*Appendix E: O*NET Data Collection Program: Nonresponse Analysis for Analysis Cycles 1, 2, and 3*

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Executive Summary

The Occupational Information Network (O*NET) is a comprehensive system for collecting, organizing, describing, and disseminating information on occupational requirements, work requirements, and worker attributes. The O*NET database is designed to be the most comprehensive standard source of occupational and skill information in the United States, providing valid, reliable, and current data for all users.

O*NET data are collected primarily through the Establishment Method, which draws from a sample of establishments, and workers within those establishments. Each participating worker is asked to complete one of four randomly assigned survey questionnaires: Skills, Knowledge (including Education and Training, and Work Styles), Generalized Work Activities, and Work Context. Workers also complete a basic demographic questionnaire and a brief, occupation-specific task inventory.

This report investigates the possible extent of nonresponse in estimates from the O*NET Program. Nonresponse bias is the expected difference between an estimate from the responding cases and an estimate from all cases originally selected from the target population. Three types of nonresponse are examined in this report: establishment nonresponse, employee nonresponse, and item nonresponse. These three types of nonresponse can lead to biased inferences if nonresponse rates are high and respondents and nonrespondents differ relative to the requirements of interest.

An examination of both establishment and employee response rates found that nonresponse patterns are somewhat related to essentially all variables considered in the analyses. However, when examining the distribution of respondents and nonrespondents across various frame attributes, it was found that the overall potential for nonresponse bias at both the establishment and the employee levels was negligible. For both establishments and employees, both the absolute size of any potential bias and the effect size were found to be small for all variables considered. Because nonresponse patterns for both establishments and employees are related to the substantive variables measured in the study, using these variables for nonresponse adjustments to the analysis weights should be effective in reducing the minimal effects, if any, due to nonresponse bias in the analysis.

At the item level, it was found that response rates varied across questionnaire types and questions. In most cases, the response rates were extremely high. This finding held at the establishment and employee levels—that is, the potential for significant nonresponse bias due to item nonresponse is negligible.

1. Introduction

Effective December 1, 1997, RTI International contracted with the National Center for O*NET Development to provide sampling, data collection, data processing, and data analysis services for the O*NET Data Collection Program. On July 26, 2002, the U.S. Department of Labor submitted to OMB a request for an extension of approval for the O*NET Data Collection Program (OMB control number 1205-0421). On September 25, we received approval of this request for a 3-year extension, subject to several terms. As one of those terms, a nonresponse analysis was conducted on data from the first three analysis cycles. This report documents the results of that analysis.

The Occupational Information Network (O*NET) is a comprehensive system for collecting, organizing, describing, and disseminating information on occupational requirements and worker attributes. The O*NET database is designed to be the most comprehensive standard source of occupational and skill information in the United States.

The National Center for O*NET Development (Center) provides core staff with acknowledged expertise in the areas of occupational analysis and assessment research and development. The Center manages projects and contracts and provides technical support and customer service to users of O*NET data and related products.

The O*NET Data Collection Program is a cooperative effort involving several organizations. Under the overall direction of the Center, RTI is responsible for data collection, data processing, data cleaning, and some of the data analyses. The Human Resources Research Organization (HumRRO) and North Carolina State University also conduct data analyses for the Center, and MCNC, Inc. is responsible for publication of the data.

The O*NET Data Collection Program is an ongoing effort to populate and maintain the O*NET database with valid, reliable, and current occupation and skills data. O*NET data are used by a wide range of audiences, including individuals making career decisions, the public workforce investment system and schools making training investment decisions, educational institutions preparing the future workforce, and employers making staffing, economic development, and training decisions. The O*NET program provides a common language and framework to meet the needs of various federal programs, including workforce investment and training programs of the Departments of Labor (DOL) and Education (ED). The O*NET database and companion O*NET Career Exploration Tools are used by many private companies and public organizations to develop applications tailored to meet their needs and the needs of their customers. Further information about the O*NET program can be found at the National Center for O*NET Development's Web site, www.onetcenter.org, and at the U.S. Department of Labor, Employment and Training Administration's Web site, www.doleta.gov/programs/onet.

The primary method for collecting this information is the Establishment method, a survey of establishments and workers within those establishments. This is a two-stage design that uses (1) a statistical sample of establishments expected to employ workers in each specific occupation and (2) a sample of workers in the occupations within each sampled establishment. The sampled workers are asked to complete the survey questionnaires.

Four domain questionnaires are used to collect data from sampled workers: Skills, Knowledge (including Education and Training, and Work Styles), Generalized Work Activities,

and Work Context. Sampled workers are asked to complete one randomly assigned domain questionnaire, a basic demographic questionnaire, and a brief, occupation-specific task inventory. Workers may either complete the paper questionnaire and return it via mail or complete an online questionnaire at the project Web site.

Data collection operations for the main study began in June 2001 and are ongoing, with analysis activities conducted in overlapping cycles. This report analyzes the combined response experience of the first three analysis cycles. Data collection was completed for each analysis cycle on the following dates:

- Analysis Cycle 1: July 2002
- Analysis Cycle 2: July 2003
- Analysis Cycle 3: December 2003.

This report analyzes the combined response experience of the first three analysis cycles. ***Section 2*** of this report describes the sampling phases and data collection activities relevant to the response process for the O*NET Data Collection Program. ***Section 3*** discusses how nonresponse can lead to biased estimates. ***Sections 4, 5,*** and ***6*** present the findings concerning establishment, employee, and item nonresponse, respectively. Conclusions are presented in ***Section 7***.

2. Summary of Sample Design and Data Collection Methods

The primary source of information for the O*NET database is a survey of establishments and sampled workers from within selected establishments. This survey is referred to as *Establishment method* data collection. Under this approach, incumbents were sampled in their workplaces using a two-stage sample design, with establishments selected in the primary stage and employees in the secondary stage.

For sampling and data collection purposes, occupations were grouped into waves of approximately 50 occupations each. The waves were designed to contain occupations that may be found in similar industries. A primary stage sample of establishments was selected from lists supplied by either InfoUSA or Dun & Bradstreet (D&B).[1] These establishments were selected from industries expected to employ the occupations. Up to 10 occupations were then randomly assigned to each establishment for possible data collection.

The sample of establishments for each wave was fielded in four sub-waves. The sub-waves are identified as *X.1*, *X.2*, *X.3*, and *X.4*, where X represents the set of primary occupations and the number following represents the order in which the sub-waves occur. In this case, *X.1* is the first sub-wave and *X.4* is the last.

Each sub-wave sample consisted of a different number of occupations and establishments. All occupations were included within the first sub-wave, X.1. Experience gained from the first sub-waves was used to more effectively target the sample to industries and establishments where the occupations could be found. This process of gaining experience from the previous wave occurred for each subsequent sub-wave. Any occupation that required additional respondents was included in the next sub-wave.

The selected establishments were contacted using the 13-step process shown in ***Exhibit 1***. RTI maintained a staff of Business Liaisons (BLs) who contacted the establishments and completed these process steps. Steps 1 through 5 have the most relevance to understanding the analyses in this report and are described below.

