



Department of Workforce Services



Utah



Difficult-
to-Fill



Jobs
Survey



Full Report

Economic Research and Analysis Division

Difficult-to-Fill Jobs Study Introduction

In recent years, Utah businesses have expressed concern about the lack of qualified applicants to fill job openings. These labor shortage conversations have revolved around the disconnect between what the business community is looking for from the labor force and what skills and abilities that labor force can provide. A key term that often arises from said discussions is “skills gap;” the concept that the labor force does not carry the essential skills in the necessary quantity to meet the business community’s evolving demands.

Skills gap conversations almost exclusively center on the shortcomings of the labor force and, by extension, perceived deficiencies within the education community that develops the labor force. The employer community’s role is often excluded or given minimal consideration. Yet a balanced skills gap conversation should include a deeper perspective of the employer community’s role.

Workforce Services desired to better understand and empirically measure the employer community’s aspirations and efforts in their quest for Utah labor. In partnership with the Center for Public Policy and Administration (CPPA) at the University of Utah, Workforce Services created this Difficult-to-Fill Jobs Study. Interviews were conducted with over 1,000 Utah private-sector employers who identified they had experienced difficulty in filling at least one occupation within the past year. Workforce Services believes the Difficult-to-Fill Jobs Study is an added contribution toward understanding how businesses view the labor shortage issue and illuminating their perceptions of the underlying cause.

If concerns were to be found and actionable guidance suggested to the education community, the greatest benefit is to address the highly-skilled and highly-educated occupations; those that require more training and investment. The higher-education community trains for these occupations, and the occupation’s strength are they lead an economy’s growth, wealth, and competitiveness. Therefore, targeting highly-skilled and highly-educated occupations became the survey’s emphasis (with much centered upon Science, Technology, Engineering, Mathematics [STEM]). Industries that employ said occupations were the foundation of the sample.

There are multiple levels of depth that can be mined when measuring the employer and labor force communities. But including all possibilities in one survey is costly, can dilute a survey’s focus, and the necessary magnitude of questions upon those who generously give their time to be surveyed is prohibitive. Therefore, this survey does not address or quantify the level of demand that exists in the Utah economy for STEM or other high-skilled occupations. It is only designed to evaluate what employers report as their difficult-to-fill occupations, and then to give some added perspective around that.

Difficult-to-Fill Jobs Study Introduction

The survey was structured from a stratified random sample of private-sector employers, based upon firm employment size, industry classification and geography. Only the private sector was selected as it is the largest segment within the Utah economy and is the most dynamic and flexible in responding to the marketplace. Only Utah's metropolitan areas were surveyed, as STEM jobs are known to be concentrated in metropolitan areas, and Utah's metropolitan areas cover 90 percent of Utah's jobs.

The survey was designed by Workforce Services with guidance from the Center for Public Policy and Administration (CPPA) at the University of Utah. CPPA also managed the survey's data collection in partnership with Lighthouse Research & Development, Inc. The majority of the data collected came via telephone interviews, although an online portal was made available to employers for self-input. The survey interview period spanned from October 2014 to January 2015. The survey results were coded, arranged and analyzed by Workforce Service's economic division.

Primary Research Objectives:

- Collect data on occupations that are considered "difficult to fill" by employers in key industries (high-skill and high-education).
- Measure the dynamics of any perceived or actual skills shortages within Utah's labor market.

Question Themes:

- Establish a baseline count of the number of difficult-to-fill occupations.
- Determine the title and SOC code of the difficult-to-fill occupations.
- Understand why hiring managers are having trouble filling these positions.
 - What do they perceive as the issue (lack of skills, education, challenging working conditions, low pay, etc.).
- Determine what skills and certification are most important for difficult-to-fill occupations, and how difficult it has been to find those qualifications.
- Establish the qualifications expected from candidates for each occupation.

Key Findings

Response and Participation Rates

Over 44 percent of the 1,197 establishments that constituted the sample fully participated in the survey, and another 5 percent provided partial responses before dropping out. About half as many (22 percent) refused to participate in the study. The remainder were not quantified for other reasons.

Nearly two-thirds of the establishments that fully participated reported they had some degree of difficulty filling some positions at their location in the last 12 months. Despite these two-thirds with some hiring challenges, their responses also suggest the vast majority of their various job openings were being filled without difficulty. In fact, difficult-to-fill openings represented less than one-quarter of total job openings in our sample.

Reasons Difficult-to-Fill Jobs Present Hiring Challenges

The majority of respondents cited that not enough applicants was their biggest hiring challenge. Respondents most often identified a “lack of applicants,” which implies a limited supply of labor. The next most often cited reasons were “lack of job-specific knowledge, skills and abilities” and “lack of work experience,” with both suggesting that the available workforce was unqualified for the job.

Most Important Knowledge, Skills and Abilities to be Successful in Difficult-to-Fill Jobs

Respondents could specify the three most important job-specific knowledge, skills, and abilities (KSAs) for success in a given difficult-to-fill occupation. In total, respondents cited soft skills 33 percent more often than hard skills. Even though soft KSAs, like professionalism or honesty, made up the majority of the survey’s responses, a hard skill was the top mentioned, it being “computers and electronics or engineering and technology.”

The requisite KSAs varied dramatically from occupation to occupation. Specifically, those occupations categorized as STEM required much higher levels of hard skills. STEM occupations mentioned hard KSAs twice as often as soft KSAs, and over one-third of all KSAs for STEM jobs were related to computers and electronics or engineering and technology.

Key Findings

The Role of Wages

“Low wages” ranked seventh among the ten reasons employers felt difficult-to-fill jobs presented a hiring challenge. In total, only 22 percent of respondents felt that low offered wages played a role in their inability to fill job openings. Workforce Services’ analysis of all employer’s offered wages for difficult-to-fill jobs revealed that 68 percent of establishments tendered wage offerings below the median for each specific occupation. Despite the employer’s general perception that low wages are not an overriding issue, relatively low offered wages compared to occupational norms may be playing a noteworthy role in making job openings difficult to fill. With the majority of respondents offering low wages relative to the occupational median, we cannot singularly state that the hiring issues businesses face are exclusively skills, education or experience related.

Expanding the Conversation

Many difficult-to-fill job conversations often revolve around the lack of KSAs, education or experience of the workforce. The Difficult-to-Fill Jobs Study cites hiring managers’ concerns and chronicles qualifications they desire from applicants. The study also had an evaluative independence in that it can appraise offered wages against market forces. That evaluation infers that wages should be a part of the conversation. Just as educators, policy makers and workers need to understand the KSAs, education and experience required to build a competitive workforce, employers must appreciate the impact wage offerings have on attracting talent from that competitive marketplace.

The Value of Adding Wages in the Discussion

Without considering offered wages, all difficult-to-fill occupations can easily be labeled as a “skills gap,” even when that may not be the underlying reason. The value of the wage conversation is that it can moderate this casting-of-a-broad-net upon the skills gap dialogue. When market-aggressive wage offerings are found and labor difficulty still remains, this helps to better isolate potential skill, certification or training shortages.

This survey desired to categorically find such isolations, yet the measured wage advertisements did not produce such clarity. Low wage offerings were too prevalent throughout the findings to confidently isolate any specific skill issues. Only Production occupations came close and offered a compelling case for further evaluation.

Production occupations can include assemblers and fabricators, metal workers, machinists,, welders, grinders, woodworkers, plant operators, chemical and petroleum equipment operators, among others.

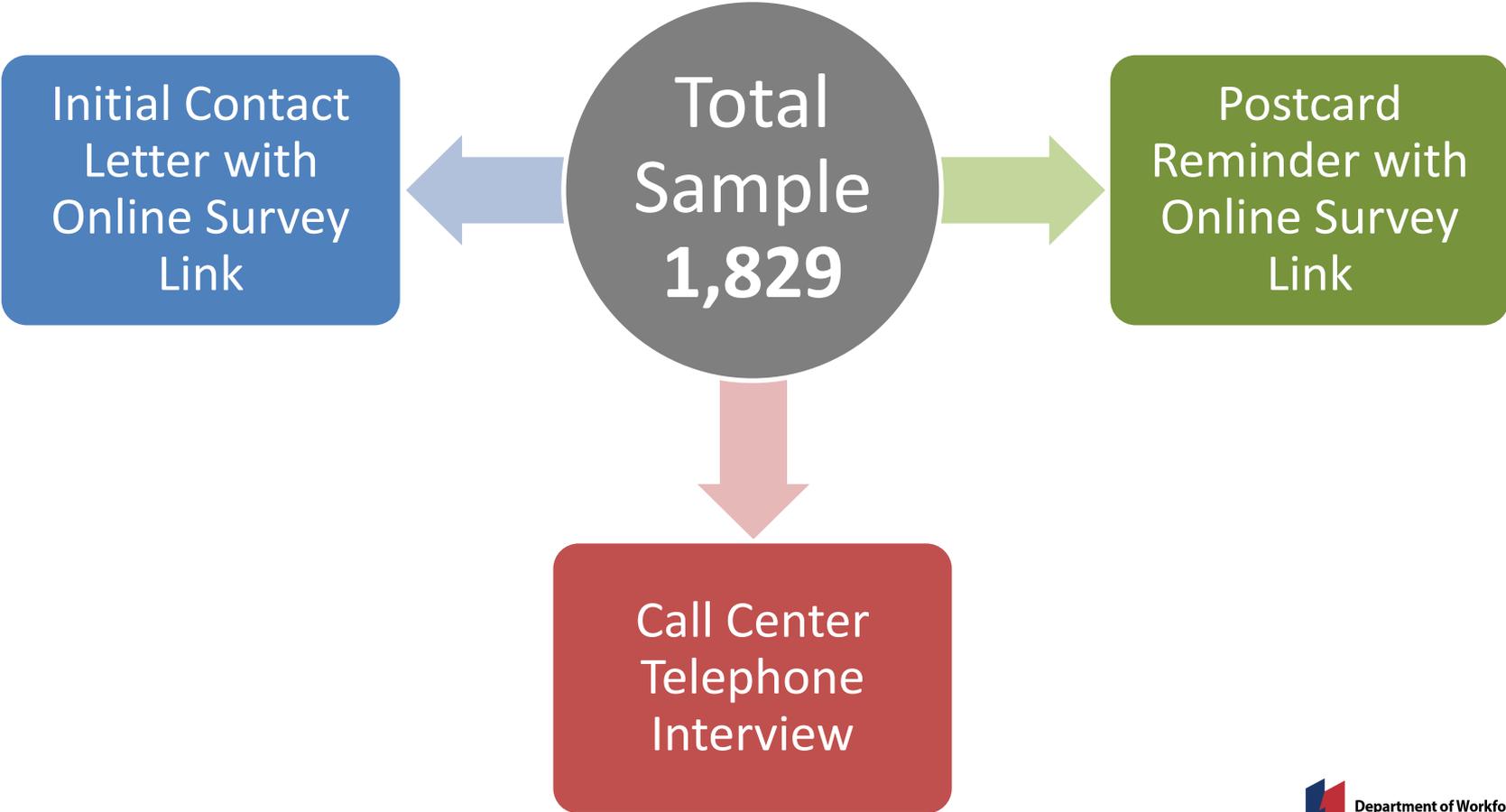


Department of Workforce Services



Data Collection Channels

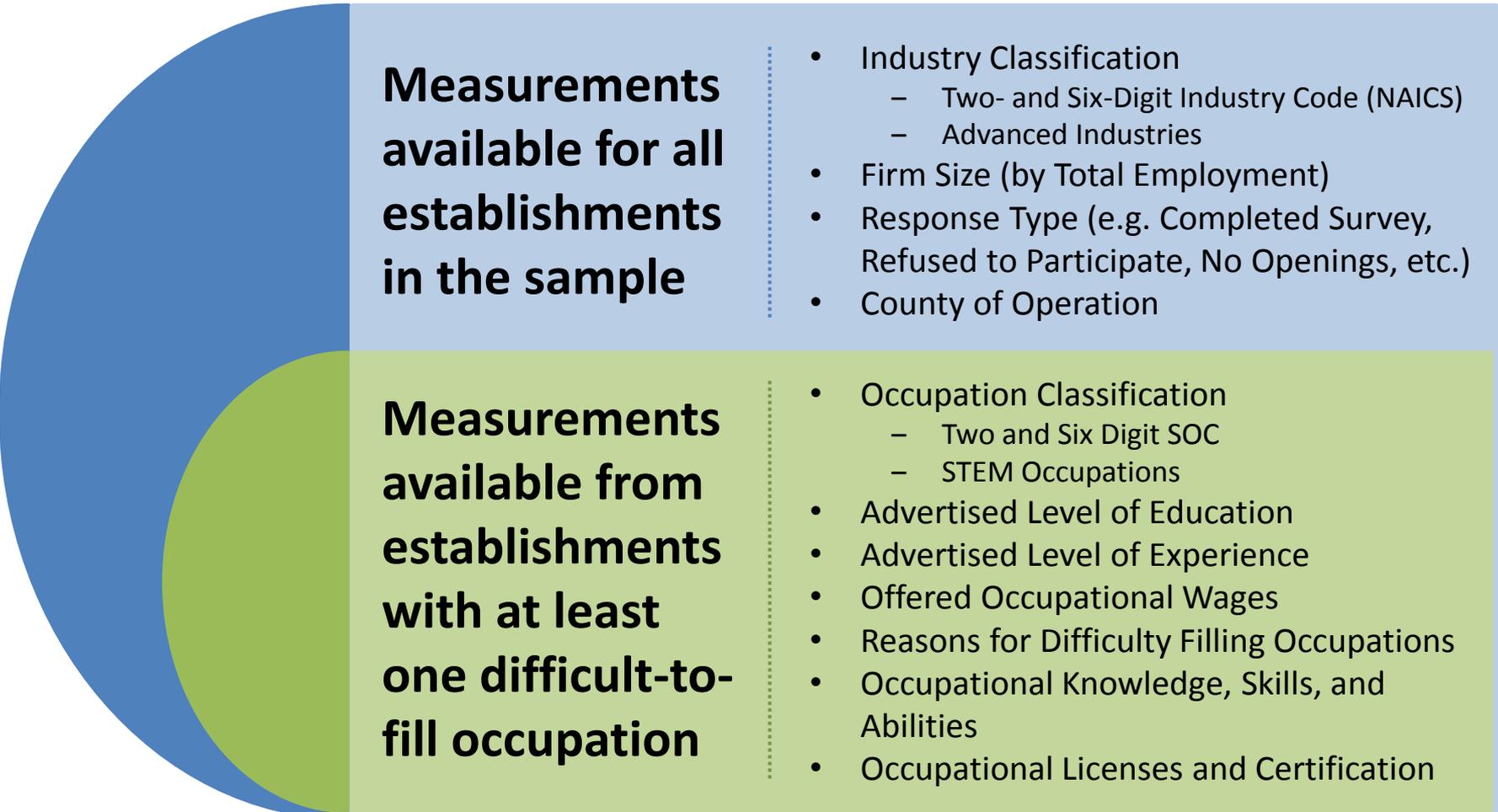
Survey data was collected through two separate channels: an online survey and telephone interviews. Establishments were first solicited via an initial contact letter that explained the purpose of the study and the benefits their participation would provide to the community. Representatives from Lighthouse Research & Development, Inc. contacted 1,126 establishments and administered 519 surveys over a four-month period. In total, 1,197 establishments were contacted via call center or entered the survey online. For a more detailed discussion of the methodology see Appendix A.



Data Segments Available for Analysis

The survey's results can be segmented by either industries or occupations.

1. The industry sample was drawn from Utah's Quarterly Census of Employment and Wages (QCEW), a program of the U.S. Bureau of Labor Statistics. That program's detail allows for establishment-level employment to be surveyed, and businesses categorized regardless of their depth of participation.
2. Occupational information came from the respondents. Segmenting occupational results is determined by the level to which each establishment participated in the study. Therefore, the most valuable response segments came from those establishments with at least one difficult-to-fill occupation.



Measurements available for all establishments in the sample

- Industry Classification
 - Two- and Six-Digit Industry Code (NAICS)
 - Advanced Industries
- Firm Size (by Total Employment)
- Response Type (e.g. Completed Survey, Refused to Participate, No Openings, etc.)
- County of Operation

Measurements available from establishments with at least one difficult-to-fill occupation

- Occupation Classification
 - Two and Six Digit SOC
 - STEM Occupations
- Advertised Level of Education
- Advertised Level of Experience
- Offered Occupational Wages
- Reasons for Difficulty Filling Occupations
- Occupational Knowledge, Skills, and Abilities
- Occupational Licenses and Certification

Definition of Commonly Used Terms

Openings or Job Openings:

- A position that is vacant, unfilled or unoccupied. In the context of the Difficult-to-Fill Jobs survey, job openings represent the total number of jobs available. It is possible that a single occupation/job title can have multiple openings at any given time.

Occupations or Unique Occupations:

- In the context of this survey, unique occupations mean specific/distinct job titles of a vacant position. For example, Software Engineer I and Software Engineer II, though similar, are distinctly different job titles and therefore counted separately.

Difficult-to-Fill or Difficult-to-Fill Jobs:

- Refers to an occupation that the person or persons responsible for hiring would consider challenging to fill. Respondents self-identified the occupations they considered “difficult to fill.” The judgment for classifying an occupation “difficult to fill” included (but was not limited to) expectations, past experiences, industry standards and lengthy job openings.

Major Occupational Group:

- A grouping of 23 major occupational clusters defined within the Standard Occupational Classification (SOC) system. Detailed occupations in the SOC with similar job duties, and in some cases skills, education, and/or training, are grouped together.

Industry Sector:

- A collection of 20 major industry groups defined by the North American Industry Classification System (NAICS). Establishments are classified into an industry based on the activity in which they are primarily engaged. Establishments using similar raw material inputs, similar capital equipment and similar labor are classified in the same industry.

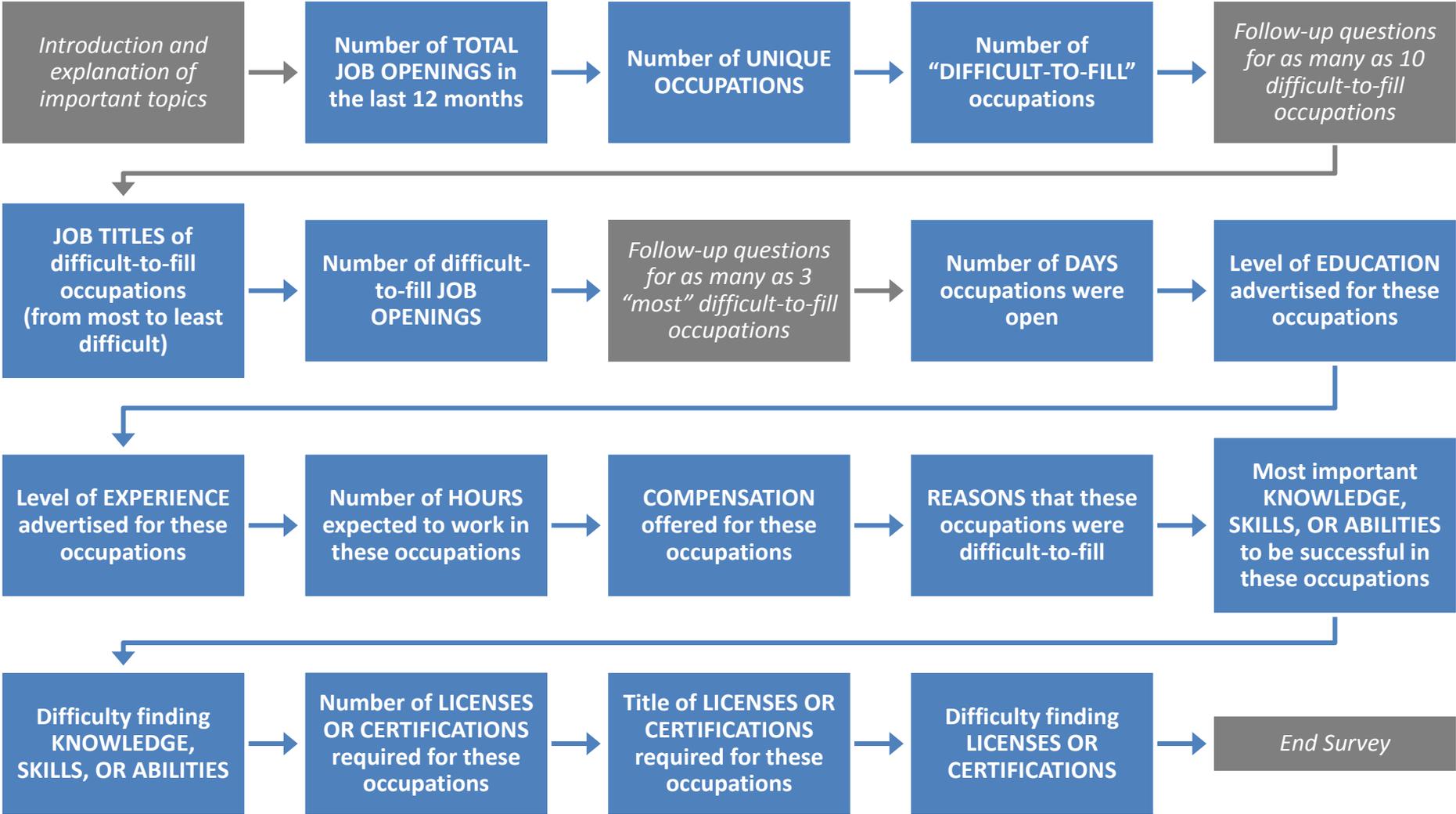
KSAs:

- Knowledge, skills and abilities specific to an occupation.
 - Soft KSAs are generally considered character traits and interpersonal skills that are not directly attributable to the tasks or activities of a specific occupation.
 - Hard KSAs are specific, teachable and measurable attributes that normally apply directly to the tasks or activities of a specific occupation.

STEM or STEM Jobs:

- Occupations that rely heavily on the knowledge of **Science**, **Technology**, **Engineering** or **Math** (STEM).

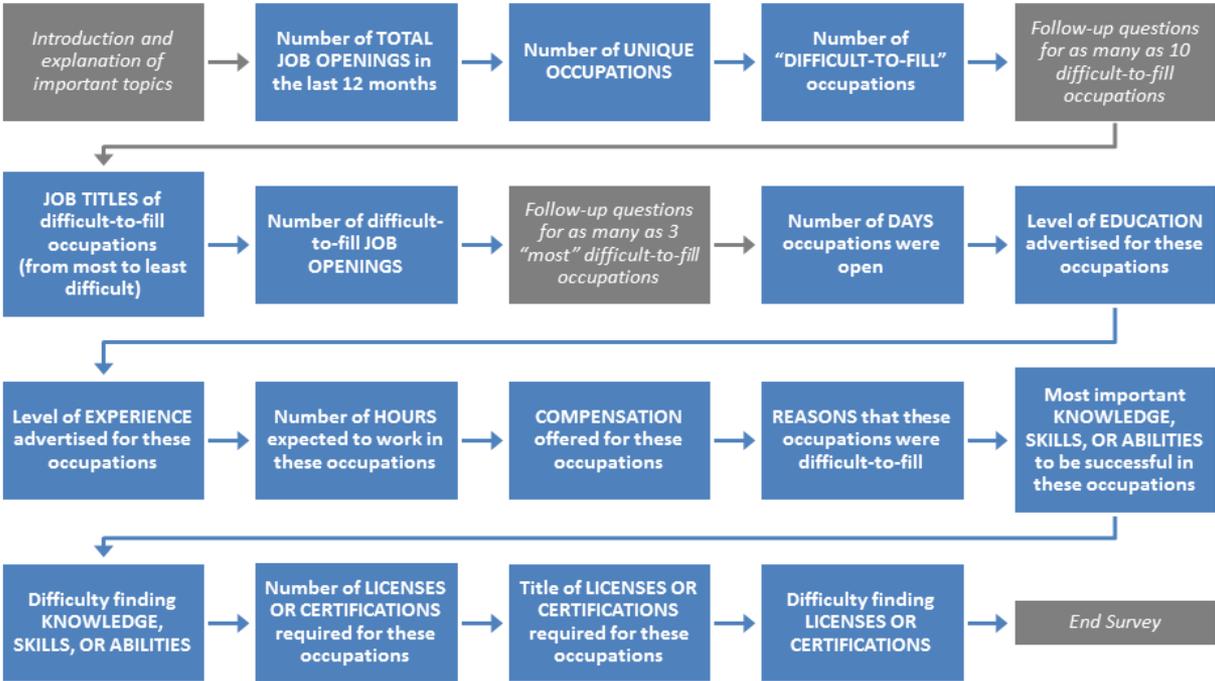
Survey Structure



Survey Answers

The structure of the slides going forward will be to isolate the questions below in chronological order, and then to summarize the answer and findings from each. Some questions will have more than one page of analysis and summarization.

Survey structure

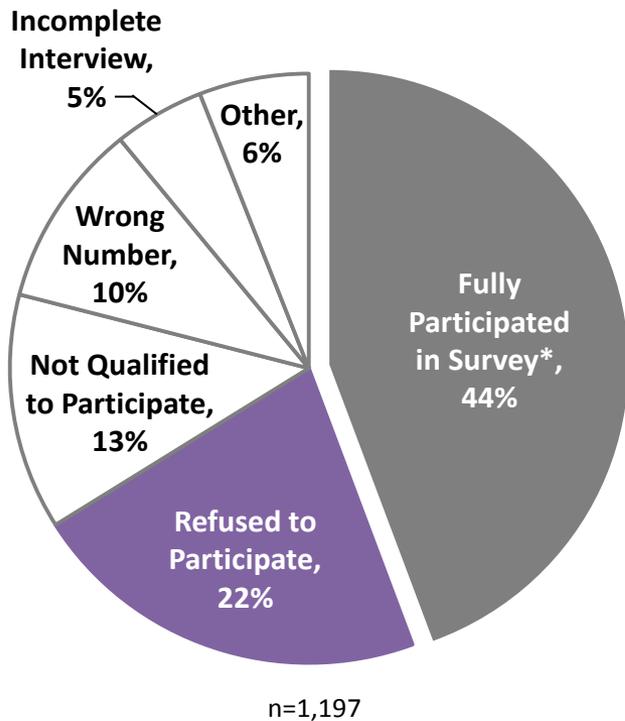


Survey Participation Rates

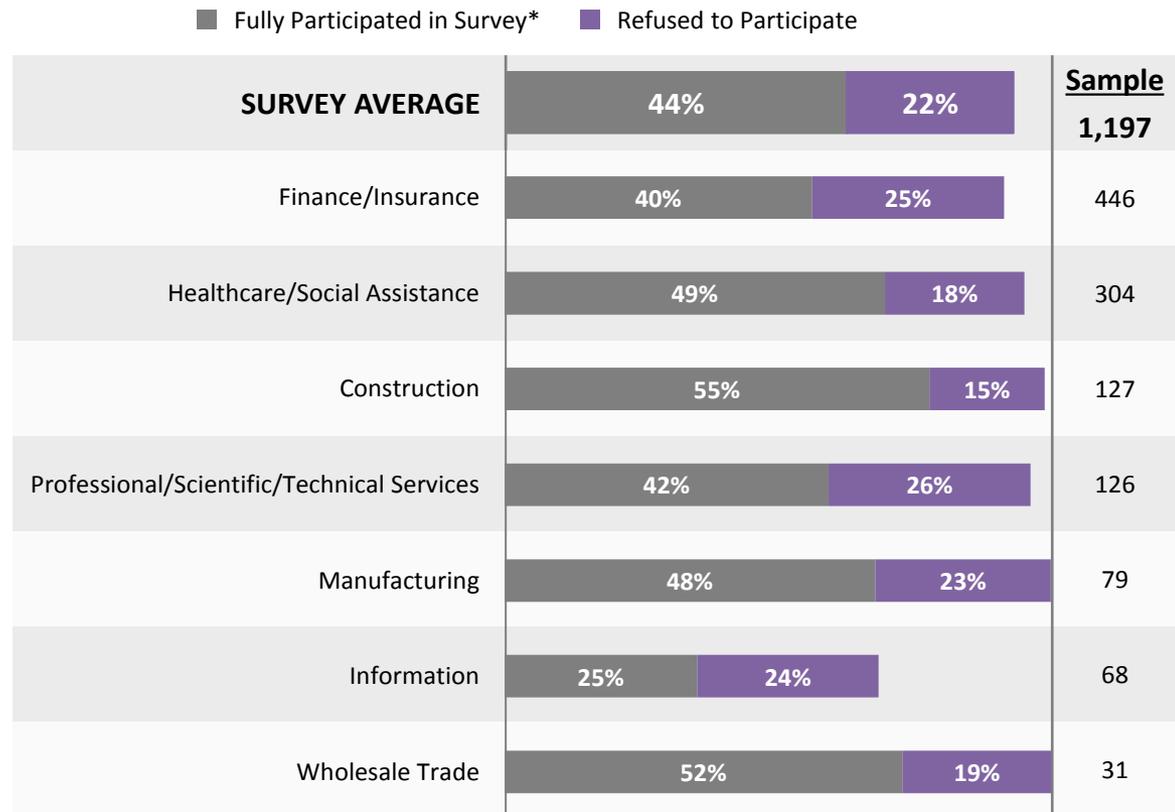
QUESTION: May I speak to the person responsible for hiring and/or human resources at your company?

RESULTS: Less than half of those establishments contacted fully participated in the survey. Those that did not fully participate cited several reasons for non-response. More than one in five establishments explicitly refused to participate, making it the largest non-response group. Refusal rates varied by industry sector. The professional, scientific and technical services industry refused to participate at the highest rate, while the construction industry refused at the lowest rate.

1,197 establishments were contacted via call center or entered the survey through the online portal



Participation and refusal rates by industry sector:



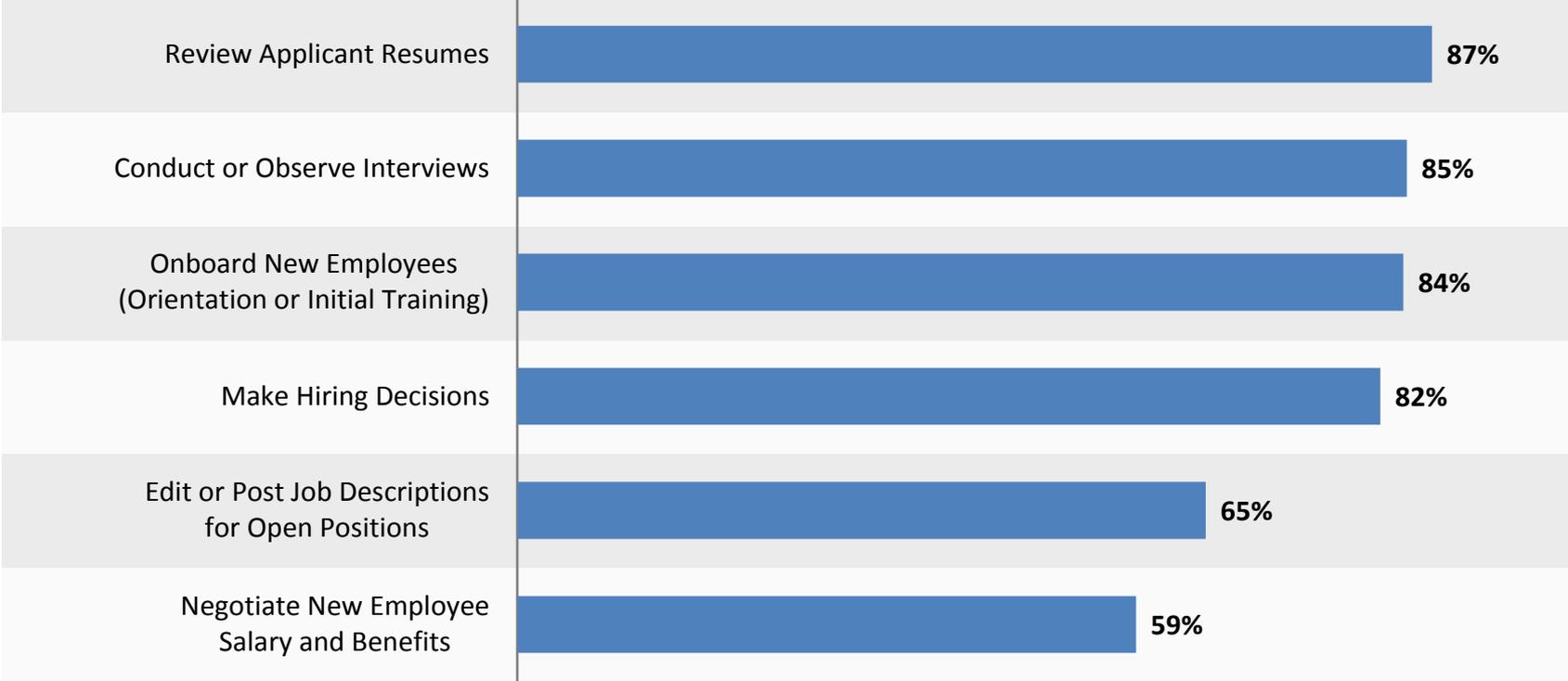
* At Least 1 Difficult-to-Fill Job, Zero Difficult-to-Fill Jobs, Zero Openings

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select ALL of the human resource functions you have performed as part of your job, even if you share these responsibilities with other employees or departments?

