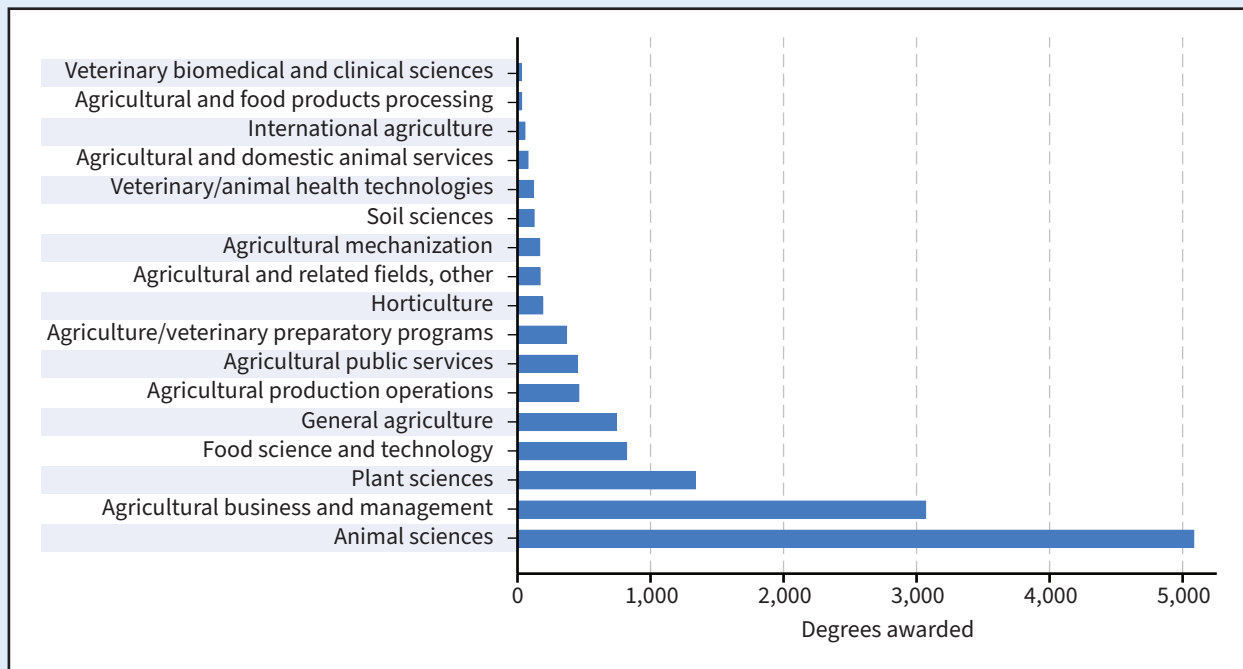
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

The number of agricultural bachelor's degrees awarded at land-grant institutions grew by more than 2,100 from 2011 to 2023, an increase of 19 percent from 2011 levels. This growth came from a diverse set of majors, with 58 fields contributing to award agricultural degrees. Animal sciences produced the most degrees in 2023 with just over 5,000, approximately 38 percent of all agricultural degrees awarded, followed by agricultural business and management with 3,000 degrees (23 percent), plant sciences with 1,300 degrees (10 percent), food sciences and technology with 800 degrees (6 percent), and general agriculture with 700 degrees (6 percent). Agricultural economics accounted for 1,300 of the 3,000 agricultural business and management degrees.

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Box figure 4

Agricultural degrees awarded at U.S. land-grant institutions (2023)



Note: Only bachelor's degrees are included in the analysis. Degree major categories are grouped according to their four-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available from the National Center for Education Statistics' website.

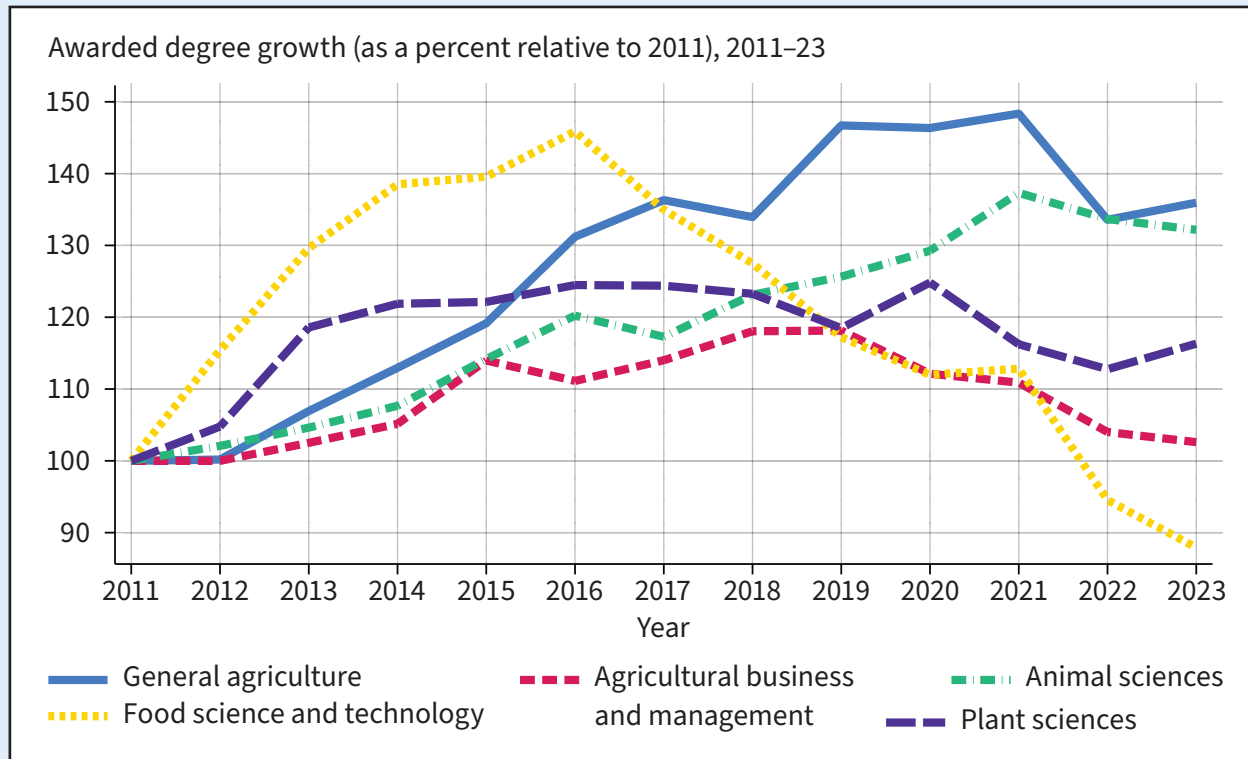
Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Almost all the largest agricultural degree fields experienced some growth over the last decade. The number of degrees awarded in animal science steadily increased since 2011, ending 32 percent higher in 2023. The number of general agriculture degrees also increased steadily from 2011 to 2021, peaking at 48 percent growth in 2021 and decreasing the next 2 years to end at 36 percent growth in 2023. Plant sciences and agricultural business and management degrees also experienced growth, increasing 16 percent and 2 percent from 2011 to 2023, respectively. Conversely, food science and technology experienced rapid growth in the first half of the decade, reaching a peak of 46 percent growth in 2016, but declining in the latter half, ending in 2023 at 88 percent of its 2011 level.

Continued on next page ►

Box figure 5

Agricultural degree growth at U.S. land-grant institutions (relative to 2011)



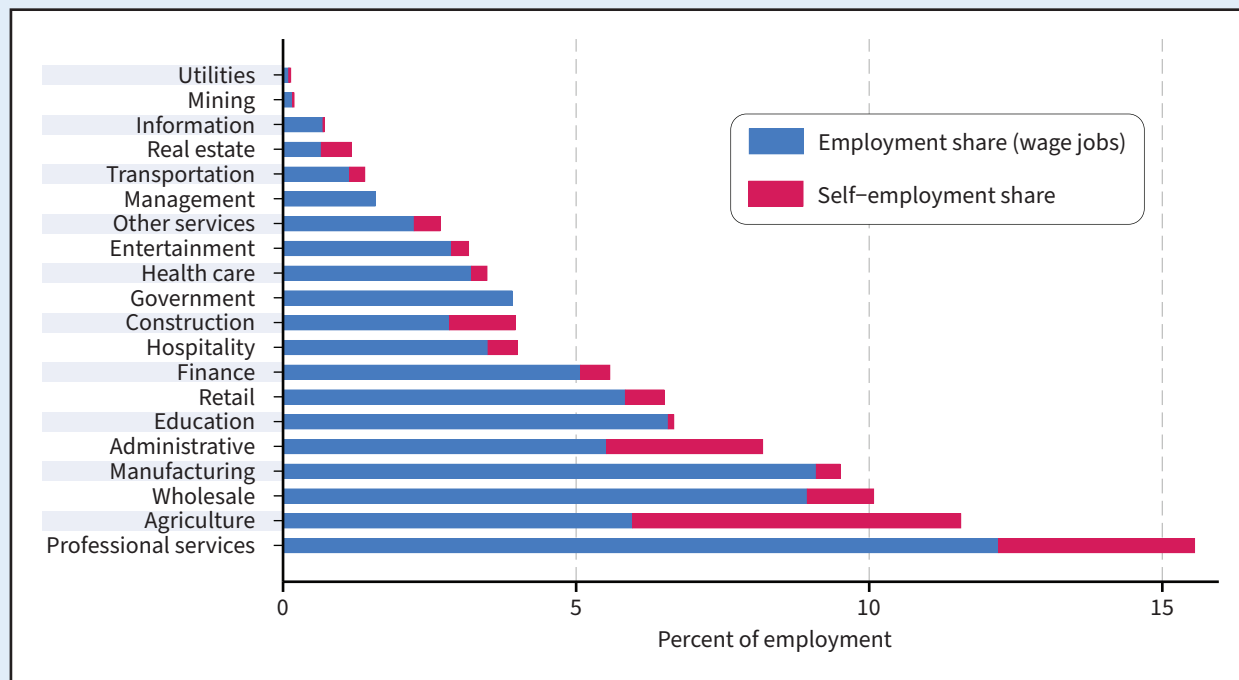
Note: Degree major categories are grouped according to their six-digit Classification of Instructional Programs (CIP) codes. CIP. A list of all CIP codes is available at the National Center for Education Statistics' website.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Continued on next page ►

Box figure 6

Industry of employment 1 year later for agricultural degree graduates from U.S. land-grant institutions (2023)



Note: Percent of graduates with bachelor's degrees in agriculture in the first year after graduation by industry. The PSEO covers jobs at employer firms. Estimates for the ratio of self-employed workers to employed workers at firms by industry were generated using the 2021 ACS for workers with bachelor's degrees in agriculture aged 25–64. These ratios were applied to the PSEO estimates to construct the figure.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, Postsecondary Employment Outcomes (PSEO) and 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

Box figure 6 shows the distribution of industries graduates with a degree in agriculture from land-grant institutions are in 1 year post-graduation. Most worked in professional services industries (15 percent), followed by agriculture (11 percent), wholesale industries (10 percent), and manufacturing (9 percent). In agriculture, almost half were self-employed, which is common for farm operators returning to (or continuing to operate) their own farm. Slightly more than a fifth of land-grant graduates with agriculture degrees working in professional services industries were also self-employed (22 percent). People with agricultural majors take jobs in all industry sectors after graduation, however they tend to favor either professional services or traditional rural goods-producing industries.

