

## Who's Who in CTE Occupations:

Documenting the Demographic  
Composition of CTE Job Holders

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## FOREWORD

Key to our nation's success is an educated and career-ready workforce. Automation and other advances in technology have motivated and inspired our political, economic, and education systems to rethink how we need to prepare learners — both young people and adults. With this acknowledgment has come a reaffirmation of the importance of supporting and promoting Career and Technical Education (CTE). Notably, “The Strengthening Career and Technical Education for the 21st Century Act” (the Perkins V Act), signed into law in 2018, has committed close to \$1.3 billion annually for CTE programs.

CTE represents 16 career clusters, including finance, health science, manufacturing, information technology, and human services; provides learning and development opportunities for approximately 12.5 million high school and college students;<sup>1</sup> and facilitates access to an estimated 16 million skilled and technical jobs.<sup>2</sup>

We at ETS believe that CTE must remain an integral part of our nation's education and workforce strategic agendas. We are excited by the research efforts we are engaged in to better understand and advance CTE, the learners who may pursue one or more of these pathways, and the educators and employers who support learners through the pathways.

This research brief, *Who's Who in CTE Occupations: Documenting the Demographic Composition of CTE Job Holders*, is the first in Research & Development's “Career and Technical Education Series.” It uses longitudinal data to document how women, racial and ethnic groups, individuals with disabilities, and those from economically disadvantaged families are represented across the different CTE career clusters. We believe that the findings will be of interest to a wide audience of policymakers, educators, and others who see the promise of CTE for the success of our nation today, tomorrow, and beyond.

It is our hope that you find this research brief engaging, enlightening, and informative.

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<sup>1</sup> <https://careertech.org/cte>

<sup>2</sup> <https://cew.georgetown.edu/cew-reports/3pathways>

## Why Career and Technical Education? And Why Now?

Career and Technical Education (CTE)<sup>3</sup> and its affiliated careers have been ever-present and important features of the U.S. educational system and economy. A sign of the U.S. government's continuing commitment to CTE careers is the Strengthening Career and Technical Education for the 21st Century Act (Perkins V), which was approved unanimously by both Congressional chambers (U.S. Department of Education, 2019) on July 31, 2018, and included increased federal funding. An explicit purpose of the reauthorized Perkins Act is to increase "the employment opportunities for populations who are chronically unemployed or underemployed" (S.3217, 2018, p. 5).

## CTE in Context

The federal government initiated its funding of CTE with the passage of the Smith-Hughes Act in 1917, and by the 1960s, particular interest in using CTE to foster the success of females, racial/ethnic minority groups, individuals with disabilities/impairments, and individuals from economically disadvantaged families had emerged (Dougherty & Lombardi, 2016; Imperatore & Hyslop, 2017). Perkins V thus continues the long CTE tradition of attempting to help members of diverse and historically marginalized populations, with the hope that CTE and employment following it can be a means of reducing achievement gaps and socioeconomic inequality (Kantrov, 2017).

Significant existing research examines the demographic representation of members of these groups among CTE course takers (e.g., Dougherty, 2018; Hudson, 2017). Nonetheless, a recent group of CTE experts described the research on specific subpopulations in CTE as "lacking" (Ahn et al., 2017, p. 5). One possible reason for this characterization may be the apparent lack of any documentation of the demographic makeup of CTE *jobholders*. This is particularly important because, although many students take CTE-related courses (enough to be considered "concentrating" in CTE), many do not intend to pursue CTE-related careers (DeFeo, 2015). Consequently, relying on demographic trends in CTE coursework as a barometer for the participation of different demographic groups in CTE careers is a flawed strategy.

## About This Study

Using data from a multi-wave longitudinal study, this research brief reports on the representation of four demographic groups: females, racial/ethnic minority groups, individuals with disabilities/impairments, and individuals from economically disadvantaged families.