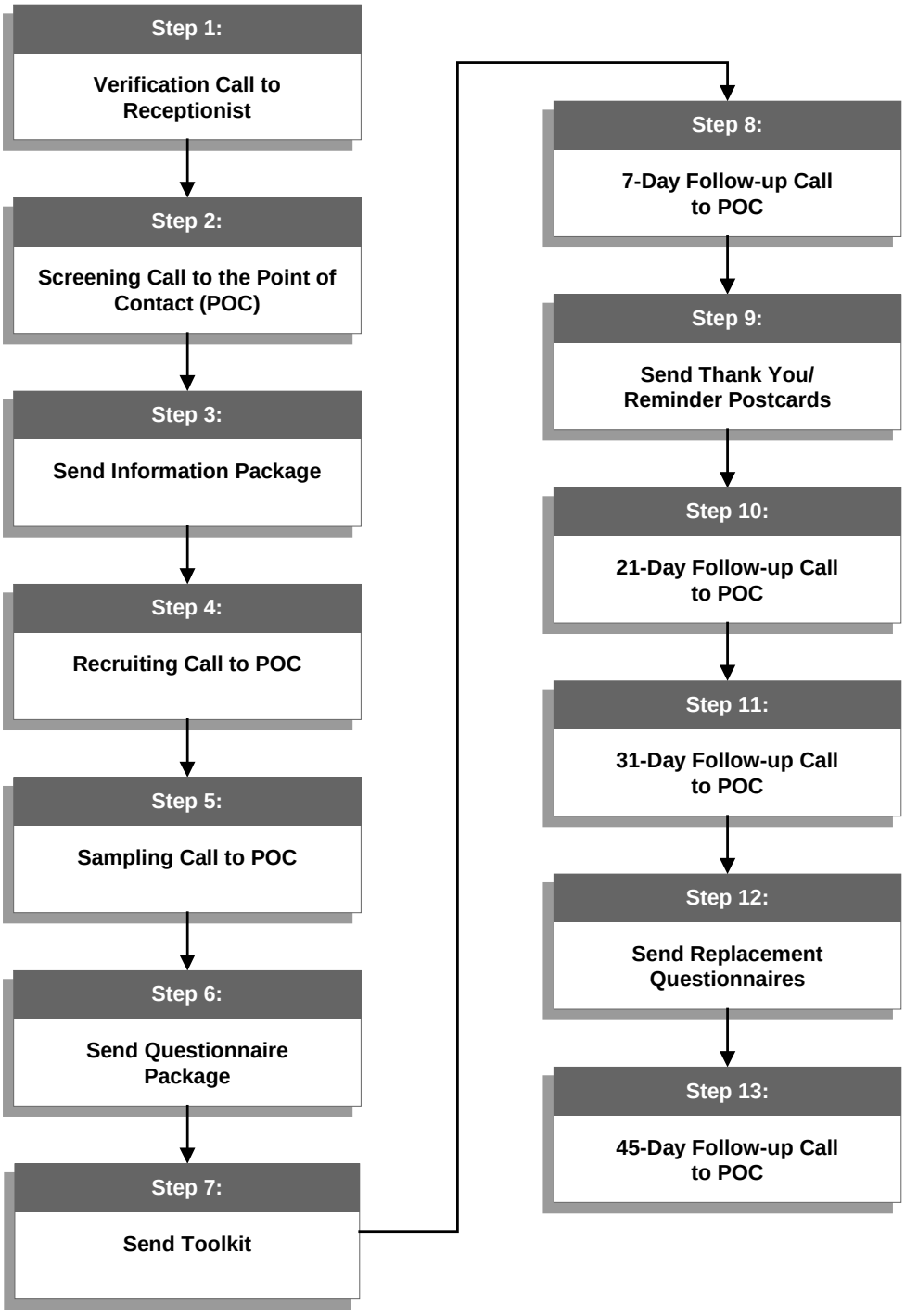
Step 1. Verification call to receptionist: The BLs conducted an initial call to each establishment to determine if the establishment was the one selected from the D&B list and whether the business was still in operation at the expected address. The BL also obtained contact information for a possible point of contact (POC).

Step 2. Screening call to the POC: A screening call was conducted with the POC to confirm that the BL had the correct POC and to determine if the establishment likely employed any of the occupations assigned to the establishment.

Step 3. Send information package: The POC was mailed an information package with information about the study and a more detailed description of the occupations assigned to the establishment.

[1] Waves sampled prior to October 2003 used the InfoUSA list, and all subsequent waves used the Dun & Bradstreet list.

Exhibit 1. Establishment Method Data Collection Flowchart



Step 4. Recruiting call to POC: During the recruiting call, the BL:

- verified that the information package had been received;
- confirmed that the POC was qualified to serve in the POC role;
- reviewed with the POC the occupation descriptions for the target occupations to determine whether the establishment had any employees in those occupations.

If one or more target occupations were present, the BL

- explained the O*NET program in greater detail, answered questions, and attempted to secure the POC's commitment to participate;
- explained to the participating POC the need to prepare a numbered roster of employees for each identified occupation, for use in selecting a sample of employees;
- set an appointment for the sampling call, allowing sufficient time for the POC to compile the occupation rosters.

Step 5: Sampling call to the POC: During this call, the BL obtained from the POC the number of names on each occupation's roster, and a sample was selected using a preprogrammed random sampling algorithm. The BL then informed the POC which employees were selected for each occupation. The POC was asked to note the line numbers of the selected employees on his/her list(s) so that the POC would know who was in the employee sample.

In subsequent steps, the questionnaires were mailed to the POC for distribution to the selected employees and follow-up calls were made to the POC to prompt for employee response.

Three types of nonresponse are examined in this report: establishment nonresponse, employee nonresponse, and item nonresponse. Nonresponse from the establishment can occur at Verification (Step 1), Screening (Step 2), Recruiting (Step 4), or Sampling (Step 5). For simplicity, in subsequent sections of this report, nonresponse at any of these steps is called ***establishment nonresponse***. Another type of nonresponse occurs at the employee level when a selected employee fails to complete and return a questionnaire. This is called ***employee nonresponse***. Finally, employees who return their questionnaires may inadvertently or intentionally skip one or more items on the questionnaire. This type of missing data is known as ***item nonresponse***. The remaining sections of this report discuss the observed levels of these three types of nonresponse over the first 3 analysis cycles.

3. How Nonresponse Is Related to Bias

Nonresponse bias is the expected difference between an estimate from the responding cases and an estimate from all cases originally selected from the target population. The extent to which nonresponse bias occurs ultimately depends on (1) the extent of missing data and (2) the difference in an estimate between respondents and nonrespondents. For example, consider the following equation:

$$\overline{X} = p_R \overline{X}_R + p_N \overline{X}_N, \tag{3.1}$$

which says that an overall population estimate, $\overline{X}$, depends on the proportion of respondents and nonrespondents (denoted p_R and p_N, respectively, with $p_R + p_N = 1$) and the mean response from both respondents and nonrespondents (denoted $\overline{X}_R$ and $\overline{X}_N$). Bias in an estimate due to nonresponse is given by the following equation:

$$Bias(\overline{X}_R) = \overline{X}_R - \overline{X} \ , \tag{3.2}$$

demonstrating that bias varies as a function of the overall population estimate and the mean response from respondents. The bias of an estimate due to nonresponse increases as the difference between $\overline{X}_R$ and $\overline{X}$ increases. Now, substituting equation 3.1 into equation 3.2 gives

$$Bias(\overline{X}_R) = \overline{X}_R (1- p_R) - p_N \overline{X}_N, \tag{3.3}$$

and since $1 - p_R = p_N$, equation 3.3 can be expressed as

$$Bias(\overline{X}_R) = p_N (\overline{X}_R - \overline{X}_N). \tag{3.4}$$

Equation 3.4 reveals that the components of nonresponse bias depend upon the proportion of nonrespondents and the distance between mean responses for respondents and nonrespondents. If both components are small, then the bias should be negligible. For bias to be important, a large proportion of nonrespondents (p_N) should exist with a large difference between the mean responses (Kish, 1965). When using sample data to approximate bias, the components p_N, $\overline{X}_R$, and $\overline{X}_N$ can be estimated with sample data across attributes that can be measured for both respondents and nonrespondents. It is rarely possible to measure any of the primary study outcome variables on the nonrespondents, or they would be respondents. Thus, it is necessary to turn to other variables that are available for both respondents and nonrespondents to serve as surrogates for the primary outcome variables. If respondent data indicate that the surrogate variables are related to the primary outcome variables, then any nonresponse bias, or lack thereof, observed in the surrogate variables can be inferred to the primary outcome variables. Such approximations are not deterministic but can give evidence of potential nonresponse bias.