RESULTS: Respondents had to demonstrate that they were involved in their establishment’s hiring process. If respondents did not serve at least one human resource function as part of their job, they were asked to provide the contact information of the person responsible for hiring decisions. Respondents that qualified commonly identified more than one human resource function. On average, qualified respondents identified between four and five human resource functions as a part of their job. The substantial hiring expertise suggests that the data collected represents the hiring perceptions of the participating establishments.

Human resources functions performed by respondents:



NOTE: Accounts for respondents that has at least 1 difficult-to-fill job, zero difficult-to-fill jobs, zero openings (including those that provided incomplete interviews).

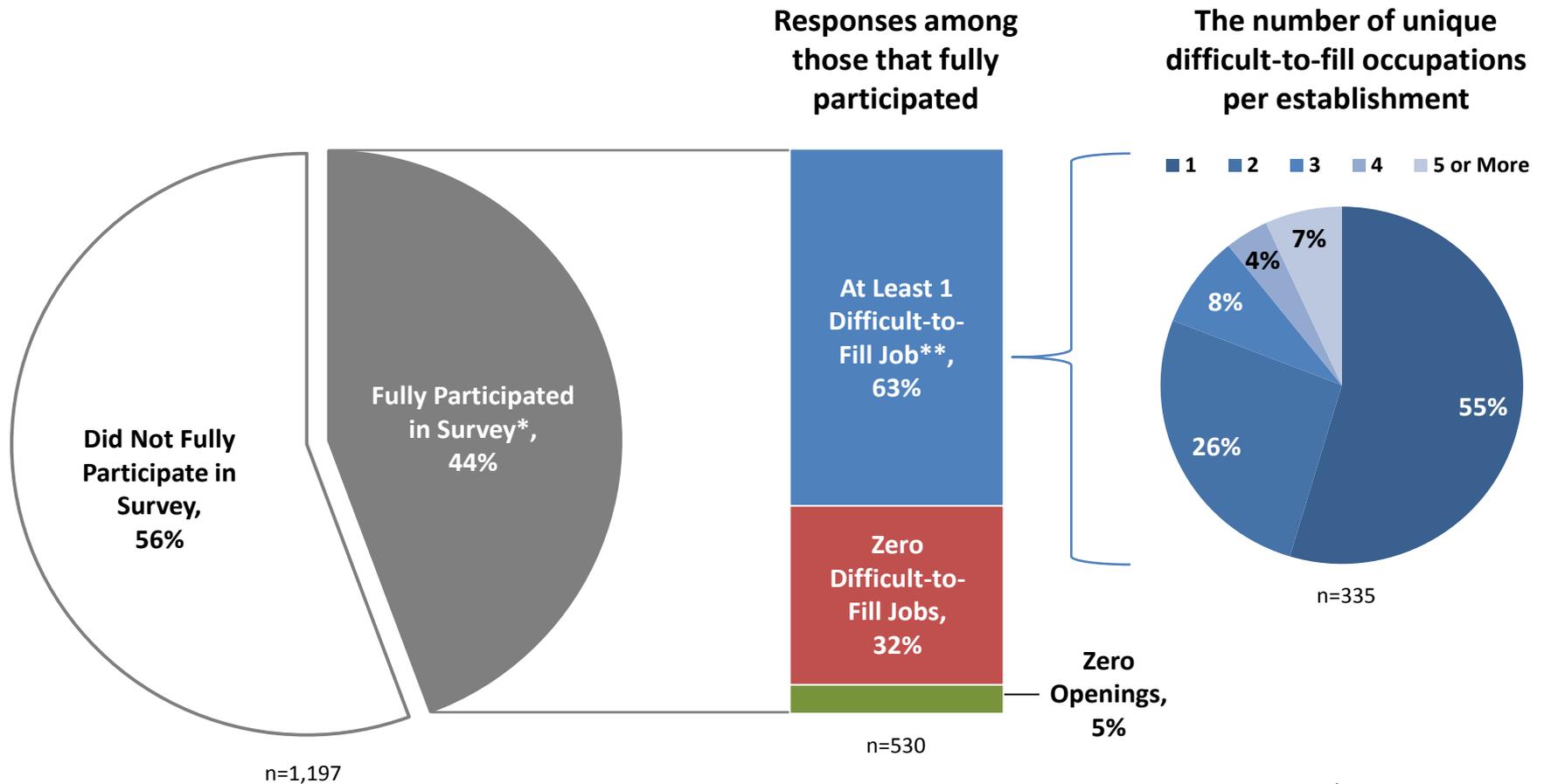
Response Types Among Those that Fully Participated

QUESTION: In the last 12 months, please estimate how many **total job openings** your establishment had. (Please include current job vacancies.)

QUESTION: Of these total job openings, please estimate how many **unique occupations** your establishment had job openings for.

QUESTION: Of these unique occupations, how many would you consider **difficult to fill**?

RESULTS: Surveyed respondents in total hired for 3,336 unique occupations resulting in 18,630 job openings. Of these, 1,009 occupations presented some hiring difficulties across 4,200 openings. Nearly two-thirds of the establishments that fully participated in the survey had at least one difficult-to-fill occupation in the last 12 months. Of those, almost 90 percent had three or fewer difficult-to-fill occupations, and the majority had difficulty filling only one specific job title.



* At Least 1 Difficult-to-Fill Job, Zero Difficult-to-Fill Jobs, Zero Openings

** Only accounts for respondents that completed the survey (excludes respondents that had "incomplete interviews")

Participation Rates and Difficult-to-Fill Job Rates by Industry Sector

QUESTION: Of these total job openings, please estimate how many **unique occupations** your establishment had job openings for.

QUESTION: Of these unique occupations, how many would you consider **difficult to fill**?

RESULTS: The level of difficulty filling jobs varied greatly among the different industry sectors. For example, 53 percent of the finance and insurance industry had at least one difficult-to-fill job opening, while 70 percent of the healthcare and social assistance industry made that claim. The share of difficult-to-fill occupations as a percent of the total number of occupational vacancies was approximately 30 percent. Meaning, that while a substantial proportion of respondents had difficulty finding candidates to fill some occupations, the majority of their open occupations they did not consider difficult to fill.

The number of establishments contacted by industry sector:

Percent that fully participated in survey*

Responses among those that fully participated:

- At Least 1 Difficult-to-Fill Job**
- Zero Difficult-to-Fill Jobs
- Zero Openings

Percent of total unique occupations that were considered difficult-to-fill

	1,197	44%	63%	32%	5%	30%	<u>Sample</u>
SURVEY TOTAL/AVERAGE							530
Finance/Insurance	446	40%	53%	43%	4%	31%	177
Healthcare/Social Assistance	304	49%	70%	26%	4%	33%	150
Construction	127	55%	72%	24%	4%	38%	70
Professional/Scientific/Technical Services	126	42%	68%	23%	9%	27%	53
Manufacturing	79	48%	74%	24%		18%	38
Information	68	25%	65%	29%	6%	27%	17
Wholesale Trade	31	52%	38%	44%	19%	37%	16
Transportation/Communication/Utilities	11	36%	50%	50%		10%	4

* At Least 1 Difficult-to-Fill Job, Zero Difficult-to-Fill Jobs, Zero Openings

** Only accounts for respondents that completed the survey (excludes respondents that had "incomplete interviews")

Job Openings that are Composed of Difficult-to-Fill Occupations

QUESTION: In the last 12 months, please estimate how many **total job openings** your establishment had. (Please include current job vacancies.)

QUESTION: For each of your difficult-to-fill occupations, estimate approximately how many job openings your establishment had in the last 12 months.

RESULTS: Examining job openings helps to put the size of the difficult-to-fill jobs problem into context. While nearly two-thirds of the establishments that fully participated in the survey had at least one difficult-to-fill occupation in the last year, the vast majority of their total job openings were not difficult-to-fill. Less than one-quarter of all job openings were composed of difficult-to-fill occupations. Establishments had an average of seven job openings that proved challenging to fill in the last 12 months.

Distribution of job openings that are considered “difficult to fill” and NOT “difficult to fill” by industry sector:

■ **NOT** Difficult-to-Fill Occupations ■ Difficult-to-Fill Occupations

		Average Number of Difficult-to-Fill Job Openings per Establishment in the last 12 Months	
SURVEY AVERAGE	<div style="display: flex; justify-content: space-between; align-items: center;"> 77% 23% </div>	7	<u>Sample</u> 18,630
Healthcare/Social Assistance	<div style="display: flex; justify-content: space-between; align-items: center;"> 64% 36% </div>	12	5,272
Professional/Scientific/Technical Services	<div style="display: flex; justify-content: space-between; align-items: center;"> 86% 14% </div>	11	4,512
Finance/Insurance	<div style="display: flex; justify-content: space-between; align-items: center;"> 89% 11% </div>	3	4,191
Manufacturing	<div style="display: flex; justify-content: space-between; align-items: center;"> 73% 27% </div>	9	1,411
Construction	<div style="display: flex; justify-content: space-between; align-items: center;"> 59% 41% </div>	8	1,396
Information	<div style="display: flex; justify-content: space-between; align-items: center;"> 77% 23% </div>	6	455
Wholesale Trade	<div style="display: flex; justify-content: space-between; align-items: center;"> 64% 36% </div>	1	56

STEM Occupation Analysis

One of the primary research objectives of the Difficult-to-Fill Jobs Study was to explore the employment challenges for highly-skilled occupations, the impetus being that occupations with rigorous KSAs and educational requirements are more likely to experience labor shortages given the scarcity of workers with the appropriate qualifications. The selection of specific industries made it more likely that we were narrowing the resultant occupational pool to highly-skilled occupations. Once the data were collected, job titles were coded into standard occupational codes that could be sorted into STEM and non-STEM occupations. Segmenting the data into STEM and non-STEM occupations further assisted in identifying and analyzing highly-skilled difficult-to-fill occupations.

The STEM and non-STEM segments revealed striking insights into the hiring difficulties for highly-skilled occupations compared to lesser-skilled ones. Perhaps the most interesting finding was the relatively small proportion of STEM occupations as a percent of total difficult-to-fill jobs. Despite stratifying the survey sample by specific industries in an attempt to focus on highly-skilled jobs, the results showed that less than one-quarter of the difficult-to-fill occupations were STEM related even within industries that generally employ STEM-trained workers. The data suggest that the majority of difficult-to-fill jobs—even in the higher-level technical industries—are in lesser-skilled occupations.

Still, STEM occupations had their share of the reported difficult-to-fill occupations, and the comparison of the two groups should not be ignored for several reasons:

- the level of difficulty filling STEM jobs—in terms of the average number of days these positions went unfilled—was much higher than non-STEM;
- the basic qualifications required of STEM applicants—in terms of advertised levels of education and experience—far exceeded those of non-STEM applicants;
- the offered wages for STEM occupations were significantly higher than those in non-STEM; and
- respondents substantially identified that hard KSAs were most important for success in STEM jobs than non-STEM.

For more information about STEM occupations (e.g. designation methodology or a complete list of all occupations that qualify as STEM) see Appendix B and Appendix C.

Non-STEM and STEM Occupations with the Most Job Openings

QUESTION: For each of the following difficult-to-fill occupations, estimate how many job openings your establishment had in the last 12 months.

RESULTS: These lists quantify the openings as measured within this survey. They do not represent total openings in the entire Utah economy for these occupations. The rankings can give insight into which occupations are being asked for in larger quantities within the Utah economy.

Non-STEM

Top 15 Detailed Occupations	Total Job Openings
Personal Care Aides	309
Nursing Assistants	254
Heavy & Tractor-Trailer Truck Drivers	211
Tellers	190
Production, Planning, & Expediting Clerks	118
Social & Human Service Assistants	98
Maids & Housekeeping Cleaners	91
Stock Clerks & Order Fillers	90
Childcare Workers	79
Preschool Teachers, Except Special Education	76
Electricians	71
Medical Assistants	62
Customer Service Representatives	59
Food Servers, Non-restaurant	57
Construction Laborers	56

STEM

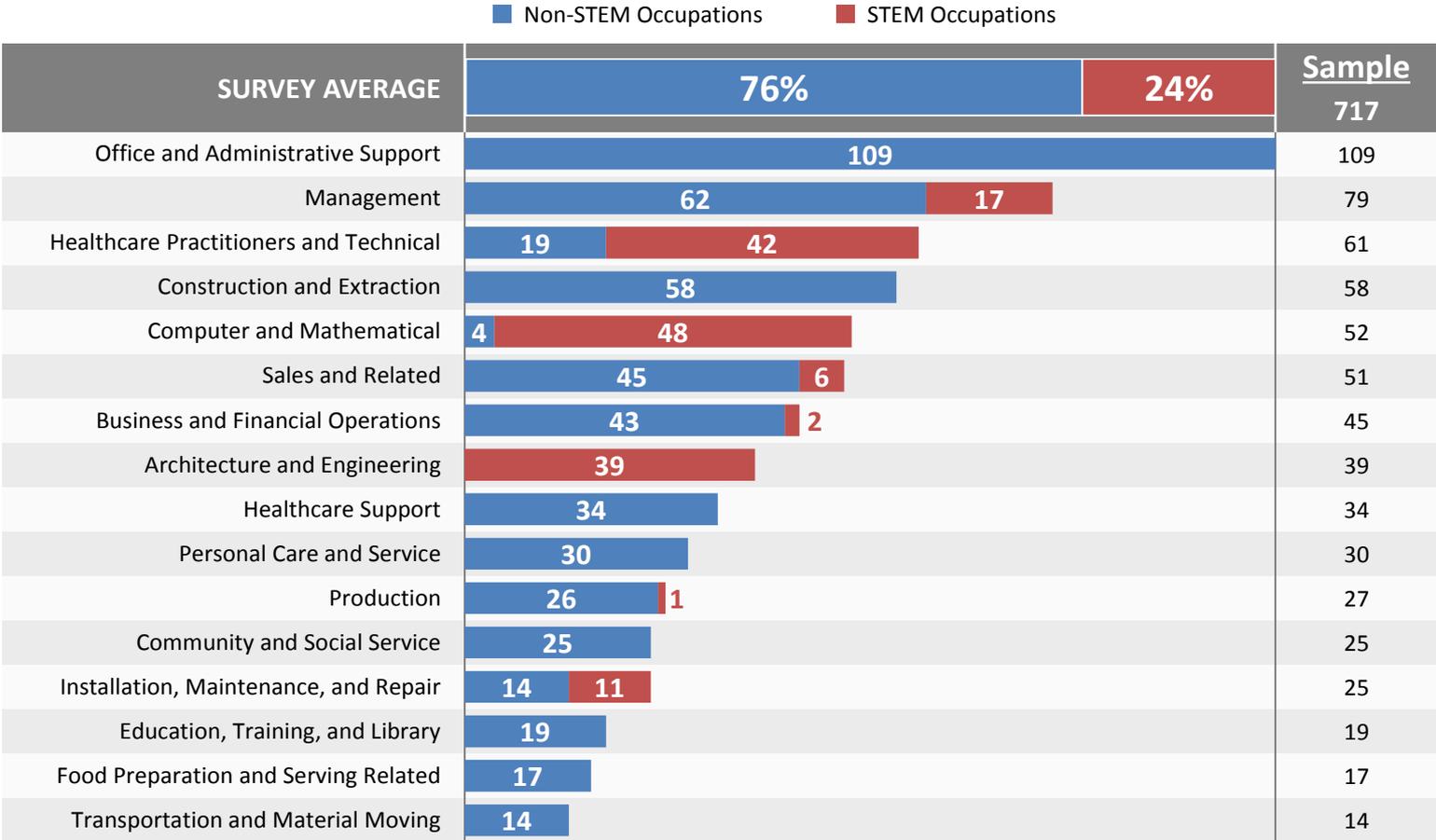
Top 15 Detailed Occupations	Total Job Openings
Registered Nurses	351
Software Developers, Systems Software	228
Computer User Support Specialists	109
Emergency Medical Technicians & Paramedics	50
Heating, Air Conditioning, & Refrigeration Mechanics & Installers	38
Sales Representatives, Wholesale & Manufacturing, Technical & Scientific Products	36
Aerospace Engineers	30
Software Developers, Applications	30
Web Developers	30
Psychiatrists	24
Industrial Production Managers	16
Computer Occupations, All Other	14
Managers, All Other	14
Architectural & Civil Drafters	13
Database Administrators	11

STEM Composition of Survey Results by Major Occupational Group

QUESTION: Of these [Insert Number] unique occupations, how many would you consider difficult to fill?

RESULTS: Occupation responses are slotted into a major occupational group. Even though the sample was designed to minimize the number of “lower skilled” and “lesser educated” occupations, respondents overwhelmingly identified these types of occupations, which we loosely call “Non-STEM,” as the majority of their difficult-to-fill occupations. The majority of STEM jobs reported are classified into three occupational groups: Computer and Mathematical; Healthcare Practitioners and Technical; and Architecture and Engineering. More than half of the 21 occupational groups had zero STEM-related difficult-to-fill jobs.

The number of difficult-to-fill occupations in each occupational category:

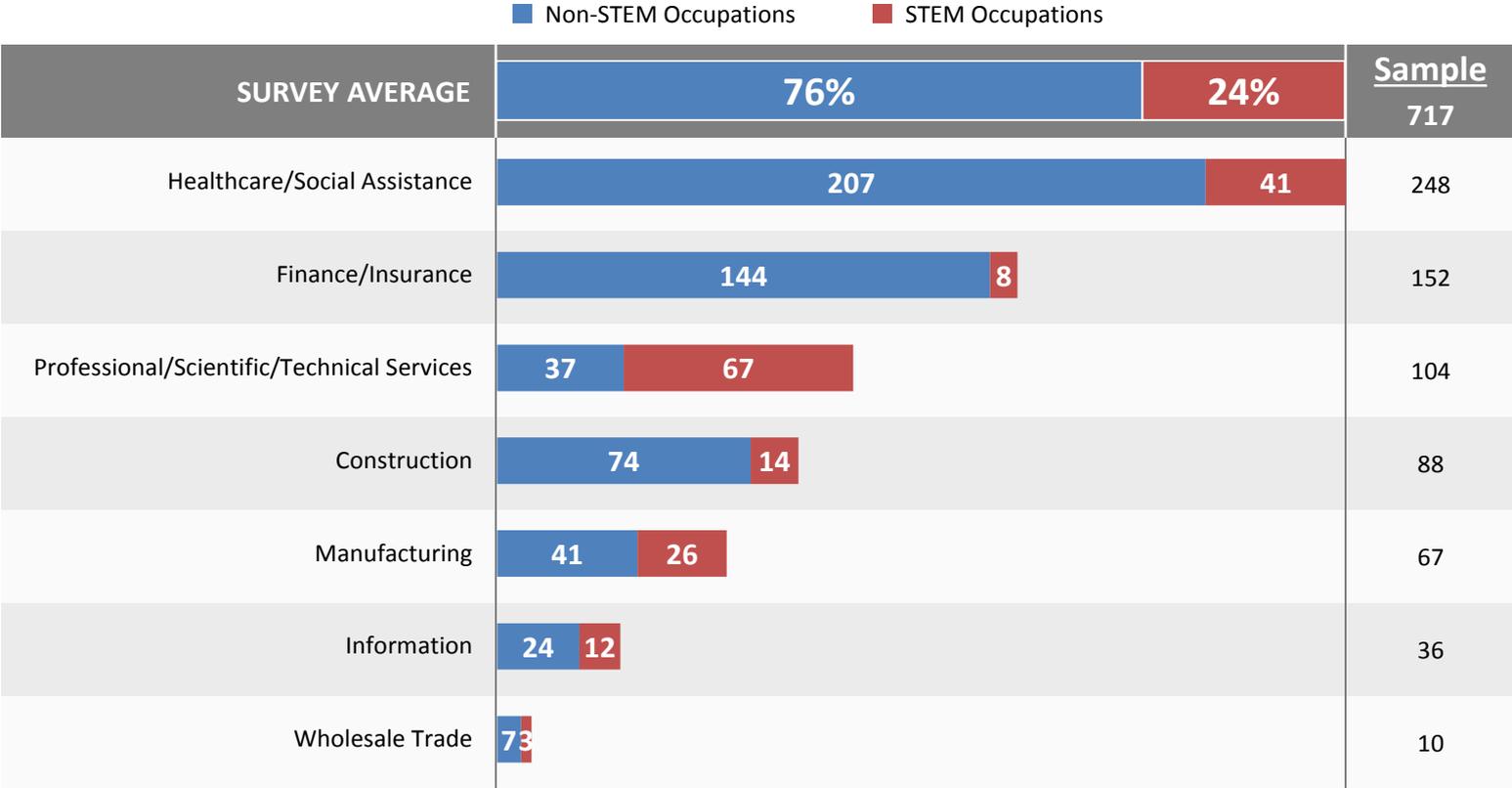


STEM Composition of Survey Results by Industry Sector

QUESTION: Of these [Insert Number] unique occupations, how many would you consider difficult to fill?

RESULTS: The majority of STEM occupations identified as difficult-to-fill were in three industry sectors: Professional, Scientific, and Technical Services; Healthcare and Social Assistance; and Manufacturing. However, the only industry in which STEM jobs represented the majority of hiring challenges was Professional, Scientific, and Technical Services (64 percent). Non-STEM occupations made up nearly 95 percent of the 152 jobs cited as difficult-to-fill in the Finance and Insurance industry.

The number of difficult-to-fill occupations in each industry sector:

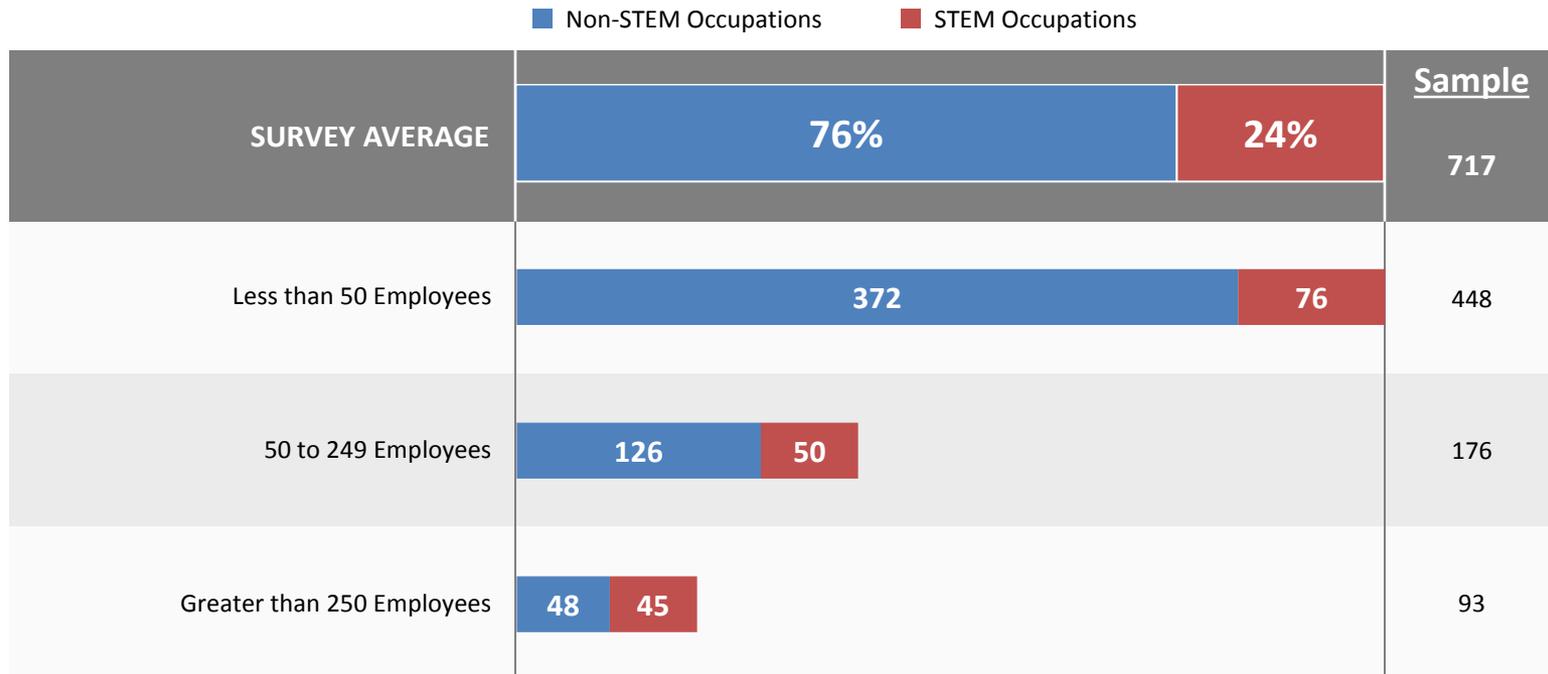


STEM Composition of Survey Results by Establishment Size

QUESTION: Of these [Insert Number] unique occupations, how many would you consider difficult to fill?

RESULTS: Respondents from larger establishments were more likely to identify STEM jobs as difficult-to-fill than smaller establishments. In some cases, the relationship between industry sector and establishment size played a role in the STEM distribution (e.g. the Professional, Scientific, and Technical Services industry had higher-than-average representation in the 50 to 249 employees group, while the Manufacturing industry had higher-than-average representation in the greater than 250 employees group). However, industry affiliation does not explain all of the correlation between the difficulty finding applicants to fill STEM occupation and the size of the establishment.

The number of difficult-to-fill occupations in each establishment size category:

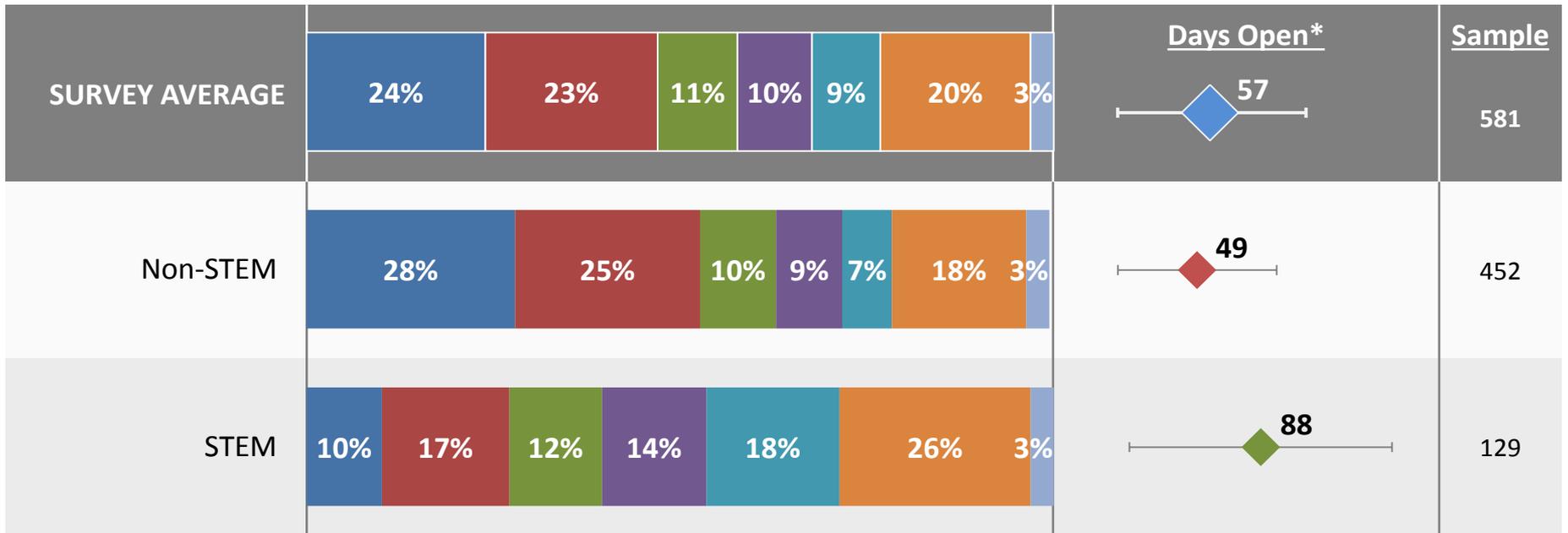


Number of Days Difficult-to-Fill Jobs Remained Open

QUESTION: On average, about **how many days** were your establishment's [Difficult-to-Fill] positions open before you found a candidate to fill the vacancy? (Please note if the position is still open or went unfilled).

RESULTS: Establishments filled the majority of difficult-to-fill jobs in under 90 days. On average, these occupations went 57 days before a candidate accepted the position. There was a significant difference in the number of days non-STEM and STEM occupations remained open. STEM occupations remained open nearly 40 days longer than non-STEM. Moreover, 53 percent of non-STEM jobs were filled in less than 60 days, compared to only 27 percent for STEM. Approximately one in five difficult-to-fill STEM jobs remained open for at least 120 days, compared to less than one in ten for non-STEM jobs.

The number of days difficult-to-fill occupations stayed open:



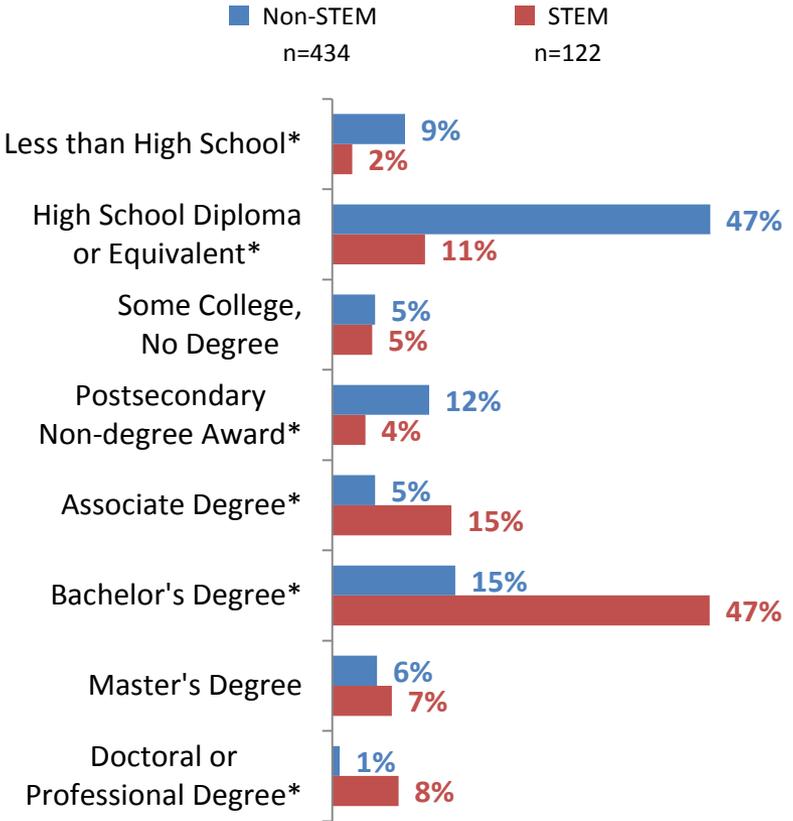
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.
 *Indicates that the difference in the non-STEM and STEM averages are statistically significant ($p < 0.01$).

Basic Qualifications for Difficult-to-Fill Job Candidates

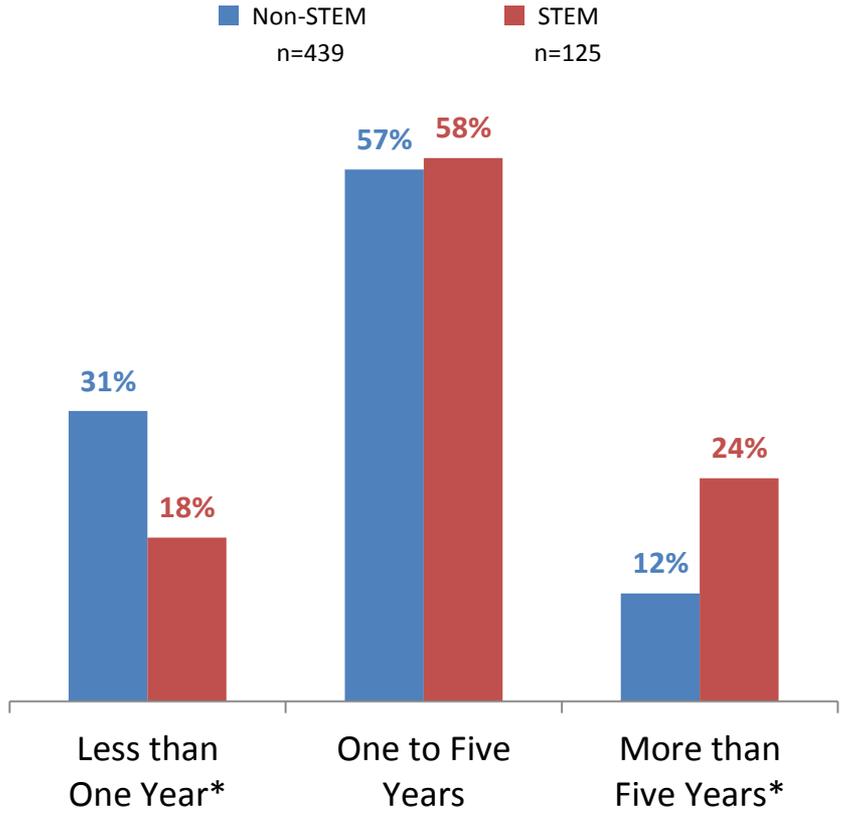
QUESTION: In general, what level of education/work experience does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The standard educational and experience expectations between non-STEM and STEM difficult-to-fill jobs diverged in a few significant ways. In terms of advertised level of educational attainment, the majority of non-STEM jobs required only a high school diploma or less. Conversely, over 60 percent of STEM jobs required a Bachelor's Degree or higher. From an experience perspective, the bulk of both non-STEM and STEM jobs advertised between one and five years; though non-STEM occupations were significantly more likely to seek candidates with less than one year of experience than STEM occupations, and vice versa for more than five years of experience.