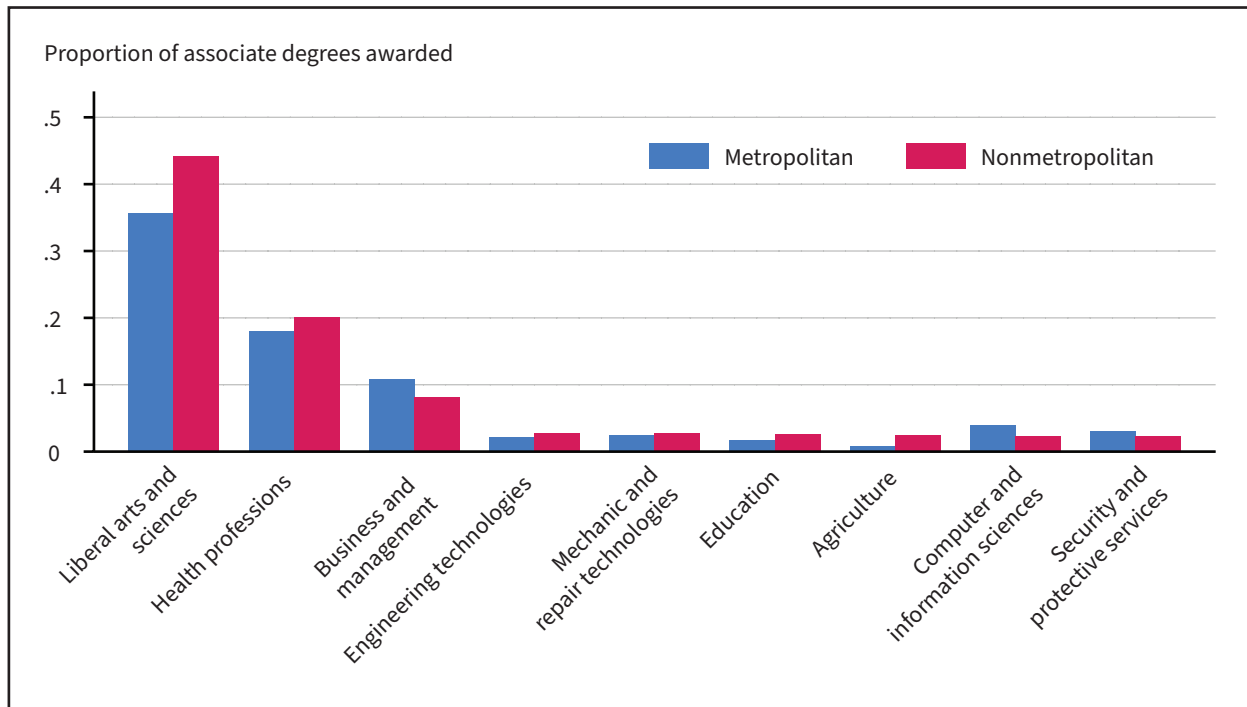
Associate Degrees Awarded by Postsecondary Institutions

Beyond bachelor's degrees, associate degrees were the second largest degree type awarded in 2023 (appendix figure A.8). While some similarities exist with bachelor's degrees, associate degree majors tended to be more broad-based or ones that emphasize a wider scope of knowledge. Figure 15 shows that as a share, the liberal arts and science degrees comprised the largest portion of associate degrees awarded in 2023, with 44 percent of all associate degrees from nonmetro institutions. This number represented more than 53,000 degrees and as a share, was larger than its metro counterpart (36 percent). Nonmetro institutions also awarded a significant number of associate degrees in health professions and business and management, totaling 24,000 and 10,000 degrees in 2023, respectively. Compared to metro institutions, nonmetro schools produced a higher share of associate degrees

in health professions (20 percent versus 18 percent), while the converse occurred for business and management degrees (8 percent in nonmetro versus 11 percent in metro). Associate degrees outside of the three largest major categories consisted of 28 percent of all nonmetro degrees awarded (33,000 degrees) while only 6 other major groupings comprised more than 1 percent of all associate degrees awarded in nonmetro institutions.

Figure 15

Associate degrees awarded in the United States in 2023

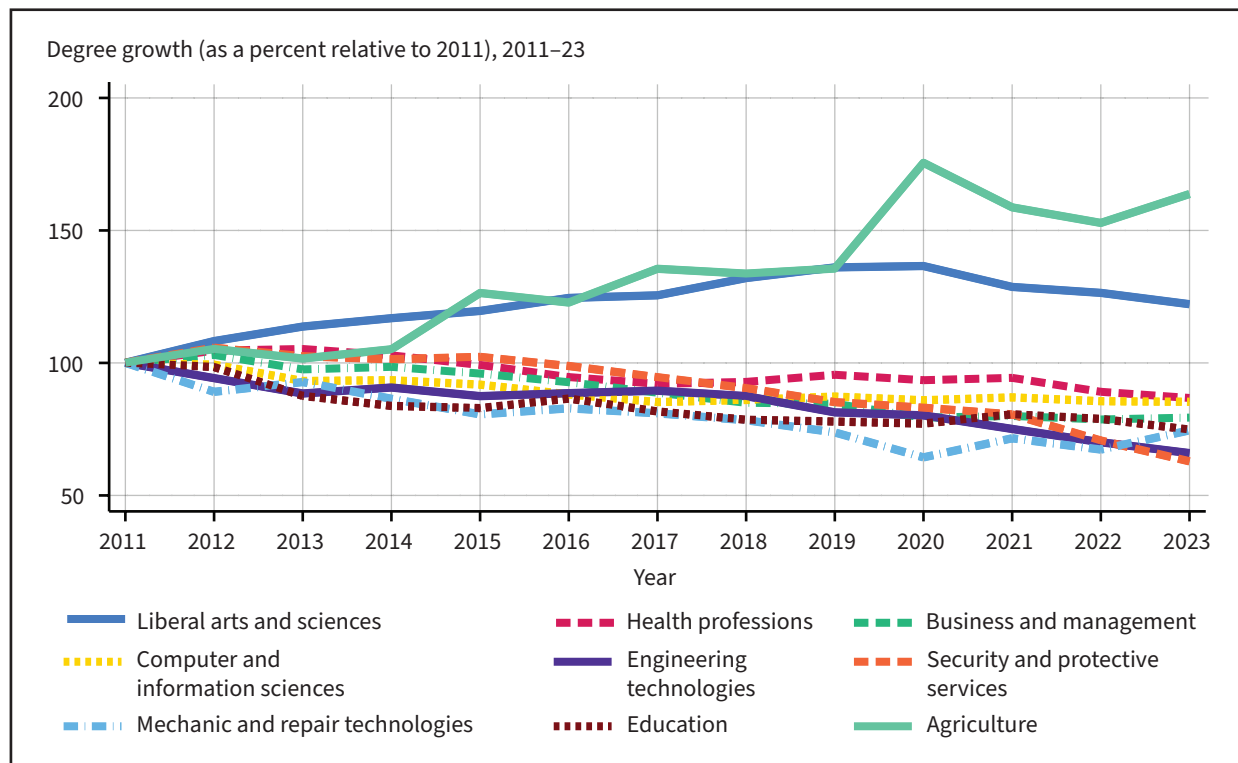


Note: A degree major category is excluded if it produces less than 1 percent of all associate degrees in nonmetropolitan counties. Degree major categories are grouped according to their two-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available at the National Center for Education Statistics website. Counties are designated as nonmetropolitan using the 2023 Office of Management and Budget (OMB) metropolitan area definitions, as published in the USDA, Economic Research Service Rural-Urban Continuum Codes (RUCC).

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Relative to 2011, only two of the nine degree major categories that comprised more than 1 percent of all associate degrees awarded experienced growth. Agriculture, which awarded 1,800 degrees in 2011, saw annual increases in degrees awarded until its peak in 2020 at 3,200 and a slight decline afterwards to 3,000 in 2023. This represented an increase of 64 percent since 2011. The growth is in part due to the ongoing transformation of farming to digital agriculture (McFadden et al., 2023) and an increase in the educational attainment of farm operators (Wang et al., 2022). Over the same period, liberal arts and sciences degrees grew by 22 percent, an increase of 9,600 associate degrees. Conversely, other degree majors such as computer and information sciences (85 percent of the 2011 level), health professions (87 percent), education (75 percent), and mechanic and repair technology (75 percent) experienced a steady decline in degrees awarded.