We conducted a study using a nationally representative data set (Education Longitudinal Study of 2002 [ELS:2002]<sup>4</sup>) to explore and document the demographic representation of the four historically considered groups in CTE occupations<sup>5</sup>. Specifically, using the ELS:2002 across the 16 CTE Career

<sup>3</sup> CTE is also referred to as career education, technical and vocational education, technical education, or vocational education (Dortch, 2014).

<sup>4</sup> Our data were drawn from the Education Longitudinal Study of 2002 (ELS:2002) compiled by the National Center for Education Statistics (NCES). The sample is composed of nationally representative 10th graders in 2002 and 12th graders in 2004 who were longitudinally tracked during their high school years and for 8 years after (Ingels et al., 2014). Because the data are longitudinal, we were able to evaluate whether students eventually entered into, and retained their place in, a CTE-related occupation by 2012.

<sup>5</sup> We defined an occupation as CTE related if it was classified as a Zone 3 job in the U.S. Department of Labor's Occupational Employment Network (O\*NET®) because most Zone 3 jobs require training from vocational schools, related on-the-job experience, or an associate degree, but not a bachelor's degree (U.S. Department of Labor & Employment and Training Administration, 2019).

Clusters<sup>6</sup> (Advance CTE, 2019), we examined the representation of individuals currently holding CTE jobs according to their gender, race/ethnicity, disability/impairment status, and their parents' income from 2001. We also compared their representation in CTE occupations to that of the general population.

This foundational research is critical in evaluating important questions around access and equity regarding CTE employment opportunities. Is there differential attrition across the members of the four groups when transitioning from CTE courses to CTE jobs? If so, this could be indicative of unequal access and opportunity in this area — undercutting a major goal of the federal investment and educational philosophy.

Although the desire to use CTE to spur the economic mobility of marginalized groups is long-standing, so is the historical tendency to “track” members of some racial/ethnic minority groups into CTE courses and careers that are considered undesirable (Dougherty & Lombardi, 2016). Clearly, this action is both unfortunate and misguided. It is important to know whether some groups are over- and underrepresented in the population of CTE jobholders relative to their proportion in the general population. Ultimately, we cannot begin to evaluate the full extent to which CTE is fulfilling one of its major purposes — aiding members of underserved groups — until we have a comprehensive understanding of the demographic composition of those pursuing CTE careers.

## Key Findings

Key findings from this study showed a great deal of underrepresentation of females and racial/ethnic minorities across the 15 career clusters.<sup>6</sup> The percentage of underrepresentation across the career clusters was:

- 47% for females,
- 53% for Black/African Americans,
- 33% for Hispanic and multi-racial individuals, and
- 67% for American Indians/Alaskan Natives (this was the most underrepresented of all the groups studied).

Key findings also showed that individuals with disabilities/impairments and those from families with incomes at or below the national median in 2001 (\$42,229; DeNavas-Walt & Cleveland, 2002)<sup>7</sup> were overrepresented in CTE occupations. The percentage of overrepresentation across career clusters was:

- 53% for individuals with disabilities/impairments,
- 60% for individuals whose parents' incomes were below the national median in 2001, and
- 47% for individuals whose parents' incomes were at the national median in 2001.

These results suggest that CTE has created opportunities across some career clusters for individuals with disabilities/impairments and individuals from economically disadvantaged families, but that there are still gaps for females and racial/ethnic minorities across many of the career clusters.

<sup>6</sup> None of the individuals in the sample we analyzed held jobs in the Science, Technology, Engineering & Mathematics career cluster and thus we only report results for 15 of the 16 clusters. The 15 clusters include: (1) Agriculture, Food & Natural Resources, (2) Architecture & Construction, (3) Arts, Audio/Video Technology & Communications, (4) Business Management & Administration, (5) Education & Training, (6) Finance, (7) Government & Public Administration, (8) Health Science, (9) Hospitality & Tourism, (10) Human Services, (11) Information Technology, (12) Law, Public Safety, Corrections & Security, (13) Manufacturing, (14) Marketing, and (15) Transportation, Distribution & Logistics.

<sup>7</sup> Equivalent to \$60,336 in 2017 dollars (Guzman, 2018).