Advertised Level of Education



Advertised Level of Experience



Note: Excludes "Refused to Answer" and "Don't Know" responses.

*Indicates that the difference in the non-STEM and STEM averages are statistically significant ($p < 0.01$).

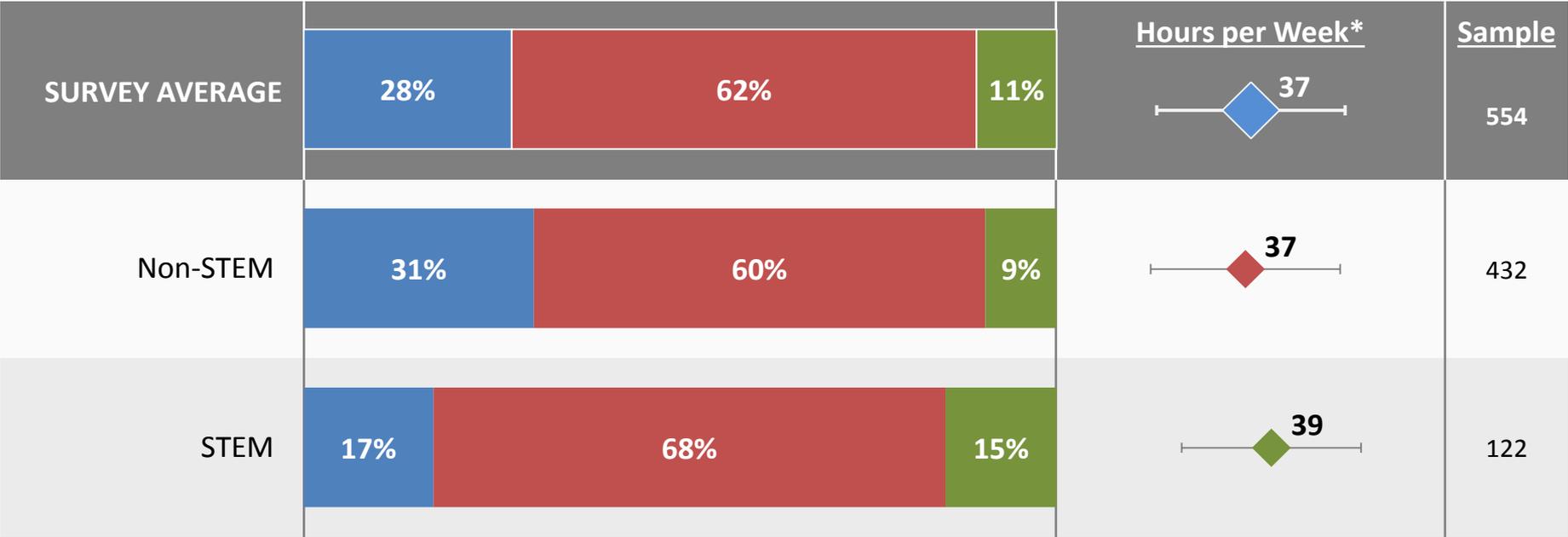
Weekly Hours Expected to Work in Difficult-to-Fill Jobs

QUESTION: For [Difficult-to-Fill Job Title], how many hours per week are candidates generally expected to work?

RESULTS: On average per week, difficult-to-fill STEM occupations are required to work two hours longer than non-STEM jobs. While the difference may seem small, it is statistically significant; and further inspection of the reported data reveal the substantial disparity. Over 30 percent of difficult-to-fill non-STEM occupations require less than 40 hours per week, compared to approximately 17 percent for STEM occupations. The inverse relationship is true for occupations that expect applicants to work more than 40 hours per week. In this case, almost 15 percent of difficult-to-fill STEM jobs expect more than 40 hours per week, compared to 9 percent for non-STEM jobs.

The number of hours difficult-to-fill job candidates are expected to work:

◆ Below Survey Average ◆ Above Survey Average
■ Less than 40 Hours ■ 40 Hours ■ More than 40 Hours One Std. Dev. Below/Above Mean



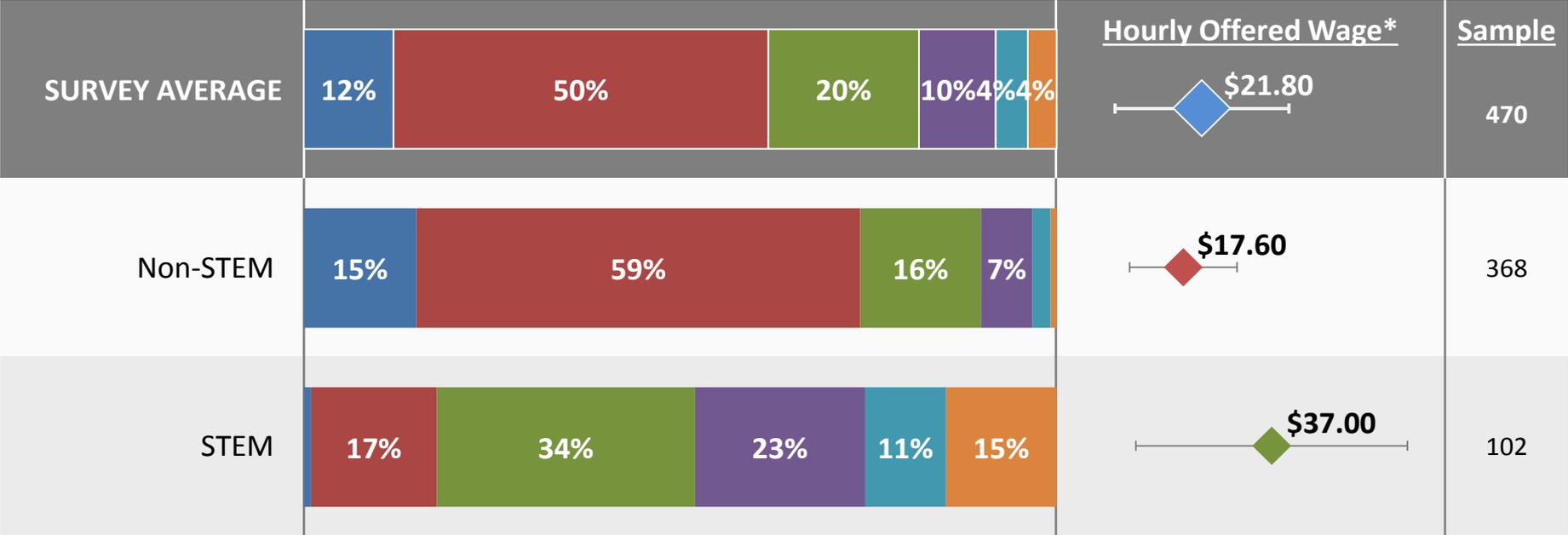
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.
 *Indicates that the difference in the non-STEM and STEM averages are statistically significant (p < 0.01).

Offered Compensation for Difficult-to-Fill Jobs

QUESTION: On average, what is the compensation offered, excluding benefits, for [Difficult-to-Fill Job Title]?

RESULTS: The average hourly wage offered to difficult-to-fill job candidates was nearly \$22. Offered wages were expected to be above the estimated state average of \$20.94, due to the higher-end industry population from which the sample was drawn. Over 60 percent of establishments surveyed offered less than \$20 an hour for difficult-to-fill jobs. Respondents identified a vast difference in offered wages between non-STEM and STEM occupations. Almost \$20 an hour separates the offered wage for non-STEM jobs from the STEM jobs. More than 80 percent of the STEM jobs get offered more than \$20 an hour, while only one-quarter of non-STEM jobs were offered that amount. The difference in pay reflects the higher standards of education and experience for STEM jobs as well as a greater desire for STEM candidates to have “hard skills,” which are more demanding to achieve than “soft skills.”

The hourly compensation offered to candidates of difficult-to-fill occupations:



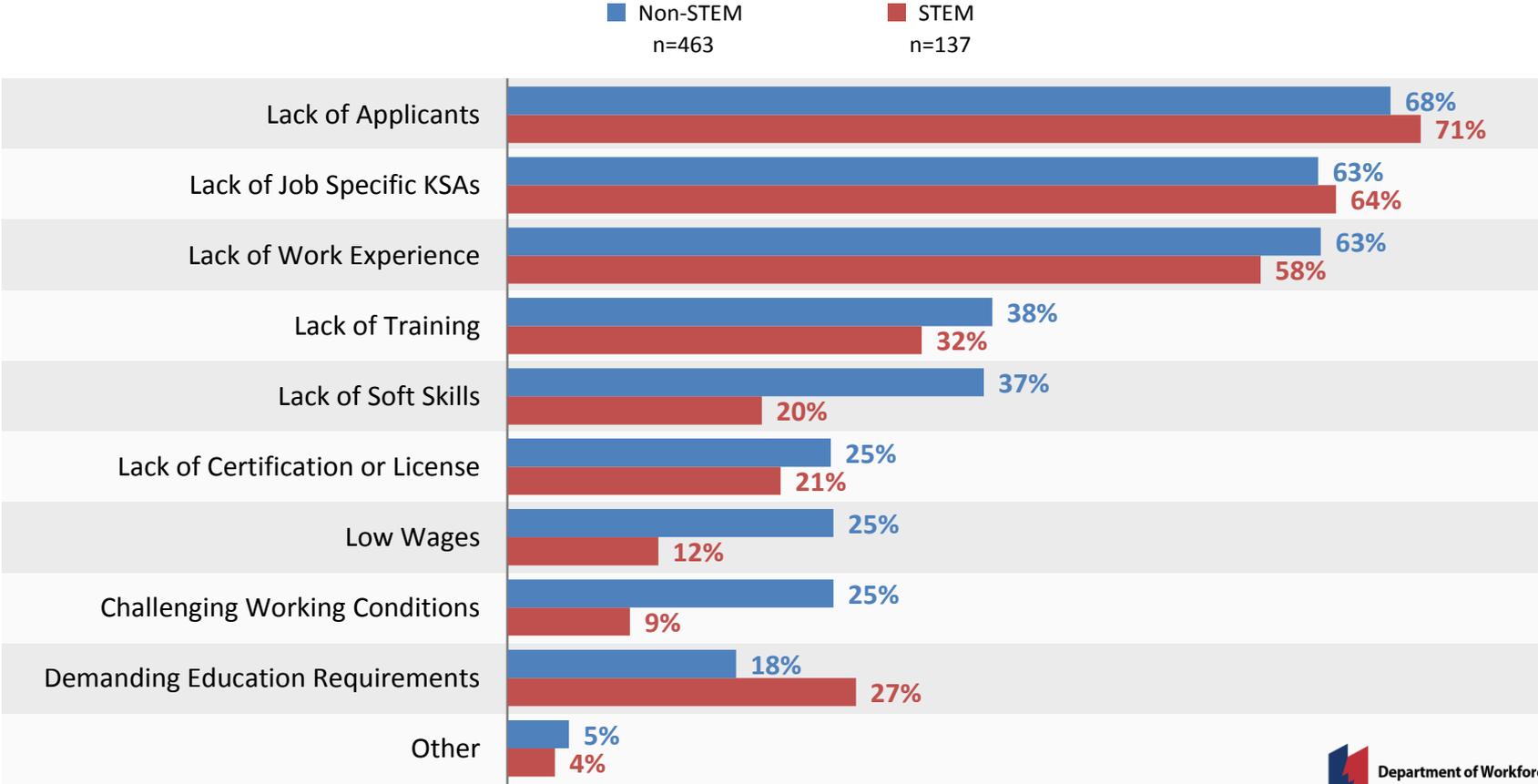
NOTE: Excludes “Refused to Answer”, “Don’t Know”, commission based wages, and “Other” responses.
 *Indicates that the difference in the non-STEM and STEM averages are statistically significant (p < 0.01).

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select ALL of the reasons you believe [Difficult-to-Fill Job Title] openings were difficult to fill.

RESULTS: Respondents were offered these ten hiring-challenge options, and were encouraged to select as many as were applicable. Though the respondent's perceptions regarding the difficult-to-fill reasons varied between non-STEM and STEM occupations, respondents cited that the principal challenges faced were labor supply deficiencies. Respondents cited that too few applicants applied for the job. Secondly, respondents indicated that the applicants that did apply lacked the necessary knowledge, skills and abilities (KSAs) or experience to qualify for the position. The larger differences in perception between non-STEM and STEM appear in the less prominent factors. Respondents of non-STEM jobs were more likely to cite that a lack of soft skills, low wages and challenging working conditions presented hiring challenges, while respondents of STEM jobs were more likely to indicate that demanding education requirements contributed to their hiring obstacle.

Reasons that difficult-to-fill occupations presented hiring challenges:

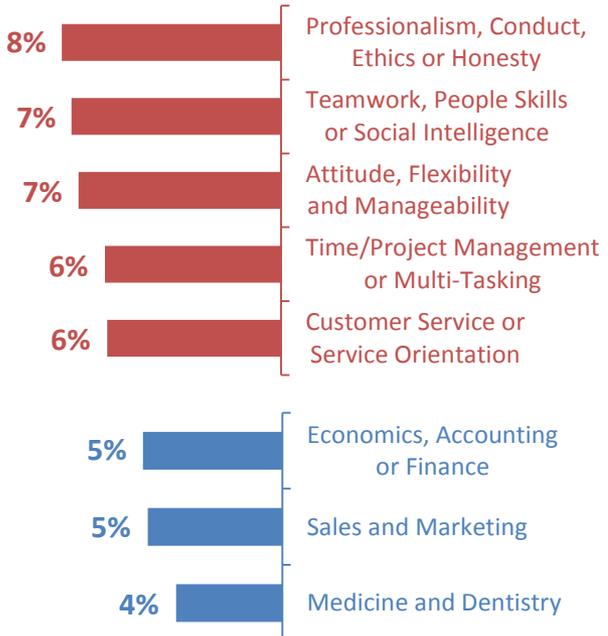


Most Important KSAs for Difficult-to-Fill Jobs

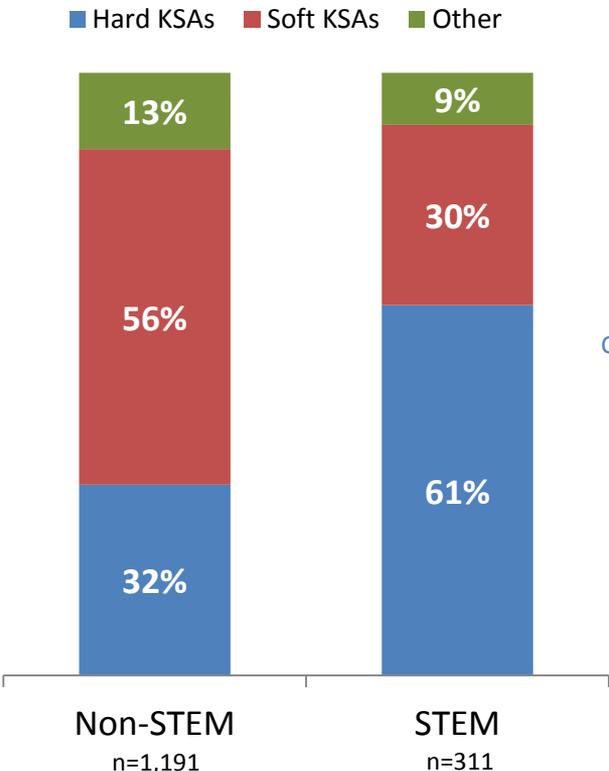
QUESTION: Please list the **three most important knowledge, skills or abilities (KSAs)** needed to be a successful [Difficult-to-Fill Job Title].

RESULTS: Respondents self-identified the most important KSAs qualitatively via open-ended responses. The results were then coded into standard KSA categories. Overall, respondents identified soft KSAs as “most important” 50 percent of the time, compared to 38 percent for hard KSAs.* However, the proportions changed substantially between non-STEM and STEM difficult-to-fill occupations. For non-STEM jobs, respondents desired soft KSAs like professionalism, conduct, ethics and honesty. In STEM jobs, hard KSAs (particularly those in computers and electronics or engineering and technology) meant the most to respondents. Despite the slight majority of all respondents identifying soft KSAs as “most important for success,” the most often-cited specific skills were in computers and electronics or engineering and technology related.

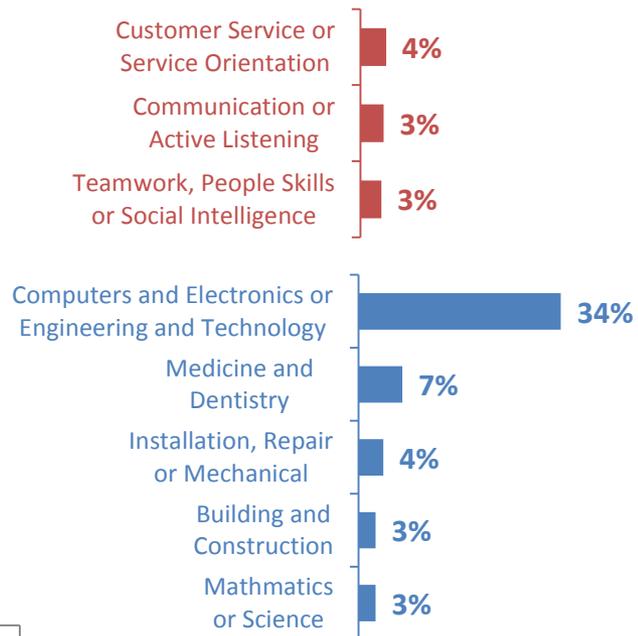
Top Knowledge, Skills and Abilities (KSAs) Identified for Non-STEM Occupations



The Difference between Non-STEM and STEM Occupations



Top Knowledge, Skills and Abilities (KSAs) Identified for STEM Occupations



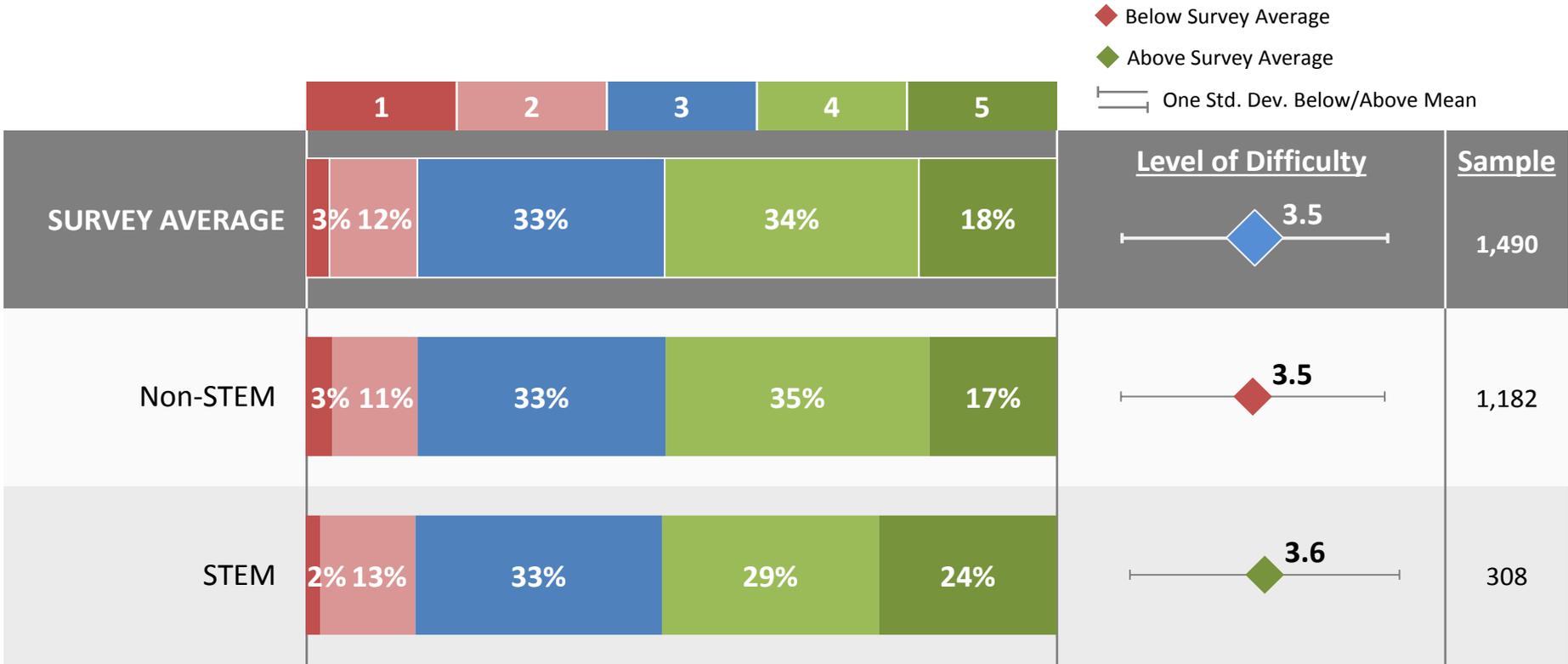
*NOTE: Excludes "Refused to Answer" and "Don't Know" responses. Additionally, the data collection and aggregation process for KSAs made statistical testing unreliable. Cannot report statistically significance differences between groups. * Hard and soft KSA percentages do not add to 100 percent. Some respondents put non-KSA answers in, such as work experience or education.*

Difficulty Finding Candidates with the Necessary KSAs

QUESTION: Identify how difficult it is for your establishment to find [Difficult-to-Fill Job Title] applicants with [Knowledge, Skill or Ability] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: Greater than 50 percent of respondents indicated that it is “difficult” (a four or five on a five-point scale) to find applicants with the most important KSAs needed to be successful in a given difficult-to-fill occupation. Respondents revealed that it is slightly less difficult for their establishment to find the KSAs necessary for non-STEM occupations. Nearly one in four KSAs for difficult-to-fill STEM jobs scored a five (very difficult to find), compared to about one in six KSAs for non-STEM jobs.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success:



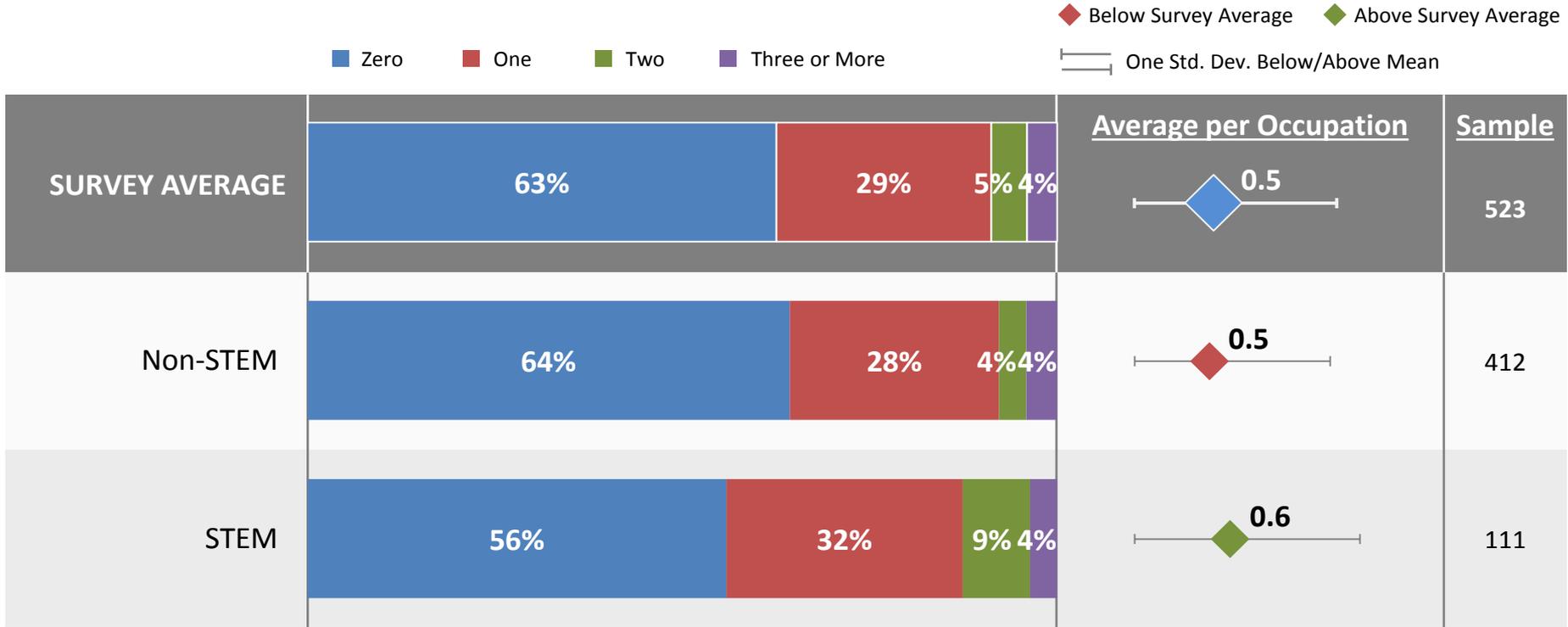
NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, the data collection and aggregation process for KSAs made statistical testing unreliable. Cannot report statistically significance differences between groups.

Number of Licenses and Certifications for Difficult-to-Fill Jobs

QUESTION: In general, how many vocational or professional licenses or certifications does your establishment advertise as necessary for [Difficult-to-Fill Job Title] applicants?

RESULTS: Over 60 percent of the difficult-to-fill occupations surveyed did not require any professional licenses or certifications to qualify for the job. When a license or certification was necessary, most establishments only advertised a single credential. Nonetheless, respondents indicated that difficult-to-fill STEM occupations were much more likely to require one or two licenses or certificates than non-STEM occupations.

Number of licenses and certifications advertised for difficult-to-fill jobs:



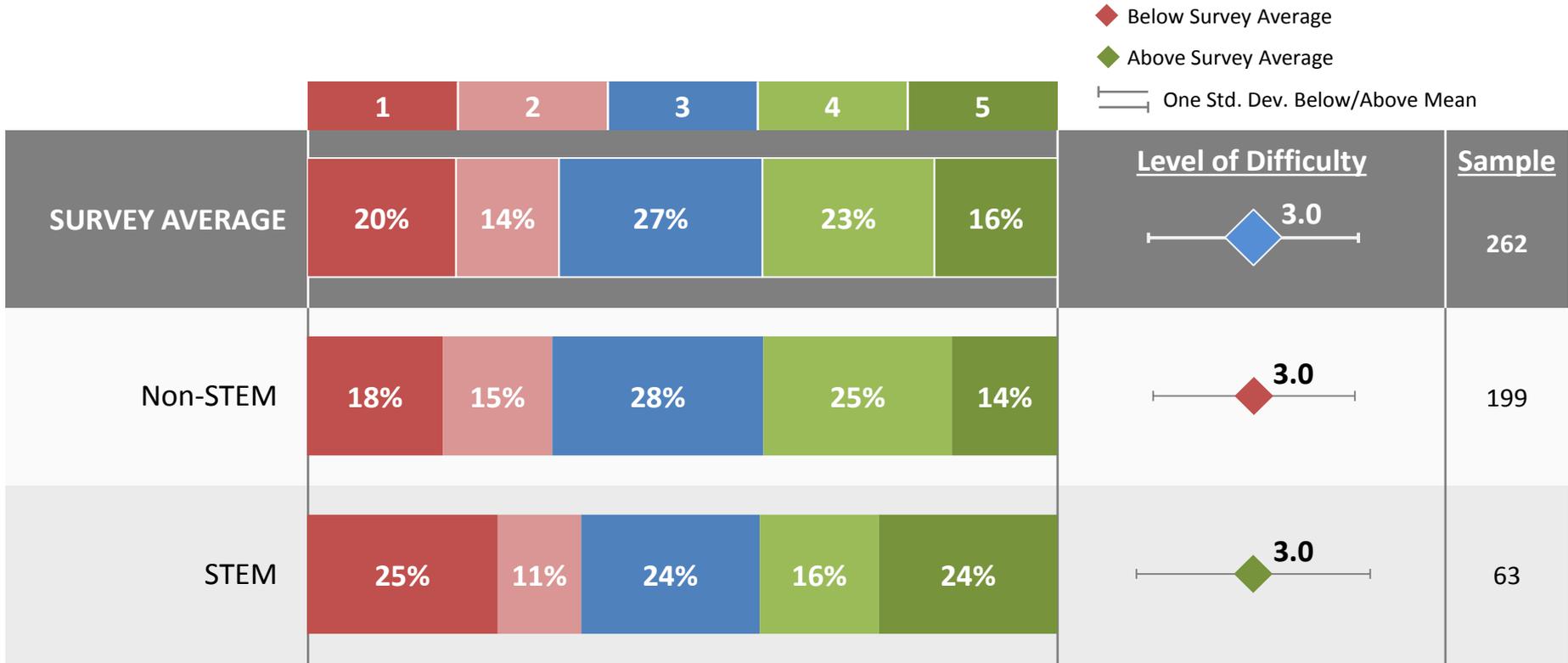
NOTE: Excludes "Refused to Answer", "Don't Know" and "Other" responses.

Difficulty Finding Candidates with Required Licenses and Certification

QUESTION: Identify how difficult it is to find [Difficult-to-Fill Job Title] applicants with [License or Certification] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: Those respondents that required licenses or certifications from applicants in order to qualify for a given difficult-to-fill job acknowledged that it was easier to find applicants with appropriate licensing than the requisite KSAs. In total, less than 40 percent of the occupations that advertised at least one license or certification found it “difficult” (a four or five on a five-point scale) to find that documentation.

Difficulty finding candidates with the required licenses or certifications:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.

Offered Wages Discussion

Wages need to be an important consideration when examining difficult-to-fill jobs. Traditional economic theory suggests that wages play a major role in the availability of labor. If wages are offered below the market equilibrium level, there will likely be a labor shortage in that market as workers will search for more lucrative employment options (either in other geographies or other occupations). Wages set below market equilibrium can occur if businesses are unaware of competitive wage rates, are slow to respond to changing economic conditions, or are unable to offer competitive wages due to budgetary or other internal constraints.

In many cases, wages for vacant positions are not made public nor are they provided to the applicant prior to being offered the position. However, there are several publicly available sources that estimate (and in some cases reveal) company specific wage data. Furthermore, establishments develop a compensation reputation through word-of-mouth based on where their wages fall relative to their competition. This is all to say that while establishment-specific wage information is not perfectly transparent, informed applicants may have a feel for a company or an industry's compensation tendencies.

Each year, the U.S. Bureau of Labor Statistics (BLS) collects occupational wage information from over 4,000 Utah businesses. This information is aggregated into a tool for employers and workers to better understand market compensation rates for hundreds of unique occupations. In order to gauge difficult-to-fill offered wages against the marketplace, this study compared the offered wages in each occupation—as reported by survey respondents—to the wage range of those occupations in Utah as reported by BLS.

A majority of establishments did not cite that they considered low wages as a contributing factor in making some jobs difficult to fill. However, this survey's market-wage comparison illustrated that nearly 70 percent of difficult-to-fill occupations offered wages below the occupational median, and 38 percent offered wages below the 25th percentile. The extent to which respondents offered relatively low wages varied greatly by occupation, industry and establishment size (among other variables).