The likelihood of missing data may be related to an observed variable, such as establishment size. For example, employees from larger establishments may be less likely to respond than employees from smaller establishments. Analyzing skills across jobs within an occupation could therefore be subject to bias if the work performed differs systematically by establishment size—that is, if employees from larger establishments tend to respond differently from employees from smaller establishments. This is evident when noting that both components of nonresponse bias (p_N and $\overline{X}_R - \overline{X}_N$) would be magnified in this hypothetical example because (1) employees in larger establishments may be less likely to respond and (2) if they do respond, they may respond differently from employees in smaller establishments.

In general, restricting an analysis to only those cases that are observed may introduce bias into the results unless the missing data mechanism is accounted for in the analysis (Graham, Hofer, & Piccinin, 1994; Little & Rubin, 1987; Schafer, 2000). Weighting is one common method of adjusting for nonresponse patterns based on observed values (Little & Rubin). The O*NET Data Collection Program incorporates weighting as one method to protect against the influence of nonresponse bias.

To reduce potential bias on the estimates caused by unit nonresponse, an adjustment is applied to the sampling weights at both the establishment and the employee levels. Unit nonresponse adjustments are computed using a response propensity modeling approach described in Folsom and Singh (2000). The Folsom and Singh modeling approach is a generalization of constrained logistic models first suggested by Deville & Särndal (1992). This approach is used to adjust for nonresponse because it has been shown to be more effective at correcting for nonresponse bias than the more commonly used weighting class approach. The increase in effectiveness comes from the ability to incorporate a greater number of correlates of nonresponse in the modeling approach than would be possible with traditional weighting class methods. This is particularly important for the O*NET survey because the respondent sample sizes within an occupation are typically small, with 60 respondents being the smallest sample size allowed). The response propensity modeling approach allows data to be combined across occupations to form the appropriate adjustments for unit nonresponse at the occupation level.

The base establishment weights are adjusted for nonresponse using constrained logistic regression models that contain different combinations of the following variables:

- Industry division
- U.S. Census division
- establishment size
- headquarters/branch type
- number of occupations asked about in an establishment
- urban vs. rural location
- time zone
- ZIP code information from the 2000 U.S. Census
    - racial distribution
    - percentage of owner-occupied housing.

In addition, the employee weights are adjusted for nonresponse using a constrained logistic regression model developed using the same list of variables used for the establishment nonresponse adjustment, with the addition of occupation-specific indicator variables to the model. Adding occupation indicators to the model maintains the correct sum of weights for each occupation while also using data across occupations for the other variables in the model to improve the adjustment.

4. Establishment Nonresponse

Table A-1 in ***Appendix A*** displays the establishment eligibility and response rates for Analysis Cycle 1, 2, and 3 by step of data collection. The analysis population of establishments included each establishment that had at least one of its assigned occupations published in Analysis Cycles 1, 2, or 3, whether or not any of the occupations was eventually selected from the establishment. The response rates are presented separately by various variables to allow examination of the possibility of nonresponse bias. These variables were selected because they were available for both respondents and nonrespondents and were likely to be related to the primary outcome variables of the O*NET Program. Rates marked with an asterisk (*) are significantly different from the overall rates (where the overall rates are assumed to be fixed quantities).[2]

The following describes the columns and rows in ***Table A-1***:

Columns:

- **Total Estab** is the total number of selected establishments at the Verification step.
- **Verification, Screening**, **Recruiting**, and **Sampling** refer to the four steps of data collection used in recruiting establishments. Rates were computed using only those establishments that responded at the previous step. For example, Screening rates reflect only establishments that responded at the Verification step. For the very first wave of data collection, Wave 1.1, there was no distinction between the Verification and Screening steps. These establishments were all considered eligible and responding at the Verification step in this analysis. **Final** rates are compounded rates across all steps of data collection.
- **Elig** is the percentage of establishments that are considered eligible. Establishments are considered survey-eligible if they are classified as (1) at the same street address or building, (2) in business (permanently or temporarily), (3) able to be located, and (4) not a duplicate. Establishments that have no employees in the list of occupations asked about during data collection are not considered survey-ineligible but rather as Sampling step respondents.
- **Resp** is the percentage of eligible establishments that are considered respondents; that is, they did not refuse to participate in the study.

Rows:

- **Census Division** is assigned using the address of the establishment. A total of 209 establishments from the analysis population had no address information because they went out of business between the time the initial sample frame was constructed and the onset of data collection. They were therefore declared ineligible at the Verification step. These establishments were assigned to the "Unknown" Census division, where the eligibility rate at the Verification step is 0%. Note that this also affects the Time Zone and Metropolitan Status rows.

[2] The tests were conditioned on the overall rates since the object was to determine any subgroups that differed from the observed overall rate.

- **Total Employees in Establishment** is the establishment total employment estimate on the sample frame. The category "Unknown" for total employees in an establishment is an actual frame classification.
- **SIC Division** is the Standard Industry Classification of the establishment.
- **Number of SOCs on Establishment Sampling List** is the number of occupations linked to an establishment's sampling list. This may be viewed as a measure of the POC's perceived level of burden.
- **Time Zone** and **Metropolitan Status** were assigned using the establishment's ZIP code.

4.1 Comments on Establishment Final Unweighted Response Rates

The data in ***Table A-1*** reveal that the final unweighted[3] response rate for establishments was 64.0%, and the final eligibility rate was 85.6%. The data also indicate that response rates were variable across the four data collection steps, with the lowest response rate occurring at the Recruiting step (76.6%) and the lowest eligibility rates occurring at the Verification (91.5%) and Screening (94.5%) steps. These results are intuitive because:

- It was not until the Recruiting step of data collection that the POC fully realized the burden involved in participation. Consequently, it was expected that most nonresponse would occur at this step.
- The first contact made to each establishment occurred at the Verification step. Because this is the step of data collection during which those establishments that have gone out of business become known, it was expected that the eligibility rate would be lower at this step. The slightly deflated eligibility rate observed between the Verification and Screening step is most likely due to the fact, as discussed above, that all Wave 1.1 establishments from the analysis population were considered to be eligible and responding at the Verification step. After combining both the Verification and Screening steps, the eligibility rate was 86.5%, which was considerably lower than the rate during the other two steps of data collection.

Using frame information, the respondents and nonrespondents can be compared across various attributes to approximate nonresponse bias. An estimate of the first component of nonresponse bias can be found in ***Table A-1*** under the column Final Response. As discussed above, low response rates are an indication of potential nonresponse bias. Treating the final unweighted response rate as a fixed quantity with no variance, the response rate for each level of a specific attribute was assessed against the overall value to determine if the difference is significant. Differences statistically significant at the 0.05 level are indicated with an asterisk (*). The results indicate the following:

- **Region.** It appears that establishments in the Mountain (68.0%) region had the highest significant final response rate, while the Middle Atlantic (59.5%) region had the lowest significant final response rate.

[3] Unweighted rates were used because appropriate weights were not available for ineligible or nonresponding establishments.