## Study Results

Results across the four groups are presented in Figures 1–4. The Equity Index (EI; Hao, 2006; Bensimon, Hao, Bustillos, 2006) was used to assess under- and overrepresentation:

$$\text{EI} = \frac{\% \text{ of Target Group in CTE}}{\% \text{ of Target Group in General Population}}$$

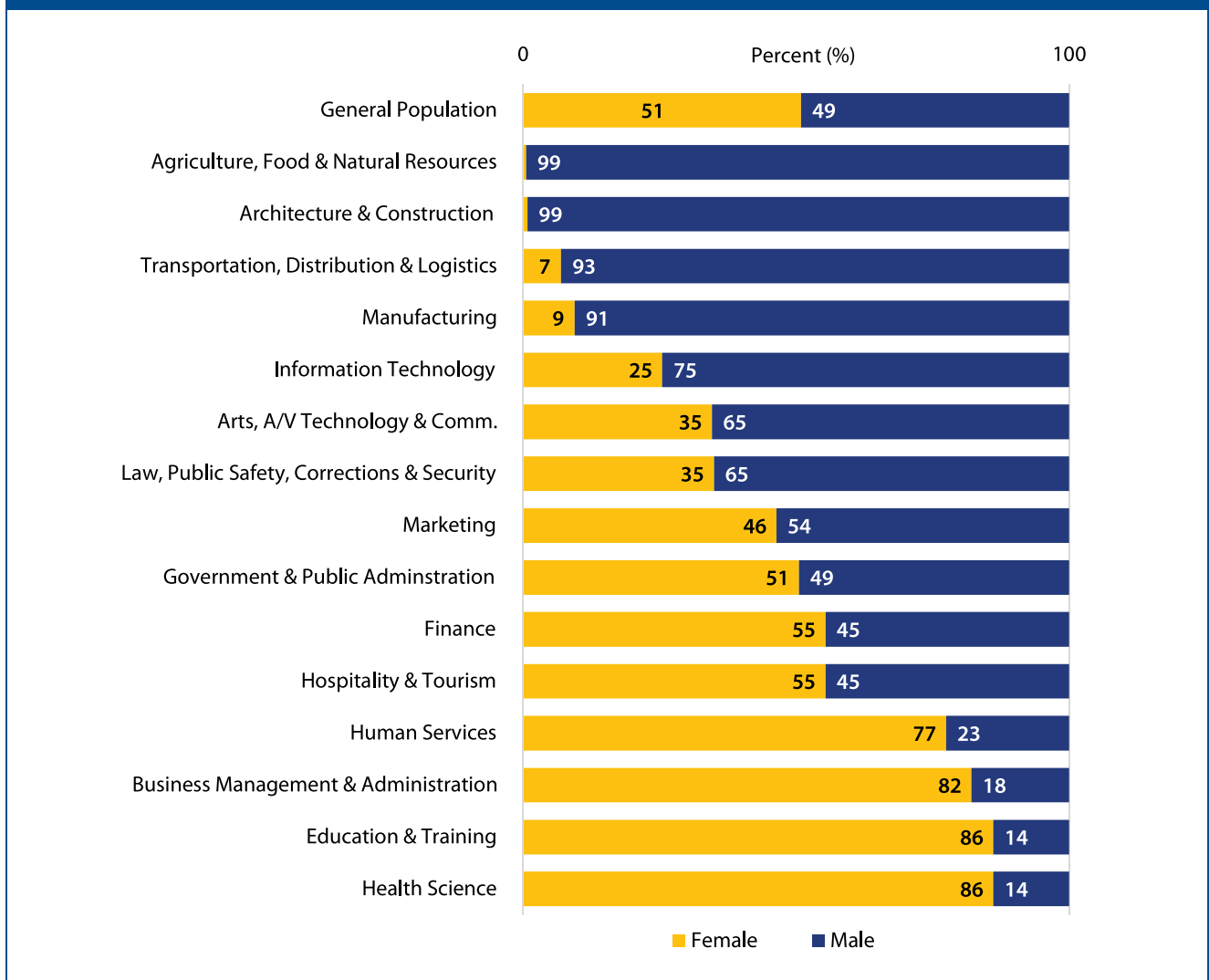
An EI score of 1.00 indicates equity, a score less than 1.00 indicates below equity, and a score greater than