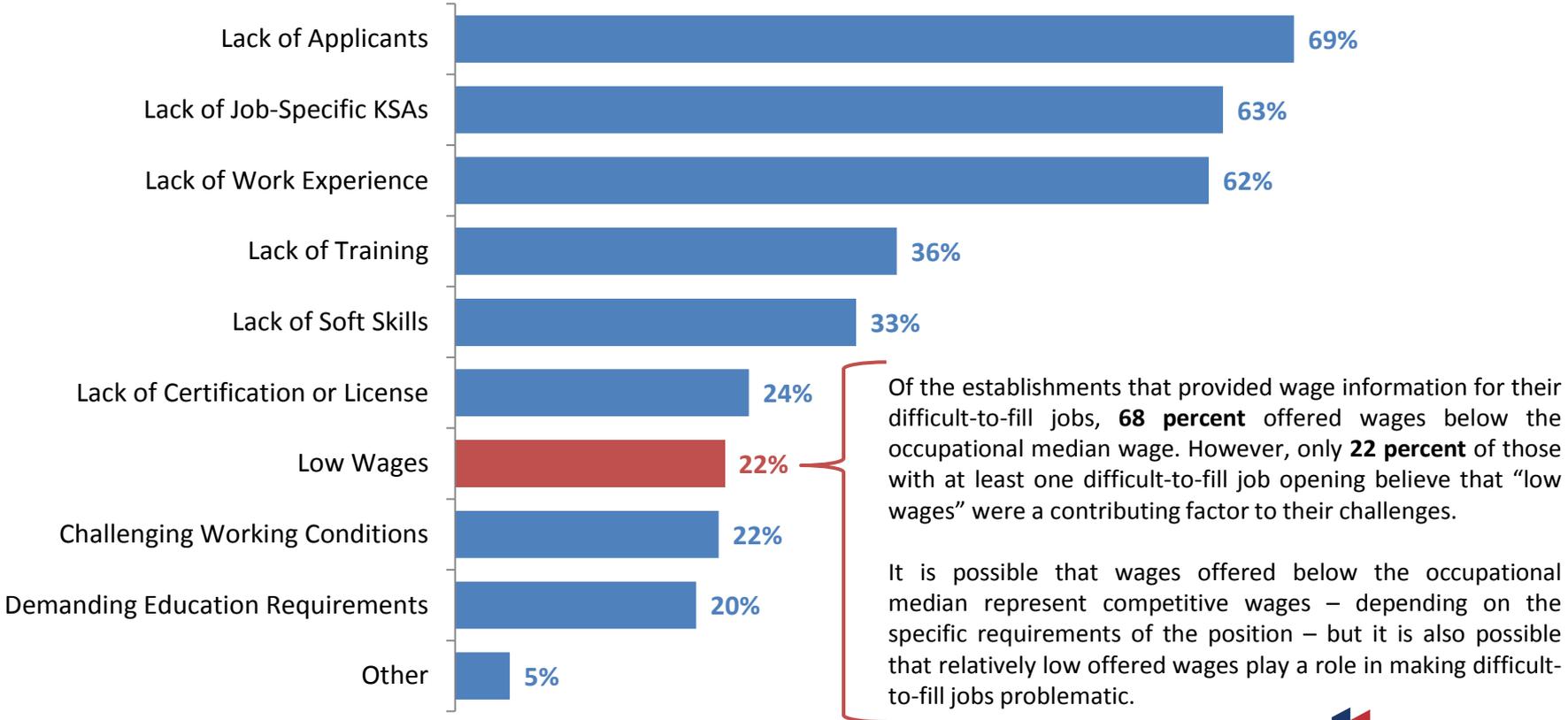
Depending on the positional requirements, it is possible that offering wages below the occupational median or as low as the 25th percentile represents a competitive wage. But given the fundamental economic notion that labor does not desire to sell its services cheap, especially if labor had to invest significantly into its own education and skill development, it is likely that low offered wages are a contributing factor in making some of these occupations challenging to fill.

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select ALL of the reasons you believe [Difficult-to-Fill Job Title] openings were difficult to fill.

RESULTS: Respondents were offered these ten hiring-challenge options, and were encouraged to select as many as were applicable. Respondents noted that the principal challenges faced were related to labor supply. Survey participants overwhelmingly cited “lack of applicants” “lack of job-specific knowledge, skills or abilities (KSAs)” and “lack of work experience” as reasons why their difficult-to-fill occupations presented hiring challenges. The perception among respondents was that too few candidates applied for their difficult-to-fill job openings, and/or that the applications they did receive were frequently missing the requisite skills or experience to qualify for the position. Offering low wages as a hiring challenges was only selected by one-in-five employers.

Reasons that difficult-to-fill occupations presented hiring challenges:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses.

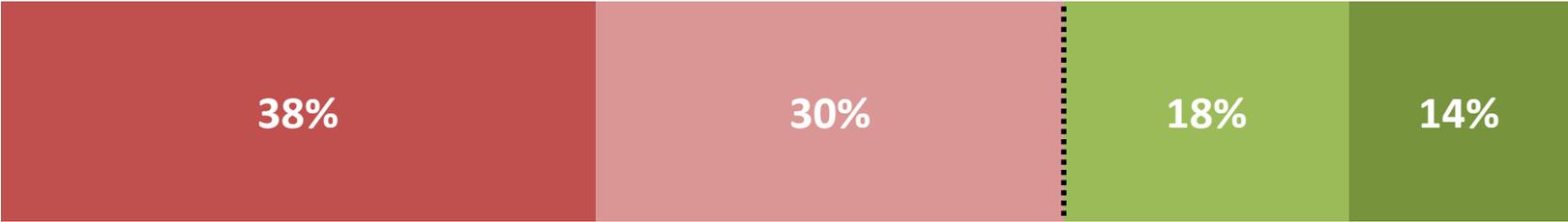
Occupational Wages and the Interquartile Wage Range

The BLS-measured wage range for every specific occupation can be dissected into four segments (interquartile). The median wage represents the mid-point of the observed wages for any given occupation. The offered wages reported for difficult-to-fill jobs were compared to the BLS interquartile wage range of that occupation and determined to fall into one of four categories: 1) below the BLS 25th percentile; 2) between the 25th and 50th percentile; 3) between the 50th and 75th percentile; or 4) above the 75th percentile. This dissection provides a benchmark against which offered wages for difficult-to-fill jobs can be evaluated against the overall Utah marketplace. Over two-thirds of the offered wages for survey respondent's difficult-to-fill jobs were below the occupational median.

Occupational Wages as Measured by BLS



Wages Offered for Difficult-to-Fill Jobs



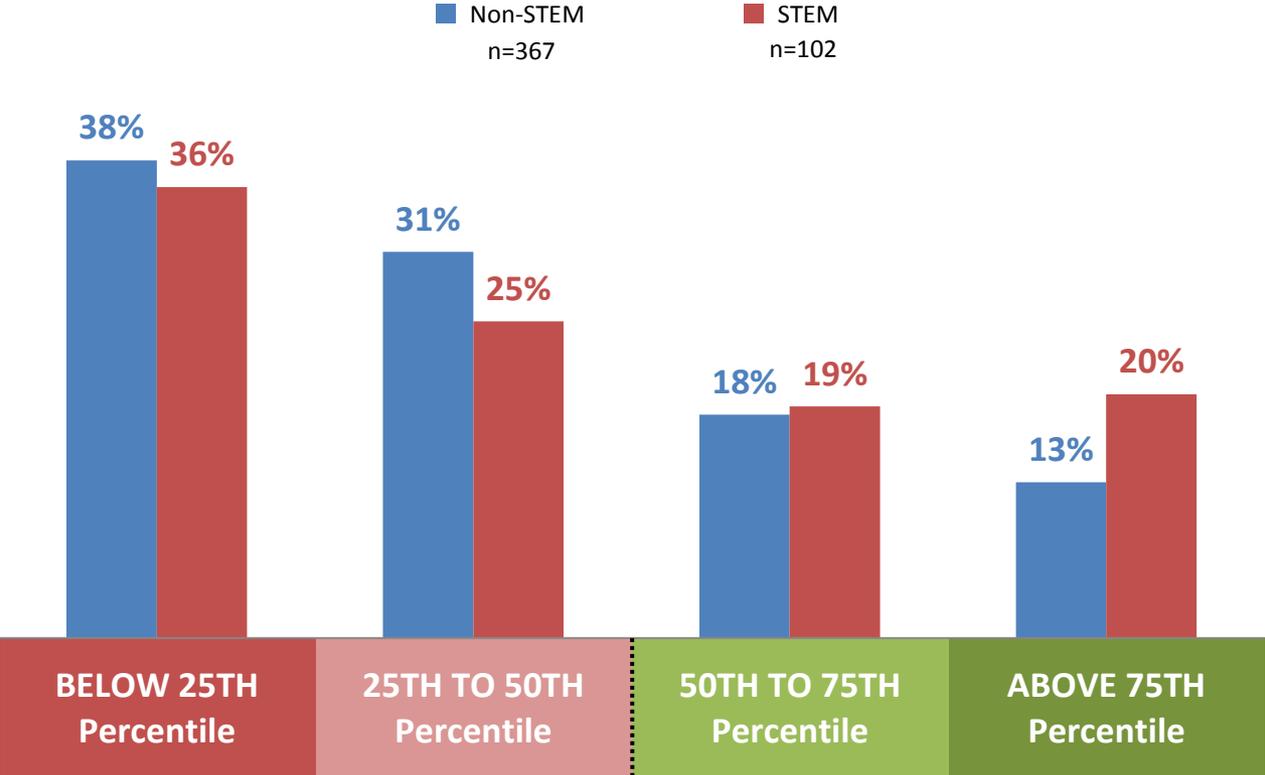
n=469

NOTE: State wages for all occupations collected through the Occupational Employment Statistics program of the U.S. Bureau of Labor Statistics. Additionally, wages offered excludes "Refused to Answer", "Don't Know", commission based wages, and "Other" responses.

Offered Wages: Non-STEM and STEM jobs

RESULTS: More than 60 percent of both non-STEM and STEM difficult-to-fill occupations offered wages below the occupational median. However, the survey suggests that non-STEM jobs citing hiring issues were more likely to offer wages below the occupational median than STEM jobs. Moreover, 20 percent of respondents with difficult-to-fill STEM occupations provided wage data that was above the 75th percentile, compared to only 13 percent of non-STEM occupations.

Offered Wages in Non-STEM and STEM Occupations



NOTE: Excludes "Refused to Answer", "Don't Know", commission based wages, and "Other" responses.

Offered Wages: Advertised Levels of Education and Experience

RESULTS: Higher levels of advertised educational attainment and experience correlated with a greater likelihood to be offered a higher wage. Difficult-to-fill jobs that advertised lower levels of education and experience (bottom-left) offered wages below the occupational median more than three-quarters of the time. That percentage improved slightly when the advertised level of education increased (top-left), though the small sample size in this group suggests that establishments were either not looking for these candidates or they were not finding jobs with these requirements “difficult to fill.” The notable increases in offered wages relative to the occupational median came with increased levels of experience. The proportion of offered wages below the median fell 10 percentage points when advertised experience increased from “less than one year” to “one year or more” (bottom-right), and another 7 percentage points when the advertised educational requirements increased along with experience (top-right). It is worth noting that even with these offered wage increases in two right quadrants, in all cases more than 50 percent of offered wages were still below the occupational median.

MORE ↑
 Education
 ↓
 LESS

Education: Associates Degree of Higher
Experience: Less than One Year

Offered Wages Relative to Average

Below Range Within Range Above Range



n=25

Education: Associates Degree of Higher
Experience: One Year or More

Offered Wages Relative to Average

Below Range Within Range Above Range



n=141

Education: Less than Associates Degree
Experience: Less than One Year

Offered Wages Relative to Average

Below Range Within Range Above Range



n=115

Education: Less than Associates Degree
Experience: One Year or More

Offered Wages Relative to Average

Below Range Within Range Above Range



n=181

LESS ← Experience → MORE

NOTE: Excludes “Refused to Answer”, “Don’t Know”, commission based wages, and “Other” responses.

Offered Wages: Major Occupational Group

RESULTS: Although most of the major occupational groups in the survey offered wages for difficult-to-fill jobs that were below the BLS mean, a few distinct trends emerged. Management and sales-related occupations offered wages well below the occupational norm. Over 50 percent of those two groups were offering wages below the 25th percentile, and in both cases, the mean hourly offered wage was at least \$12 per hour lower than the BLS occupational mean. The production occupational group was the only group in which more than 50 percent of the offered wages were above the occupational mean. On the surface, this suggests that this occupational group's difficulties are more skill and training issues than wage considerations.

Wages offered for difficult-to-fill jobs relative to occupational median:

Below Range Within Range Above Range

Below Survey Average Above Survey Average

One Std. Dev. Below/Above Mean

SURVEY AVERAGE	Wage Distribution				Mean Offered Wage	+/- BLS Mean	Sample
	Below Range	Within Range	Above Range	Other			
	38%	30%	18%	14%	\$21.80	-\$3.40	469
Office and Administrative Support	31%	27%	21%	21%	\$13.80*	-\$0.80	71
Management	65%	23%	8%	4%	\$30.40*	-\$18.20	48
Construction and Extraction	30%	30%	24%	15%	\$18.50	-\$1.60	46
Sales and Related	56%	21%	13%	10%	\$19.10	-\$12.40	39
Healthcare Practitioners and Technical	41%	29%	9%	21%	\$42.10*	+\$8.80	34
Computer and Mathematical	32%	32%	15%	21%	\$36.80*	-\$0.10	34
Healthcare Support	44%	24%	24%	8%	\$11.40*	-\$1.00	25
Personal Care and Service	22%	52%	17%	9%	\$9.20*	-\$0.90	23
Architecture and Engineering	36%	27%	23%	14%	\$30.50*	-\$4.20	22
Production	9%	29%	24%	38%	\$20.10	+\$2.30	21
Business and Financial Operations	32%	16%	26%	26%	\$28.90*	-\$2.40	19
Installation, Maintenance, and Repair	39%	39%	22%		\$18.30	-\$4.40	18
Community and Social Service	35%	41%	18%	6%	\$15.30	-\$3.10	17
Food Preparation and Serving Related	33%	50%	17%		\$10.50*	-\$1.40	12
Education, Training, and Library	50%	30%	20%		\$9.80*	-\$5.60	10
Transportation and Material Moving	30%	40%	20%	10%	\$16.50	-\$1.70	10

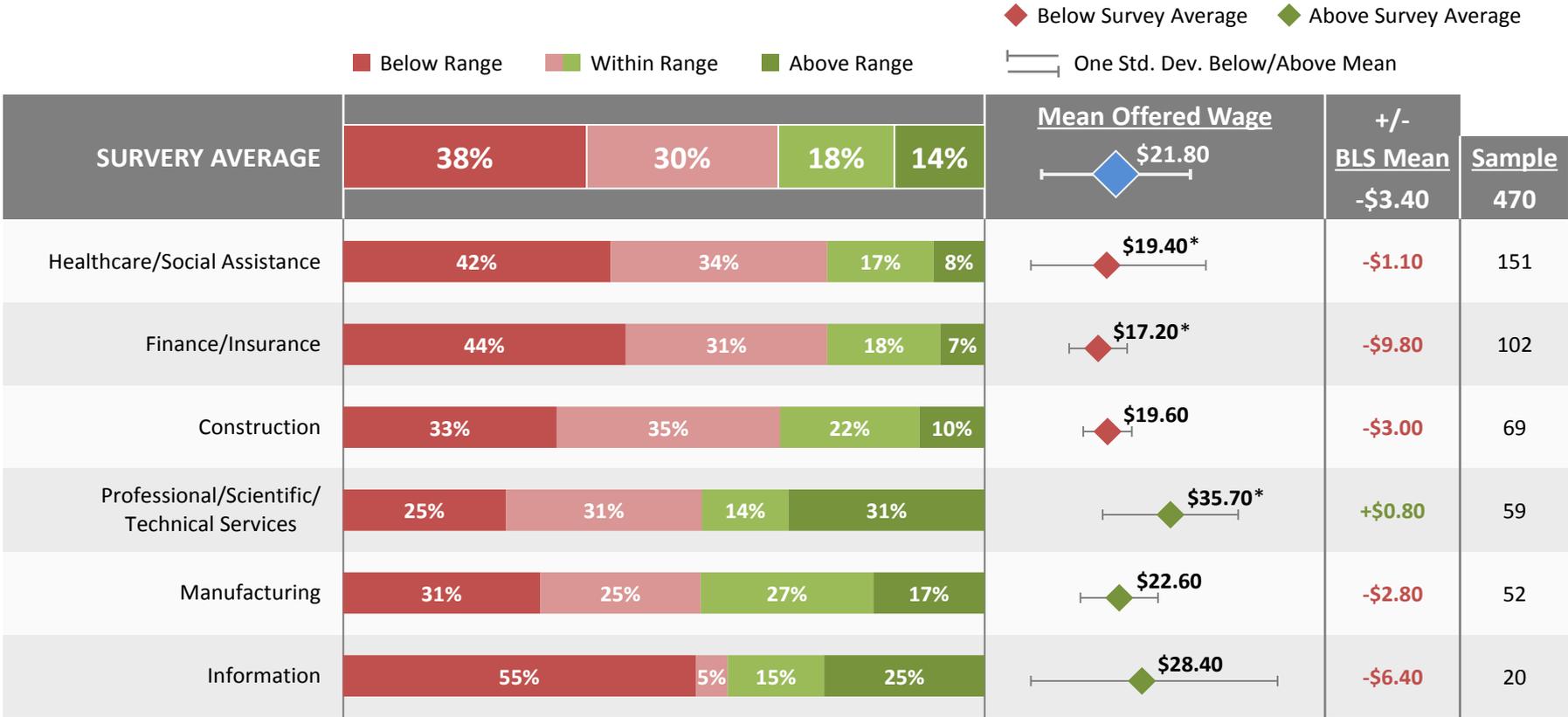
* Indicates that the observed data for a given occupational group is significantly different from the aggregate data of the other occupational groups (p < 0.01).

NOTE: Excludes "Refused to Answer", "Don't Know", commission based wages, and "Other" responses.

Offered Wages: Industry Sector

RESULTS: The largest proportion of wages offered above the occupational median was in the Professional, Scientific, and Technical Services industry sector (45 percent). Its mean hourly offered wage was also slightly higher than the BLS occupational mean. The Healthcare and Social Assistance industries, along with the Finance and Insurance industries, offered the largest proportion of wages below the occupational median. Approximately three-quarters of the difficult-to-fill jobs observed in these industry sectors offered wages below the occupational median.

Wages offered for difficult-to-fill jobs relative to occupational median:



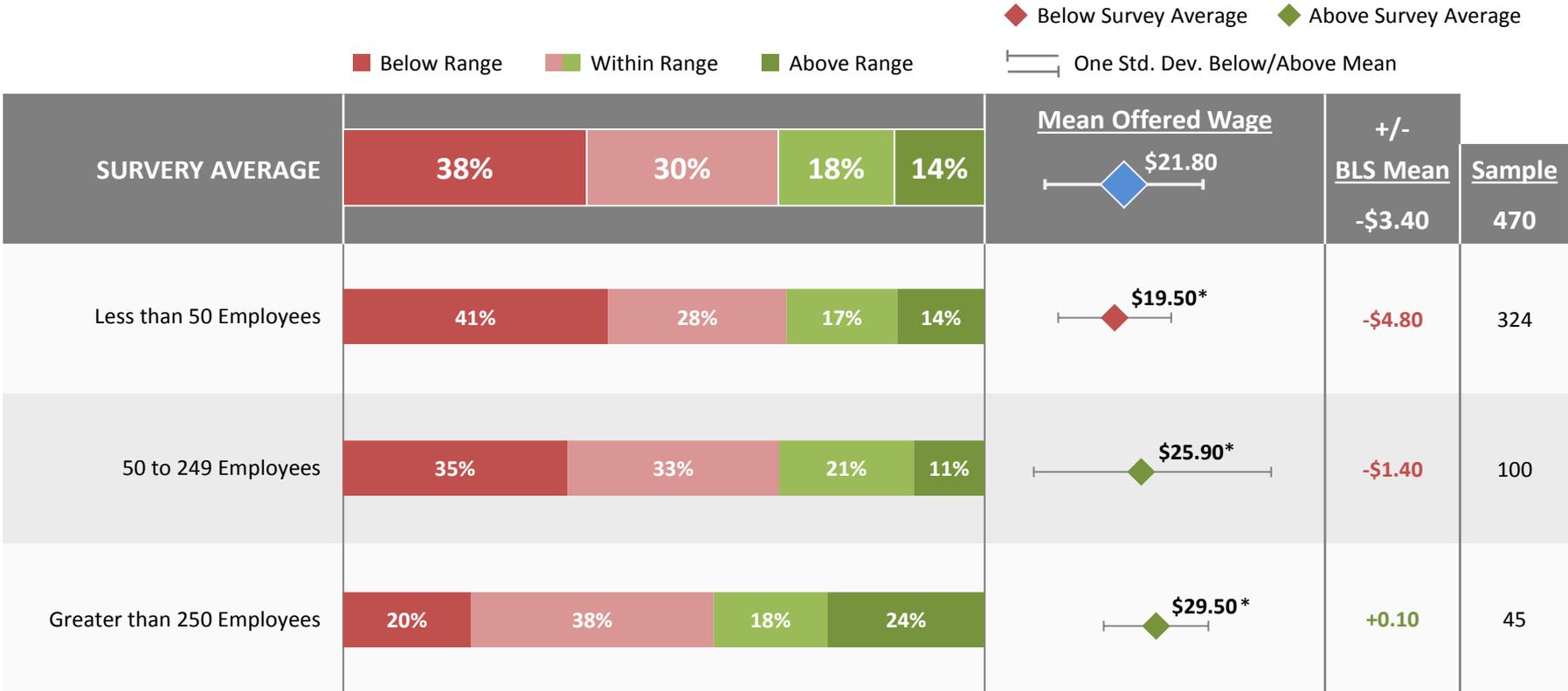
NOTE: Excludes "Refused to Answer", "Don't Know", commission based wages, and "Other" responses.

* Indicates that the observed data for a given industry sector is significantly different from the aggregate data of the other industry sectors (p < 0.01).

Offered Wages: Establishment Size

RESULTS: Offered wages relative to occupational norms increased greatly as the size of the establishment increased. Respondents from small establishments, those with 50 or fewer employees, offered compensation below the occupational median in nearly 70 percent of the observations. The mean offered wages for small establishments was significantly below the two larger establishment size categories. The proportion of respondents offering wages below the occupational median fell only slightly for medium establishments, those with employment between 50 and 249, but the percent paying below the 25th percentile of occupational wages fell noticeably and the difference between the mean offered wage and the BLS mean shrank considerably. Large establishments were less likely to offer wages below the 25th percentile and more likely to offer wages above the 75th percentile.

Wages offered for difficult-to-fill jobs relative to occupational median:



NOTE: Excludes "Refused to Answer", "Don't Know", commission based wages, and "Other" responses

* Indicates that the observed data for a given establishment size category is significantly different from the aggregate data of the other establishment size categories (p < 0.01).



Department of Workforce Services

APPENDICES



Appendix A: Methodology

Sample Design

The sample used in this research was drawn from Utah’s Quarterly Census of Employment and Wages (QCEW), a U.S. Bureau of Labor Statistics program, between the first and third quarters of 2013. The unit of analysis is an establishment, as opposed to a firm. Example: Walmart is a firm that has many establishments. The target population was selected by satisfying specific eligibility criteria: 1) Private ownership; 2) Establishments are located within metropolitan counties; 3) Establishments’ industry classifications (by NAICS codes) are within the samples selected NAICS codes; and 4) The employment levels by strata are sufficiently large. The employment size criteria varied by geographic area. Along the Wasatch Front, establishments with employment lower than 10 were eliminated (the employment cutoff was five for establishments in NAICS 52, which are finance and insurance industries). Establishments in Washington County were eliminated if they had employment lower than 5.

Eligible Counties

1. Box Elder
2. Cache
3. Davis
4. Juab
5. Salt Lake
6. Tooele
7. Utah
8. Washington
9. Weber

Selected Industries

NAICS Code	Industry Title	NAICS Code	Industry Title
236	Construction of buildings	511	Publishing industries, except Internet
237	Heavy and civil engineering construction	5112	Software publishers (separate)
238	Specialty trade contractors	512	Motion picture and sound recording industries
323	Printing and related support activities	515	Broadcasting, except Internet
324	Petroleum and coal products manufacturing	517	Telecommunications
325	Chemical manufacturing (except subgroup 3256 Soap, cleaning compound, and toiletry manufacturing)	518	Data processing hosting and related services
326	Plastics and rubber products manufacturing	519	Other information services
327	Nonmetallic mineral product manufacturing	522	Credit intermediation and related activities
331	Primary metal manufacturing	523	Securities, commodity, contracts, investments
332	Fabricated metal product manufacturing	524	Insurance carriers and related activities
333	Machinery manufacturing	525	Funds, trust, and other financial vehicles
334	Computer and electronic product manufacturing	541	Professional and technical services
335	Electrical equipment and appliance manufacturing	5413	Architectural, engineering, and related services (separate)
336	Transportation equipment manufacturing (except subgroup 3361 Motor vehicle manufacturing)	5415	Computer systems design and related services (separate)
3364	Aerospace product and parts manufacturing (separate)	621	Ambulatory health care services
4234	Professional and commercial equipment and supplies merchant wholesalers	622	Hospitals
4236	Electrical and electronic goods merchant wholesalers	623	Nursing and residential care facilities
425	Electronic markets and agents and brokers	624	Social assistance
493	Warehousing and storage		

NAICS = North American Industry Classification System

Note: The selected industries are comprised of those industries considered to be high-skilled or high-education.

Appendix A: Methodology

Sample Design Continued

Once these conditions were applied, the resulting sampling frame included 2,442 establishments from combined Wasatch Front counties and 195 establishments from Washington County for a total of 2,637 establishments. Initially, Washington County was treated essentially as a separate stratum in order to maintain its relative proportion, which could have been dampened if they were pooled with the other counties during the sampling process. The other Wasatch Front counties are more likely to share the same labor market, but the distance of Washington County makes its labor market more likely to be distinct.

Rather than taking a random sample from population of interest from Washington County, which was small, all 195 establishments were included in a census sample. The sample size for Wasatch Front aimed for a 95 percent confidence level and 2 percent confidence interval. Assuming a 75 percent response rate, the resultant sample size for Wasatch Front was 1,615. A 75 percent response rate was initially chosen as that matched the response rate of the BLS occupational wage survey cited in this report's prior "offered wages discussion" section. That BLS wage data is administered here in Utah by Workforce Services.

The sample was stratified by establishment size and industry to maintain representativeness among these strata. Establishment size was based on the number of employees reported at each establishment through the Utah QCEW program, and was grouped into three size classes: small (1-49), medium (50-249) and large (250 or more). Industry stratification is represented by the industries listed in the table on the prior page, ordinarily at the three-digit NAICS level but in some cases at the four-digit NAICS level.

In addition to this sample, certain establishments considered highly significant for their role in the economy based on analyst judgment were added to the sample. The combination of the three sample segments – Wasatch Front, Washington County, and the judgment sample – resulted in a randomly selected sample of 1,829 establishments which would be contacted to participate in the survey.

Response Rates

Data was collected from an online survey through two channels. Initially, DWS sent a contact letter with the online survey link to the establishments. After approximately two weeks, a contracted research company, Lighthouse Research & Development, Inc., contacted non-respondents by telephone and administered the survey to participants. Telephone surveys took place from November to January, 2015. Final reminder postcards were sent to non-respondents in January, and the survey officially closed on January 30, 2015.

The response rate was 32 percent and the completion rate was 29 percent.

Nearly 23 percent of establishments in our sample were unreachable due to a number of phone issues, including disconnected phone numbers, no available phone numbers, or wrong phone numbers.

Given that 94 percent of our responses came from phone interviews, a substantial number of potential participants were lost due to poor quality contact information. It is worth noting that nonparticipation due to phone issues does not appear to have a systemic bias and appears random. Besides nonparticipation due to phone issues, another 45 percent refused to participate or were unable to participate because they did not have the appropriate HR functions.

Appendix A: Methodology

Response Rates Continued

While the sample was stratified for the purpose of representing each relevant intersection of industry and firm size, responses to our survey were lower than we expected, resulting in a lack of confidence in estimates from detailed strata. When response counts were rolled up to the two-digit NAICS level and all firm size groups were combined, the rates were satisfactory in most cases. Nonresponse problems became apparent, though, when response counts were distributed among the different strata. At increased levels of detail in industry categories and distinct firm size groups, sample results underrepresent the diversity of establishments by industry and firm size. The carefully selected stratified sample represented the population from which it was drawn, but the responses lacked the same degree of coverage.

The response rate from Washington County was 54 percent and the completion rate was 47 percent. The overall rates are adequate, but as with the larger sample, errors of coverage are evident throughout the strata, making analysis at a detailed level unreliable. The sample ratio between Washington County and Wasatch Front was approximately 11 percent. The response ratio comparing the two regions is also approximately 11 percent. To bolster response rates by strata, the responses from Washington County were combined with Wasatch Front. Given that the ratio of responses between the two regions retains the ratio from the populations of interest, there is little concern that responses from Washington County have improperly influenced the results.

Coding Responses

Employers responding to the survey provided open-ended occupational titles. In order to standardize and compare responses, the occupational titles were coded using the U.S. Government's Standard Occupational Classification (SOC) titles. Similarly, other open-ended responses were recoded into classes to facilitate comparisons across establishments. These include: skills, abilities or knowledge; and required licenses or certifications.

Statistical Analysis

Various survey data fields were analyzed statistically to compare estimates. The fields include major occupational group, industry sector, firm size, and STEM status. As estimates were computed for each field, they were also tested for statistical significance. Most of the analyses involved computing averages or computing proportions of multiple variables by classes within fields. The variables used to analyze the fields include the length of time a vacancy was open, expected hours, offered compensation, experience levels and education levels. The primary tests of statistical significance employed in this effort were the t-test for independent samples and the binomial test. The threshold confidence level for statistical significance is 90 percent.

Interpretation of Statistical Analysis

Tests of statistical significance indicate whether measurements from the classes within fields were statistically different from all other classes. For example, when analyzing the field of major occupational group by the variable representing the length of time a vacancy was open, the statistical test indicated statistical significance with the class representing the Computer and Mathematical major occupational group. The correct interpretation of this would be that the average length of time vacancies were open in Computer and Mathematical occupations is statistically different from the average across all other major occupational groups.

A similar interpretation holds in the analysis of proportions. For example, the education breakdown by major occupational groups shows the distribution of education categories for each major occupational group. Tests of statistical significance in this case could indicate whether the proportion of a particular education category for a given major occupational group is statistically different from the proportion of that particular education group across all other major occupational groups.

APPENDIX B: STEM Occupation Definitions

The basis for the determination of STEM occupations is a Brookings Institute publication, *The Hidden STEM Economy*, which outlined their procedure for determining STEM occupations. Documentation can be found online at <http://www.brookings.edu/research/reports/2013/06/10-stem-economy-rothwell>, authored by Jonathan Rothwell. The methodology outlined in that article was followed to the extent that it was necessary and useful. However, some steps were omitted for the sake of simplicity and expediency. It can be justified that including the omitted/unmodified steps would, for DWS's intents and purposes, provide no additional benefit or accuracy of determining "STEM-ness." Essentially, the procedure involves using "Knowledge" scores within O*NET to single out STEM occupations. The main strengths of this process are that it provides a rigorous way of determining the STEM-ness of every occupation. It also allows the essence of STEM to be defined as one sees fit—various gradations can be used to determine STEM-ness, e.g., High-STEM, Super-STEM, STEM across disciplines, etc.

Knowledge scores are determined by O*NET, which uses the questionnaire to ask for the level of knowledge required to perform a given occupation. The questionnaire is filled out either by an incumbent (respondent), an analyst, or an occupational expert. There are two Likert scales used to measure knowledge. Importance of a knowledge domain, say chemistry, is gauged using a 1-to-5 Likert scale. The level of knowledge within a particular knowledge domain is gauged using a 1-to-7 Likert scale. It is this second 1-to-7 Likert score that was used for determining the STEM-ness of each occupation.

Per the Brookings Institute methodology, six knowledge domains were used to determine STEM: Biology, Chemistry, Computer and Electronics, Engineering and Technology, Mathematics, and Physics. STEM is seen here to be contained within these knowledge domains. Using these scores disparately and in tandem allow for a dynamic way to grade "STEM-ness."

Two definitions of STEM were used to identify STEM occupations mentioned by respondents of the Difficult-to-Fill Jobs Survey:

High-STEM

- For each "High-STEM" occupation, the average "knowledge score" must be greater than or equal to 2 standard deviations above the average for all occupations in one of the six STEM knowledge domains. For an occupation to be considered "High-STEM," the occupation must require a significantly high level of knowledge (2 std. dev. above the average) in **at least one** STEM-related knowledge domain.

High-STEM Across Fields

- For each "High-STEM Across Fields" occupation, the combined STEM score — the sum of the score from each of the six STEM knowledge domains — must be greater than or equal to 1.5 standard deviations above the average STEM score for all occupations. For an occupation to be considered "High-STEM Across Fields," the occupation must require a relatively high level of knowledge (STEM score of 1.5 std. dev. above the average) **across the six** STEM-related knowledge domains.

The Occupational Information Network (O*NET) is a free online database that contains hundreds of occupational definitions. It was developed under the sponsorship of the U.S. Department of Labor/Employment and Training Administration (USDOL/ETA).

A Likert scale is a psychological measurement scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research, such that the term is often used interchangeably with rating scale.