- **Total number of employees.** Ignoring the Unknown category, there appears to be a decreasing trend in the final response rates as the size of the establishment increases. This suggests that the perceived burden of the POCs in smaller establishments may have been lower than the perceived burden of the POCs in larger establishments. In addition, in larger organizations, the decision to participate may not be at the discretion of the POC, but involve corporate approval. This is consistent with other literature, such as Willamack, Nichols, and Sudman (2002) and Tomaskovic-Dewey, Leiter, and Thompson (1994).
- **SIC division.** Comparing the different SIC divisions to the overall final response rate, Public Administration (77.8%) and Mining (73.6%) industries had the highest significant final response rates, while the Retail Trade (55.0%) industry had the lowest final response rate. Response rate patterns by industry are highly dependent on the occupations included in a particular collection of occupations. Thus, these findings would not necessarily apply to a different set of occupations in other analysis cycles.
- **Number of occupations.** At the Recruiting step, the response rate for establishments with one to five occupations on the sampling list (85.9%) was significantly higher than the overall response rate of 76.6%, indicating again that the POC may perceive a lower number of O*NET occupations as less of a burden. Interestingly, though, the establishments with one to five occupations listed had a significantly lower response rate at Verification. Overall, there is no discernible trend in the final response rates by number of occupations asked.
- **Metropolitan status.** Compared to the overall response rate, it appears that rural establishments (71.9%) had a final response rate significantly higher than the overall response rate, while urban establishments (62.4%) had a significantly lower final response rate.

4.2 Comparison of Establishment Respondents and Nonrespondents

Table A-2 shows a comparison of the distribution of respondents and nonrespondents across various establishment attributes. The column Difference in Percent (Respondents vs. Nonrespondents) reveals an estimate of the second component of nonresponse bias. As discussed above, a potential source of nonresponse bias occurs when this difference becomes large. An estimate of the nonresponse bias across an attribute (see equations 3.2 and 3.4) is shown in the last column, Difference in Percent (Respondents vs. Overall). Differences between respondents and overall marked with an asterisk are statistically different from each other at the 0.05 level. Large positive or negative values indicate potential evidence of nonresponse bias. While there are numerous statistically significant differences, the large sample sizes make it likely that very small differences will be statistically significant. In this situation, it is important to determine if the differences are of sufficient magnitude to be meaningful. For establishment nonresponse, the differences between respondents and overall do not appear to be meaningful. For instance:

- Approximately 65.1% of the attributes had an absolute bias[4] of less than 1 percentage point.

[4] Absolute value of the last column of ***Table A-2***.

- Approximately 18.6% of the attributes had an absolute bias of at least 1 but less than 2 percentage points.
- Approximately 16.3% of the attributes had an absolute bias of at least 2 but less than 3 percentage points.

Another measure of potential nonresponse bias is the effect size as defined by Cohen (1988). In this case, the effect size is related to the chi-square test for comparing the equivalence of percentage distributions from respondents and overall for the variables listed in ***Table A-2***. Cohen classified an effect size as "small" when it is about 0.10, as "medium" when it is about 0.30, and as "large" when it is about 0.50. For the variables in ***Table A-2***, all of the effect sizes were small, with only one variable exceeding an effect size of 0.10 (0.13 for Total Employees in Establishment). The combination of small absolute biases and very small effect sizes indicate a low likelihood of bias due to establishment nonresponse.

5. Employee Nonresponse

Table B-1 in ***Appendix B*** displays the unweighted[5] response rates for employees from Establishment method data collection for occupations published in Analysis Cycles 1, 2, or 3. The following describes the columns and rows in ***Table B-1***:

Columns:

- **Sampled** is the total number of selected employees.
- **Response Rate** is the unweighted percentage of selected employees who responded by returning a completed domain questionnaire.

Rows:

In addition to the categories displayed in ***Table A-1***, ***Table B-1*** also displays response rates by the following employee-level requirements:

- **Selected Employees in Establishment** is the number of employees who were selected from the establishment. Note that this value ranges from only 1 to 20. In Wave 1.1, the maximum number of employees to be selected from an establishment was 15, but beginning in Wave 1.2, it was decided to allow up to 20 employees to be selected from any single establishment per 12-month period.
- **Questionnaire Type** is the type of questionnaire that the employee was selected to complete (Skills, Work Activities, Work Context, or Knowledge).
- **Occupation Class** is derived from the first two digits of the O*NET SOC.

The response rates are presented separately by the various row variables to allow examination of the possibility of nonresponse bias. These variables were selected because they were available for both respondents and nonrespondents and likely to be related to the primary outcome variables of the O*NET Program.

5.1 Comments on Employee Response Rates

Employee nonresponse, similar to establishment nonresponse, is difficult to thoroughly characterize in the O*NET Data Collection Program because relatively little information is known about the nonrespondents (except for some descriptive frame characteristics). However, as with the establishment level, using information known about both responding and nonresponding employees, it is possible to determine indirectly if the nonrespondents are different from the respondents across variables that may be highly correlated with the survey data being collected. Thus, potential sources of nonresponse bias can be approximated at the employee level. An estimate of the first component of nonresponse bias can be found in ***Table B-1*** under the column Response Rate. As discussed in ***Section 3***, low response rates are a potential indication of nonresponse bias. Treating the final unweighted response rate as a fixed quantity with no variance,[6] the response rate for each level of a specific covariate was assessed

[5] Unweighted rates were used because appropriate weights were not available for nonresponding employees.

[6] The tests were conditioned on the overall rates since the object was to determine any subgroups that differed from the observed overall rate.

against the overall value to determine if the difference was significant. Differences statistically significant at the 0.05 level are indicated with an asterisk (*). The unweighted results indicate the following:

- **Region.** Employees in the West North Central (66.9%) and East North Central (66.4%) divisions had the highest significant response rates, and employees in the Pacific (58.9%) division had the lowest significant response rates.
- **Total number of employees**. There appears to be a decreasing trend in the employee response rates as the size of the establishment increases. However, this trend is not as prominent as that observed at the establishment level.
- **Number of selected employees**. Much variation exists in the response rate across the number of selected employees. However, it appears that the response rates are higher when the selected number of employees is five or fewer than when the selected number of employees exceeds five.
- **Questionnaire type.** The response rates do not appear to vary greatly across questionnaire type, with the highest response rate (65.5%) associated with the Work Context questionnaire and the lowest response rate (61.4%) associated with the Work Activities questionnaire, both of which are statistically different from the overall rate.
- **SIC division**. Agriculture, Forestry, and Fishing (71.6%) and Public Administration (68.7%) had the highest significant response rates when compared to the overall response rate, while Construction (56.0%) and Retail Trade (56.1%) had the lowest significant response rates.
- **Occupation classes.** Compared to the overall response rate, Education, Training, and Library Occupations (78.3%), Life, Physical, and Social Science Occupations (69.3%) and Management Occupations (69.0) had the highest significant response rates, while Food Preparation and Serving Related Occupations (51.6%) and Construction and Extraction Occupations (55.0%) had the lowest significant response rates.
- **Number of occupations.** There is no clear pattern in the employee response rate by the number of occupations on the establishment sampling list.
- **Metropolitan status.** The findings at the employee level were similar to the findings at the establishment level. That is, the overall response rate for employees from rural areas was significantly higher than those from urban areas.