1.00 indicates above equity. A group was considered underrepresented in CTE if its EI was less than .80 (i.e., less than 4/5 of its presence in the general population) and overrepresented if its EI was greater than 1.20 (i.e., more than 6/5 of its presence in the general population).<sup>8</sup>

## Representation of Females (Figure 1)

Females were overrepresented in four of the 15 career clusters and underrepresented in seven. In two of these clusters (Agriculture, Food & Natural

FIGURE 1: Gender Representation Across CTE Career Clusters



SOURCE: U.S. Department of Education, National Center for Education Statistics, Educational Longitudinal Study of 2002 (ELS:2002)

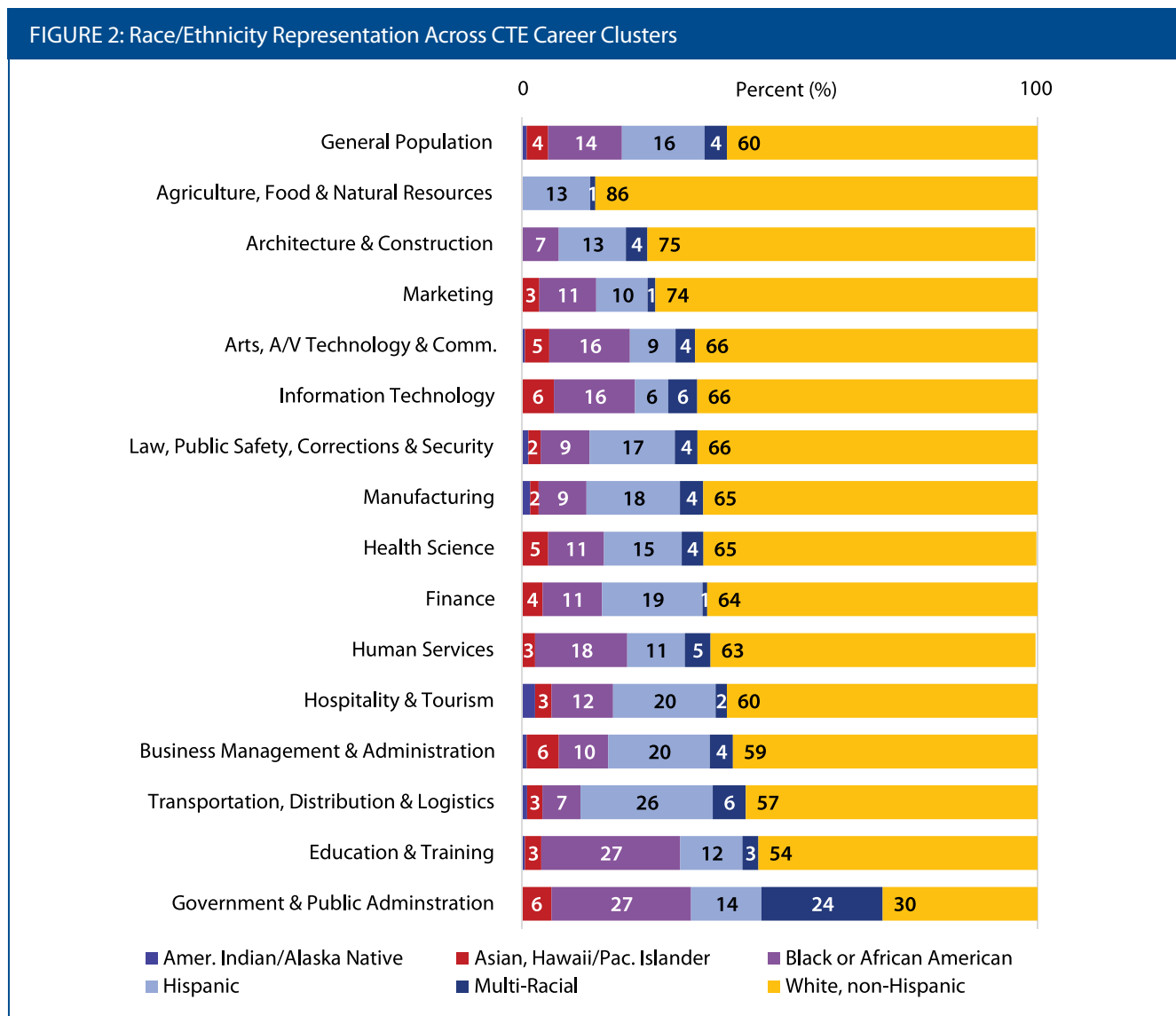
<sup>8</sup> Informed by the 4/5s Rule (Equal Opportunity Employment Commission, Civil Service Commission, U.S. Department of Labor, & U.S. Department of Justice, 1978) and Bensimon, Hao, and Bustillo's (2003) categorizations of "Above Equity > 1.0," "Below Equity < 1.0," and "Almost at Equity 0.8 – 0.9."