APPENDIX C: STEM Occupation List

High-STEM List	
Code	Occupational Title
151122	Information Security Analysts
151131	Computer Programmers
151132	Software Developers, Applications
151134	Web Developers
151141	Database Administrators
151151	Computer User Support Specialists
152011	Actuaries
152091	Mathematical Technicians
173012	Electrical and Electronics Drafters
173013	Mechanical Drafters
193011	Economists
193039	Psychologists, All Other
251022	Mathematical Science Teachers, Postsecondary
291011	Chiropractors
291063	Internists, General
291066	Psychiatrists
291123	Physical Therapists
291161	Nurse Midwives
291199	Health Diagnosing and Treating Practitioners, All Other
299092	Genetic Counselors
299099	Healthcare Practitioners and Technical Workers, All Other
333031	Fish and Game Wardens
394031	Morticians, Undertakers, and Funeral Directors
474041	Hazardous Materials Removal Workers
492011	Computer, Automated Teller, and Office Machine Repairers

High-STEM Across Fields List			
Code	Occupational Title	Code	Occupational Title
111011	Chief Executives	292041	Emergency Medical Technicians and Paramedics
113021	Computer and Information Systems Managers	292054	Respiratory Therapy Technicians
119021	Construction Managers	292091	Orthotists and Prosthetists
119161	Emergency Management Directors	299011	Occupational Health and Safety Specialists
119199	Managers, All Other	299012	Occupational Health and Safety Technicians
131041	Compliance Officers	331021	First-Line Supervisors of Fire Fighting and Prevention Workers
131051	Cost Estimators	332022	Forest Fire Inspectors and Prevention Specialists
131199	Business Operations Specialists, All Other	414011	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products
151143	Computer Network Architects	454011	Forest and Conservation Workers
171012	Landscape Architects	475013	Service Unit Operators, Oil, Gas, and Mining
173011	Architectural and Civil Drafters	491011	First-Line Supervisors of Mechanics, Installers, and Repairers
173022	Civil Engineering Technicians	492021	Radio, Cellular, and Tower Equipment Installers and Repairs
173024	Electro-Mechanical Technicians	492094	Electrical and Electronics Repairers, Commercial and Industrial Equipment
173026	Industrial Engineering Technicians	492095	Electrical and Electronics Repairers, Powerhouse, Substation, and Relay
173027	Mechanical Engineering Technicians	499041	Industrial Machinery Mechanics
173031	Surveying and Mapping Technicians	499062	Medical Equipment Repairers
192099	Physical Scientists, All Other	499081	Wind Turbine Service Technicians
194011	Agricultural and Food Science Technicians	499099	Installation, Maintenance, and Repair Workers, All Other
194091	Environmental Science and Protection Technicians, Including Health	514011	Computer-Controlled Machine Tool Operators, Metal and Plastic
194092	Forensic Science Technicians	518013	Power Plant Operators
251064	Geography Teachers, Postsecondary	518091	Chemical Plant and System Operators
259021	Farm and Home Management Advisors	532011	Airline Pilots, Copilots, and Flight Engineers
291081	Podiatrists	535031	Ship Engineers
291124	Radiation Therapists	536051	Transportation Inspectors
291126	Respiratory Therapists	537011	Conveyor Operators and Tenders
292034	Radiologic Technologists		
292035	Magnetic Resonance Imaging Technologists		

NOTE: All "codes" are SOC codes.

APPENDIX C: STEM Occupation List

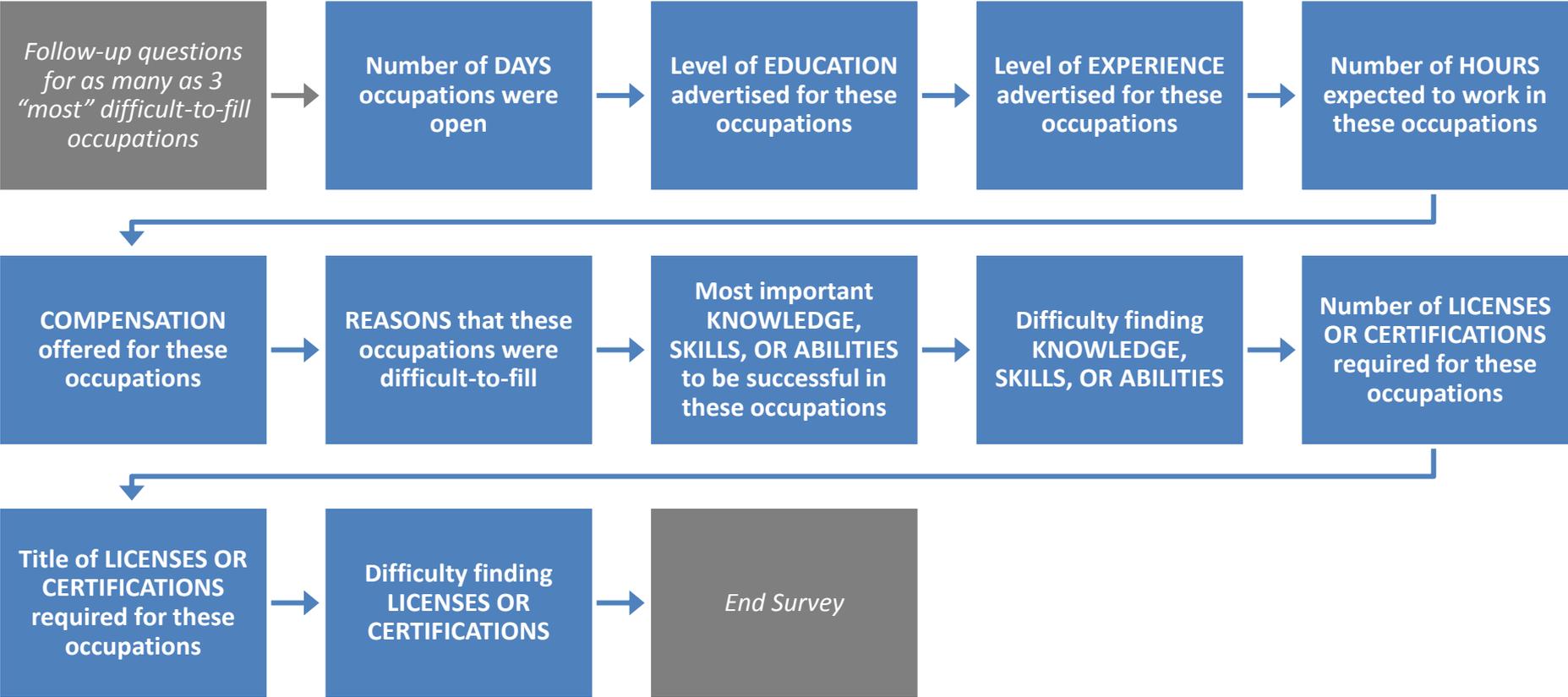
Occupations that Qualify for Both STEM Lists

Code	Occupational Title	Code	Occupational Title	Code	Occupational Title	Code	Occupational Title
113051	Industrial Production Managers	172131	Materials Engineers	192041	Environmental Scientists and Specialists, Including Health	291041	Optometrists
119013	Farmers, Ranchers, and Other Agricultural Managers	172141	Mechanical Engineers	192042	Geoscientists, Except Hydrologists and Geographers	291051	Pharmacists
119041	Architectural and Engineering Managers	172151	Mining and Geological Engineers, Including Mining Safety Engineers	192043	Hydrologists	291061	Anesthesiologists
119121	Natural Sciences Managers	172161	Nuclear Engineers	194021	Biological Technicians	291062	Family and General Practitioners
131081	Logisticians	172171	Petroleum Engineers	194031	Chemical Technicians	291064	Obstetricians and Gynecologists
151111	Computer and Information Research Scientists	172199	Engineers, All Other	194041	Geological and Petroleum Technicians	291065	Pediatricians, General
151121	Computer Systems Analysts	173021	Aerospace Engineering and Operations Technicians	194051	Nuclear Technicians	291067	Surgeons
151133	Software Developers, Systems Software	173023	Electrical and Electronics Engineering Technicians	194099	Life, Physical, and Social Science Technicians, All Other	291069	Physicians and Surgeons, All Other
151199	Computer Occupations, All Other	173025	Environmental Engineering Technicians	251021	Computer Science Teachers, Postsecondary	291071	Physician Assistants
152021	Mathematicians	173029	Engineering Technicians, Except Drafters, All Other	251031	Architecture Teachers, Postsecondary	291128	Exercise Physiologists
152031	Operations Research Analysts	191011	Animal Scientists	251032	Engineering Teachers, Postsecondary	291131	Veterinarians
152041	Statisticians	191012	Food Scientists and Technologists	251041	Agricultural Sciences Teachers, Postsecondary	291141	Registered Nurses
171011	Architects, Except Landscape and Naval	191013	Soil and Plant Scientists	251042	Biological Science Teachers, Postsecondary	291151	Nurse Anesthetists
171022	Surveyors	191020	Biological Scientists	251043	Forestry and Conservation Science Teachers, Postsecondary	291171	Nurse Practitioners
172011	Aerospace Engineers	191021	Biochemists and Biophysicists	251051	Atmospheric, Earth, Marine, and Space Sciences Teachers, Postsecondary	292011	Medical and Clinical Laboratory Technologists
172021	Agricultural Engineers	191022	Microbiologists	251052	Chemistry Teachers, Postsecondary	292012	Medical and Clinical Laboratory Technicians
172031	Biomedical Engineers	191023	Zoologists and Wildlife Biologists	251053	Environmental Science Teachers, Postsecondary	292033	Nuclear Medicine Technologists
172041	Chemical Engineers	191029	Biological Scientists, All Other	251054	Physics Teachers, Postsecondary	332021	Fire Inspectors and Investigators
172051	Civil Engineers	191031	Conservation Scientists	251071	Health Specialties Teachers, Postsecondary	394011	Embalmers
172061	Computer Hardware Engineers	191041	Epidemiologists	251072	Nursing Instructors and Teachers, Postsecondary	451011	First-Line Supervisors of Farming, Fishing, and Forestry Workers
172071	Electrical Engineers	191042	Medical Scientists, Except Epidemiologists	271021	Commercial and Industrial Designers	499021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers
172072	Electronics Engineers, Except Computer	192011	Astronomers	291021	Dentists, General	499092	Commercial Divers
172081	Environmental Engineers	192012	Physicists	291022	Oral and Maxillofacial Surgeons	518011	Nuclear Power Reactor Operators
172111	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	192021	Atmospheric and Space Scientists	291023	Orthodontists	518031	Water and Wastewater Treatment Plant and System Operators
172112	Industrial Engineers	192031	Chemists	291024	Prosthodontists	536041	Traffic Technicians
172121	Marine Engineers and Naval Architects	192032	Materials Scientists	291031	Dietitians and Nutritionists		

NOTE: All "codes" are SOC codes

APPENDIX D: Occupational Segmentation

The following data cover the specific questions asked of respondents with at least one difficult-to-fill occupation. The results have been segmented by major occupational group.

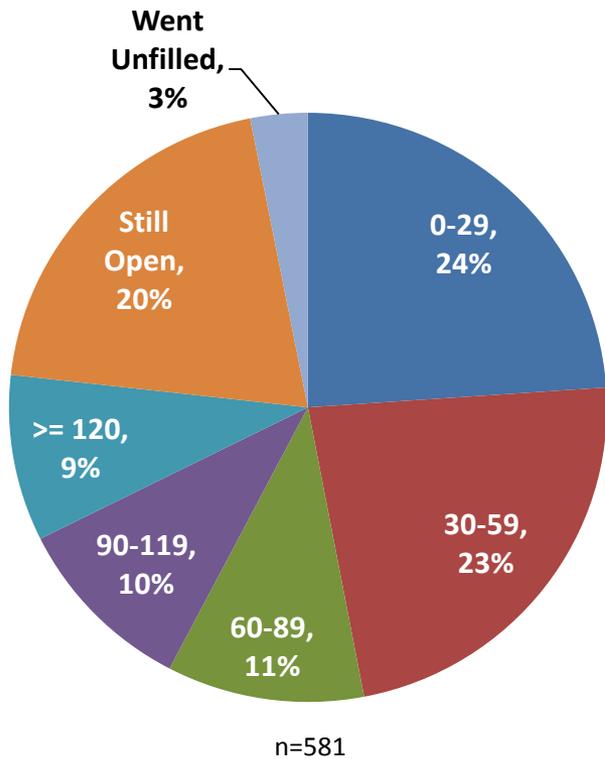


Number of Days Difficult-to-Fill Jobs Remained Open

QUESTION: On average, about **how many days** were your establishment's [Difficult-to-Fill Job Title] positions open before you found a candidate to fill the vacancy? (Please note if the position is still open or went unfilled).

RESULTS: Nearly half of the respondents indicated that it took less than 60 days to fill their most difficult-to-fill occupations. On average, difficult-to-fill jobs stayed open for 57 days. Occupational groups with the highest education requirements and wages generally remained open longer. Architecture and Engineering along with Computer and Mathematical occupations remained open for an average of 107 and 91 days, respectively.

The number of days difficult-to-fill occupations stayed open:



Average number of days difficult-to-fill occupations stayed open by major occupational group:

◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

SURVEY AVERAGE	57 days	Sample
Office and Administrative Support	39*	79
Management	71*	46
Sales and Related	54	41
Healthcare Practitioners and Technical	64	37
Construction and Extraction	45	31
Business and Financial Operations	80*	30
Healthcare Support	47	25
Computer and Mathematical	91*	23
Architecture and Engineering	107*	20
Production	45	17
Personal Care and Service	33*	17
Installation, Maintenance, and Repair	66	17
Community and Social Service	35	15
Transportation and Material Moving	36	12
Education, Training, and Library	39	10

* Indicates that the observed data for a given occupational group is significantly different from the aggregate data of the other occupational groups ($p < 0.01$).

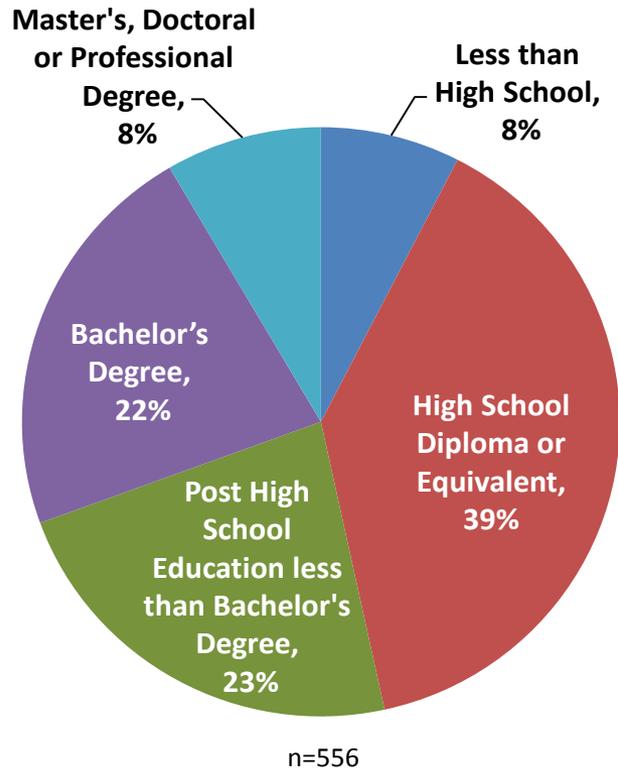
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Education Expectations for Difficult-to-Fill Job Candidates

QUESTION: In general, what level of education does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs advertised education beyond a high school diploma or equivalent (53 percent). However, establishments required a high school education more often than any other specific level of educational attainment (39 percent). Higher levels of advertised educational attainment correlated with higher paying occupations, such as Healthcare Practitioners and Technical as well as Computers and Mathematics; while lower paying occupations, like Office and Administrative Support and Personal Care and Services, generally required lower levels of educational attainment.

Level of education advertised for difficult-to-fill jobs:



Level of education advertised for difficult-to-fill jobs by major occupational group:

■ High School Diploma or Equivalent
 ■ Post High School Education less than Bachelor's
 ■ Bachelor's Degree
 ■ Other

SURVEY AVERAGE	SURVEY AVERAGE				Sample
	39%	23%	22%	16%	
Office and Administrative Support	75%	9%	5%	11%	87
Management	29%	12%	41%	17% [†]	58
Construction and Extraction	57%	18%	2%	22%	49
Healthcare Practitioners and Technical	8%	35%	19%	38%	48
Sales and Related	56%	22% [†]	16%	7%	45
Computer and Mathematical	3%	26%	69%	3%	35
Business and Financial Operations	11%	17%	51%	20%	35
Healthcare Support	14%	86%			28
Personal Care and Service	56%	26%	4%	15% [†]	27
Architecture and Engineering	12%	19%	65%	4%	26
Production	65%	15%	10%	10%	20
Installation, Maintenance, and Repair	40% [†]	35%		25%	20
Community and Social Service	21%	11%	42%	26%	19
Education, Training, and Library	38%	38%	23%		13
Transportation and Material Moving	58%	33%		8%	12
Food Preparation and Serving Related	55%		9%	36%	11

[†] Indicates that the observed data for a given occupational group is **NOT** significantly different from the aggregate data of the other occupational groups ($p < 0.01$). Meaning that unmarked occupational group data **ARE** significantly different from the aggregate.

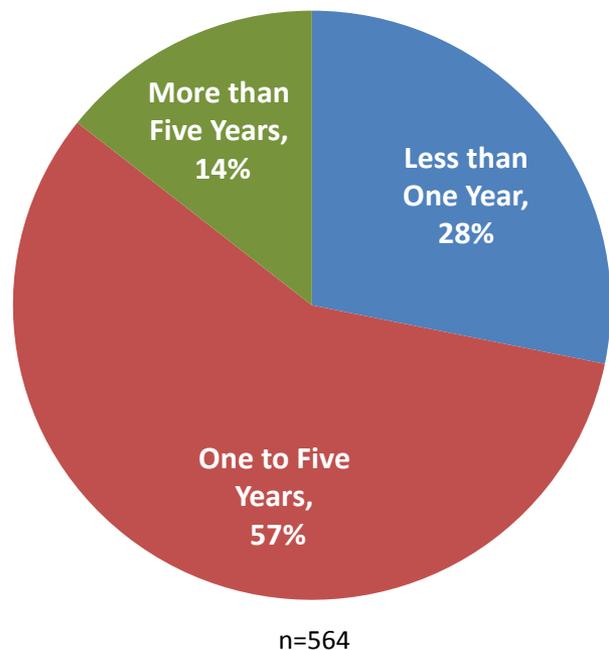
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Experience Expectations for Difficult-to-Fill Job Candidates

QUESTION: In general, what level of **work experience** does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs did not require more than five years of experience. In order to qualify, candidates were generally expected to have between one and five years of experience. Similar to educational attainment, higher paying occupational groups tended to require higher levels of experience. Management, Computer and Mathematical as well as Architecture and Engineering occupations were the least likely to advertise less than one year of experience as a prerequisite. Healthcare Support as well as Personal Care and Services jobs were the most likely to advertise less than one year.

Level of experience advertised for difficult-to-fill jobs:



Level of experience advertised for difficult-to-fill jobs by major occupational group:

■ Less than One Year ■ One to Five Years ■ More than Five Years

SURVEY AVERAGE	Sample		
	28%	57%	14%
Office and Administrative Support	35%	63%	2%
Management	3%	53%	43%
Construction and Extraction	16%	56%	28%
Healthcare Practitioners and Technical	36%	62%	2%
Sales and Related	25%	70%	5%
Computer and Mathematical	8%	74%	18%
Business and Financial Operations	14%	56% [†]	31%
Healthcare Support	79%	21%	
Personal Care and Service	69%	31%	
Architecture and Engineering	12%	58% [†]	31%
Production	14%	62%	24%
Installation, Maintenance, and Repair	24%	67%	10%
Community and Social Service	37%	63%	
Education, Training, and Library	46%	46%	8%
Transportation and Material Moving	17%	83%	
Food Preparation and Serving Related	58%	42%	

[†] Indicates that the observed data for a given occupational group is **NOT** significantly different from the aggregate data of the other occupational groups ($p < 0.01$). Meaning that unmarked occupational group data **ARE** significantly different from the aggregate.

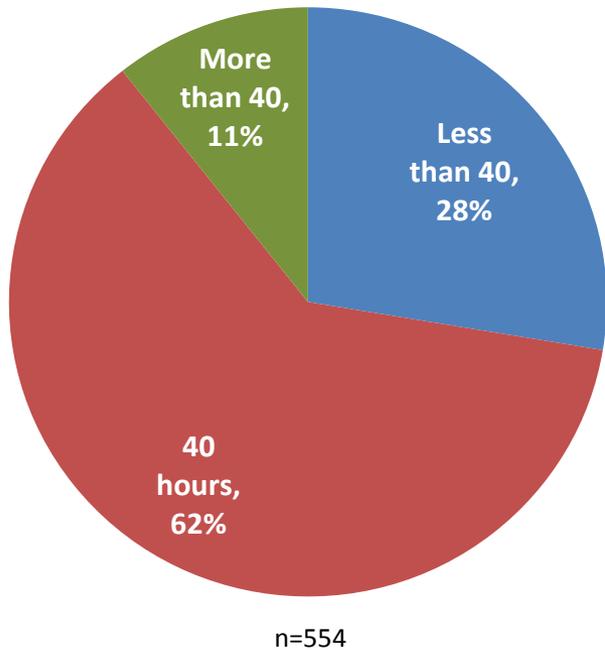
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Weekly Hours Expected to Work in Difficult-to-Fill Jobs

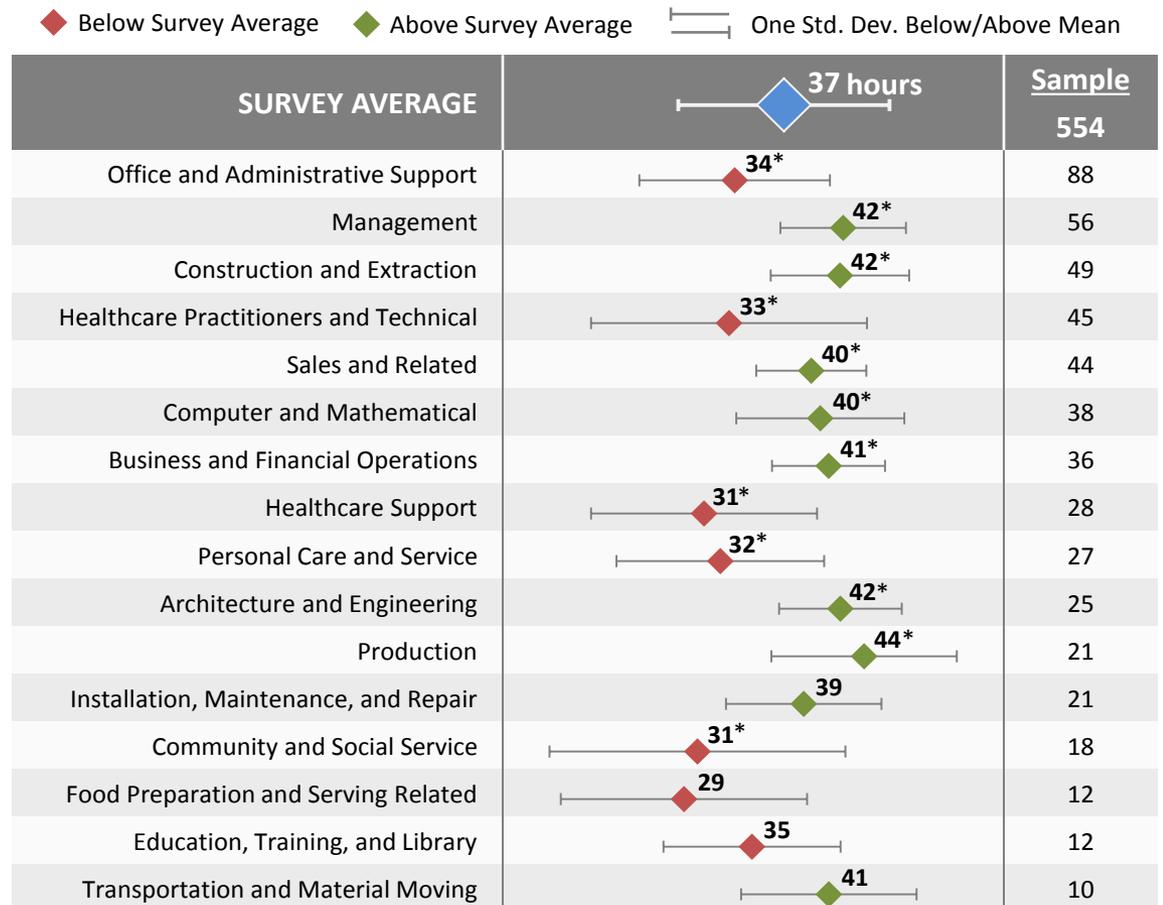
QUESTION: For [Difficult-to-Fill Job Title], how many hours per week are candidates generally expected to work?

RESULTS: Respondents indicated that difficult-to-fill occupations were generally full-time jobs, requiring 40 hours a week or more. However, some occupational groups were composed of more part-time jobs than others. There were seven occupational groups that averaged 35 hours or less of expected hours per week. Moreover, those groups had larger variation in the reported number of hours expected because the part-time positions may have required 20 or fewer hours per week while the full-time openings expected candidates to work 40 or more hours per week.

The number of hours difficult-to-fill job candidates are expected to work:



Average number of hours difficult-to-fill job candidates are expected to work by major occupational group:



* Indicates that the observed data for a given occupational group is significantly different from the aggregate data of the other occupational groups ($p < 0.01$).

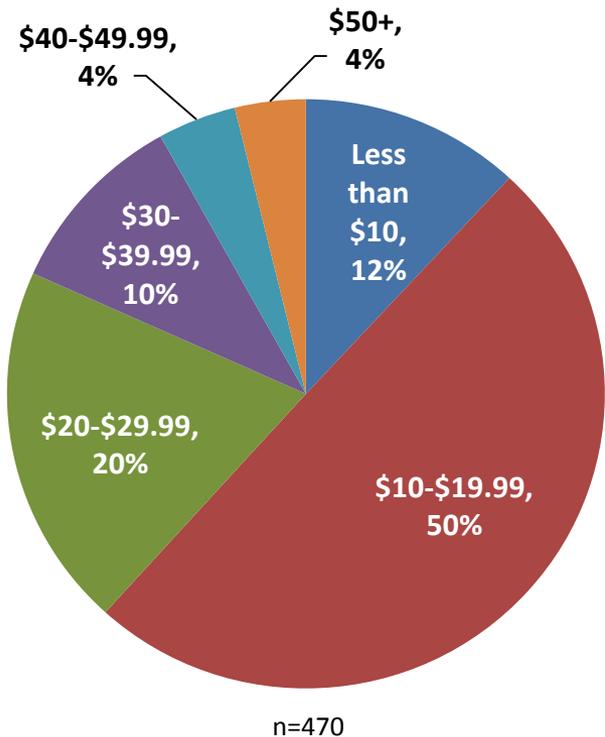
NOTE: Excludes "Refused to Answer", "Don't Know" and "Other" responses.

Offered Compensation for Difficult-to-Fill Jobs

QUESTION: On average, what is the **compensation offered**, excluding benefits, to [Difficult-to-Fill Job Title]?

RESULTS: The average hourly compensation offered for difficult-to-fill jobs was nearly \$22, though over 60% of respondents offered wages below \$20 an hour. The level of offered wages for difficult-to-fill jobs correlates with the levels of both education and experience requirements. Offered wages are highest in the occupational groups in which expected education and experience levels were significantly higher than the survey averages. Education and experience requirements were lower in occupational groups that offered relatively low wages for difficult-to-fill jobs.

The hourly compensation offered to candidates of difficult-to-fill occupations:



Average hourly compensation offered to candidates of difficult-to-fill occupations by major occupational group:

◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

SURVEY AVERAGE	Occupational Group	Sample
\$21.80		470
\$13.80*	Office and Administrative Support	71
\$30.40*	Management	48
\$18.50	Construction and Extraction	46
\$19.10	Sales and Related	39
\$42.10*	Healthcare Practitioners and Technical	34
\$36.80*	Computer and Mathematical	34
\$11.40*	Healthcare Support	25
\$9.20*	Personal Care and Service	23
\$30.50*	Architecture and Engineering	22
\$20.10	Production	21
\$28.90*	Business and Financial Operations	19
\$18.30	Installation, Maintenance, and Repair	18
\$15.30	Community and Social Service	17
\$10.50	Food Preparation and Serving Related	12
\$9.80	Education, Training, and Library	11
\$16.50	Transportation and Material Moving	10

* Indicates that the observed data for a given occupational group is significantly different from the aggregate data of the other occupational groups (p < 0.01).

NOTE: Excludes "Refused to Answer", "Don't Know", "other", and commission based wage responses.

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select ALL of the reasons you believe [Difficult-to-Fill Job Title] openings were difficult to fill.

RESULTS: The top three reasons that respondents selected as their biggest hiring challenge were cited far more often than any other reason. Yet, other reasons were also quite relevant to some occupational groups. For example, “lack of certification or license” were significant in Healthcare Support and Transportation and Material Moving, and “low wages” were a significant issue for Food Preparation and Serving Related.

Reasons difficult-to-fill occupations presented hiring challenges by major occupational group:

SURVEY AVERAGE	Lack of Applicants		Lack of Job Specific KSAs		Lack of Work Experience		Lack of Training		Lack of Soft Skills		Lack of Certification or License		Low Wages		Challenging Working Conditions		Demanding Education Requirements		Other		Sample
	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	
	69%	63%	62%	36%	33%	24%	22%	22%	20%	5%	600										
Office and Administrative Support	62%	2 ^T	67%	1	62%	2 ^T	34%	4	47%	3	9%	7	21%	5	19%	6	7%	8	5%	9	94
Management	67%	3	82%	1	77%	2	46%	4	43%	5	23%	8	10%	9	34%	6	33%	7	0%	10	61
Healthcare Practitioners and Technical	77%	1	48%	2	44%	3	27%	5 ^T	10%	8	27%	5 ^T	17%	7	21%	6	35%	4	2%	9	52
Construction and Extraction	71%	2	75%	1	67%	3	49%	4	25%	7 ^T	35%	5	25%	7 ^T	33%	6	14%	8	4%	9	51
Sales and Related	69%	3	82%	2	87%	1	51%	5	58%	4	16%	7 ^T	9%	8	20%	6	16%	7 ^T	0%	N/A	45
Computer and Mathematical	71%	1	66%	2	50%	3	32%	4	18%	7	24%	5	16%	8	8%	9	21%	6	3%	10	38
Business and Financial Operations	62%	3	68%	1	65%	2	41%	4	24%	6	22%	7	11%	8	5%	10	27%	5	8%	9	37
Architecture and Engineering	50%	2	53%	1 ^T	53%	1 ^T	25%	3	19%	5 ^T	19%	5 ^T	6%	7	3%	8	22%	4	8%	6	36
Healthcare Support	70%	1	47%	4	60%	2	40%	5	37%	6	57%	3	33%	7	20%	8 ^T	20%	8 ^T	3%	9	30
Personal Care and Service	89%	1	37%	5	41%	4	15%	7 ^T	52%	3	15%	7 ^T	56%	2	33%	6	11%	8 ^T	11%	8 ^T	27
Installation, Maintenance, and Repair	77%	2 ^T	82%	1	77%	2 ^T	55%	3	18%	5 ^T	36%	4	14%	6 ^T	14%	6 ^T	18%	5 ^T	0%	N/A	22
Production	48%	3	81%	2	86%	1	33%	4	10%	8 ^T	14%	7	10%	8 ^T	19%	6	24%	5	0%	N/A	21
Community and Social Service	84%	1	32%	3 ^T	32%	3 ^T	11%	6	16%	5	32%	3 ^T	58%	2	26%	4 ^T	32%	3 ^T	26%	4 ^T	19
Education, Training, and Library	75%	1	38%	4 ^T	50%	3 ^T	38%	4 ^T	31%	5	13%	7	56%	2	50%	3 ^T	25%	6	0%	N/A	16
Transportation and Material Moving	69%	1	54%	3	62%	2 ^T	38%	4 ^T	31%	5	62%	2 ^T	23%	6	38%	4 ^T	0%	N/A	15%	7	13
Food Preparation and Serving Related	92%	1	67%	3 ^T	67%	3 ^T	50%	4	75%	2 ^T	17%	6	75%	2 ^T	25%	5	0%	N/A	0%	N/A	12

NOTE: Excludes “Refused to Answer,” “Don’t Know,” “other,” and commission based wage responses.

“Rk” is the rank order of the reason for each occupational group; “T” represents a tie in the order.

Most Important KSAs for Difficult-to-Fill Jobs

QUESTION: Please list the three most important knowledge, skills or abilities (KSAs) needed to be a successful [Difficult-to-Fill Job Title].

RESULTS: Soft KSAs were mentioned more often than hard KSAs, even though knowledge of “Computers and Electronic or Engineering and Technology” rated as the single most important KSA. Certain major occupational groups, like those affiliated with STEM jobs, identified hard KSAs more often than others. The proportion of respondents that valued hard KSAs was particularly elevated in the Architecture and Engineering and the Computer and Mathematics occupational groups. Soft KSAs were overwhelmingly important to occupational groups like Personal Care and Service and Office and Administrative Support.