5.2 Comparison of Employee Respondents and Nonrespondents

Table B-2 presents a comparison of the distribution of respondents and nonrespondents across various employee attributes. The column Difference in Percent (Respondents vs. Nonrespondents) reveals an estimate of the second component of nonresponse bias. As discussed above, a potential source of nonresponse bias occurs when this difference becomes large. The column Difference in Percent (Respondents vs. Overall) shows an estimate of the nonresponse bias across an attribute (see equations 3.2 and 3.4). Differences between respondents and overall marked with an asterisk are statistically different from each other at the 0.05 level. Large positive or negative values indicate potential evidence of nonresponse bias. While there are numerous statistically significant differences, the large sample sizes make it likely that very small

differences can be statistically detected. In this situation, it is important to determine if the differences are of sufficient magnitudes to be meaningful. For employee nonresponse, the differences between respondents and overall do not appear to be meaningful. For instance:

- Approximately 88.8% of the attributes had an absolute bias[7] of less than 1 percentage point.
- Approximately 11.2% of the attributes had an absolute bias of at least 1 but less than 2 percentage points.

Another measure of the possibility for nonresponse bias is the effect size as defined by Cohen (1988). In this case, the effect size is related to the chi-square test for comparing the equivalence of percentage distributions from respondents and overall for the variables listed in ***Table B-2***. Cohen classified an effect size as "small" when it is about 0.10, as "medium" when it is about 0.30, and as "large" when it is about 0.50. For the variables in ***Table B-2***, all of the effect sizes were small (less than 0.10).

The combination of small absolute biases and very small effect sizes indicate a low likelihood of bias due to employee nonresponse.

[7] Absolute value of the last column of ***Table B-2***.

6. Item Nonresponse

Tables C-1 through ***C-8*** in ***Appendix C*** display unweighted item response rates by item, item type, and occupation. These tables include questionnaire data from employee respondents in the 287 occupations published in Analysis Cycles 1, 2, and 3 completed using the Establishment method. Only items from those questionnaires classified as "complete" were evaluated. Cases with incomplete questionnaires were included as employee nonrespondents in ***Section 5***.

6.1 Comments on Item Response Rates

Item nonresponse is analogous to partial information patterns in which some variables are observed and some are missing. Despite the fact that partial information is present, item nonresponse can still create biased parameter estimation if the missing values are systematically related to the outcome (e.g., wealthy respondents tend to leave an income question missing). The results indicate the following:

- **Skills, Work Activities, and Work Context.** The data in ***Tables C-1*** through ***C-4*** suggest that for the Skills, Work Activities, and Work Context questionnaires, there is little item nonresponse with respect to a single item on each questionnaire. The minimum response rate for any specific item is 94.7% for the Skills questionnaire item 22 (Level), 95.3% for the Work Activities questionnaire item 40 (Level), 97.7% for item 49 of the Work Context questionnaire, and 92.1% for the Knowledge questionnaire item E08 (Level). In addition, as seen in ***Table C-7***, item nonresponse is slightly more prevalent for Level items than Importance items, regardless of questionnaire type.
- **Occupation-specific tasks**. It appears from ***Table C-5*** that item nonresponse may be potentially more serious for certain Frequency and Importance items. However, it should be noted that the eligible sample size is small for these Frequency and Importance items because a responding employee is not required to respond to the corresponding Frequency and Importance item if he/she does not consider a task to be relevant. Most of the Frequency and Importance items with a low response rate are suppressed from publication because they were also found to be not relevant to the occupation since too few respondents rated the task as relevant. Another explanation of the low response rates on these items involves those employees in Wave 1.1 who returned a domain questionnaire but failed to return a Task questionnaire. In these cases, all Task items for these employees were classified as "item nonresponse." This latter situation cannot occur after Wave 1.1 due to a change in data collection methodology.
- **Background questionnaire**. In ***Table C-6***, item response rates appear to be nearly constant and high (over 94%), with the exception of item 4. This item elicits information from the respondent about working in a family business (81.8%).
- **Item type**. The response rates by item type in ***Table C-7*** are all over 95%.
- **Occupation.** Item response rates are provided in ***Table C-8*** for all occupations completed in the first three analysis cycles. The overall item response rate is 97.8%, with the smallest response rate, 93.9%, coming from Home Health Aides (SOC 31-1011.00), and the largest, 99.6%, coming from Mining and Geological Engineers, Including Mining Safety

Engineers (SOC 17-2151.00). The extremely high item response rates indicate a low likelihood of bias due to item nonresponse.

7. Conclusion

Unit and item nonresponse can lead to biased inferences if the nonresponse rates are high and respondents and nonrespondents differ relative to the requirements of interest. An examination of both establishment and employee response rates found that nonresponse patterns are somewhat related to essentially all variables considered in the analyses. However, when examining the distribution of respondents and nonrespondents across various frame attributes, it was found that the overall potential for nonresponse bias at both the establishment and employee levels was negligible. For both establishments and employees, both the absolute size of any potential bias and the effect size were found to be small for all variables considered. Because nonresponse patterns for both establishments and employees are related to the substantive variables measured in the study, using these variables for nonresponse adjustments to the analysis weights should be effective at reducing the minimal effects, if any, due to nonresponse bias in the analysis.

At the item level, it was found that different questionnaire types and questions exhibited varying response rates, and in most cases the response rates were extremely high. This finding coincides with the findings at the establishment and employee levels—that is, the potential for significant nonresponse bias due to item nonresponse is negligible.

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Appendix A: Establishment Response Tables

Table A-1. Establishment Eligibility and Response Rates by Data Collection Step

Category	Total Estab	Verification		Screening		Recruiting		Sampling		Final	
		Elig	Resp	Elig	Resp	Elig	Resp	Elig	Resp	Elig	Resp
Total	44,041	91.5	96.3	94.5	93.8	98.7	76.6	99.9	93.0	85.6	64.0
Census Division											
New England	2,284	92.0	96.5	93.8	94.1	98.6	76.3	99.7	92.2	85.2	63.5
Middle Atlantic	5,884	91.5	96.2	94.8	92.2*	98.6	73.3*	100.0*	91.9*	85.9	59.5*
East North Central	6,652	92.0	96.5	95.3*	93.7	98.6	75.2*	99.9	92.9	86.7*	63.0
West North Central	3,102	93.0*	97.2*	96.7*	94.7*	98.6	78.2	99.8	93.1	88.7*	66.8*
South Atlantic	7,947	90.9	95.9	94.7	94.5*	98.7	77.3	99.8	93.0	85.2	64.8
East South Central	2,487	93.6*	97.0	95.9*	94.6	99.0	78.4*	99.9	93.9	89.0*	67.4*
West South Central	5,111	90.3*	96.4	95.3*	94.0	98.9	79.0*	99.9	93.0	85.4	66.2*
Mountain	3,316	90.9	97.1*	95.8*	95.1*	98.8	78.9*	99.9	93.8	86.2	68.0*
Pacific	7,045	91.1	95.6*	93.9	92.6*	98.4	75.8	99.9	93.6	84.5*	62.3*
Unknown	209	0.0	-	-	-	-	-	-	-	0.0	-
Total Employees in Establishment											
Unknown	713	78.7*	89.1*	98.4*	92.1	99.1	81.5*	100.0	96.2*	77.0*	64.1
1-4	7,063	83.8*	91.3*	88.0*	92.6*	98.7	86.4*	99.9	98.1*	73.9*	70.6*
5-9	3,666	94.9*	97.6*	88.5*	94.4	98.6	83.9*	99.7	95.9*	82.9*	73.8*
10-49	9,574	92.6*	97.3*	95.0*	95.4*	99.0*	81.1*	99.9	95.0*	87.2*	71.3*
50-99	4,283	93.4*	97.9*	97.0*	94.2	99.0*	78.9*	100.0*	93.7	89.8*	68.1*
100-249	3,222	94.7*	97.8*	96.0*	94.8*	98.9	75.1	99.9	91.6*	90.0*	63.6
250-499	7,694	91.8	96.4	97.9*	92.9*	98.9	71.1*	99.9	90.5*	89.1*	57.3*
500-999	3,669	92.8*	97.2*	96.4*	92.0*	99.0	69.5*	99.9	87.8*	88.7*	54.4*
1,000-4,999	3,672	95.0*	98.0*	96.3*	93.1	97.2*	62.3*	99.6	85.4*	88.9*	48.1*
5,000 +	481	95.8*	98.3*	93.2	92.2	92.8*	57.9*	99.5	80.8*	83.4	41.9*
SIC Division											
Agriculture, Forestry, Fishing	776	88.4*	93.0*	97.0*	94.8	99.1	77.8	100.0	97.6*	85.3	66.8
Mining	1,209	82.2*	95.6	96.0*	94.0	98.6	85.4*	100.0	96.3*	78.1*	73.6*
Construction	3,822	90.9	93.9*	91.9*	91.5*	98.9	79.3*	99.9	95.2*	83.2*	63.9
Manufacturing	4,165	92.5*	97.9*	95.5*	93.0	98.8	69.8*	100.0	89.9*	87.5*	56.5*
Transportation, Communication, Electric, Gas, and Sanitary Services	3,430	88.7*	94.2*	95.7*	92.2*	99.1*	72.2*	99.8	90.3*	84.4	56.4*
Wholesale Trade	842	92.2	99.1*	91.7*	94.2	98.3	72.9*	99.6	92.2	83.0*	62.5
Retail Trade	3,749	92.9*	93.7*	94.5	92.5*	99.0	69.1*	99.9	92.2	87.3*	55.0*
Finance, Insurance, Real Estate	2,731	91.1	96.4	91.8*	91.9*	98.2	69.9*	99.9	91.1*	82.5*	56.1*
Services	19,464	91.7	96.9*	94.3	94.1*	98.5*	78.5*	99.9	93.2	85.3	66.4*
Public Administration	3,849	95.1*	98.6*	97.3*	98.0*	98.9	84.6*	99.8	95.2*	91.4*	77.8*