Resources and Architecture & Construction), this underrepresentation was extreme, with females holding .02 times or less of these jobs relative to their presence in the general U.S. population.

## Representation of Racial/Ethnic Minority Groups (Figure 2)

American Indians/Alaskan Natives were underrepresented in 10 clusters (with zero representation in eight) and overrepresented in three — holding jobs in Hospitality & Tourism at

over 2.5 times the rate of their presence in the general population. Black/African Americans were underrepresented in eight clusters and overrepresented in three, while Hispanic individuals were underrepresented in five clusters and overrepresented in four. Multiracial individuals were underrepresented in five of the career clusters and overrepresented in three, being present in Government & Public Administration occupations at nearly 5.5 times their proportion in the general population.



SOURCE: U.S. Department of Education, National Center for Education Statistics, Educational Longitudinal Study of 2002 (ELS:2002)

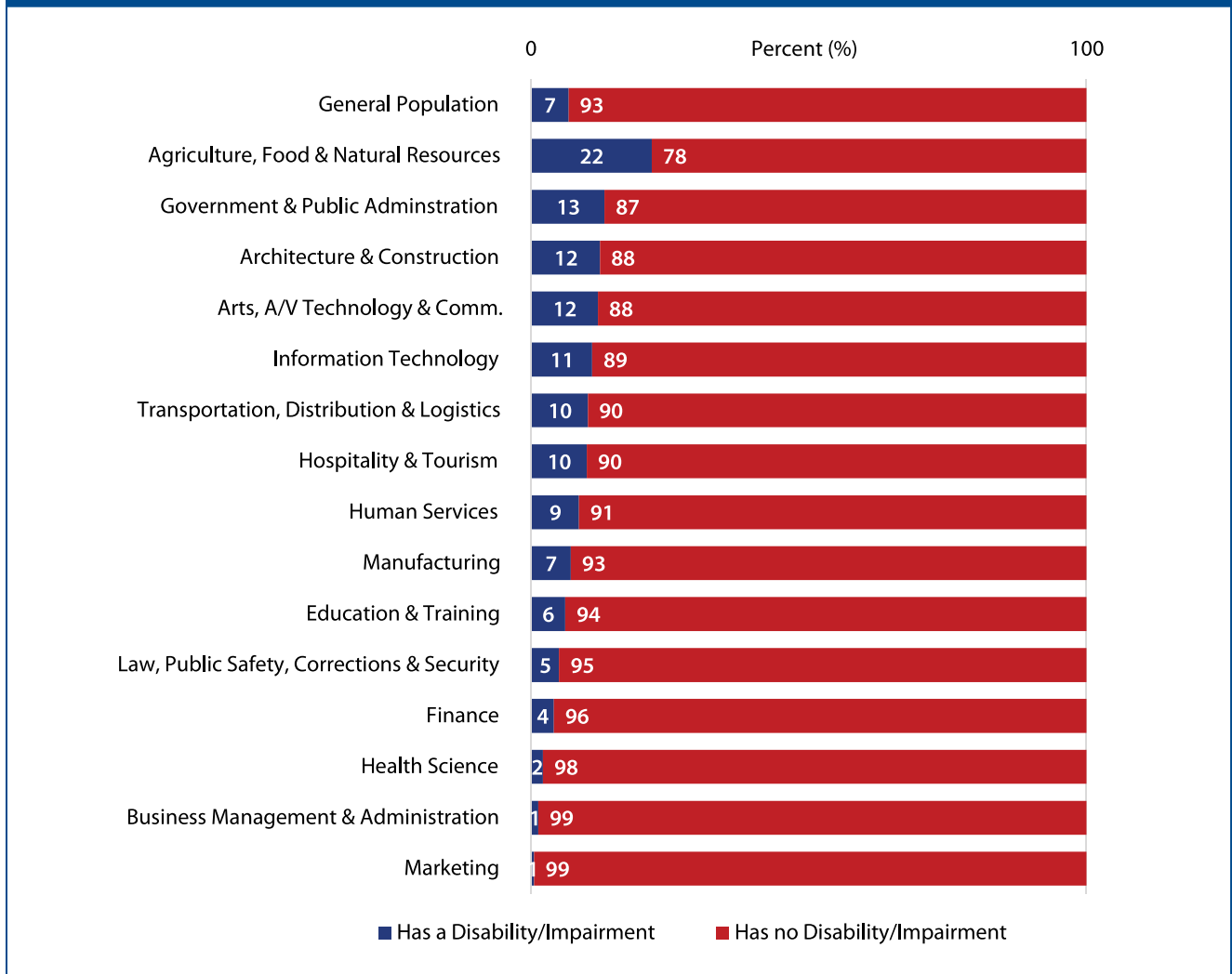
## Representation of Individuals with Disabilities/Impairments (Figure 3)