Specific knowledge, skills or abilities (KSAs) cited as most important for difficult-to-fill jobs:

■ Hard KSAs ■ Soft KSAs

Specific KSA	Percentage	Sample
Computers/Electronics or Engineering/Technology	10%	147
Professionalism, Conduct or Ethics	7%	99
Teamwork, People Skills or Social Intelligence	6%	97
Attitude, Flexibility or Manageability	6%	93
Customer Service or Service Orientation	6%	84
Time/Project Management	6%	83
Hard Working, Self-Starter or Motivated	5%	78
Medicine & Dentistry	5%	68
Communication (Written & Verbal) or Listening	4%	66
Sales & Marketing	4%	64

Most important knowledge, skills or abilities (KSAs) needed to be successful in difficult-to-fill occupations by major occupational group:

■ Hard KSAs ■ Soft KSAs ■ Other

SURVEY AVERAGE	Percentage			Top Ranked KSA	Sample
	Hard KSAs	Soft KSAs	Other		
Computers/Electronics Engineering/Technology	38%	50%	12%	Computers/Electronics Engineering/Technology 10%	1,502
Office and Administrative Support	21%	70%	9%	Customer Service or Service Orientation 12%	253
Management	40%	43%	16%	Economics, Accounting or Finance 11%	159
Construction and Extraction	43%	45%	12%	Building or Construction 23%	128
Sales and Related	40%	53%	7%	Sales & Marketing 24%	123
Healthcare Practitioners and Technical	48%	39%	13%	Medicine & Dentistry 27%	120
Computer and Mathematical	74%	24%	2%	Computers/Electronics Engineering/Technology 72%	88
Business and Financial Operations	45%	43%	12%	Economics, Accounting or Finance 19%	84
Healthcare Support	34%	58%	8%	Medicine & Dentistry 29%	77
Personal Care and Service	9%	74%	17%	Professionalism, Conduct or Ethics 23%	77
Architecture and Engineering	76%	19%	5%	Computers/Electronics Engineering/Technology 60%	63
Production	56%	37%	7%	Production & Processing or Operation & Control 37%	59
Installation, Maintenance, and Repair	46%	46%	8%	Installation, Repair or Mechanical 39%	52
Community and Social Service	31%	53%	16%	Attitude, Flexibility or Manageability 16%	51
Education, Training, and Library	11%	70%	19%	Professionalism, Conduct or Ethics 14%	37
Transportation and Material Moving	9%	40%	51%	Customer Service or Service Orientation 9%	35
Food Preparation and Serving Related	74%	23%	3%	Professionalism, Conduct or Ethics 23%	31

NOTE: Excludes “Refused to Answer” and “Don’t Know” responses.

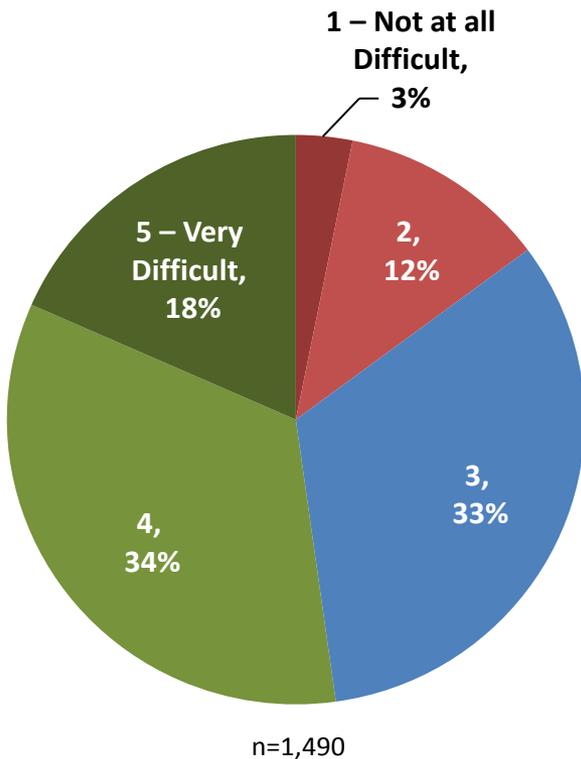
Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among occupational groups.

Difficulty Finding Candidates with the Necessary KSAs

QUESTION: Identify how difficult it is for your establishment to find [Difficult-to-Fill Job Title] applicants with [Knowledge, Skill or Ability] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: The majority of respondents felt that it was difficult to find applicants with the most important KSAs. On average, getting applicants with the right KSAs proved to be most difficult in Construction and Extraction as well as Production occupations. Among the occupational groups in which finding applicants with the most important KSAs was least difficult were Office and Administrative Support, Sales and Related, and Business and Financial Operations.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among occupational groups.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success by major occupational group:

SURVEY AVERAGE	Not Difficult			Difficult			Sample
	15%	33%	52%	15%	33%	52%	
Office and Administrative Support	17%	38%	45%	3.4	252		
Management	10%	28%	62%	3.7	160		
Sales and Related	17%	37%	46%	3.4	126		
Construction and Extraction	8%	29%	63%	3.9	120		
Healthcare Practitioners and Technical	23%	26%	50%	3.4	117		
Computer and Mathematical	11%	40%	48%	3.6	89		
Business and Financial Operations	18%	39%	43%	3.4	84		
Healthcare Support	17%	31%	53%	3.4	78		
Personal Care and Service	21%	23%	56%	3.4	77		
Production	7%	27%	66%	3.8	59		
Architecture and Engineering	15%	31%	54%	3.6	59		
Installation, Maintenance, and Repair	10%	31%	59%	3.8	51		
Community and Social Service	14%	42%	44%	3.4	50		
Education, Training, and Library	16%	30%	54%	3.5	37		
Transportation and Material Moving	17%	31%	51%	3.4	35		
Food Preparation and Serving Related	29%	68%		3.8	31		

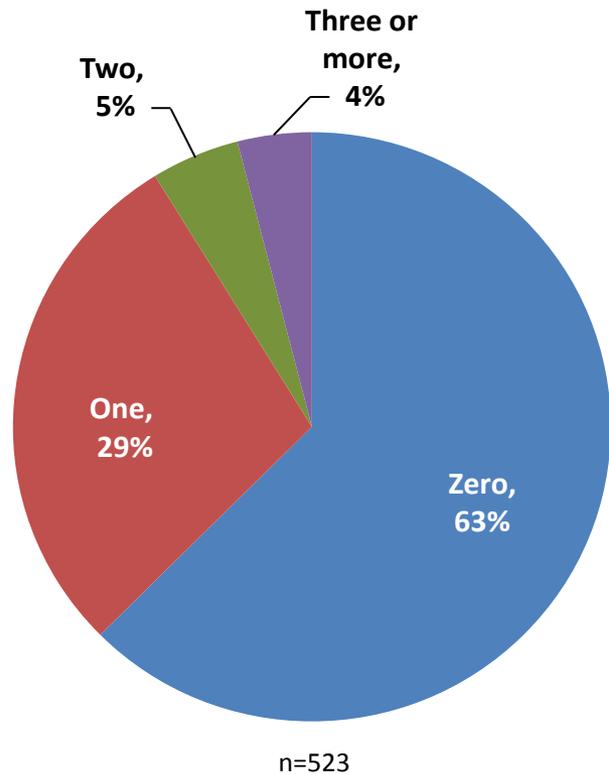
◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

Number of Licenses and Certifications for Difficult-to-Fill Jobs

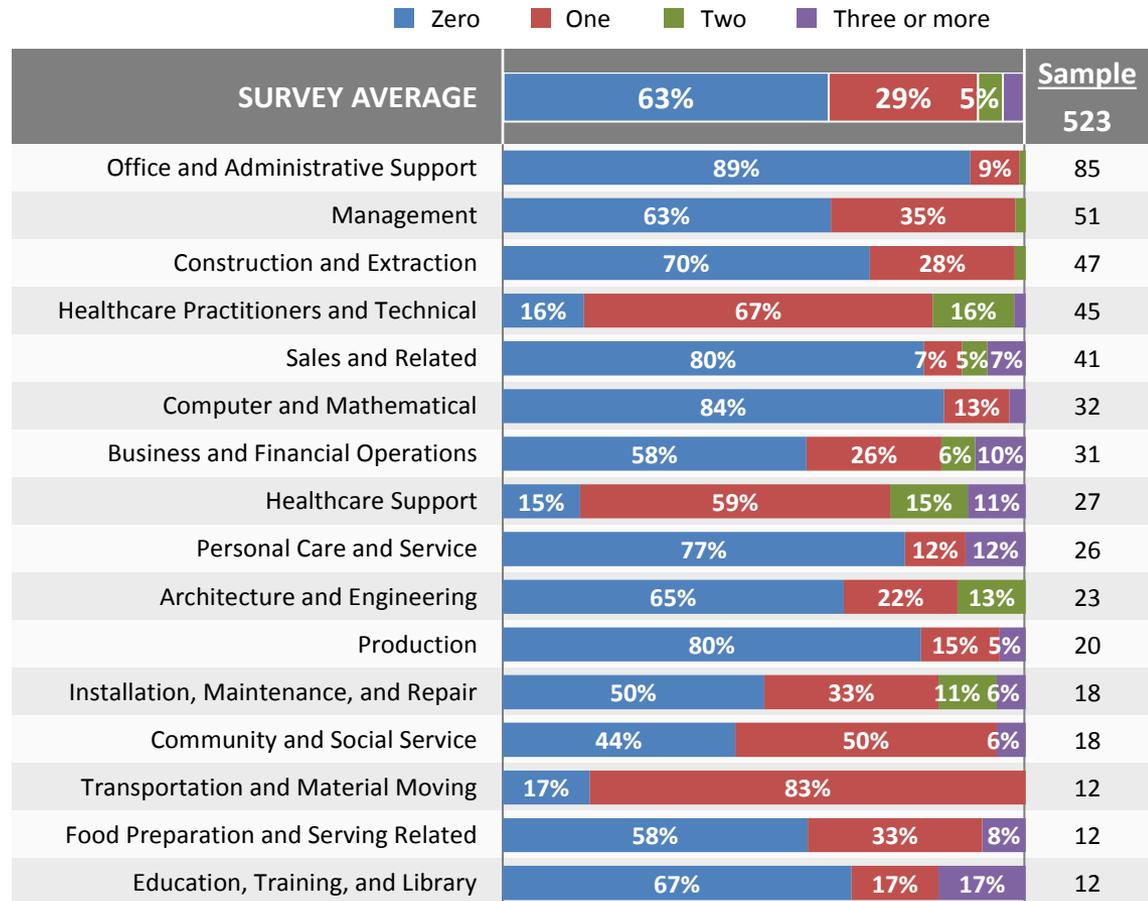
QUESTION: In general, how many vocational or professional licenses or certifications does your establishment advertise as necessary for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of the difficult-to-fill occupations surveyed did not require a license or certification to qualify for the position. That trend held true for most of the major occupational groups with the exception of Healthcare Support, Healthcare Practitioners and Technical, and Transportation and Material Moving, which all required one or more license or certification more than 80 percent of the time.

Number of licenses and certifications advertised for difficult-to-fill jobs:



Number of licenses and certifications advertised for difficult-to-fill jobs by major occupational group:



NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Licenses and Certifications for Difficult-to-Fill Jobs

QUESTION: Please list the licenses or certifications **your establishment requires** of [Difficult-to-Fill Job Title] applicants.

RESULTS: Of those difficult-to-fill occupations that required a license or certification, medical licenses were the most common designation. The Healthcare Related occupational group required licensing at a far greater rate than almost any other occupational group.

Licenses and certifications required for difficult-to-fill occupations:

(of those that require at least one license or certification)

		<u>Sample</u>
Medical License/Certification	28%	75
Industry Association License/Certification	16%	43
Financial License/Certification	14%	38
Social Work License/Certification	9%	25
Permits/Specialized Training	8%	21
Registered Nurse	8%	21
Degree/Experience	4%	11
Truck/Drivers License	4%	11
Insurance License	3%	9
Accounting/CPA License	3%	7
Specialized Information Technology	2%	6
Legal License/Bar Exam	0%	1

Licenses and certifications required for difficult-to-fill occupations by major occupational group:

SURVEY AVERAGE	Most Often Cited Licenses & Certifications		Sample
	First Most Often	Second Most Often	
	Medical 28%	Industry Association 16%	268
Healthcare Practitioners and Technical	Medical 59%	Registered Nurse 35%	46
Healthcare Support	Medical 89%	Social Work 6%	35
Business and Financial Operations	Financial 58%	Accounting/CPA 17%	24
Management	Permits/Specialized Training 25%	Registered Nurse 20%	20
Installation, Maintenance, and Repair	Industry Association 75%	Medical 13%	16
Construction and Extraction	Industry Association 100%	N/A	15
Sales and Related	Financial 67%	Insurance 20%	15
Personal Care and Service	Medical 46%	Social Work 23%	13
Community and Social Service	Social Work 83%	Medical 8%	12
Office and Administrative Support	Financial 40%	Medical 30%	10
Architecture and Engineering	Industry Association 60%	Degree/Experience 30%	10
Transportation and Material Moving	Truck/Drivers License 100%	N/A	10
Legal	Financial 80%	Legal/Bar Exam 10%	10

NOTE: Excludes "Refused to Answer" and "Don't Know" responses

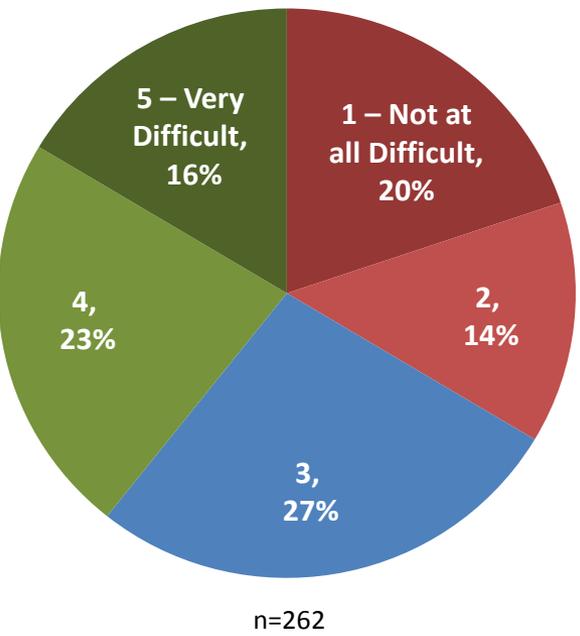
Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.

Difficulty Finding Candidates with Required Licenses and Certification

QUESTION: Identify how difficult it is to find [Difficult-to-Fill Job Title] applicants with [License or Certification] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: Respondent data suggests that it was less difficult to find candidates with the requisite license or certification than it was to find the most important KSAs for difficult-to-fill jobs. Additionally, the occupational groups most likely to have required licensing, those related to Healthcare, were among those least likely to have had difficulty finding candidates with proper certification.

Difficulty finding candidates with the required licenses or certifications:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, data collection and aggregation methods for licenses and certifications made statistical testing unreliable. Cannot report statistical significance among occupational groups.

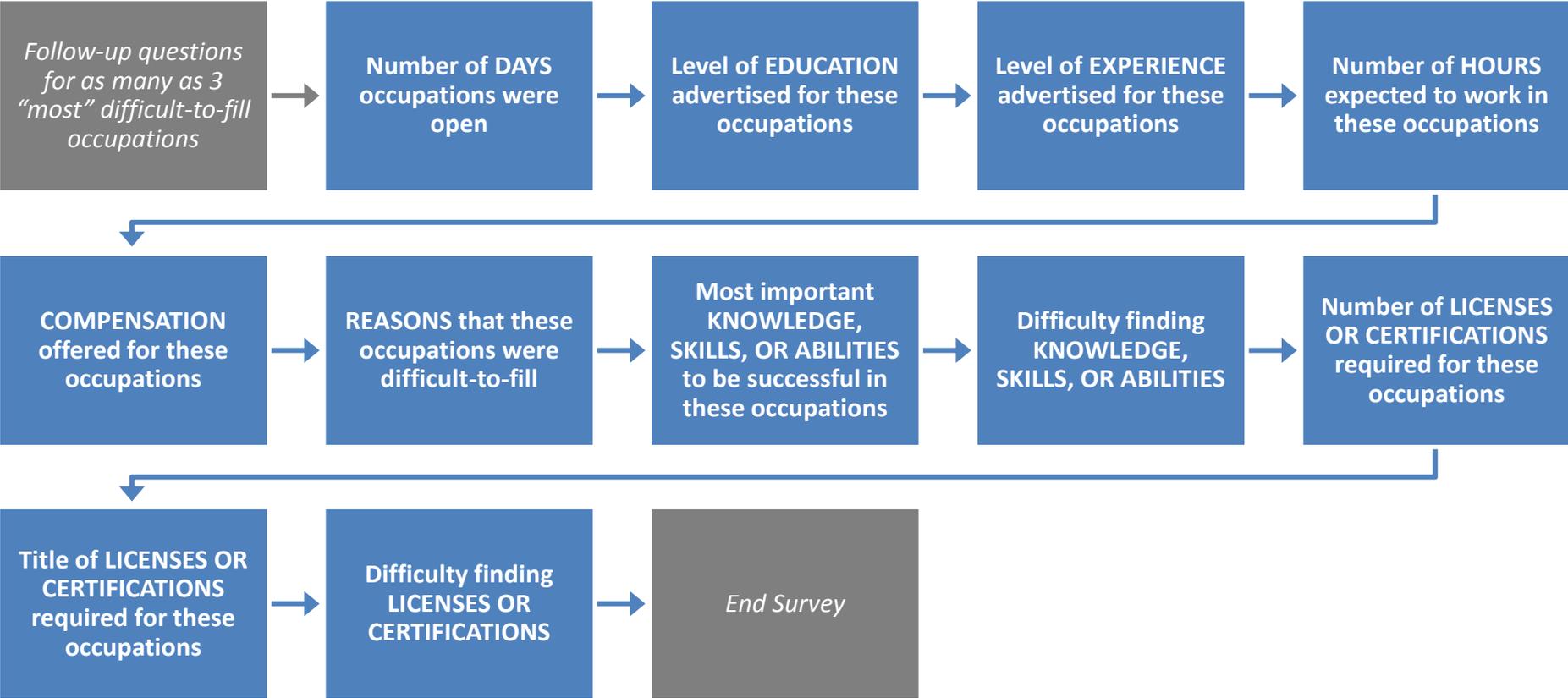
Difficulty finding candidates with the required licenses or certifications by major occupational group:

SURVEY AVERAGE	Not Difficult			Difficult			Survey Average	Sample
	34%	27%	39%	34%	27%	39%		
Healthcare Practitioners and Technical	47%	16%	38%	2.8	45			
Healthcare Support	44%	38%	18%	2.6	34			
Business and Financial Operations	45%	23%	32%	2.8	22			
Management	58%	16%	26%	2.4	19			
Sales and Related	25%	19%	56%	3.6	16			
Installation, Maintenance, and Repair	44%	56%	3.9	16				
Construction and Extraction	7%	7%	87%	4.2	15			
Personal Care and Service	23%	8%	69%	3.2	13			
Community and Social Service	8%	33%	58%	3.5	12			
Transportation and Material Moving	40%	30%	30%	2.7	10			
Office and Administrative Support	10%	60%	30%	3.3	10			
Legal	60%	10%	30%	2.6	10			
Architecture and Engineering	20%	30%	50%	3.2	10			

◆ Below Survey Average
 ◆ Above Survey Average
 [] One Std. Dev. Below/Above Mean

APPENDIX E: Industry Segmentation

The following data cover the specific questions asked of respondents with at least one difficult-to-fill occupation. The results have been segmented by industry sector.

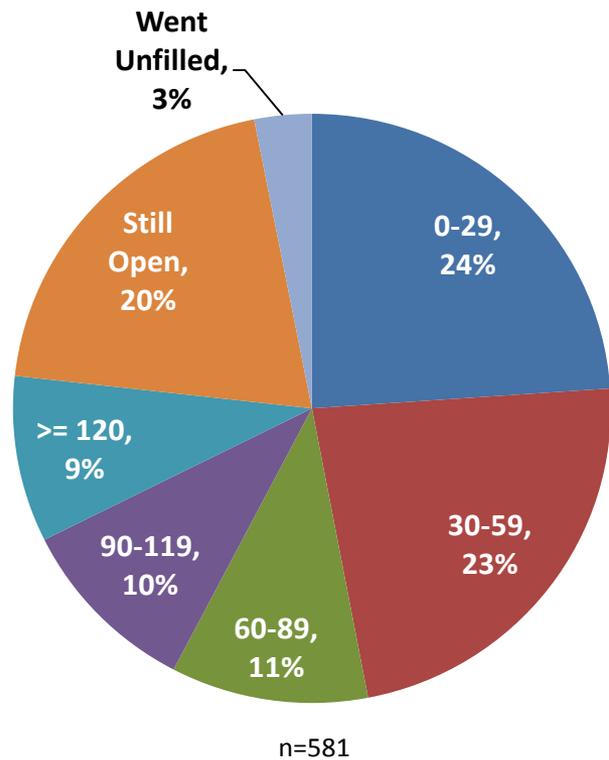


Number of Days Difficult-to-Fill Jobs Remained Open

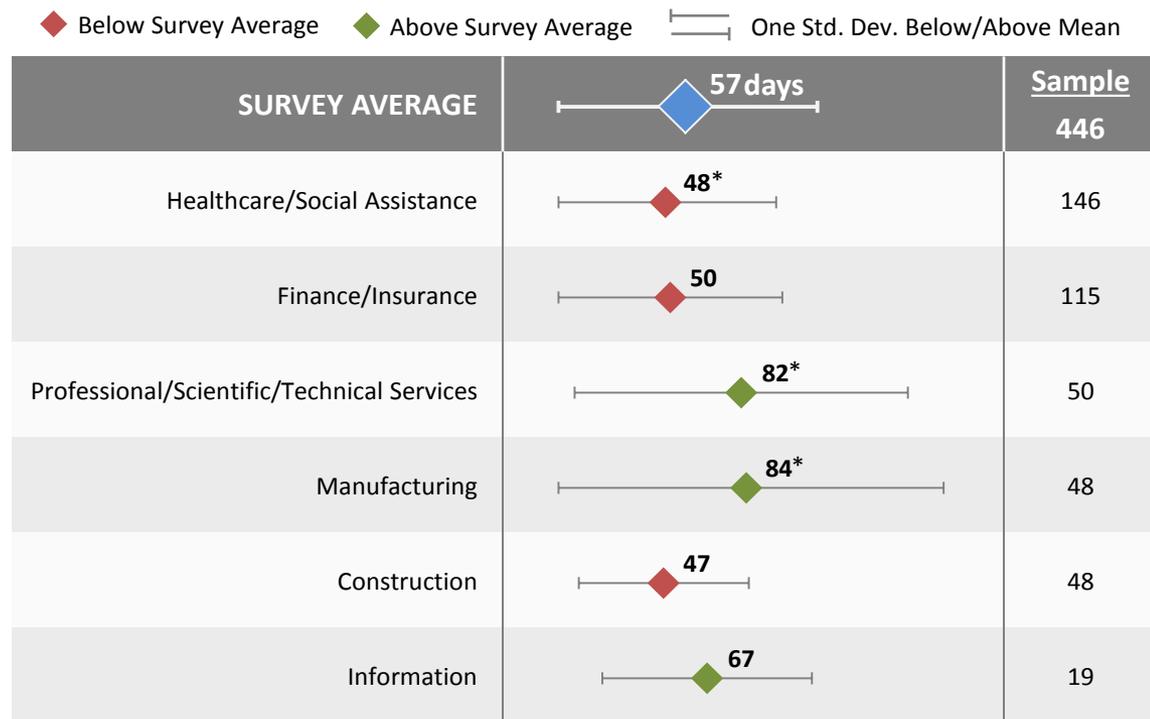
QUESTION: On average, about **how many days** were your establishment's [Difficult-to-Fill Job Title] positions open before you found a candidate to fill the vacancy? (Please note if the position is still open or went unfilled).

RESULTS: Nearly half of the respondents indicated that it took less than 60 days to fill their most difficult-to-fill occupations. On average, difficult-to-fill jobs stayed open for 57 days. Industry sectors with the highest education and experience requirements as well as those with relatively high offered wages generally remained open longer. Occupations in Manufacturing as well as Professional, Scientific and Technical Services were open longer than 80 days.

The number of days difficult-to-fill occupations stayed open:



Average number of days difficult-to-fill occupations stayed open by industry sector:



* Indicates that the observed data for a given industry sector is significantly different from the aggregate data of the other industry sectors ($p < 0.01$).

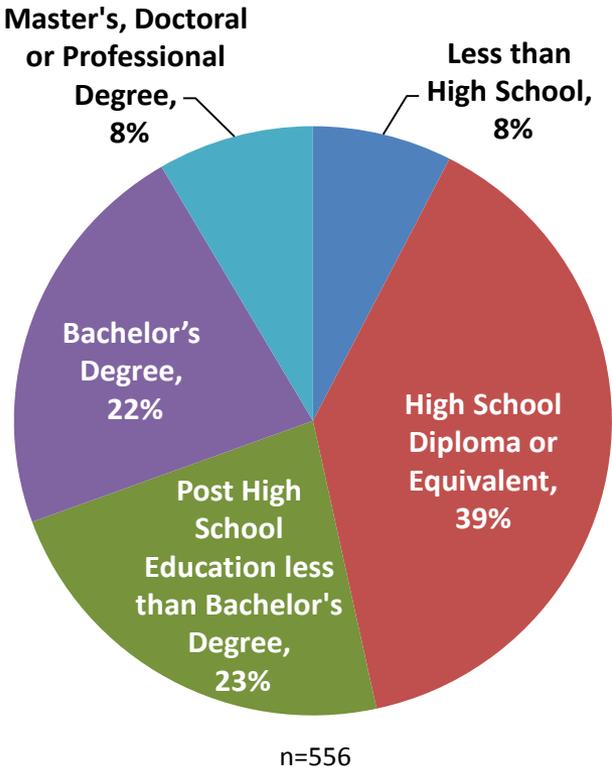
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Education Expectations for Difficult-to-Fill Job Candidates

QUESTION: In general, what level of education does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs advertised education beyond a high school diploma or equivalent. However, establishments required a high school education more often than any other specific level of educational attainment. Industry sectors that advertised higher levels of educational attainment for their difficult-to-fill job openings (e.g. Professional, Scientific and Technical Services) generally offered higher wages, while industry sectors that offered lower wages for their difficult-to-fill job openings (e.g. Finance and Insurance) commonly required lower levels of educational attainment.

Level of education advertised for difficult-to-fill jobs:



Level of education advertised for difficult-to-fill jobs by industry sector:

- High School Diploma or Equivalent
- Post High School Education less than Bachelor's
- Bachelor's Degree
- Other

Industry Sector	SURVEY AVERAGE				Sample
	High School Diploma or Equivalent	Post High School Education less than Bachelor's	Bachelor's Degree	Other	
	39%	23%	22%	16%	556
Healthcare/Social Assistance	31%	33%	17%	19%	186
Finance/Insurance	63%	13%	18%	7%	131
Construction	49%	26%	6%	18%	77
Professional/Scientific/Technical Services	8%	20%	52%	21%	66
Manufacturing	44%	11%	27%	18%	55
Information	32%	18%	45%	5%	22
Wholesale Trade	20%	50%	30%		10

*† Indicates that the observed data for a given industry sector is **NOT** significantly different from the aggregate data of the other industry sectors ($p < 0.01$). Meaning that unmarked industry sector data **ARE** significantly different from the aggregate.*

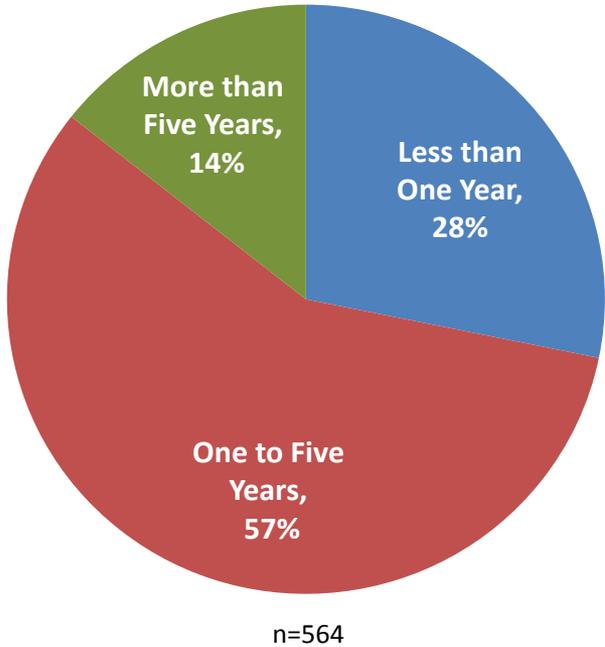
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Experience Expectations for Difficult-to-Fill Job Candidates

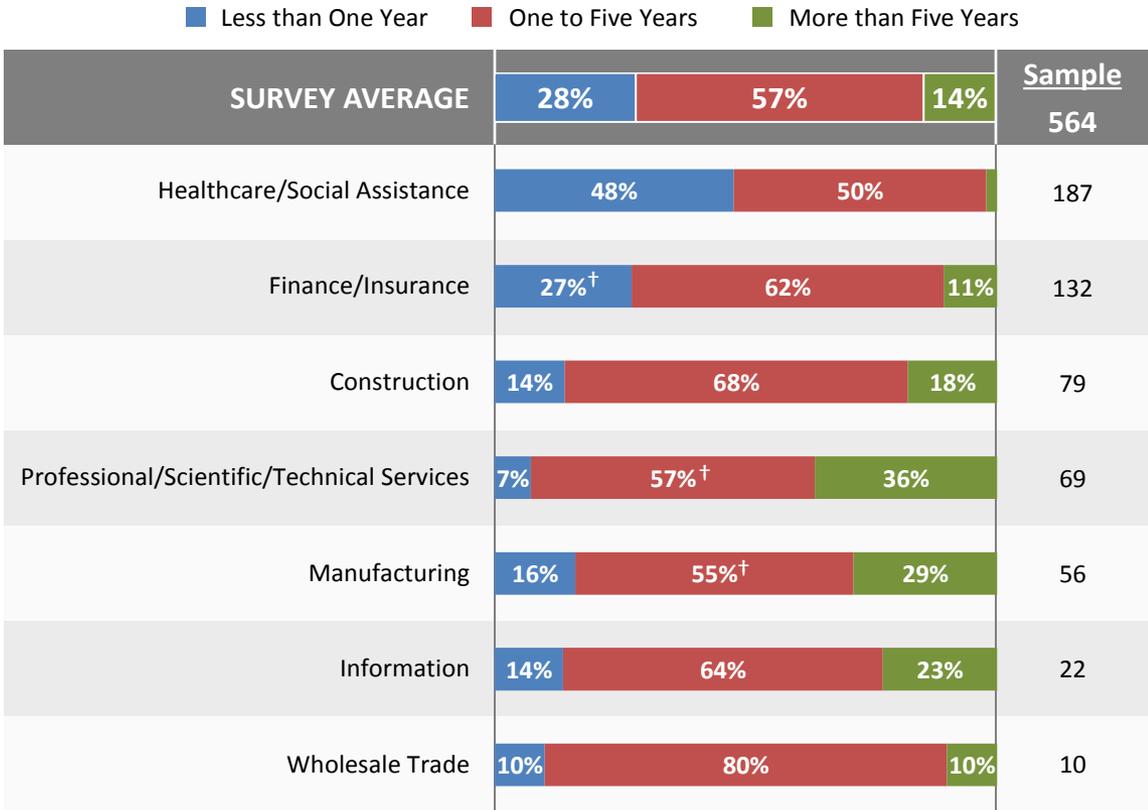
QUESTION: In general, what level of **work experience** does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs did not require more than five years of experience. In order to qualify, candidates were generally expected to have between one and five years of experience. Similar to educational attainment, higher paying industry sectors tended to require higher levels of experience. Occupations in the Professional, Scientific and Technical Services industries were the least likely to advertise less than one year of experience as a prerequisite. Occupations in the Healthcare and Social Assistance industries were the most likely to advertise less than one year of experience.

Level of experience advertised for difficult-to-fill jobs:



Level of experience advertised for difficult-to-fill jobs by industry sector:



[†] Indicates that the observed data for a given industry sector is **NOT** significantly different from the aggregate data of the other industry sectors ($p < 0.01$). Meaning that unmarked industry sector data **ARE** significantly different from the aggregate.

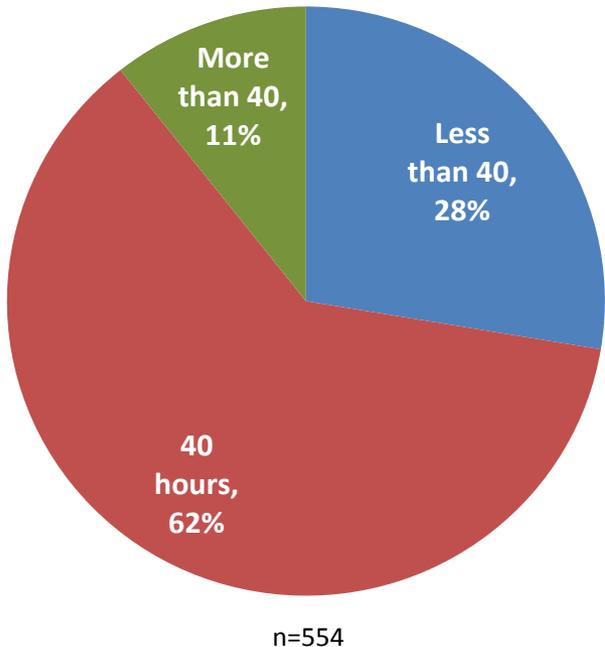
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Weekly Hours Expected to Work in Difficult-to-Fill Jobs

QUESTION: For [Difficult-to-Fill Job Title], how many hours per week are candidates generally expected to work?