continued

Table A-1. Establishment Eligibility and Response Rates by Data Collection Step (cont.)

Category	Total Estab	Verification		Screening		Recruiting		Sampling		Final	
		Elig	Resp	Elig	Resp	Elig	Resp	Elig	Resp	Elig	Resp
Number of Occupations on Establishment Sampling List											
1-5	9,588	87.9*	95.8*	98.0*	94.7*	99.5*	85.9*	100.0*	97.1*	85.9	75.1*
6	2,159	89.9*	93.1*	94.6	92.3*	99.0	78.5	99.9	93.6	84.6	62.8
7	2,958	89.9*	95.1*	96.0*	93.4	98.9	76.5	100.0	93.8	85.6	63.6
8	2,797	92.8*	96.7	93.7	94.9*	99.0	75.4	99.8	91.5*	86.3	63.1
9	3,206	96.4*	97.4*	88.6*	94.9*	97.7*	77.1	99.9	93.0	83.9*	65.9*
10	23,329	92.5*	96.8*	93.9*	93.3*	98.4*	72.8*	99.8	91.1*	85.7	59.5*
Time Zone											
Eastern Time	20,433	91.5	96.1	94.9*	93.7	98.7	75.8*	99.9	92.7	85.9	62.9*
Central Time	12,875	91.8	96.8*	95.5*	94.2	98.8	77.7*	99.9	93.0	86.7*	65.7*
Mountain Time	2,959	91.1	97.3*	96.0*	95.1*	98.8	79.9*	99.9	93.7	86.5	69.1*
Pacific Time	7,146	90.9	95.5*	94.0	92.5*	98.5	75.2*	99.9	93.6	84.5*	61.8*
Alaska Time	213	91.1	97.4	96.3	96.7*	97.7	82.6*	100.0	93.0	85.9	72.1*
Hawaii Time	202	94.1	96.3	96.2	94.9	97.0	80.2	100.0	95.4	88.1	69.7
Unknown	209	100.0	100.0	0.0	-	-	-	-	-	0.0	-
Metropolitan Status											
Rural	7,485	93.3*	96.9*	96.4*	95.2*	99.2*	82.0*	99.9	95.4*	89.3*	71.9*
Urban	36,343	91.1*	96.2	94.7	93.5*	98.6	75.4*	99.9	92.5*	85.3	62.4*
Unknown	209	100.0	100.0	0.0	-	-	-	-	-	0.0	-

*Statistically different from the total category at the 0.05 level.
Note: Response rates were calculated from those establishments that were classified as eligible at each step.
The final eligibility and response rates are compounded rates across all steps of data collection.

Table A-2. Comparison of Establishment Respondents and Nonrespondents

Category	Respondents		Nonrespondents		Overall		Diff in Percent (Resp vs. Non-)	Diff in Percent (Resp vs. Overall)
	No.	%	No.	%	No.	%		
Total	24,132	100.0	13,548	100.0	37,680	100.0	-	-
Census Division (effect size = 0.04)								
New England	1,237	5.1	710	5.2	1,947	5.2	-0.1	-0.0
Middle Atlantic	3,006	12.5	2,050	15.1	5,056	13.4	-2.7	-1.0*
East North Central	3,631	15.0	2,135	15.8	5,766	15.3	-0.7	-0.3
West North Central	1,840	7.6	913	6.7	2,753	7.3	0.9	0.3
South Atlantic	4,384	18.2	2,384	17.6	6,768	18.0	0.6	0.2
East South Central	1,491	6.2	722	5.3	2,213	5.9	0.8	0.3
West South Central	2,888	12.0	1,477	10.9	4,365	11.6	1.1	0.4
Mountain	1,944	8.1	913	6.7	2,857	7.6	1.3	0.5*
Pacific	3,711	15.4	2,244	16.6	5,955	15.8	-1.2	-0.4
Total Employees in Establishment (effect size = 0.13)								
Unknown	352	1.5	197	1.5	549	1.5	0.0	0.0
1-4	3,682	15.3	1,536	11.3	5,218	13.8	3.9	1.4*
5-9	2,242	9.3	798	5.9	3,040	8.1	3.4	1.2*
10-49	5,954	24.7	2,395	17.7	8,349	22.2	7.0	2.5*
50-99	2,620	10.9	1,227	9.1	3,847	10.2	1.8	0.6*
100-249	1,843	7.6	1,057	7.8	2,900	7.7	-0.2	-0.1
250-499	3,929	16.3	2,924	21.6	6,853	18.2	-5.3	-1.9*
500-999	1,770	7.3	1,486	11.0	3,256	8.6	-3.6	-1.3*
1,000-4,999	1,572	6.5	1,695	12.5	3,267	8.7	-6.0	-2.2*
5,000 +	168	0.7	233	1.7	401	1.1	-1.0	-0.4*
SIC Division (effect size = 0.10)								
Agriculture, Forestry, Fishing	442	1.8	220	1.6	662	1.8	0.2	0.1
Mining	695	2.9	249	1.8	944	2.5	1.0	0.4*
Construction	2,035	8.4	1,149	8.5	3,184	8.5	-0.0	-0.0
Manufacturing	2,061	8.5	1,584	11.7	3,645	9.7	-3.2	-1.1*
Transportation, Communication, Electric, Gas, and Sanitary Services	1,631	6.8	1,263	9.3	2,894	7.7	-2.6	-0.9*
Wholesale Trade	437	1.8	262	1.9	699	1.9	-0.1	-0.0
Retail Trade	1,798	7.5	1,474	10.9	3,272	8.7	-3.4	-1.2*
Finance, Insurance, Real Estate	1,263	5.2	989	7.3	2,252	6.0	-2.1	-0.7*
Services	11,034	45.7	5,577	41.2	16,611	44.1	4.6	1.6*
Public Administration	2,736	11.3	781	5.8	3,517	9.3	5.6	2.0*

continued

Table A-2. Comparison of Establishment Respondents and Nonrespondents (cont.)