Figure 16

Associate degree growth in U.S. nonmetropolitan counties (relative to 2011)

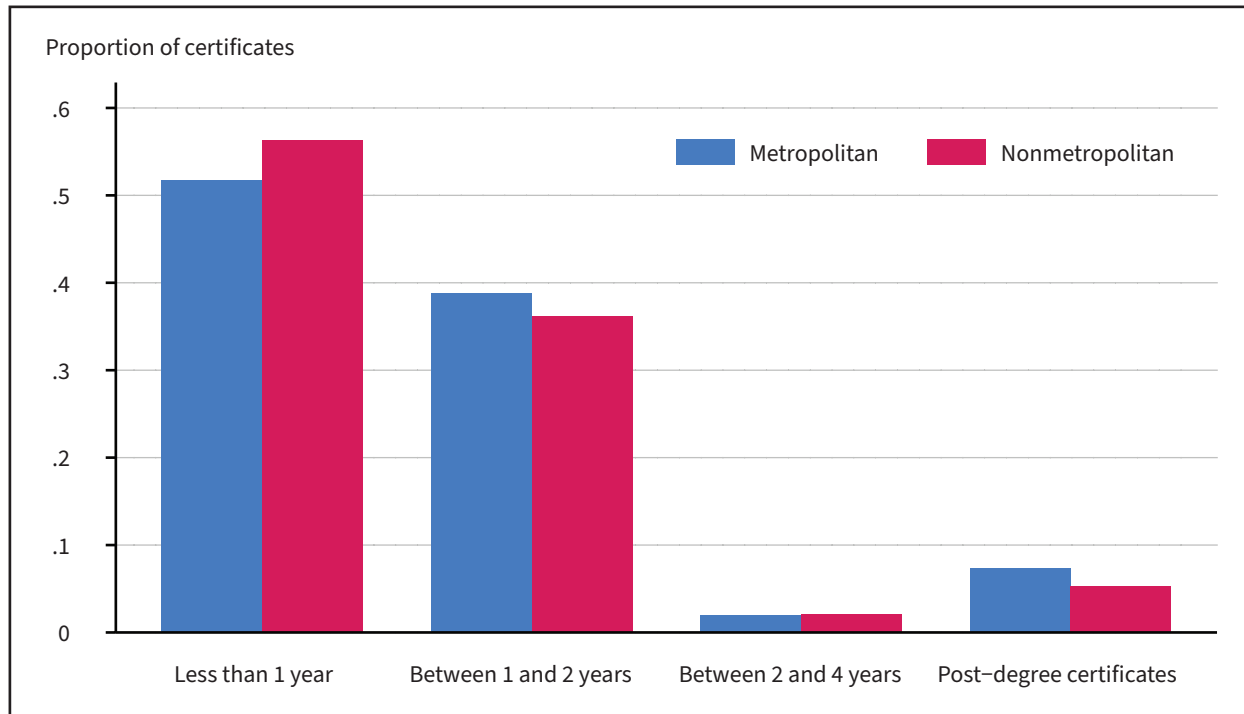
Note: A degree major category is excluded if it produces less than 1 percent of all associate degrees in U.S. nonmetropolitan counties. Degree major categories are grouped according to their two-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available at the National Center for Education Statistics website.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Certificates Awarded by Postsecondary Institutions

Certificates, unlike bachelor's and associate degrees, are separated by the length it takes to complete the schooling, with lower lengths of time often covering specific skill acquisition and longer programs providing more comprehensive training. Most certificates awarded in 2023 took less than 1 year to complete, with 57 percent of nonmetro certificates falling into this category, slightly larger than the share from their metro counterparts (52 percent). Additionally, certificates that took 1 to 2 years to complete comprised 36 percent of all nonmetro certificates in 2023, implying that 9 out of every 10 certificates awarded at nonmetro institutions took less than 2 years to complete (93 percent). Post-degree certificates such as post-baccalaureate and post-master's are often utilized to qualify for licensure or certification for certain occupations, like teaching and counseling. These certificates made up 5 percent of all nonmetro certificates awarded, slightly less than metro institutions (7 percent).

Figure 17

Distribution of certificate types (2023)

Note: “Less than 1 year” certificates include programs that are under 900 clock hours, under 30 semester or trimester hours, or under 45 quarter credit hours. Certificates of “Between 1 and 2 years” include programs of at least 900 but less than 1,800 clock hours, or at least 30 but less than 60 semester or trimester hours, or at least 45 but less than 90 quarter hours. Certificates of “Between 2 and 4 years” include programs of 1,800 or more clock hours, or 60 or more semester or trimester credit hours, or 90 or more quarter credit hours. “Post-degree certificates” include both post-baccalaureate and post-master’s certificates.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Table 1 shows how the most popular certificate fields at nonmetro institutions in 2023 differed by the length of time it took to complete the certificate. Certificates that took less than 2 years to complete focused largely on nursing. Nursing and patient care assistants were the most popular field for certificates taking less than 1 year to complete and licensed practical/vocational nurse training the most popular field for certificates taking between 1 and 2 years to complete. Welding technology was also a common field for recipients of certificates that took less than 2 years to complete and was the second most popular for those taking less than 1 year and the fourth most popular for those taking between 1 and 2 years. Conversely, certificates taking less than 1 year to complete focused more on truck and bus driver/vehicle operators, business administration, and emergency medical technology fields, while certificates taking between 1 and 2 years focused more on cosmetology and fields in liberal arts.

Certificates that took longer to complete, specifically between 2 and 4 years, took a larger focus in mechanical trade fields, with 35 percent of those certificates being awarded in automobile mechanic technology and diesel mechanic technology fields. Popular 2-to-4-year certificate fields also included cosmetology, electricians, and registered nursing. Post-degree certificates, however, took a larger focus on licensure needs and professional development. Certificates focused on education were three of the top five post-degree certificate fields, consisting of educational leadership and administration, teacher education and professional development, and curriculum and instruction.

Table 1

Most popular certificate fields by type among U.S. nonmetropolitan students (2023)

Less than 1 year			Between 1 and 2 years			Between 2 and 4 years			Post-degree		
(1)	Nursing and patient care assistant	11%	(1)	Licensed practical/vocational nurse training	17%	(1)	Automobile mechanic technology	20%	(1)	Educational leadership and administration	14%
(2)	Welding technology	10%	(2)	Cosmetology	9%	(2)	Diesel mechanics technology	15%	(2)	Engineering technologies, other	5%
(3)	Truck and bus driver/commercial vehicle operation	5%	(3)	Liberal arts and sciences	9%	(3)	Cosmetology	8%	(3)	Teacher education and professional development, specific levels and methods, other	4%
(4)	Business administration and management	4%	(4)	Welding technology	7%	(4)	Electrician	7%	(4)	Curriculum and instruction	3%
(5)	Emergency medical technology (EMT paramedic)	3%	(5)	Liberal arts and sciences, general studies and humanities, other	4%	(5)	Registered nursing	7%	(5)	Public health, general	3%

Note: Degree major categories are grouped according to their six-digit Classification of Instructional Programs (CIP) codes. A list of all CIP codes is available at the National Center for Education Statistics' website. "Less than 1 year" certificates include programs that are under 900 clock hours, under 30 semester or trimester hours, or under 45 quarter credit hours. Certificates of "Between 1 and 2 years" include programs of at least 900 but less than 1,800 clock hours, or at least 30 but less than 60 semester or trimester hours, or at least 45 but less than 90 quarter hours. Certificates of "Between 2 and 4 years" include programs of 1,800 or more clock hours, or 60 or more semester or trimester credit hours, or 90 or more quarter credit hours. "Post-degree certificates" include both post-baccalaureate and post-master's certificates.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Conclusion

In this study, we analyze multiple dimensions of the rural college labor market. This includes examining nonmetro postsecondary institutions, with a particular focus on enrollment and degrees granted over the last decade. Additionally, we take a comprehensive look at the rural workforce, exploring the share of rural workers who hold a bachelor's or associate degree in each industry or occupational grouping. Our analysis also examines the types of degrees produced by institutions produced, taking particular interest in how majors and fields differ by type of degree (i.e., associate versus bachelor's). Last, given the importance of land-grant institutions in producing agricultural degree majors, we examine trends in enrollment, degree completion, and agricultural degrees granted at these institutions.

We find that while overall nonmetro postsecondary enrollment has dipped, degree completions have remained steady across rural-serving institutions, including land-grants which provide most of the nation's agricultural degrees. This steady output of college graduates has contributed to the increased educational attainment of the rural workforce at a time when rural economies are reallocating toward industries that require higher shares of college-educated labor. By understanding these shifts in institutional roles and industry needs, policymakers and educators can better align rural education systems with the evolving economic landscape. Ultimately, these trends suggest restructuring of rural labor markets, where higher education serves as a key bridge between the agricultural sector and modern economic demands.

Summary of Findings and Implications

Undergraduate enrollment in nonmetro postsecondary institutions declined 23 percent between 2011 and 2023. This represented a decrease of 641,000 students over the 13-year period. However, the number of annually completed degrees either increased or slightly decreased during the same period, awarding 1,300 less associate degrees (120,000 total awarded in 2023), 1,500 less bachelor's degrees (178,000 total in 2023), 15,000 more master's degrees (64,000 total in 2023), and 2,800 more advanced degrees (8,000 total in 2023) at nonmetro institutions. The decrease in nonmetro student enrollment coupled with a slight increase in degrees awarded suggests a more efficient sorting of college-aged students, with the decline in enrollment being concentrated among those who were most likely never to finish their college degrees. Additionally, an increase in 4-year graduation rates occurred between 2011 (32 percent) and 2023 (40 percent) which also indicates the decline in student enrollment is partially attributed to students completing their degrees faster. Altogether, the negative impact of a decrease in college enrollment was contained to postsecondary institutions, as their financial outlook declined but did not impact the college-educated labor market, as degrees granted slightly increased from 2011 to 2023.

The report further finds that 10 percent of the nonmetro population 25 years and older held associate degrees in 2019–23, an increase of 24 percent from 2009 to 2013. Another 14 percent held a bachelor's degree (an increase of 22 percent) and 8 percent continued school to earn a graduate or professional degree, following an increase of 28 percent over the 10-year period. This number is in part explained because nonmetro employment growth over the same time period was higher in occupations that employed a greater proportion of college-educated workers such as healthcare, professional services, and STEM (Davis et al., 2022).