RESULTS: Respondents indicated that difficult-to-fill occupations were generally full-time jobs, requiring 40 hours a week or more. However, some industry sectors were composed of more part-time jobs than others. There were three industry sectors that averaged an expected work week of less than 40 hours, and three industry sectors that averaged more than 40 hours per week. The industry sector in which difficult-to-fill occupations averaged the fewest hours per week, and the highest proportion of part-time jobs, was Healthcare and Social Assistance.

The number of hours difficult-to-fill job candidates are expected to work:



Average number of hours difficult-to-fill job candidates are expected to work by industry sector:

◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

SURVEY AVERAGE	37 hours	Sample
Healthcare/Social Assistance	33*	181
Finance/Insurance	37	132
Construction	42*	79
Professional/Scientific/Technical Services	40*	68
Manufacturing	42*	53
Information	38	22
Wholesale Trade	42	10

* Indicates that the observed data for a given industry sector is significantly different from the aggregate data of the other industry sectors ($p < 0.01$).

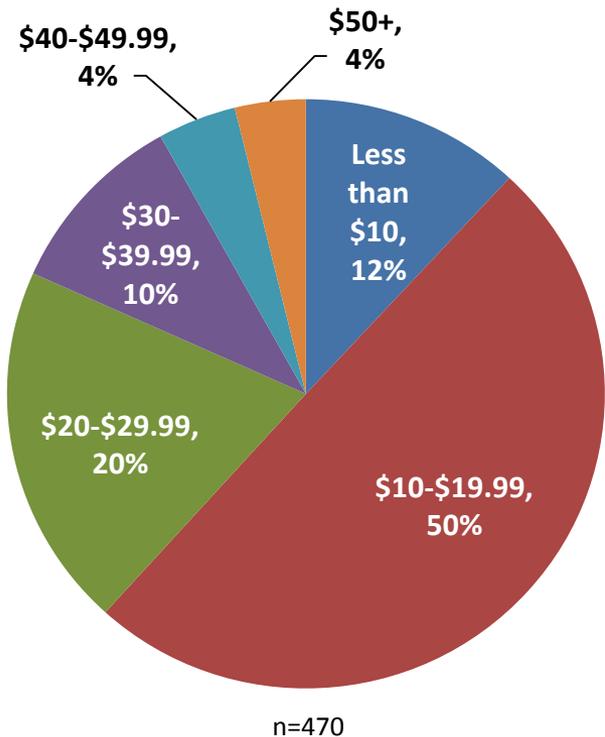
NOTE: Excludes "Refused to Answer", "Don't Know" and "Other" responses.

Offered Compensation for Difficult-to-Fill Jobs

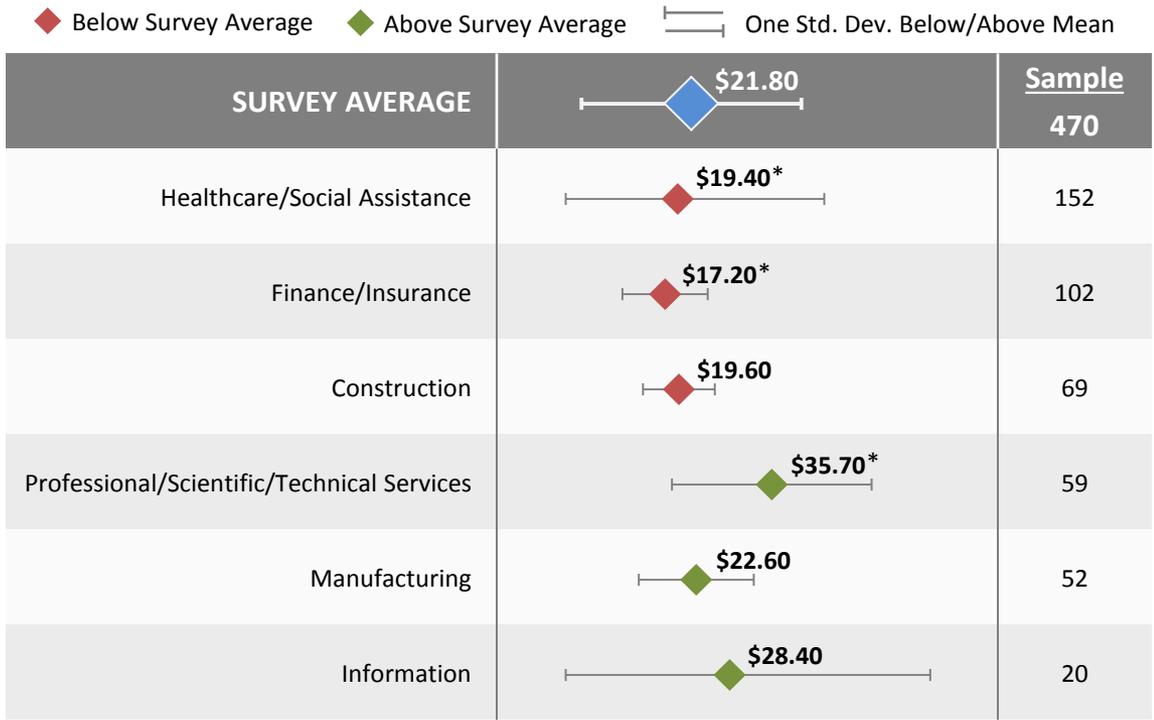
QUESTION: On average, what is the **compensation offered**, excluding benefits, to [Difficult-to-Fill Job Title]?

RESULTS: The average hourly compensation offered for difficult-to-fill jobs was nearly \$22, though over 60% of respondents offered wages below \$20 an hour. The level of offered wages for difficult-to-fill jobs correlates with the levels of both education and experience requirements. Offered wages were highest for occupations in the industry sectors in which expected education and experience levels were significantly higher than the survey averages. Education and experience requirements were lower for occupations in industries that offered relatively low wages for difficult-to-fill jobs.

The hourly compensation offered to candidates of difficult-to-fill occupations:



Average hourly compensation offered to candidates of difficult-to-fill occupations by industry sector:



NOTE: Excludes "Refused to Answer", "Don't Know", "other", and commission based wage responses.

* Indicates that the observed data for a given industry sector is significantly different from the aggregate data of the other industry sectors (p < 0.01).

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select ALL of the reasons you believe [Difficult-to-Fill Job Title] openings were difficult to fill.

RESULTS: The top three reasons that respondents selected as their biggest hiring challenge were cited far more often than any other reason. Yet, other reasons were also quite relevant to some industry sectors. For example, while respondents identified “lack of applicants” as the number-one challenge they face when hiring for difficult-to-fill jobs, “lack of training” and “lack of soft skills” were significant to the Wholesale Trade industry.

Reasons difficult-to-fill occupations presented hiring challenges by industry sector:

SURVEY AVERAGE	Lack of Applicants		Lack of Job Specific KSAs		Lack of Work Experience		Lack of Training		Lack of Soft Skills		Lack of Certification or License		Low Wages		Challenging Working Conditions		Demanding Education Requirements		Other		Sample
	69%		63%		62%		36%		33%		24%		22%		22%		20%		5%		
	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	
Healthcare/Social Assistance	77%	1	49%	3	51%	2	28%	7	34%	5	29%	6	38%	4	26%	8	21%	9	7%	10	199
Finance/Insurance	65%	3	74%	1	71%	2	47%	4	43%	5	16%	7	12%	9	19%	6	14%	8	3%	10	139
Professional/Scientific/Technical Services	65%	1	64%	2	57%	3	30%	4 ^T	30%	4 ^T	25%	6	11%	7	7%	9	27%	5	4%	9	81
Construction	68%	3	71%	1	69%	2	48%	4	26%	7	36%	5	19%	8 ^T	33%	6	19%	8 ^T	4%	9	80
Manufacturing	61%	2	71%	1 ^T	71%	1 ^T	25%	3	16%	5	18%	4 ^T	14%	6	18%	4 ^T	13%	7	7%	8	56
Information	74%	3	87%	1	78%	2	48%	4	39%	5	4%	9	13%	8	26%	7	30%	6	0%	N/A	23
Wholesale Trade	60%	3 ^T	70%	2	90%	1	60%	3 ^T	60%	3 ^T	50%	4 ^T	30%	5	10%	6	50%	4 ^T	0%	N/A	10

NOTE: Excludes “Refused to Answer,” “Don’t Know,” “other,” and commission based wage responses.

“Rk” is the rank order of the reason for each occupational group; “T” represents a tie in the order.

Most Important KSAs for Difficult-to-Fill Jobs

QUESTION: Please list the **three most important knowledge, skills or abilities (KSAs)** needed to be a successful [Difficult-to-Fill Job Title].

RESULTS: Soft KSAs were mentioned more often than hard KSAs, even though knowledge of “Computers and Electronic or Engineering and Technology” rated as the single most important KSA. Certain industry sectors, like those more heavily associated with STEM jobs, identified hard KSAs more often than others. The proportion of respondents that valued hard KSAs was particularly elevated for the occupations in the Professional, Scientific and Technical industries. Soft KSAs were substantially important for occupations in the Healthcare and Social Assistance as well as the Finance and Insurance industries.

Specific knowledge, skills or abilities (KSAs) cited as most important for difficult-to-fill jobs:

■ Hard KSAs ■ Soft KSAs

		<u>Sample</u>
Computers/Electronics or Engineering/Technology	10%	147
Professionalism, Conduct or Ethics	7%	99
Teamwork, People Skills or Social Intelligence	6%	97
Attitude, Flexibility or Manageability	6%	93
Customer Service or Service Orientation	6%	84
Time/Project Management	6%	83
Hard Working, Self-Starter or Motivated	5%	78
Medicine & Dentistry	5%	68
Communication (Written & Verbal) or Listening	4%	66
Sales & Marketing	4%	64

Most important knowledge, skills or abilities (KSAs) needed to be successful in difficult-to-fill occupations by industry sector:

■ Hard KSAs ■ Soft KSAs ■ Other

SURVEY AVERAGE	Top Ranked KSA			Sample	
	Hard KSAs	Soft KSAs	Other		
	38%	50%	12%	Computers/Electronics or Engineering/Technology 10%	1,502
Healthcare/Social Assistance	26%	61%	13%	Medicine & Dentistry 13%	503
Finance/Insurance	32%	57%	11%	Customer Service or Service Orientation 13%	363
Construction	41%	44%	15%	Building & Construction 18%	206
Professional/Scientific/Technical Services	66%	31%	3%	Computers/Electronics or Engineering/Technology 44%	169
Manufacturing	56%	31%	14%	Production & Processing or Operation & Control 17%	147
Information	45%	44%	11%	Computers/Electronics or Engineering/Technology 21%	66
Wholesale Trade	38%	50%	13%	Other Soft Skill 13%	24

NOTE: Excludes “Refused to Answer” and “Don’t Know” responses.

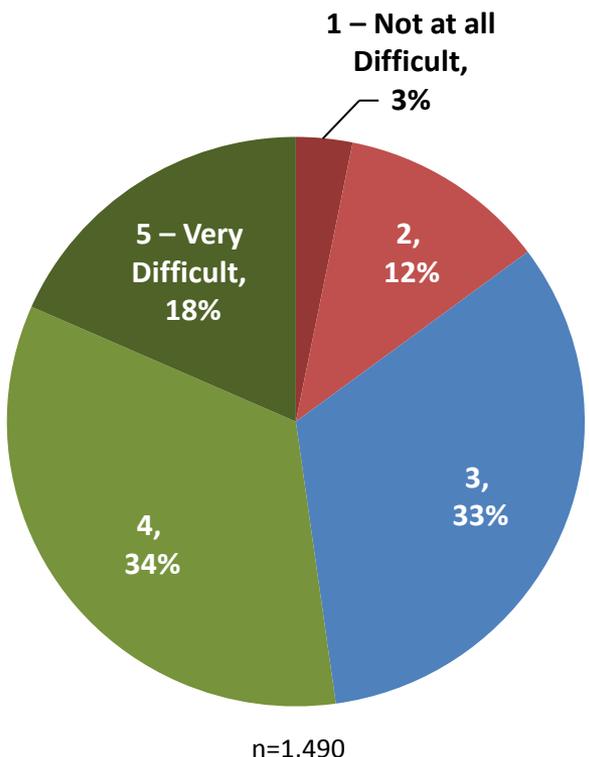
Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among industry sectors.

Difficulty Finding Candidates with the Necessary KSAs

QUESTION: Identify how difficult it is for your establishment to find [Difficult-to-Fill Job Title] applicants with [Knowledge, Skill or Ability] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: The majority of respondents felt that it was “difficult” to find applicants with the most important KSAs. On average, getting applicants with the right KSAs proved to be most difficult in the Wholesale Trade and Information industries. Among the industry sectors in which finding applicants with the most important KSAs was least difficult were Healthcare and Social Assistance as well as Finance and Insurance.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among industry sectors.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success by industry sector:

Industry Sector	Difficulty Level Distribution			Survey Average	Sample Size
	Not Difficult	Difficult	Very Difficult		
SURVEY AVERAGE	15%	52%	33%	3.5	1,490
Healthcare/Social Assistance	17%	51%	31%	3.5	500
Finance/Insurance	17%	46%	37%	3.4	366
Construction	11%	57%	32%	3.7	197
Professional/Scientific/Technical Services	11%	54%	35%	3.6	170
Manufacturing	9%	61%	31%	3.7	147
Information	11%	63%	25%	3.7	63
Wholesale Trade	13%	61%	26%	3.8	23

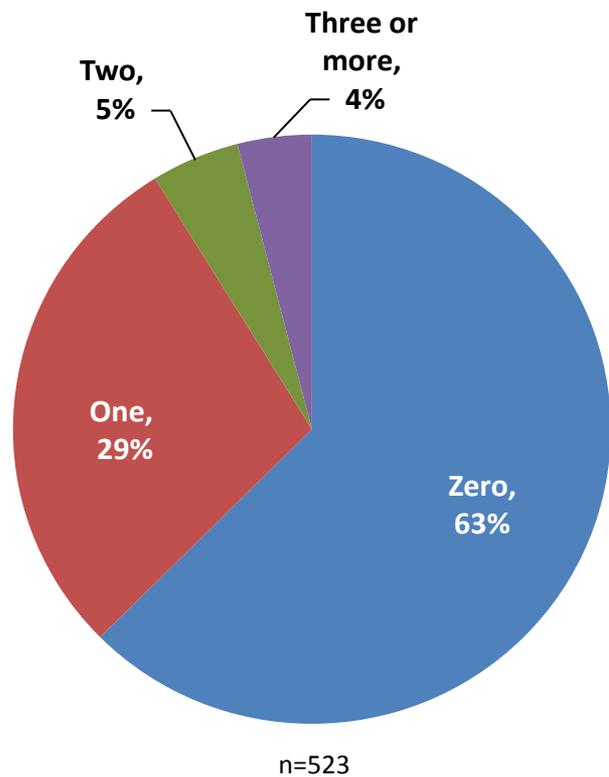
◆ Below Survey Average
 ◆ Above Survey Average
 — One Std. Dev. Below/Above Mean

Number of Licenses and Certifications for Difficult-to-Fill Jobs

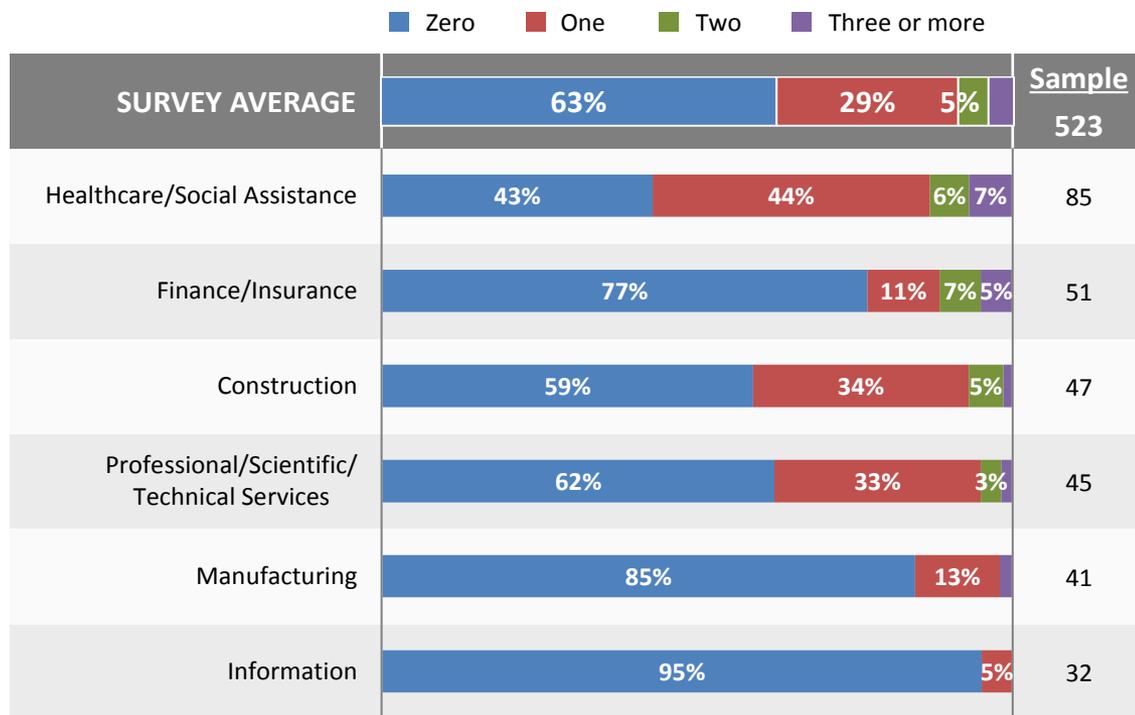
QUESTION: In general, how many vocational or professional licenses or certifications does your establishment advertise as necessary for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of the difficult-to-fill occupations surveyed did not require a license or certification to qualify for the position. That trend held true for all of the industry sectors except Healthcare and Social Assistance, where 57 percent of the difficult-to-fill jobs required at least one license or certification.

Number of licenses and certifications advertised for difficult-to-fill jobs:



Number of licenses and certifications advertised for difficult-to-fill jobs by industry sector :



NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Licenses and Certifications for Difficult-to-Fill Jobs

QUESTION: Please list the licenses or certifications **your establishment requires** of [Difficult-to-Fill Job Title] applicants.

RESULTS: Of those difficult-to-fill occupations that required a license or certification, medical licenses were the most common designation. Occupations in the Healthcare and Social Assistance industries required licensing at a far greater rate than any other industry sector.

Licenses and certifications required for difficult-to-fill occupations:

(of those that require at least one license or certification)

		Sample
Medical License/Certification	28%	75
Industry Association License/Certification	16%	43
Financial License/Certification	14%	38
Social Work License/Certification	9%	25
Permits/Specialized Training	8%	21
Registered Nurse	8%	21
Degree/Experience	4%	11
Truck/Drivers License	4%	11
Insurance License	3%	9
Accounting/CPA License	3%	7
Specialized Information Technology	2%	6
Legal License/Bar Exam	0%	1

Licenses and certifications required for difficult-to-fill occupations by industry sector :

SURVEY AVERAGE	Most Often Cited Licenses & Certifications		Sample
	First Most Often	Second Most Often	
	Medical 28%	Industry Association 16%	268
Healthcare/Social Assistance	Medical 59%	Social Work 35%	141
Finance/Insurance	Financial 89%	Insurance 6%	50
Construction	Industry Association 58%	Truck/Drivers License 17%	36
Professional/Scientific/Technical Services	Industry Association 25%	Specialized Information Technology 20%	27

NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

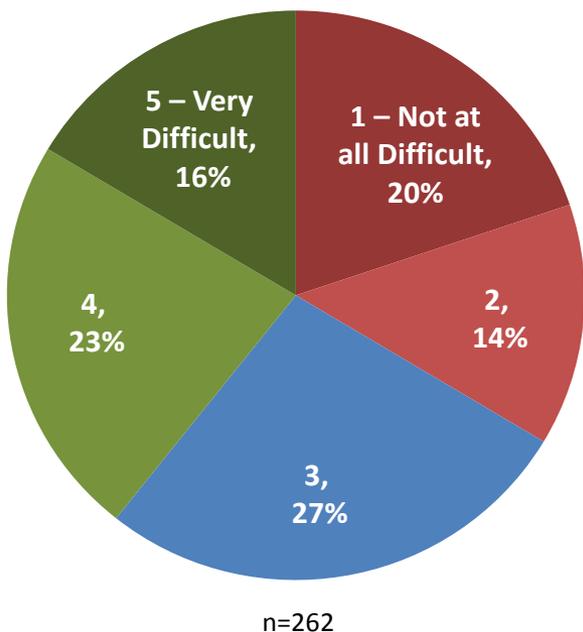
Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.

Difficulty Finding Candidates with Required Licenses and Certification

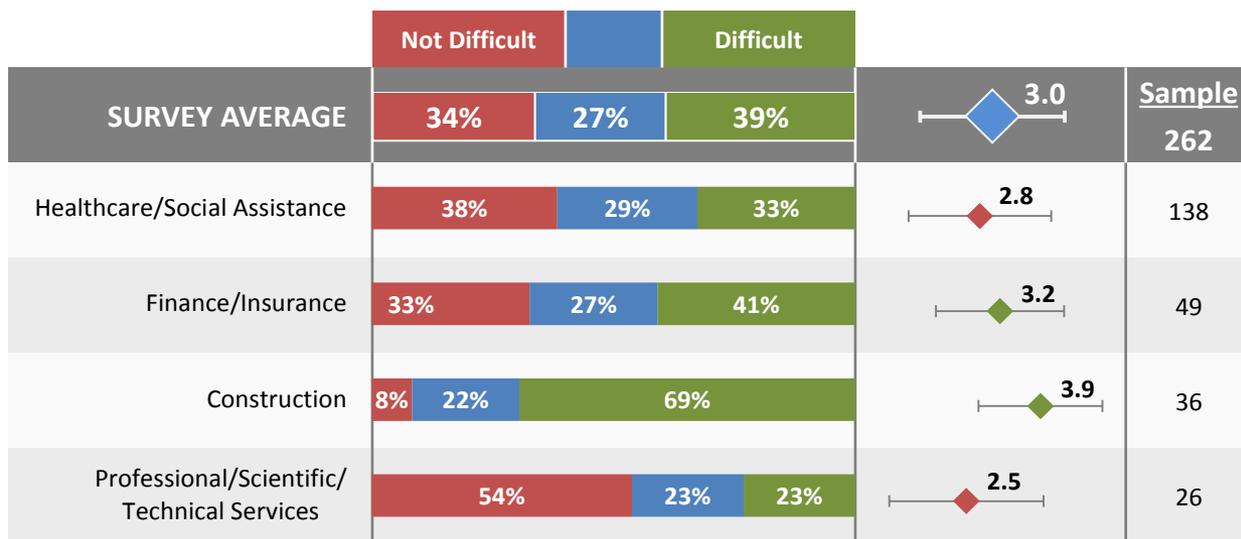
QUESTION: Identify how difficult it is to find [Difficult-to-Fill Job Title] applicants with [License or Certification] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: Respondent data suggests that it was less difficult to find candidates with the requisite license or certification than it was to find the most important KSAs for difficult-to-fill jobs. Additionally, the industry sector in which occupations were most likely to require licensing, Healthcare and Social Assistance, was among those least likely to have had difficulty finding candidates with proper certification.

Difficulty finding candidates with the required licenses or certifications:



Difficulty finding candidates with the required licenses or certifications by industry sector :



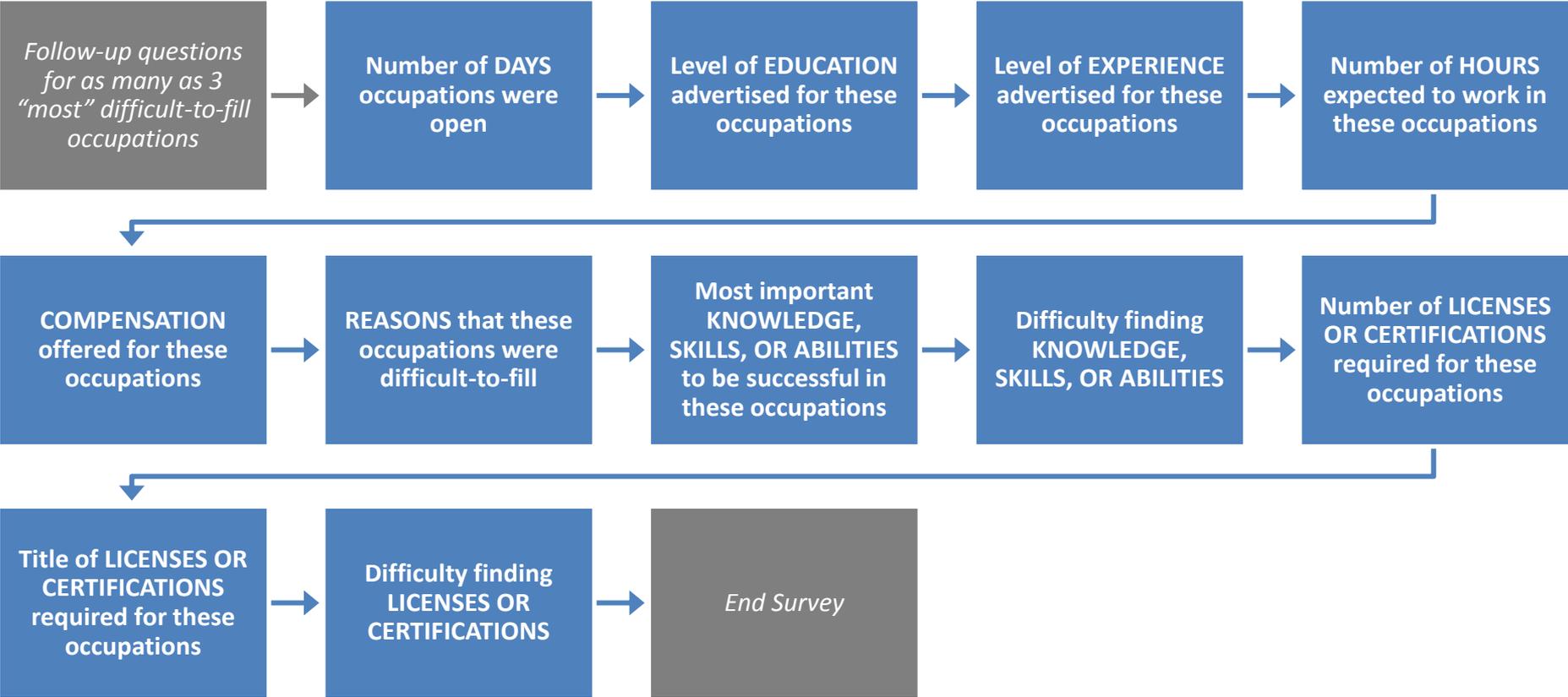
◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

NOTE: Excludes “Refused to Answer” and “Don’t Know” responses.

Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.

APPENDIX F: Establishment Size Segmentation

The following data cover the specific questions asked of respondents with at least one difficult-to-fill occupation. The results have been segmented by the three categories of employment size for each establishment.

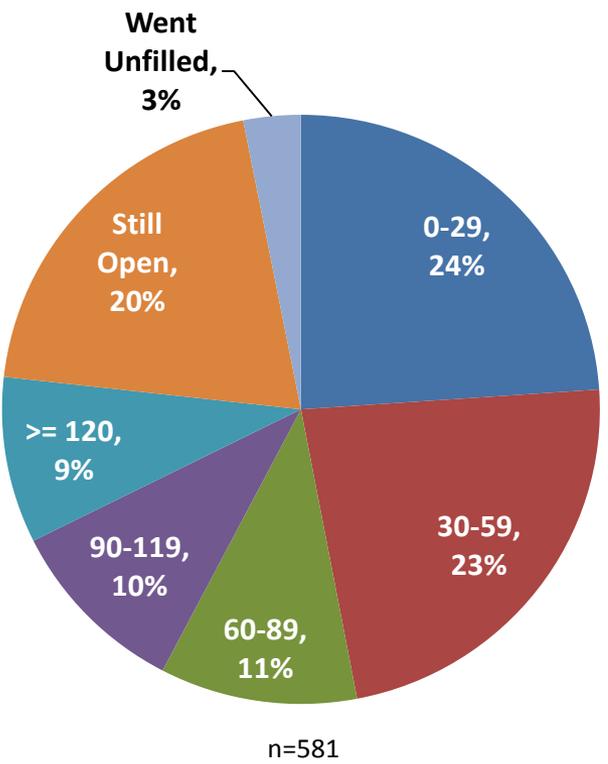


Number of Days Difficult-to-Fill Jobs Remained Open

QUESTION: On average, about **how many days** were your establishment's [Difficult-to-Fill Job Title] positions open before you found a candidate to fill the vacancy? (Please note if the position is still open or went unfilled).

RESULTS: Nearly half of the respondents indicated that it took less than 60 days to fill their most difficult-to-fill occupations. On average, difficult-to-fill jobs stayed open for 57 days. Difficult-to-fill occupations at larger establishments, which had higher education and experience requirements and offered higher wages, generally remained open longer. Occupations in establishments with more than 250 employees were open for an average of 82 days.

The number of days difficult-to-fill occupations stayed open:



Average number of days difficult-to-fill occupations stayed open by establishment size:

◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

	SURVEY AVERAGE	Sample
	57 days	446
Less than 50 Employees	48*	299
50 to 249 Employees	73*	107
Greater than 250 Employees	82*	40

NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

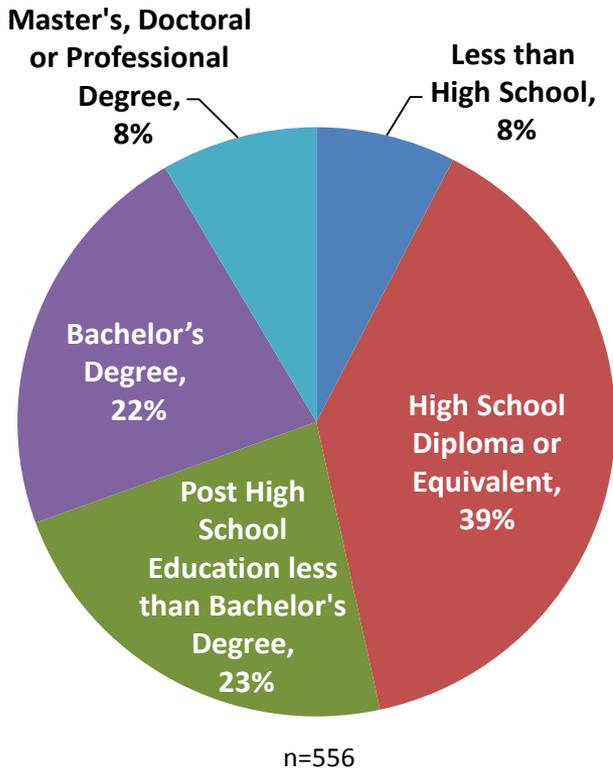
* Indicates that the observed data for a given establishment size category is significantly different from the aggregate data of the other establishment size categories (p < 0.01).

Education Expectations for Difficult-to-Fill Job Candidates

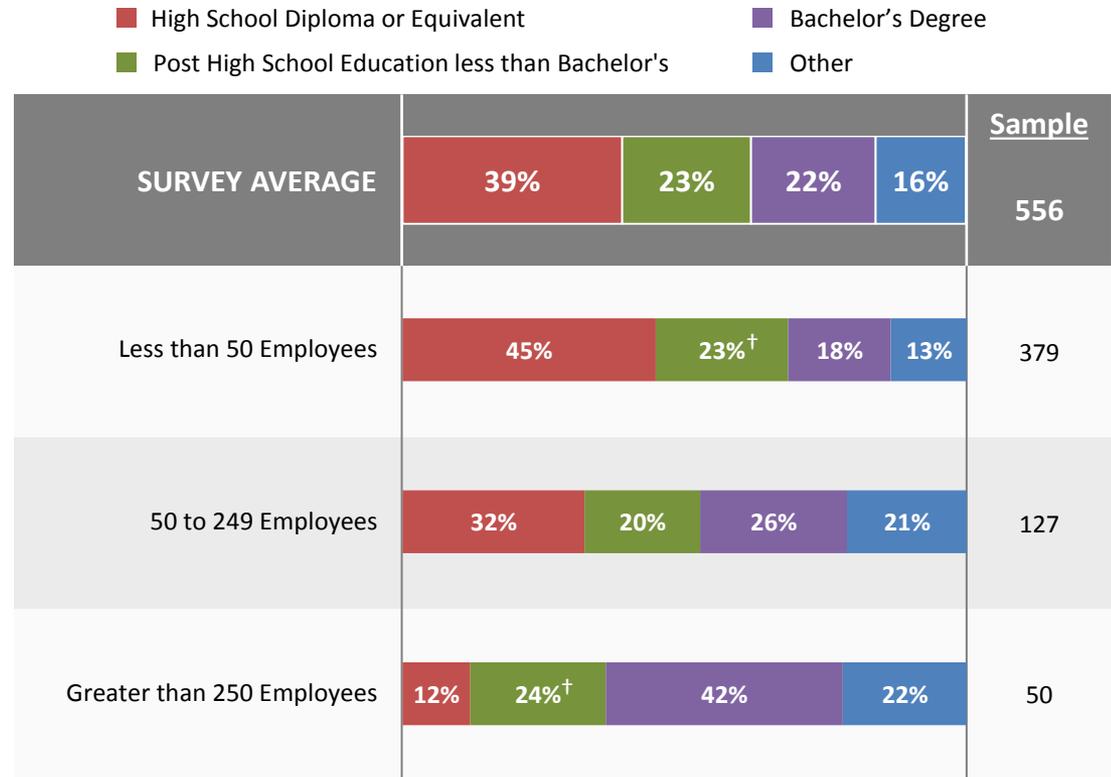
QUESTION: In general, what level of education does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs advertised education beyond a high school diploma or equivalent. However, establishments required a high school education more often than any other specific level of educational attainment. Higher levels of advertised educational attainment correlated with higher paying occupations. On average, larger establishments advertised higher levels of educational attainment for their difficult-to-fill jobs and offered higher wages, while smaller establishments offered lower wages for their difficult-to-fill jobs and required lower levels of educational attainment.