Category	Respondents		Nonrespondents		Overall		Diff in Percent (Resp vs. Non-)	Diff in Percent (Resp vs. Overall)
	No.	%	No.	%	No.	%		
Number of Occupations on Establishment Sampling List (effect size = 0.10)								
1-5	6,182	25.6	2,053	15.2	8,235	21.9	10.5	3.8*
6	1,148	4.8	679	5.0	1,827	4.8	-0.3	-0.1
7	1,609	6.7	922	6.8	2,531	6.7	-0.1	-0.0
8	1,524	6.3	890	6.6	2,414	6.4	-0.3	-0.1
9	1,772	7.3	918	6.8	2,690	7.1	0.6	0.2
10	11,897	49.3	8,086	59.7	19,983	53.0	-10.4	-3.7*
Time Zone (effect size = 0.03)								
Eastern Time	11,042	45.8	6,512	48.1	17,554	46.6	-2.3	-0.8*
Central Time	7,336	30.4	3,831	28.3	11,167	29.6	2.1	0.8*
Mountain Time	1,767	7.3	792	5.8	2,559	6.8	1.5	0.5*
Pacific Time	3,731	15.5	2,308	17.0	6,039	16.0	-1.6	-0.6
Alaska Time	132	0.5	51	0.4	183	0.5	0.2	0.1
Hawaii Time	124	0.5	54	0.4	178	0.5	0.1	0.0
Metropolitan Status (effect size = 0.06)								
Rural	4,804	19.9	1,882	13.9	6,686	17.7	6.0	2.2*
Urban	19,328	80.1	11,666	86.1	30,994	82.3	-6.0	-2.2*

*Statistically different from zero at the 0.05 level.

Note: The difference columns may not match their constituent parts due to rounding.

Appendix B: Employee Response Tables

Table B-1. Employee Response Rates

Category	Sampled	Response Rate
Total	81,748	63.2
Census Division		
New England	4,395	61.8
Middle Atlantic	9,445	62.7
East North Central	12,787	66.4*
West North Central	6,983	66.9*
South Atlantic	15,097	62.7
East South Central	5,324	65.8
West South Central	9,438	62.8
Mountain	7,567	61.7
Pacific	10,712	58.9*
Total Employees in Establishment		
Unknown	798	70.4*
1 - 4	3,243	70.2*
5 - 9	3,264	66.9*
10 - 49	16,160	67.2*
50 - 99	9,664	63.9
100 - 249	7,444	63.1
250 - 499	20,666	61.4*
500 - 999	9,808	60.9*
1,000 – 4, 999	9,846	59.0*
5,000 +	855	52.3*
Selected Employees in Establishment		
1	2,596	75.8*
2	3,282	71.6*
3	3,570	71.5*
4	3,584	68.8*
5	3,785	68.1*
6	3,036	64.6
7	3,115	65.4
8	7,448	62.6
9	3,762	66.1
10	3,610	63.5
11	3,190	61.5
12	3,084	63.5
13	2,977	66.3
14	2,912	60.9
15	5,745	59.4*
16	4,304	61.9
17	2,499	56.2*
18	1,908	61.9
19	1,881	57.7
20	15,460	57.6*

continued

Table B-1. Employee Response Rates (cont.)

Category	Sampled	Response Rate
Questionnaire Type		
Skills	20,425	63.1
Work Activities	20,548	61.4*
Work Context	20,306	65.5*
Knowledge	20,469	62.9
SIC Division		
Agriculture, Forestry, Fishing	1,396	71.6*
Mining	1,963	68.2*
Construction	3,831	56.0*
Manufacturing	8,921	63.7
Transportation, Communication, Electric, Gas, and Sanitary Services	6,974	64.2
Wholesale Trade	1,277	63.7
Retail Trade	7,812	56.1*
Finance, Insurance, Real Estate	3,863	63.4
Services	34,113	62.8
Public Administration	11,598	68.7*
Occupation Class		
Management	4,272	69.0*
Business and Financial Operations	3,206	68.1*
Computer and Mathematical	2,806	65.3
Architecture and Engineering	3,884	63.7
Life, Physical, and Social Science	3,247	69.3*
Community and Social Services	1,355	66.8
Legal	800	57.8*
Education, Training, and Library	1,286	78.3*
Arts, Design, Entertainment, Sports, and Media	6,505	62.0
Healthcare Practitioners and Technical	7,005	59.5*
Healthcare Support	2,447	58.5*
Protective Service	4,532	67.1*
Food Preparation and Serving Related	7,130	51.6*
Building and Grounds Cleaning and Maintenance	41	65.9
Personal Care and Service	4,534	64.8
Sales and Related	2,221	63.5
Office and Administrative Support	13,021	67.7*
Farming, Fishing, and Forestry	103	65.0
Construction and Extraction	4,460	55.0*
Installation, Maintenance, and Repair	4,353	64.2
Production	1,828	59.0
Transportation and Material Moving	2,712	61.8

continued

Table B-1. Employee Response Rates (cont.)

Category	Sampled	Response Rate
Number of Occupations on Establishment Sampling List		
1-5	12,597	65.9*
6	2,859	64.9
7	5,629	67.5*
8	5,644	63.7
9	5,450	67.0*
10	49,569	61.5*
Time Zone		
Eastern Time	37,772	63.5
Central Time	25,310	64.9*
Mountain Time	6,478	63.4
Pacific Time	11,199	58.5*
Alaska Time	438	66.0
Hawaii Time	551	57.0
Metropolitan Status		
Rural	16,030	68.3*
Urban	65,718	62.0*

*Statistically different from the total category at the 0.05 level.