The report also examines the share of rural workers who held associate or bachelor's degrees in each industry or occupational grouping. Employment growth in the last 20 years suggests a shift from goods-producing industries towards service-oriented industries that have a higher share of employees with associate or bachelor's degrees. The top half of the distribution of industries with higher shares of college-educated workers added 1.5 million jobs from 2001 to 2022. This represents a growth of 17 percent from 2001 levels. Conversely, the bottom half of the distribution, industries with lower shares of college-educated workers, grew by 1 percent since 2001 and represented increased employment of 167,000 workers. Additionally, like the results for industries, occupational data provide some evidence of reallocation of jobs in the rural economy toward those occupations with higher shares of workers that hold postsecondary degrees.

We additionally focus on the degree majors produced by rural institutions, separating our analysis by degree type. We found that 3 out of every 10 bachelor's degrees awarded from nonmetro institutions in 2023 were in either business and management or health professions. Bachelor's degrees in education were more popular in nonmetro areas than metro areas (9 percent to 4 percent, respectively) but have increasingly declined in popularity. While education was the largest degree major held by the nonmetro population, the college-educated older population aged 65 and older was much more likely to have chosen an education major than the 40–64 and 25–39 aged cohorts. Conversely, broad-based majors that emphasized a wider scope of knowledge dominated associate degrees from nonmetro institutions. Approximately 44 percent of all associate degrees from nonmetro institutions in 2023 were awarded in liberal arts and science, a discipline that also had one of the highest growth rates in degrees awarded the last decade, increasing 22 percent from 2011 to 2023.

Besides examining trends at nonmetro institutions, this report also analyzes land-grant institutions with a particular focus on the number of agricultural degrees. In 2023, land-grant institutions awarded 13,000 bachelor's degrees in agriculture, a 19-percent increase since 2011. Almost 40 percent of agricultural bachelor's degrees awarded were in animal sciences and one out of every five were in agricultural business and management. Overall, the five largest degree fields comprised 83 percent of all agricultural bachelor's degrees awarded in 2023 (animal sciences, agricultural business and management, plant sciences, food science and technology, and general agriculture). Moreover, the largest agricultural bachelor's degree field, animal sciences, was also one of the fastest growing, increasing 32 percent from 2011 to 2023. The rapid increase in agricultural degrees awarded at land-grant institutions outpaced the increase in undergraduate enrollment at these institutions during the same period (11 percent). This growth is in part due to the ongoing transformation of agriculture, which increasingly relies on technology for farming. These results also align with previous research that found an increase in the educational attainment of farm operators (Wang et al., 2022). Land-grant institutions remain the primary source of agricultural degrees in the United States.

Study Limitations and Directions for Future Research

This report and associated analysis are limited by the absence of individual student-level data, and in particular, person-level migration data. Ideally, a study that tracks individuals from secondary school to college to their first and subsequent jobs could support a deeper understanding of students' pathways into the rural labor force and throughout their working careers. Sources of restricted-use Federal data that leverage administrative sources of microdata now exist to comprehensively support the exploration of mobility of workers over time (Abowd et al., 2004, 2009). In this report we review trends in degrees earned by new college graduates and the degrees and occupations held by rural workers. Migration data can complete the picture of where rural college-educated workers came from and the trajectory of their careers and earnings over time, based on the job decisions they make.

Pertinent questions for future research include the relationship of place of origin to the location choices of college-educated workers, age and life circumstances of rural return, and the role of rural firms in worker choices. A better understanding of educational pathways and job choices over time will uncover the underlying forces behind job growth for college-educated workers as documented in this report. An important subset of these same questions focuses on farming communities, and the college education of farmers and ranchers. Understanding the supply and demand of rural college-educated workers is an ongoing and active area of inquiry.

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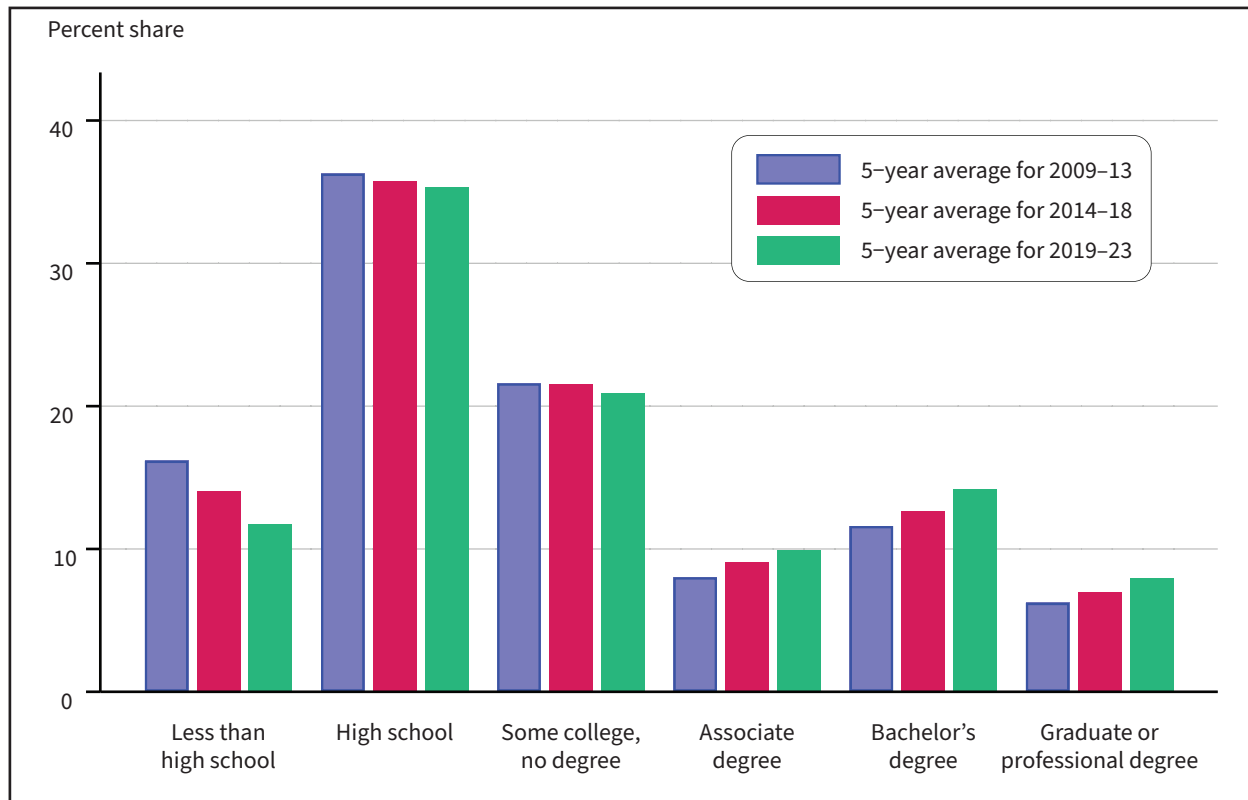
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Appendix A: Additional Figures

Figure A.1

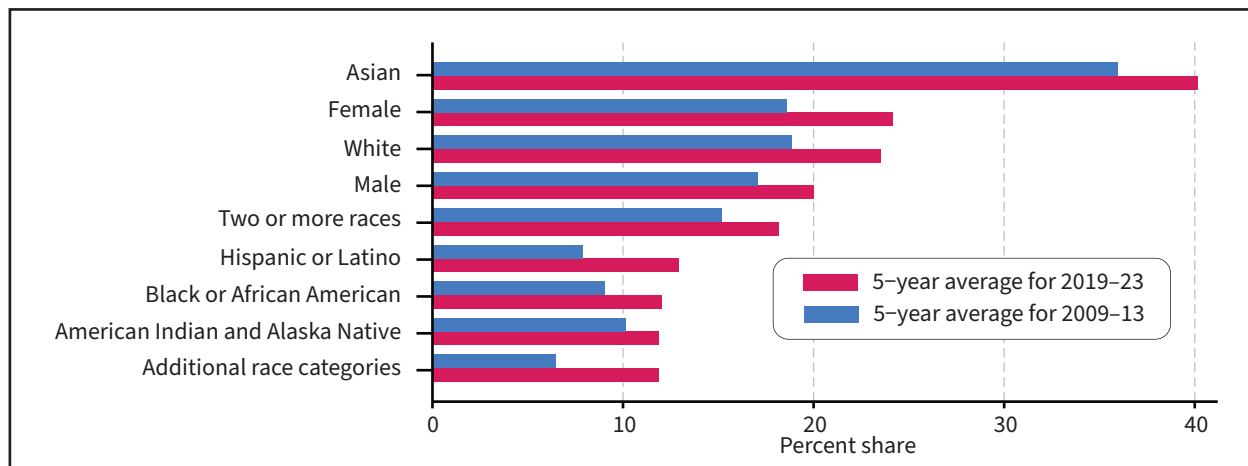
Percent of the U.S. metropolitan population 25 years and over by educational attainment



Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

Figure A.2

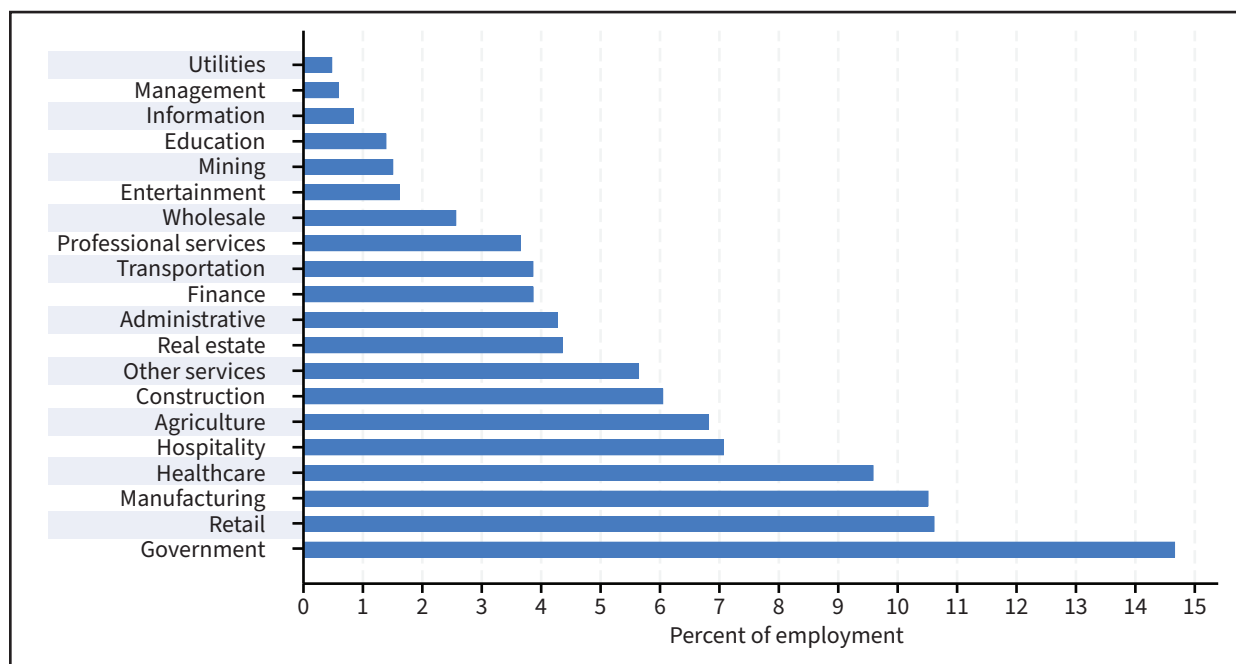
Percent of the U.S. metropolitan population 25 years and over with bachelor's degrees by subgroups



Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2013 and 2023 5-year American Community Survey (ACS) data.

Figure A.3

U.S. nonmetropolitan employment share by industry in 2022

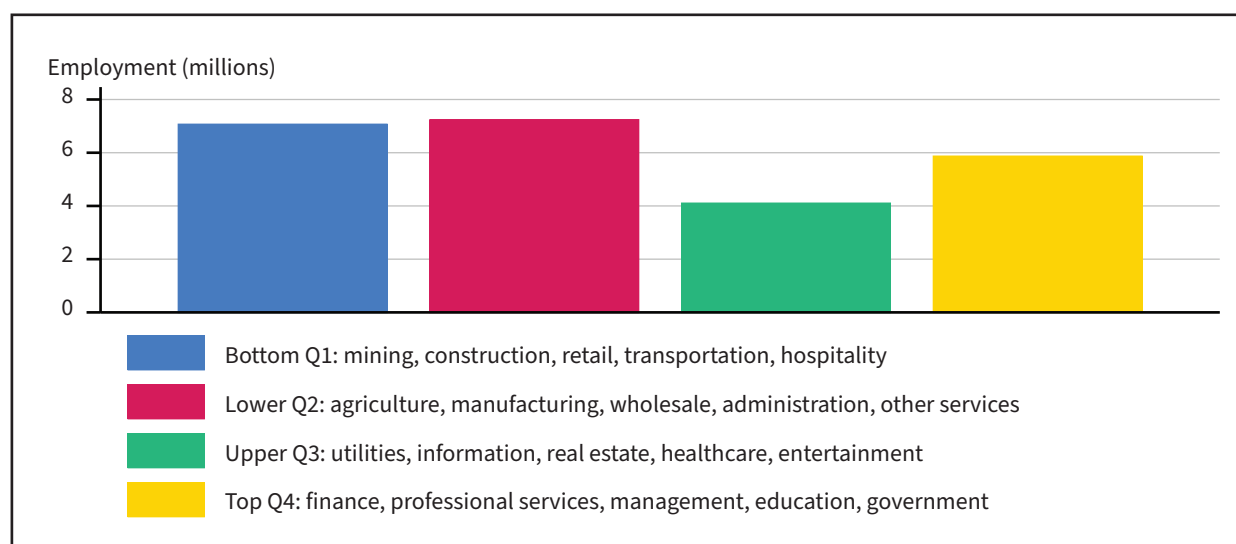


Note: The chart shows the 2022 industry percent of total employment in U.S. nonmetropolitan areas. Metropolitan areas are defined (geographically delineated) by Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Regional Data for Total Full-Time and Part-Time Employment by NAICS Industry (CAEMP25N) 2022 data.

Figure A.4

U.S. nonmetropolitan employment by quartile for industries ranked by the share of workers with bachelor's degrees, 2022

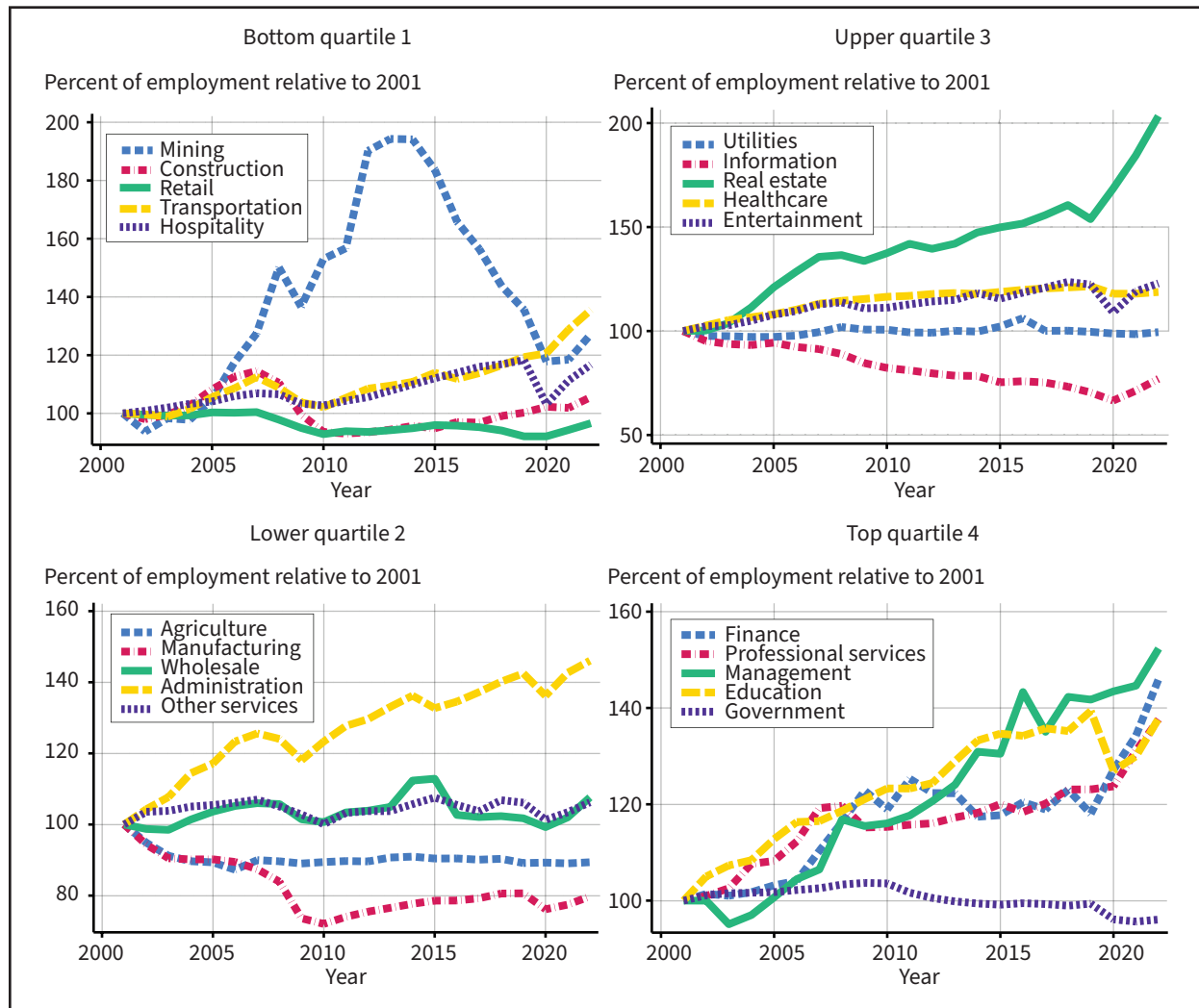


Note: The chart shows the 2022 total U.S. nonmetropolitan employment by industry quartile. Industries are grouped into quartiles (Q), based on the share of workers with bachelor's degrees in each industry. Metropolitan areas are defined (geographically delineated) by Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Regional Data for Total Full-Time and Part-Time Employment by NAICS Industry (CAEMP25N) 2022 data.