Level of education advertised for difficult-to-fill jobs:



Level of education advertised for difficult-to-fill jobs by establishment size:



[†] Indicates that the observed data for a given establishment size category is **NOT** significantly different from the aggregate data of the other establishment size categories ($p < 0.01$). Meaning that unmarked industry sector data **ARE** significantly different from the aggregate.

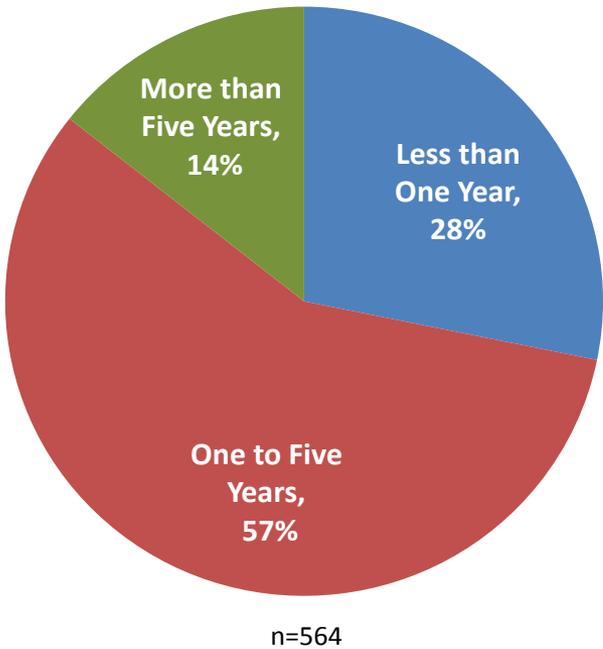
NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Experience Expectations for Difficult-to-Fill Job Candidates

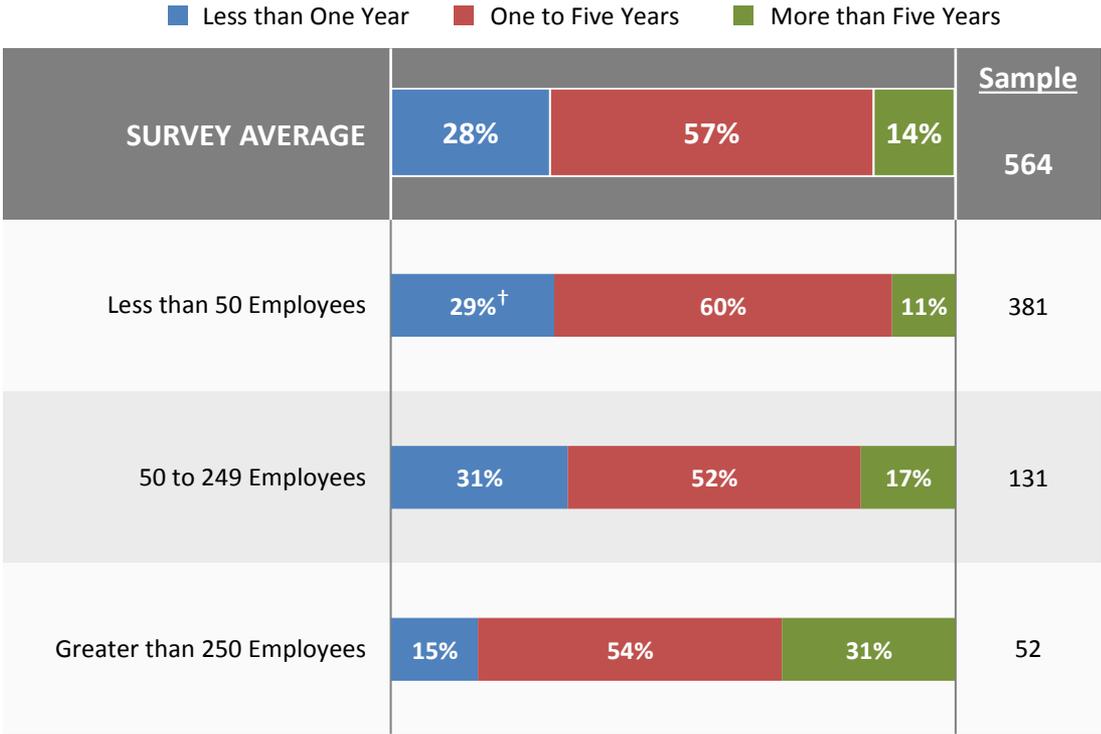
QUESTION: In general, what level of **work experience** does your establishment advertise for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of difficult-to-fill jobs did not require more than five years of experience. In order to qualify, candidates were generally expected to have between one and five years of experience. Similar to educational attainment, difficult-to-fill occupations at establishments with over 250 employees tended to require higher levels of experience.

Level of experience advertised for difficult-to-fill jobs:



Level of experience advertised for difficult-to-fill Jobs by establishment size:



NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

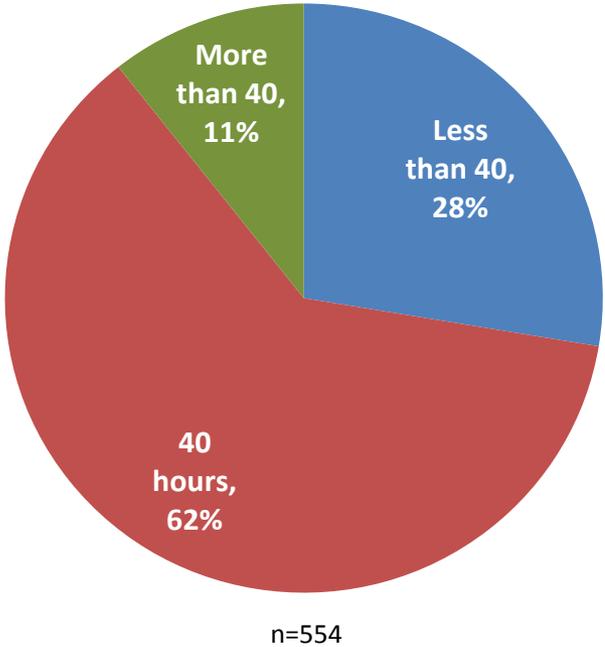
[†] Indicates that the observed data for a given establishment size category is **NOT** significantly different from the aggregate data of the other establishment size categories ($p < 0.01$). Meaning that unmarked industry sector data **ARE** significantly different from the aggregate.

Weekly Hours Expected to Work in Difficult-to-Fill Jobs

QUESTION: For [Difficult-to-Fill Job Title], how many hours per week are candidates generally expected to work?

RESULTS: Respondents indicated that difficult-to-fill occupations were generally full-time jobs, requiring 40 hours a week or more. However, smaller establishments were more likely composed of part-time jobs than establishments with over 250 employees. Occupations in both of the smaller establishment size categories averaged an expected work week of 37 hours, compared to the 42 hour work week for jobs at establishments larger than 250 employees.

The number of hours difficult-to-fill job candidates are expected to work:



Average number of hours difficult-to-fill job candidates are expected to work by establishment size:

◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

	SURVEY AVERAGE	Sample
	37 hours	554
Less than 50 Employees	37*	375
50 to 249 Employees	37	127
Greater than 250 Employees	42*	52

NOTE: Excludes "Refused to Answer," "Don't Know," and "Other" responses.

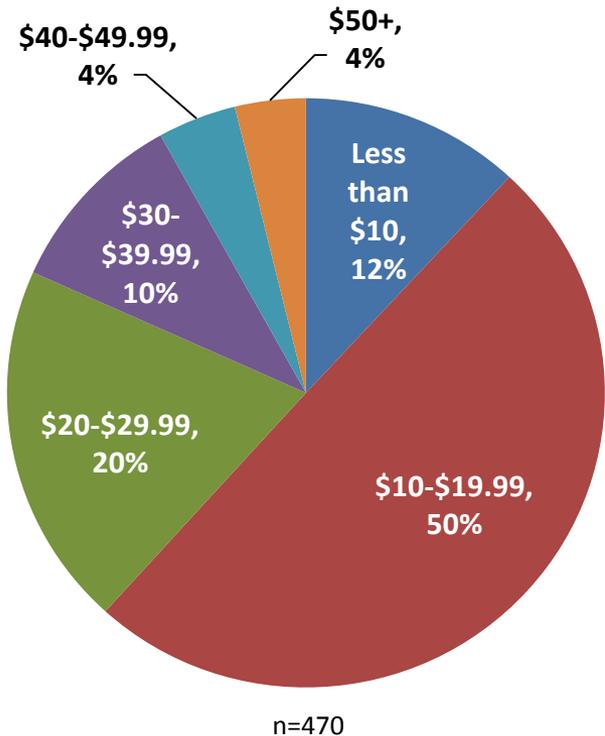
* Indicates that the observed data for a given establishment size category is significantly different from the aggregate data of the other establishment size categories (p < 0.01).

Offered Compensation for Difficult-to-Fill Jobs

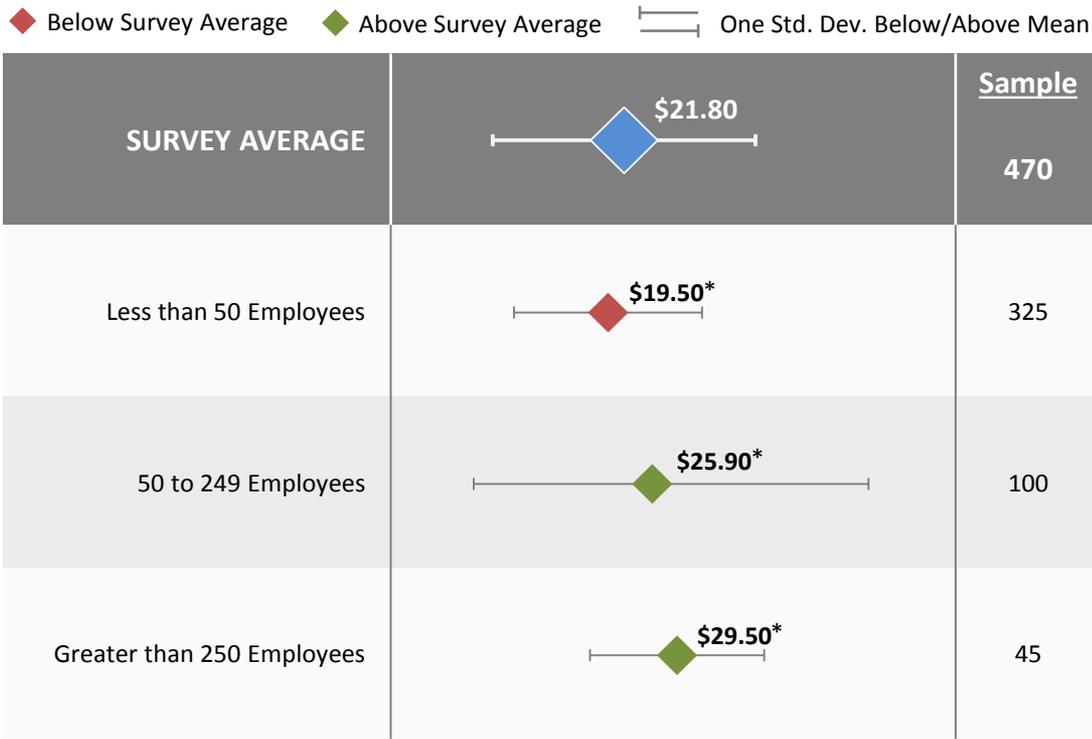
QUESTION: On average, what is the compensation offered, excluding benefits, to [Difficult-to-Fill Job Title]?

RESULTS: The average hourly compensation offered for difficult-to-fill jobs was nearly \$22, though over 60% of respondents offered wages below \$20 an hour. The level of offered wages for difficult-to-fill jobs correlates with the levels of both education and experience requirements. Offered wages were highest for occupations in the largest establishment size category, which also had the highest levels of advertised education and experience.

The hourly compensation offered to candidates of difficult-to-fill occupations:



Average hourly compensation offered to candidates of difficult-to-fill occupations by establishment size:



NOTE: Excludes "Refused to Answer", "Don't Know", "other", and commission based wage responses.

* Indicates that the observed data for a given establishment size category is significantly different from the aggregate data of the other establishment size categories (p < 0.01).

Reasons Difficult-to-Fill Occupations Present a Hiring Challenge

QUESTION: Please select **ALL** of the reasons you believe [Difficult-to-Fill Job Title] openings were difficult to fill.

RESULTS: The top three reasons that respondents selected as their biggest hiring challenge were cited far more often than any other reason. Yet, one reason proved to be more relevant for occupations in establishments with more than 250 employees than it was for the other establishment size categories. Respondents from large establishments ranked “lack of job-specific KSAs” as the number one challenge they face when hiring for difficult-to-fill jobs, while both smaller establishment sizes identified “lack of applicants” as the top issue.

Reasons difficult-to-fill occupations presented hiring challenges by establishment size:

SURVEY AVERAGE	Lack of Applicants		Lack of Job Specific KSAs		Lack of Work Experience		Lack of Training		Lack of Soft Skills		Lack of Certification or License		Low Wages		Challenging Working Conditions		Demanding Education Requirements		Other		Sample 600
	69%		63%		62%		36%		33%		24%		22%		22%		20%		5%		
	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	%	Rk	
Less than 50 Employees	71%	1	64%	2 ^T	64%	2 ^T	39%	3	38%	4	25%	5	24%	6	21%	7	20%	8	4%	9	405
50 to 249 Employees	69%	1	61%	2	57%	3	31%	4	26%	5	24%	6	19%	9	22%	7	20%	8	4%	10	140
Greater than 250 Employees	53%	3	62%	1	58%	2	29%	4	16%	8	20%	6	13%	9	24%	5	18%	7	7%	10	55

NOTE: Excludes “Refused to Answer,” “Don’t Know,” “other,” and commission based wage responses.

“Rk” is the rank order of the reason for each occupational group; “T” represents a tie in the order.

Most Important KSAs for Difficult-to-Fill Jobs

QUESTION: Please list the **three most important knowledge, skills or abilities (KSAs)** needed to be a successful [Difficult-to-Fill Job Title].

RESULTS: Soft KSAs were mentioned more often than hard KSAs, even though knowledge of “Computers and Electronic or Engineering and Technology” rated as the single most important KSA. Difficult-to-fill occupations are more heavily associated with STEM jobs at establishments with more than 250 employees, and respondents from these establishments identified hard KSAs more often than smaller establishments.

Specific knowledge, skills or abilities (KSAs) cited as most important for difficult-to-fill jobs:

■ Hard KSAs ■ Soft KSAs

		<u>Sample</u>
Computers/Electronics or Engineering/Technology	10%	147
Professionalism, Conduct or Ethics	7%	99
Teamwork, People Skills or Social Intelligence	6%	97
Attitude, Flexibility or Manageability	6%	93
Customer Service or Service Orientation	6%	84
Time/Project Management	6%	83
Hard Working, Self-Starter or Motivated	5%	78
Medicine & Dentistry	5%	68
Communication (Written & Verbal) or Listening	4%	66
Sales & Marketing	4%	64

Most important knowledge, skills or abilities (KSAs) needed to be successful in difficult-to-fill occupations by establishment size:

■ Hard KSAs ■ Soft KSAs ■ Other

	SURVEY AVERAGE			<u>Top Ranked KSA</u>	<u>Sample</u>
	38%	50%	12%		
Less than 50 Employees	35%	55%	10%	Computers/Electronics or Engineering/Technology 8%	1,050
50 to 249 Employees	43%	39%	18%	All Other 8%	326
Greater than 250 Employees	50%	39%	11%	Computers/Electronics or Engineering/Technology 29%	126

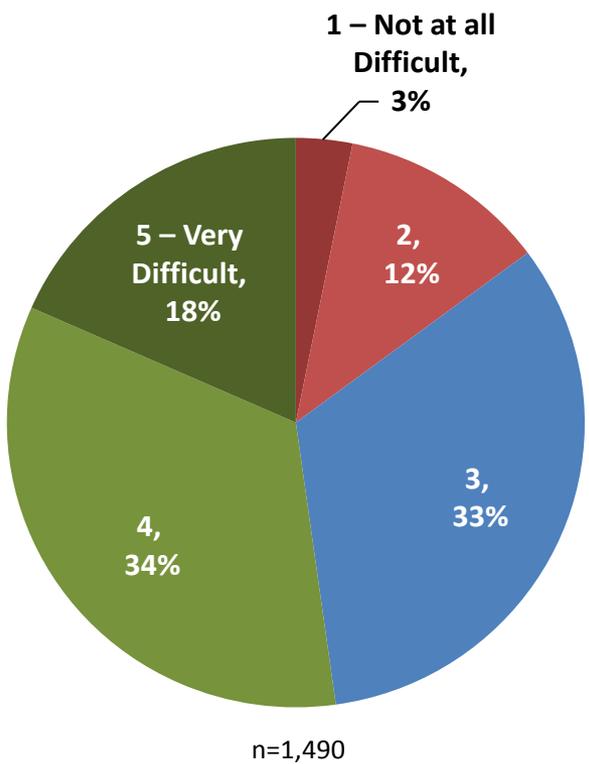
NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among establishment size categories.

Difficulty Finding Candidates with the Necessary KSAs

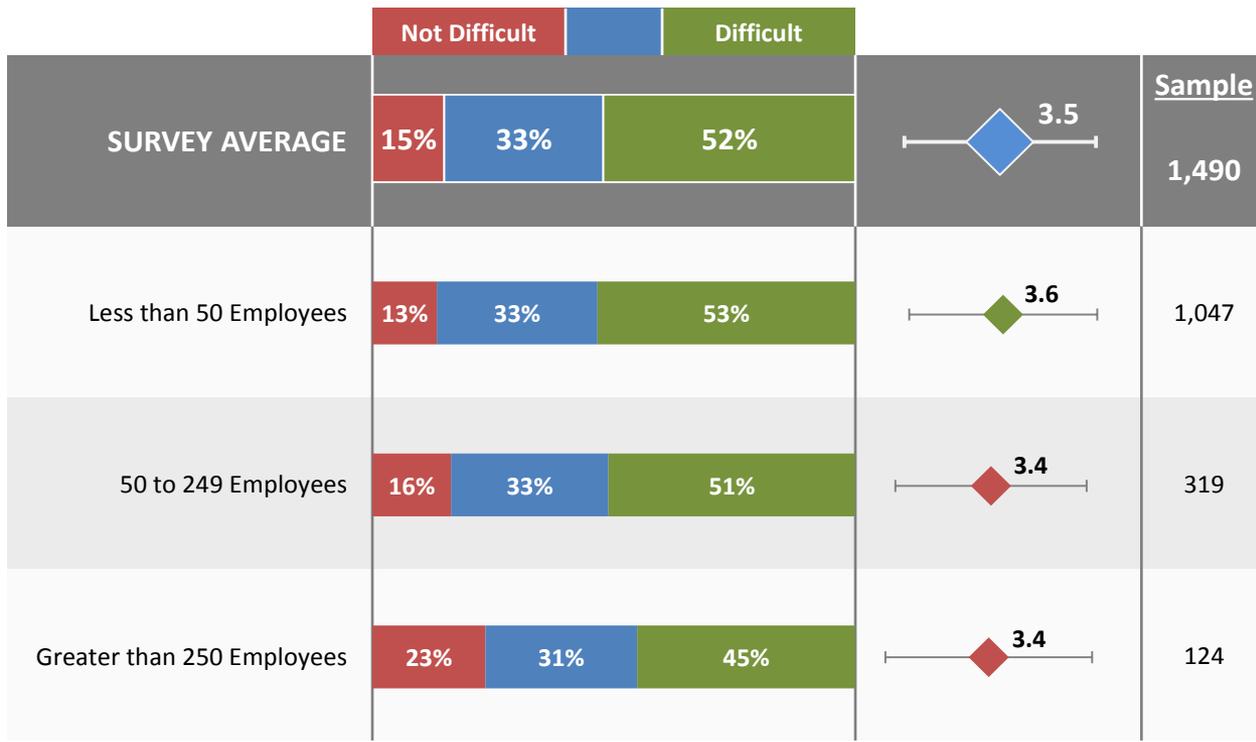
QUESTION: Identify how difficult it is for your establishment to find [Difficult-to-Fill Job Title] applicants with [Knowledge, Skill or Ability] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: The majority of respondents felt that it was “difficult” to find applicants with the most important KSAs. On average, getting applicants with the right KSAs proved to be most difficult for establishments with less than 50 employees. The perceived level of difficulty in finding the most important KSAs decreased as the establishment size categories increased.

Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success:



Difficulty finding candidates with the knowledge, skills or abilities (KSAs) most important to success by establishment size:



NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, data collection and aggregation methods for KSAs made statistical testing unreliable. Cannot report statistical significance among establishment size categories.

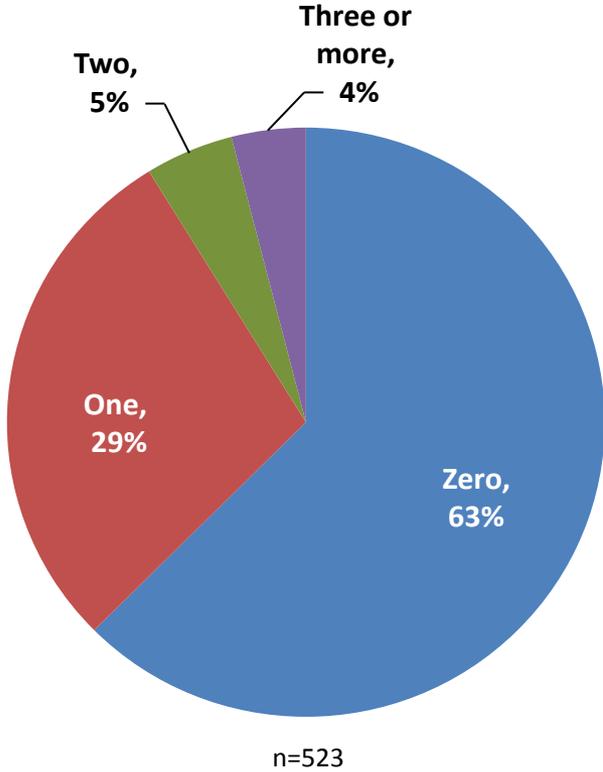
◆ Below Survey Average
 ◆ Above Survey Average
 — One Std. Dev. Below/Above Mean

Number of Licenses and Certifications for Difficult-to-Fill Jobs

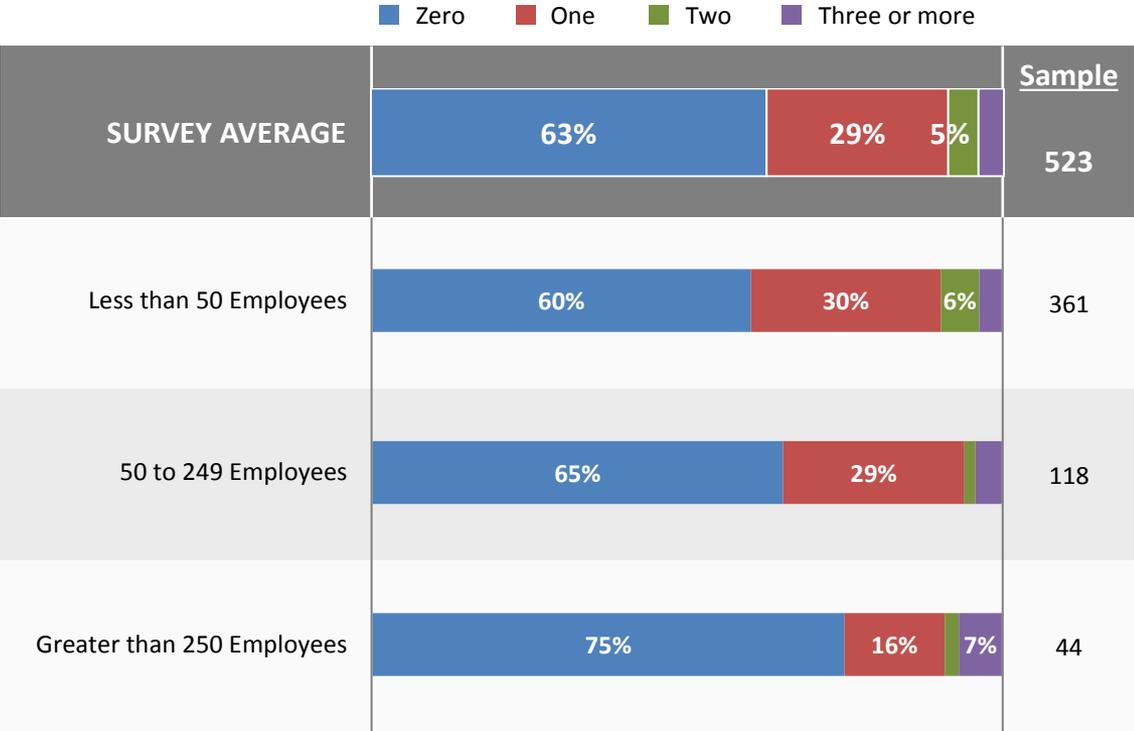
QUESTION: In general, how many vocational or professional licenses or certifications does your establishment advertise as necessary for [Difficult-to-Fill Job Title] applicants?

RESULTS: The majority of the difficult-to-fill occupations surveyed did not require a license or certification to qualify for the position. That trend held true for all of the establishment size categories.

Number of licenses and certifications advertised for difficult-to-fill jobs:



Number of licenses and certifications advertised for difficult-to-fill jobs by establishment size:



NOTE: Excludes "Refused to Answer" and "Don't Know" responses.

Licenses and Certifications for Difficult-to-Fill Jobs

QUESTION: Please list the licenses or certifications your establishment requires of [Difficult-to-Fill Job Title] applicants.

RESULTS: Of those difficult-to-fill occupations that required a license or certification, Medical Licenses were the most common designation.

Licenses and certifications required for difficult-to-fill occupations:

(of those that require at least one license or certification)

Licenses and Certifications	Percentage	Sample
Medical License/Certification	28%	75
Industry Association License/Certification	16%	43
Financial License/Certification	14%	38
Social Work License/Certification	9%	25
Permits/Specialized Training	8%	21
Registered Nurse	8%	21
Degree/Experience	4%	11
Truck/Drivers License	4%	11
Insurance License	3%	9
Accounting/CPA License	3%	7
Specialized Information Technology	2%	6
Legal License/Bar Exam	0%	1

Licenses and certifications required for difficult-to-fill occupations by establishment size:

SURVEY AVERAGE	Most Often Cited Licenses & Certifications		Sample
	First Most Often	Second Most Often	
	Medical 28%	Industry Association 16%	268
Less than 50 Employees	Medical 30%	Industry Association 18%	196
50 to 249 Employees	Medical 89%	Financial 6%	56
Greater than 250 Employees	Medical 58%	Registered Nurse 17%	16

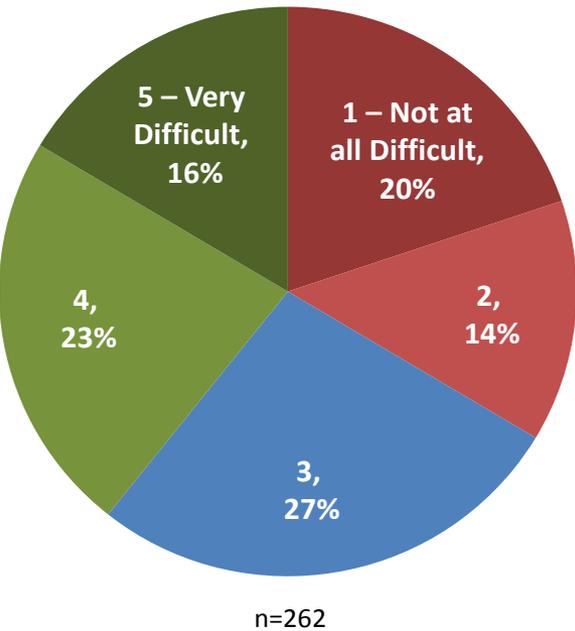
NOTE: Excludes "Refused to Answer" and "Don't Know" responses. Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.

Difficulty Finding Candidates with Required Licenses and Certification

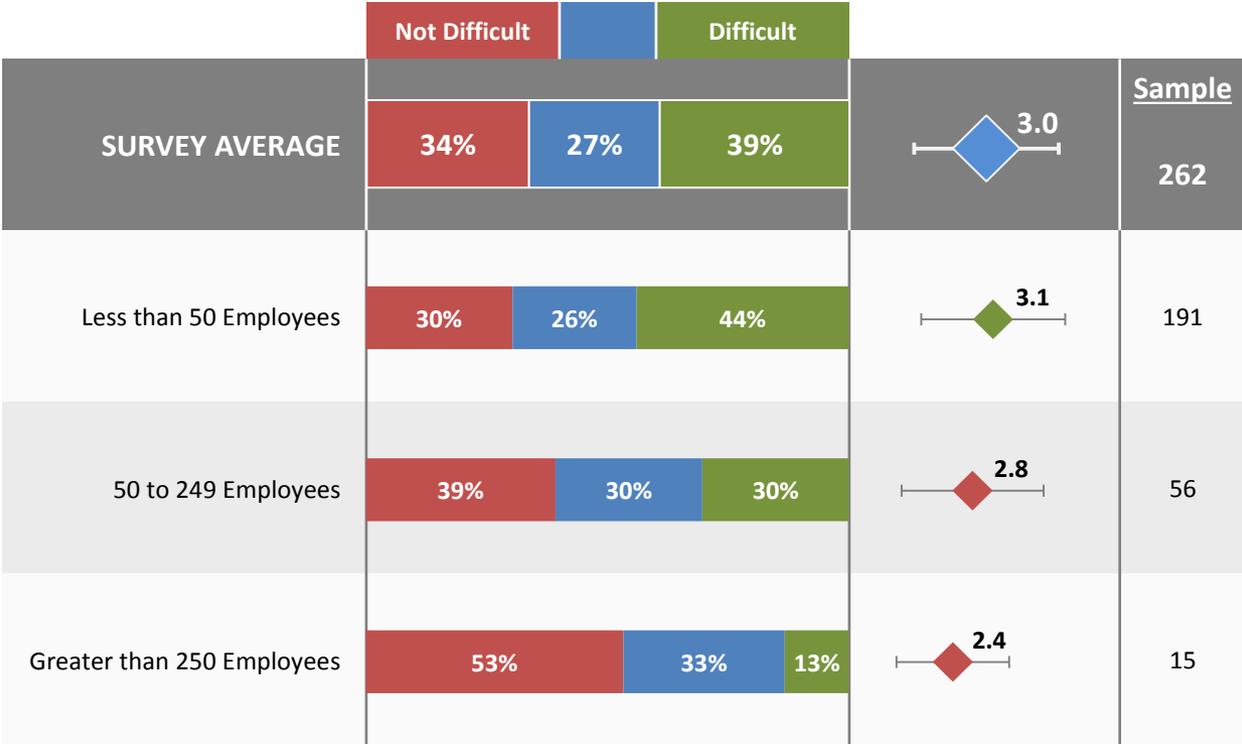
QUESTION: Identify how difficult it is to find [Difficult-to-Fill Job Title] applicants with [License or Certification] on a scale from one to five (where one means “not at all difficult to find” and five means “very difficult to find”).

RESULTS: Respondent data suggest that it was less difficult to find candidates with the requisite license or certification than it was to find the most important KSAs for difficult-to-fill jobs. Additionally, occupations in establishments with less than 50 employees were most likely to require licensing and least likely to have had difficulty finding candidates with proper certification.

Difficulty finding candidates with the required licenses or certifications:



Difficulty finding candidates with the required licenses or certifications by establishment size:



◆ Below Survey Average ◆ Above Survey Average — One Std. Dev. Below/Above Mean

NOTE: Excludes “Refused to Answer” and “Don’t Know” responses. Additionally, the data collection and aggregation process for licenses and certifications made statistical testing unreliable. Cannot report statistically significance differences between groups.