Individuals with a disability/impairment were underrepresented in five career clusters and overrepresented in eight clusters. Individuals with disabilities appeared at 3.2 times their rate in the general population in Agriculture, Food & Natural Resources.

## Representation of Individuals from Economically Disadvantaged Families (Figure 4)

Parental income at the time participants were in high school was used to capture the extent to which CTE jobholders came from economically disadvantaged families. For ease of data interpretation, parental income was divided into three groups: below the median range (less than \$35,001), at the median

FIGURE 3: Disability/Impairment Representation Across CTE Career Clusters

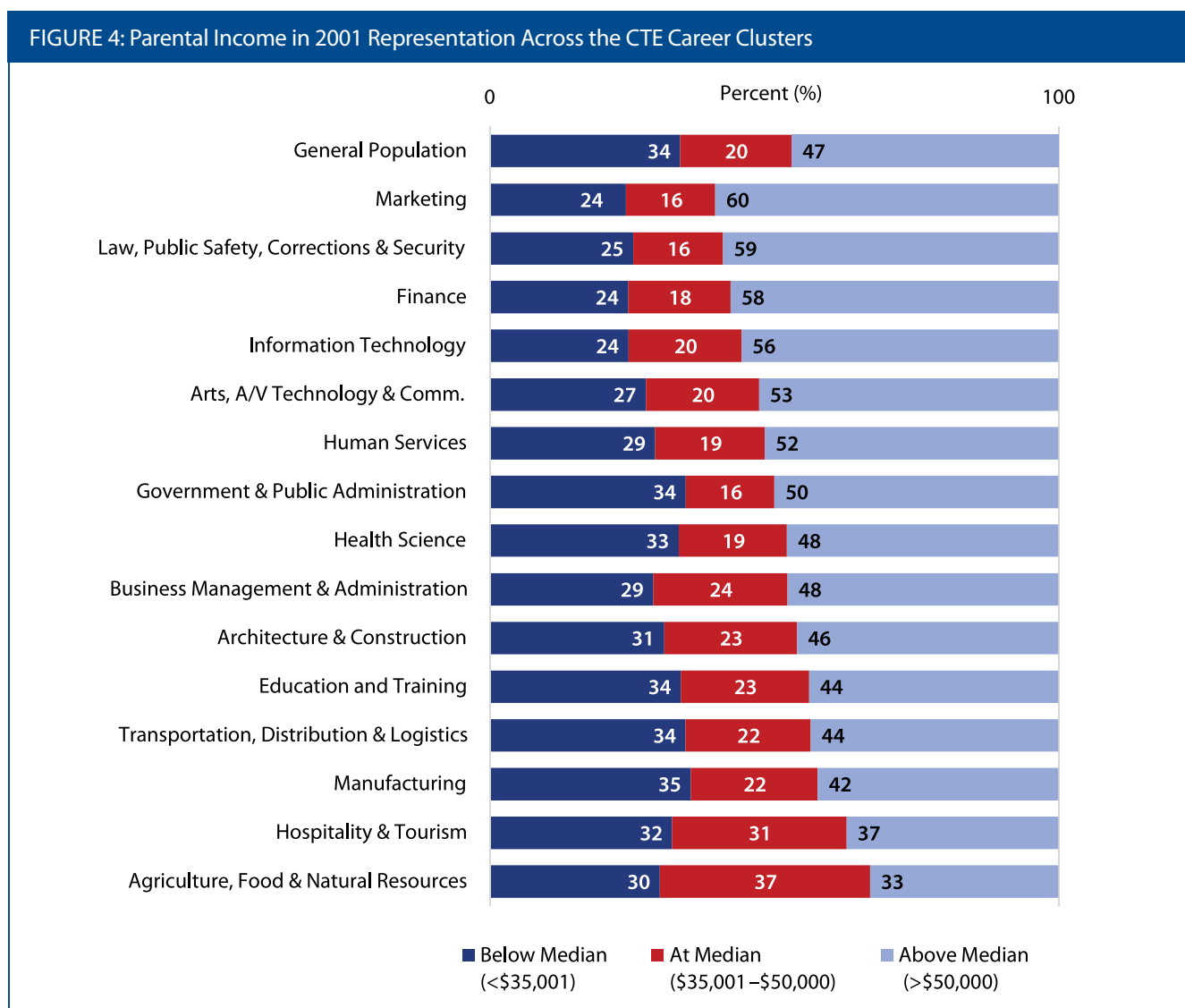


SOURCE: U.S. Department of Education, National Center for Education Statistics, Educational Longitudinal Study of 2002 (ELS:2002)

range (\$35,001–\$50,000), and above the median range (greater than \$50,000). These categories were calibrated according to the median income in the general U.S. population in 2001, which was \$42,228 (DeNavas-Walt & Cleveland, 2002).

Individuals from families with incomes below the median range were not underrepresented in any career clusters and were overrepresented in nine, appearing at nearly one and a half times their

proportion in the general population in Human Services, Manufacturing, and Transportation, Distribution & Logistics occupations. Those with parents whose incomes were at the median range were not underrepresented in any career clusters and were overrepresented in seven, particularly in Hospitality & Tourism and Agriculture, Food & Natural Resources, where they occupied jobs at over 1.7 and 2.0 times their frequency in the general population, respectively.



SOURCE: U.S. Department of Education, National Center for Education Statistics, Educational Longitudinal Study of 2002 (ELS:2002)



## Conclusions and Recommendations

Equity is clearly a major, ongoing challenge among CTE occupations. Future research must investigate the underlying causes of these differences in representation, which could stem from a wide variety of factors ranging from the stereotyping of career pathways, to differential educational and employment opportunities and access in various regions of the country, to systemic and structural bias and prejudice against the members of some groups. It is also important to dig deeper to examine equity of pay among members of different groups across career clusters. Even if a marginalized group is equitably represented in an occupation, it does not guarantee its members will be equitably compensated (Hegewisch & Tesfaselassie, 2019). Lastly, as more resources are placed in the CTE curriculum in K–12 education (Imperatore & Hyslop, 2017), it is important to reevaluate these demographic trends.

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