Figure A.5

Decomposition of U.S. industry growth by quartile, 2001–22

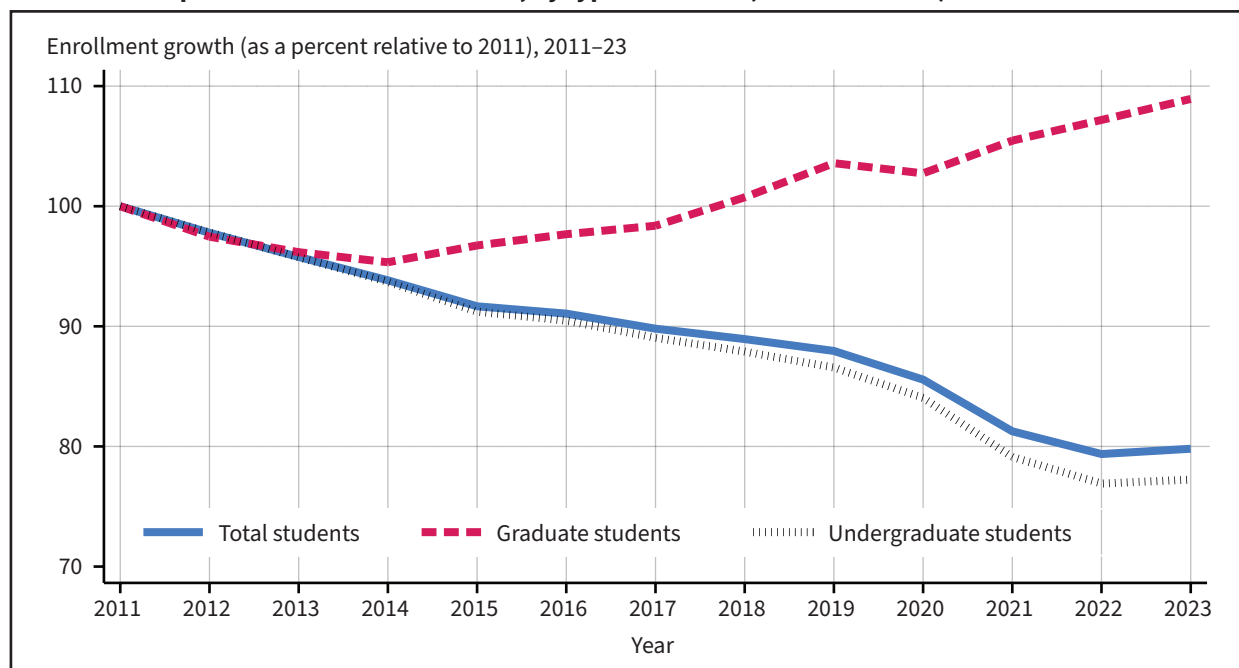


Note: The chart shows the 2022 employment contribution by U.S. industry within each quartile. Industries are grouped into quartiles, based on the share of workers with bachelor's degrees in each industry. Larger industries (as shown in figure A.3) have a greater influence on the growth trends shown in figure 5. Metropolitan areas are defined (geographically delineated) by Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Regional Data for Total Full-Time and Part-Time Employment by NAICS Industry (CAEMP25N) 2022 data.

Figure A.6

U.S. nonmetropolitan 12-month enrollment, by type of student (relative to 2011)

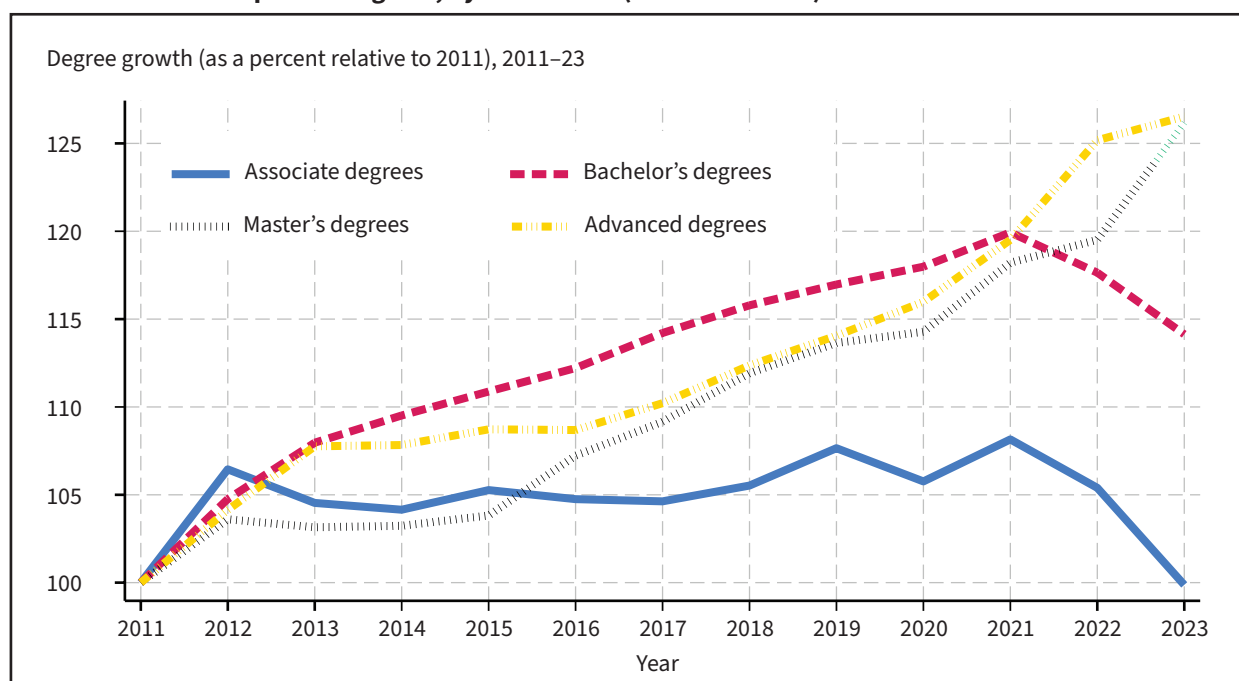


Note: Undergraduate students include all students enrolled in a 4- or 5-year bachelor's degree program, an associate degree program, or a vocational or technical program below the baccalaureate level. Graduate students include all students who hold a bachelor's degree or above and are taking courses at the postbaccalaureate level. These students may or may not be enrolled in graduate programs.

Source: USDA, Economic Research Service using the U.S. Department of Education, National Center for Education Statistics, Integrated Post-secondary Education Data System (IPEDS).

Figure A.7

Distribution of metropolitan degrees, by award level (relative to 2011)

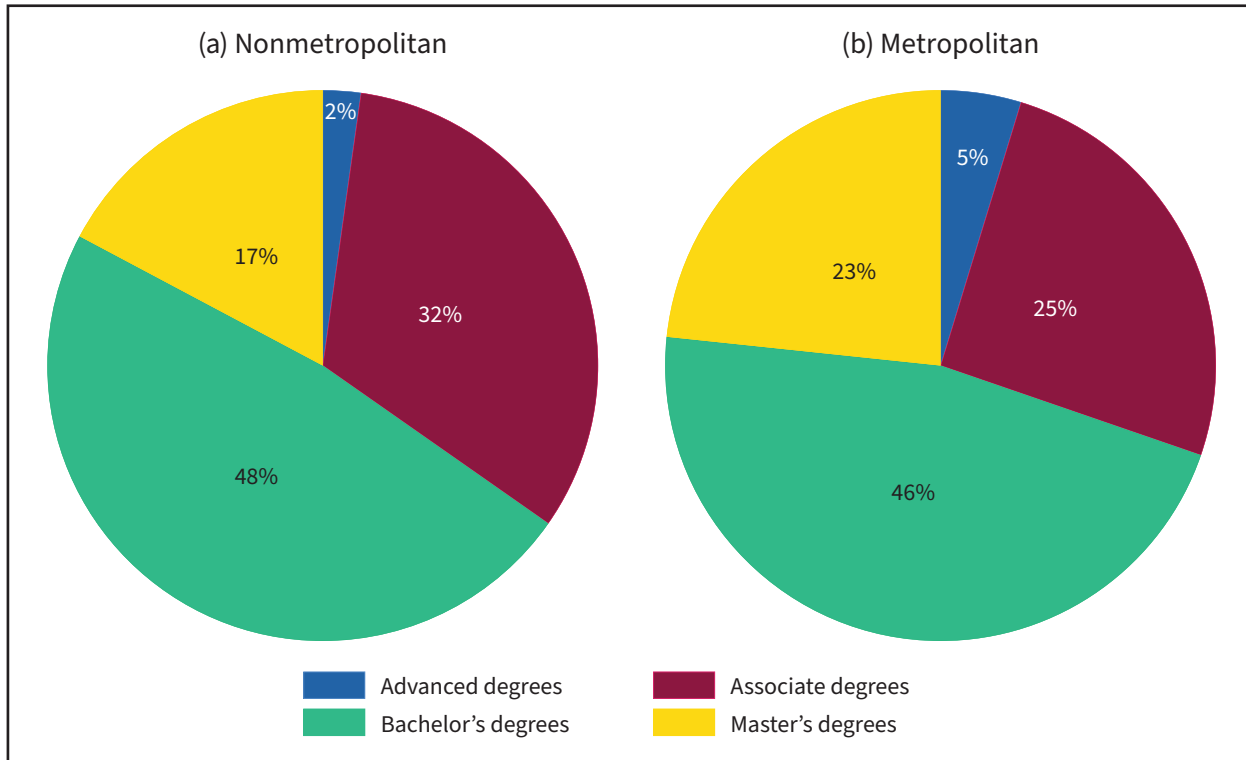


Note: Advanced degrees are grouped from the IPEDS' classifications of "Doctor's degree—other," "Doctor's degree—professional practice," and "Doctor's degree—research/scholarship" which include doctoral degrees of professional practice (such as chiropractic, dentistry, Law, and Medicine) and of research (such as Ph.D., Ed.D., D.M.A., and D.Sc.).

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

Figure A.8

Distribution of degrees, by award level (2023)



Note: Advanced degrees are grouped from the IPEDS' classifications of "Doctor's degree–other," "Doctor's degree–professional practice," and "Doctor's degree–research/scholarship", which include doctoral degrees of professional practice (such as chiropractic, dentistry, law, and medicine) and of research (such as Ph.D., Ed.D., D.M.A., and D.Sc.).

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS).

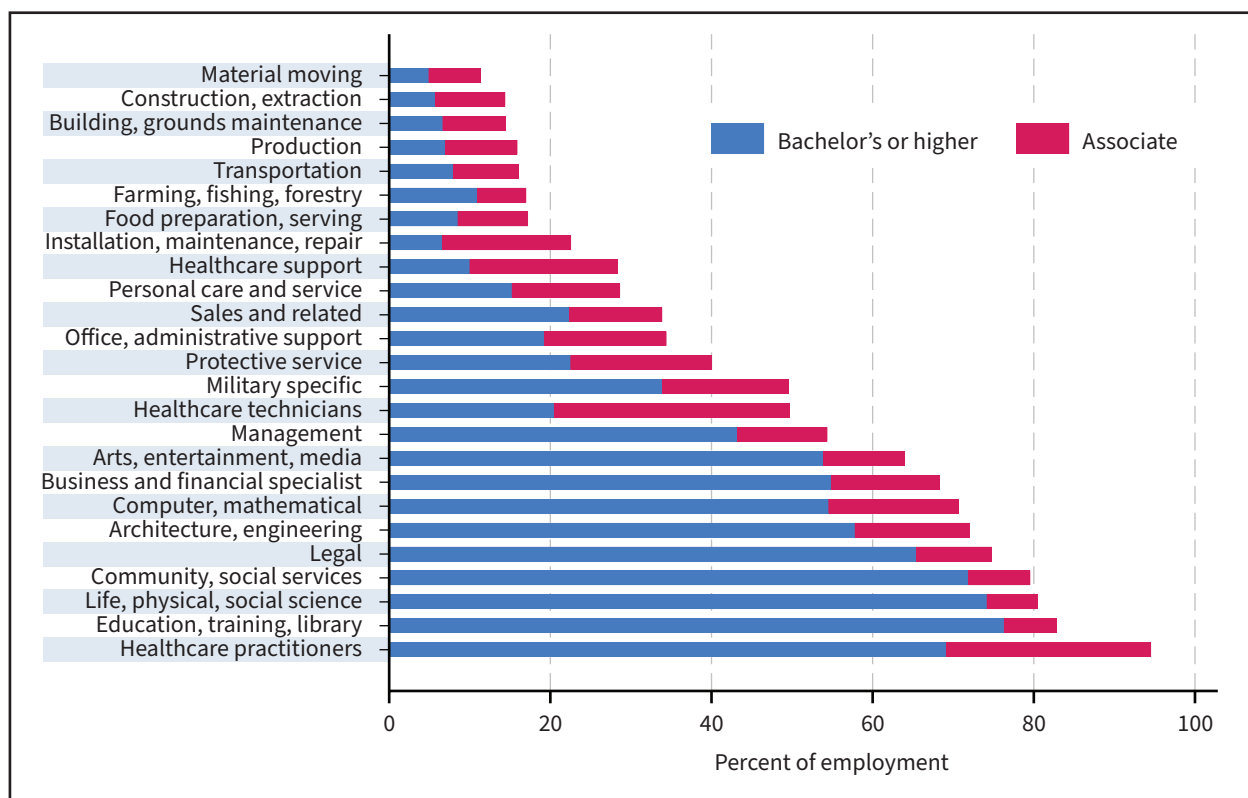
Appendix B

Occupational Reallocation

Figure B.1 presents the share of U.S. workers with associate degrees and a bachelor's degree or higher by the occupation of their job.¹⁴ Some occupations where most workers have either an associate or bachelor's degree are largely associated with specific industry sectors such as healthcare practitioners working in the healthcare sector. However, some occupations with a majority of college-educated workers span across industries such as workers in business and financial specialist occupations. Occupations are ranked in figure B.1 from the smallest percent of workers that have college degrees at the top to the occupation with the largest share on the bottom.

Figure B.1

Percent of U.S. nonmetropolitan workers with postsecondary degrees by occupation, 2021



Source: USDA, Economic Research Service using U.S. Department of Commerce, Bureau of the Census, 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data, harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

Ninety-four percent of healthcare practitioners have post-secondary degrees, with 25 percent holding associate degrees and 69.1 percent having bachelor's degrees. Occupations with the highest percent of nonmetro workers with bachelor's degrees are education, training, and library (76 percent), life, physical, and social science (74 percent), and community and social services (72 percent). Occupations with the least post-secondary training include construction, extraction, and material moving. In some occupational groups, those with post-secondary education more commonly received associate degrees over

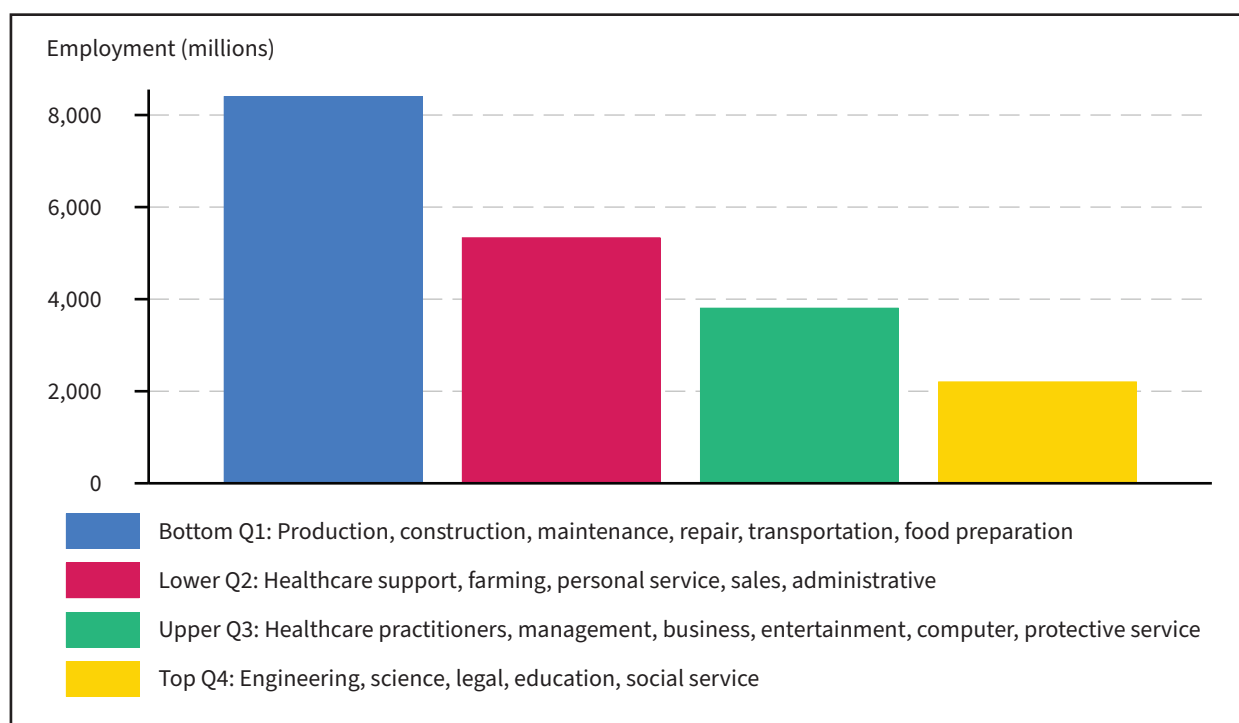
¹⁴ The major occupational groups are as defined by the 2018 Standard Occupational Classification System and combine detailed ACS occupations, using the IPUMS ACS harmonized categories for the 2010 basis occupation definition.

bachelor's degrees, such as healthcare technicians; healthcare support; and installation, maintenance, and repair occupations where specialized associate degree training programs are common.

Analogous to the results for industries, the occupational data provide evidence of reallocation of jobs in the rural economy toward those occupations with higher shares of workers that hold post-secondary degrees. We use U.S. Department of Labor, Bureau of Labor Statistics (BLS) Occupational Employment and Wage Statistics (OEWS) data for nonmetro areas to explore employment and changes by occupation group from 2006 to 2023. The 22 major occupational groups are ranked in figure B.1 from highest to lowest share of workers with bachelor's degrees and grouped into quartiles. In figure B.2, quartile 1 (which includes occupations with the lowest share of workers with a bachelor's degree) is the largest employment group, comprising 8.4 million workers in 2023 in production, construction, maintenance, repair, transportation, and food preparation occupations. Quartile 4 shows occupations with the highest share of college-educated workers and includes 2.2 million workers performing jobs in engineering, science, legal, education, and social service occupations.

Figure B.2

U.S. nonmetropolitan employment by quartile for occupations ranked by the share of workers with bachelor's degrees, 2023



Note: The chart shows the 2023 total U.S. nonmetropolitan employment by occupation quartile. Occupations are grouped into quartiles based on the share of workers with bachelor's degrees in each major occupational classification calculated, using 2021 1-year ACS data. Employment is calculated as the OEWS occupational share of BEA nonmetropolitan private nonfarm employment. BEA nonmetropolitan employment is estimated for 2023 using 2022 BEA data extended to 2023 using OEWS nonmetropolitan annual employment growth. Occupational shares are used because OEWS nonmetropolitan employment totals are not comparable over time due to nonmetropolitan area definition changes within the data. Metropolitan areas are defined (geographically delineated) by Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

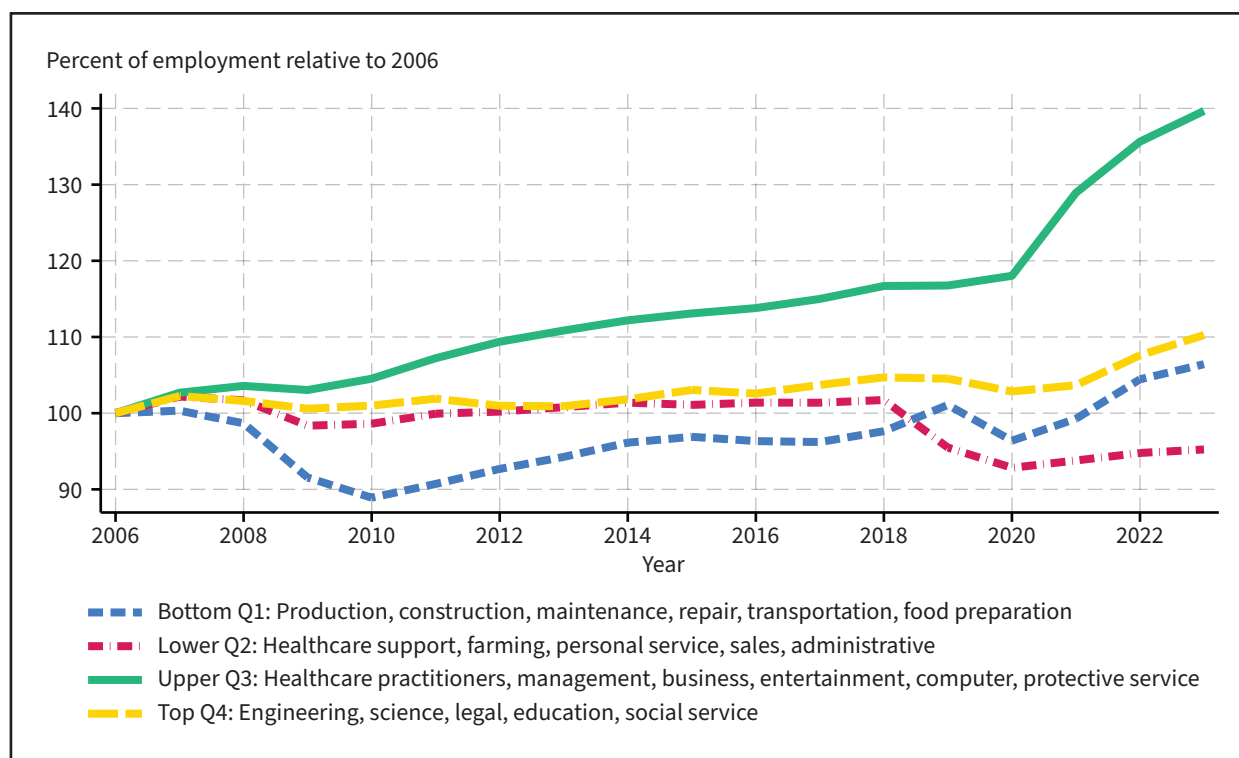
Source: USDA, Economic Research Service using U.S. Department of Labor, Bureau of Labor Statistics 2022 and 2023 Occupational Employment and Wage Statistics (OEWS) for nonmetropolitan areas; U.S. Department of Commerce, Bureau of Economic Analysis Regional Data for Total Full-Time and Part-Time Employment (CAEMP25N) 2022 data; and U.S. Department of Commerce, Bureau of the Census, 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

Figure B.3 shows changes over time in employment for the four quartiles of occupations. The values for each year are shown as a percentage relative to the base year of 2006, the first available year for nonmetro OEWS statistics. The largest, nonmetro quartile 1, experienced an employment decline during the 2008–10 economic recession. Those industries recovered and grew 6 percent by 2023, relative to 2006. Quartile 4 occupations with the most college-educated, nonmetro workers grew 5 percent from 2006 to 2019 and declined 2 percent during the Coronavirus (COVID-19) pandemic, yet by 2023 had grown 10 percent relative to 2006. The highest employment growth was for occupations in quartile 3 which grew steadily from 2006 forward, with an acceleration of growth that began in 2020 driven by increases in nonmetro business, management, and computer jobs. By 2023 quartile 3 occupations had 40 percent more jobs than in 2006. The decline of jobs in quartile 2 from 2018 to 2020 was driven by declines in personal service, office, and administrative occupations. This, however, was somewhat offset by increases in healthcare support occupations.

Overall, from 2006 to 2023, quartiles 1 and 2 together increased employment by 241,000 workers, a 2-percent change from 2006. Quartiles 3 and 4, occupations with higher shares of college-educated workers, added 1.3 million jobs for a growth of 27 percent.

Figure B.3

U.S. nonmetropolitan employment growth by quartile for occupations ranked by the share of workers with bachelor's degrees, relative to 2006



Note: The chart shows U.S. nonmetropolitan employment by occupation quartile over time, relative to 2006. Occupations are grouped into quartiles based on the share of workers with bachelor's degrees in each major occupational classification, calculated using 2021 1-year ACS data. Employment is calculated as the OEWS occupational share of BEA nonmetropolitan private nonfarm employment. BEA nonmetropolitan employment is estimated for 2023 using 2022 BEA data extended to 2023 using OEWS annual nonmetropolitan employment growth. Occupational shares are used because OEWS nonmetropolitan employment totals are not comparable over time for all years due to nonmetropolitan-area definition changes within the data. Metropolitan areas are defined (geographically delineated) by Office of Management and Budget bulletin number 20-01 issued March 6, 2020.

Source: USDA, Economic Research Service using U.S. Department of Labor, Bureau of Labor Statistics (BLS) 2006–223 Occupational Employment and Wage Statistics (OEWS) for nonmetropolitan areas; U.S. Department of Commerce, Bureau of Economic Analysis (BEA) Regional Data for Total Full-Time and Part-Time Employment (CAEMP25N) 2006–22 data; and U.S. Department of Commerce, Bureau of the Census, 2021 1-year American Community Survey (ACS) Public Use Microdata Sample (PUMS) data, harmonized by the University of Minnesota as the Integrated Public Use Microdata Sample (IPUMS).

The top half of the occupational distribution produced considerably more rural jobs from 2006 to 2023 than did the bottom half, representing a relative reallocation of jobs into occupations where workers more often hold bachelor's degrees.

Appendix C

Crosswalks

Table C.1

CIP codes to ACS degree codes crosswalk

CIP code	CIP title	ACS degree code	ACS degree title
01	Agricultural/Animal/Plant/Veterinary Science and Related Fields	11	Agriculture
03	Natural Resources and Conservation	13	Environment and Natural Resources
04	Architecture and Related Services	14	Architecture
05	Area, Ethnic, Cultural, Gender, and Group Studies	15	Area, Ethnic, and Civilization Studies
09	Communication, Journalism, and Related Programs	19	Communications
10	Communications Technologies/Technicians and Support Services	20	Communication Technologies
11	Computer and Information Sciences and Support Services	21	Computer and Information Sciences
12	Culinary, Entertainment, and Personal Services	22	Cosmetology Services and Culinary Arts
13	Education	23	Education Administration and Teaching
14	Engineering	24	Engineering
15	Engineering/Engineering Related Technologies/Technicians	25	Engineering Technologies
16	Foreign Languages, Literatures, and Linguistics	26	Linguistics and Foreign Languages
19	Family and Consumer Sciences/Human Sciences	29	Family and Consumer Sciences
22	Legal Professions and Studies	32	Law
23	English Language and Literature/Letters	33	English Language, Literature, and Composition
24	Liberal Arts and Sciences, General Studies, and Humanities	34	Liberal Arts and Humanities
25	Library Sciences	35	Library Science
26	Biological and Biomedical Sciences	36	Biology and Life Sciences
27	Mathematics and Statistics	37	Mathematics and Statistics
28	Military Science, Leadership and Operational Art	NA	NA
29	Military Technologies and Applied Sciences	38	Military Technologies
30	Multi/Interdisciplinary Studies	40	Interdisciplinary and Multi-Disciplinary Studies (General)
31	Parks, Recreation, Leisure, Fitness, and Kinesiology	41	Physical Fitness, Parks, Recreation, and Leisure
32	Basic Skills and Developmental/Remedial Education	NA	NA

Continued on next page ►

CIP code	CIP title	ACS degree code		ACS degree title
33	Citizenship Activities	NA	NA	
34	Health-Related Knowledge and Skills	NA	NA	
35	Interpersonal and Social Skills	NA	NA	
36	Leisure and Recreational Activities	NA	NA	
37	Personal Awareness and Self-Improvement	NA	NA	
38	Philosophy and Religious Studies	48		Philosophy and Religious Studies
39	Theology and Religious Vocations	49		Theology and Religious Vocations
40	Physical Sciences	50		Physical Sciences
41	Science Technologies/Technicians	51		Nuclear, Industrial Radiology, and Biological Technologies
42	Psychology	52		Psychology
43	Homeland Security, Law Enforcement, Firefighting and Related Protective Services	53		Criminal Justice and Fire Protection
44	Public Administration and Social Service Professions	54		Public Affairs, Policy, and Social Work
45	Social Sciences	55		Social Sciences
46	Construction Trades	56		Construction Services
47	Mechanical and Repair Technologies/Technicians	57		Electrical and Mechanical Repairs and Technologies
48	Precision Production	58		Precision Production and Industrial Arts
49	Transportation and Materials Moving	59		Transportation Sciences and Technologies
50	Visual and Performing Arts	60		Fine Arts
51	Health Professions and Related Programs	61		Medical and Health Sciences and Services
52	Business, Management, Marketing, and Related Support Services	62		Business
53	High School/Secondary Diplomas and Certificates	NA	NA	
54	History	64		History
60	Health Professions Residency/Fellowship Programs	NA	NA	
61	Medical Residency/Fellowship Programs	NA	NA	

Note: Fields labeled “NA” do not have a corresponding match and are left out of the analysis. The Classification of Instructional Programs (CIP) offers a standardized system that helps ensure consistent tracking and reporting of academic programs and the number of students completing them. CIP codes are maintained, produced, and utilized by the U.S. Department of Education, National Center for Education Statistics. ACS degree codes are utilized by the American Community Survey and are based off NCES’s CIP codes.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Classification of Instructional Programs (CIP) codes; and U.S. Department of Commerce, Bureau of the Census, American Community Survey.

Table C.2

Combined ACS degree codes

ACS description of degree majors (figure 15)	Included ACS 2-digit degree codes (see titles in table C.1)
Computers, Mathematics, and Statistics	21, 37, 40 part (data science and data analytics)
Biological, Agricultural, and Environmental Sciences	11, 13, 36
Physical and Related Sciences	50
Psychology	52
Social Sciences	15, 55, 64 part (history of science and technology)
Engineering	24
Multidisciplinary Studies	40
Science and Engineering Related Fields	14, 21 part (computer programming and data processing), 23 part (computer, math or science teacher education), 25, 51, 61
Business	32 part (court reporting), 61 part (medical administration), 62
Education	23
Literature and Languages	26, 33
Liberal Arts and History	34, 48, 49, 64
Visual and Performing Arts	60
Communications	19, 20
Other Arts and Humanities	22, 29, 32, 35, 38, 41, 53, 54, 56, 57, 58, 59

Note: ACS degree codes are utilized by the American Community Survey to classify degree fields and are based off of NCES's CIP codes.

Source: USDA, Economic Research Service using data from the U.S. Department of Education, National Center for Education Statistics, Classification of Instructional Programs (CIP) codes; and U.S. Department of Commerce, Bureau of the Census, American Community Survey.