Table B-2. Comparison of Employee Respondents and Nonrespondents

Category	Respondents		Nonrespondents		Overall		Diff in Percent (Resp vs. Non-Resp)	Diff in Percent (Resp vs. Overall)
	No.	%	No.	%	No.	%		
Total	51,670	100.0	30,078	100.0	81,748	100.0	-	-
Census Division (effect size = 0.04)								
New England	2,714	5.3	1,681	5.6	4,395	5.4	-0.3	-0.1
Middle Atlantic	5,924	11.5	3,521	11.7	9,445	11.6	-0.2	-0.1
East North Central	8,496	16.4	4,291	14.3	12,787	15.6	2.2	0.8*
West North Central	4,673	9.0	2,310	7.7	6,983	8.5	1.4	0.5*
South Atlantic	9,461	18.3	5,636	18.7	15,097	18.5	-0.4	-0.2
East South Central	3,501	6.8	1,823	6.1	5,324	6.5	0.7	0.3
West South Central	5,927	11.5	3,511	11.7	9,438	11.5	-0.2	-0.1
Mountain	4,668	9.0	2,899	9.6	7,567	9.3	-0.6	-0.2
Pacific	6,306	12.2	4,406	14.6	10,712	13.1	-2.4	-0.9*
Total Employees in Establishment (effect size = 0.05)								
Unknown	562	1.1	236	0.8	798	1.0	0.3	0.1*
1-4	2,277	4.4	966	3.2	3,243	4.0	1.2	0.4*
5-9	2,182	4.2	1,082	3.6	3,264	4.0	0.6	0.2*
10-49	10,861	21.0	5,299	17.6	16,160	19.8	3.4	1.3*
50-99	6,174	11.9	3,490	11.6	9,664	11.8	0.3	0.1
100-249	4,697	9.1	2,747	9.1	7,444	9.1	-0.0	-0.0
250-499	12,684	24.5	7,982	26.5	20,666	25.3	-2.0	-0.7*
500-999	5,975	11.6	3,833	12.7	9,808	12.0	-1.2	-0.4*
1,000-4,999	5,811	11.2	4,035	13.4	9,846	12.0	-2.2	-0.8*
5,000 +	447	0.9	408	1.4	855	1.0	-0.5	-0.2*
Total Selected Employees in Establishment (effect size = 0.08)								
1	1,967	3.8	629	2.1	2,596	3.2	1.7	0.6*
2	2,350	4.5	932	3.1	3,282	4.0	1.4	0.5*
3	2,551	4.9	1,019	3.4	3,570	4.4	1.5	0.6*
4	2,464	4.8	1,120	3.7	3,584	4.4	1.0	0.4*
5	2,577	5.0	1,208	4.0	3,785	4.6	1.0	0.4*
6	1,961	3.8	1,075	3.6	3,036	3.7	0.2	0.1
7	2,036	3.9	1,079	3.6	3,115	3.8	0.4	0.1
8	4,665	9.0	2,783	9.3	7,448	9.1	-0.2	-0.1
9	2,486	4.8	1,276	4.2	3,762	4.6	0.6	0.2
10	2,291	4.4	1,319	4.4	3,610	4.4	0.0	0.0
11	1,963	3.8	1,227	4.1	3,190	3.9	-0.3	-0.1
12	1,958	3.8	1,126	3.7	3,084	3.8	0.0	0.0
13	1,974	3.8	1,003	3.3	2,977	3.6	0.5	0.2
14	1,774	3.4	1,138	3.8	2,912	3.6	-0.4	-0.1
15	3,412	6.6	2,333	7.8	5,745	7.0	-1.2	-0.4*
16	2,663	5.2	1,641	5.5	4,304	5.3	-0.3	-0.1
17	1,404	2.7	1,095	3.6	2,499	3.1	-0.9	-0.3*
18	1,182	2.3	726	2.4	1,908	2.3	-0.1	-0.0
19	1,085	2.1	796	2.6	1,881	2.3	-0.5	-0.2
20	8,907	17.2	6,553	21.8	15,460	18.9	-4.5	-1.7*

continued

Table B-2. Comparison of Employee Respondents and Nonrespondents (cont.)

Category	Respondents		Nonrespondents		Overall		Diff in Percent (Resp vs. Non-Resp)	Diff in Percent (Resp vs. Overall)
	No.	%	No.	%	No.	%		
Questionnaire Type (effect size = 0.02)								
Skills	12,889	24.9	7,536	25.1	20,425	25.0	-0.1	-0.0
Work Activities	12,613	24.4	7,935	26.4	20,548	25.1	-2.0	-0.7*
Work Context	13,296	25.7	7,010	23.3	20,306	24.8	2.4	0.9*
Knowledge	12,872	24.9	7,597	25.3	20,469	25.0	-0.3	-0.1
SIC Division (effect size= 0.06)								
Agriculture, Forestry, Fishing	1,000	1.9	396	1.3	1,396	1.7	0.6	0.2*
Mining	1,338	2.6	625	2.1	1,963	2.4	0.5	0.2*
Construction	2,145	4.2	1,686	5.6	3,831	4.7	-1.5	-0.5*
Manufacturing	5,683	11.0	3,238	10.8	8,921	10.9	0.2	0.1
Transportation, Communication, Electric, Gas, and Sanitary Services	4,480	8.7	2,494	8.3	6,974	8.5	0.4	0.1
Wholesale Trade	813	1.6	464	1.5	1,277	1.6	0.0	0.0
Retail Trade	4,379	8.5	3,433	11.4	7,812	9.6	-2.9	-1.1*
Finance, Insurance, Real Estate	2,449	4.7	1,414	4.7	3,863	4.7	0.0	0.0
Services	21,413	41.4	12,700	42.2	34,113	41.7	-0.8	-0.3
Public Administration	7,970	15.4	3,628	12.1	11,598	14.2	3.4	1.2*
Occupation Class (effect size = 0.09)								
Management	2,947	5.7	1,325	4.4	4,272	5.2	1.3	0.5*
Business and Financial Operations	2,182	4.2	1,024	3.4	3,206	3.9	0.8	0.3*
Computer and Mathematical	1,832	3.5	974	3.2	2,806	3.4	0.3	0.1
Architecture and Engineering	2,474	4.8	1,410	4.7	3,884	4.8	0.1	0.0
Life, Physical, and Social Science	2,251	4.4	996	3.3	3,247	4.0	1.0	0.4*
Community and Social Services	905	1.8	450	1.5	1,355	1.7	0.3	0.1
Legal	462	0.9	338	1.1	800	1.0	-0.2	-0.1*
Education, Training, and Library	1,007	1.9	279	0.9	1,286	1.6	1.0	0.4*
Arts, Design, Entertainment, Sports, and Media	4,032	7.8	2,473	8.2	6,505	8.0	-0.4	-0.2
Healthcare Practitioners and Technical	4,168	8.1	2,837	9.4	7,005	8.6	-1.4	-0.5*
Healthcare Support	1,431	2.8	1,016	3.4	2,447	3.0	-0.6	-0.2*
Protective Service Occupations	3,041	5.9	1,491	5.0	4,532	5.5	0.9	0.3*

continued

Table B-2. Comparison of Employee Respondents and Nonrespondents (cont.)

Category	Respondents		Nonrespondents		Overall		Diff in Percent (Resp vs. Non-Resp)	Diff in Percent (Resp vs. Overall)
	No.	%	No.	%	No.	%		
Food Preparation and Serving Related	3,678	7.1	3,452	11.5	7,130	8.7	-4.4	-1.6*
Building and Grounds Cleaning and Maintenance	27	0.1	14	0.0	41	0.1	0.0	0.0
Personal Care and Service	2,937	5.7	1,597	5.3	4,534	5.5	0.4	0.1
Sales and Related	1,411	2.7	810	2.7	2,221	2.7	0.0	0.0
Office and Administrative Support	8,816	17.1	4,205	14.0	13,021	15.9	3.1	1.1*
Farming, Fishing, and Forestry	67	0.1	36	0.1	103	0.1	0.0	0.0
Construction and Extraction	2,454	4.7	2,006	6.7	4,460	5.5	-1.9	-0.7*
Installation, Maintenance, and Repair	2,793	5.4	1,560	5.2	4,353	5.3	0.2	0.1
Production	1,078	2.1	750	2.5	1,828	2.2	-0.4	-0.1
Transportation and Material Moving	1,677	3.2	1,035	3.4	2,712	3.3	-0.2	-0.1
Number of Occupations on Establishment Sampling List (effect size = 0.04)								
1-5	8,307	16.1	4,290	14.3	12,597	15.4	1.8	0.7*
6	1,855	3.6	1,004	3.3	2,859	3.5	0.3	0.1
7	3,798	7.4	1,831	6.1	5,629	6.9	1.3	0.5*
8	3,597	7.0	2,047	6.8	5,644	6.9	0.2	0.1
9	3,650	7.1	1,800	6.0	5,450	6.7	1.1	0.4*
10	30,463	59.0	19,106	63.5	49,569	60.6	-4.6	-1.7*
Time Zone (effect size = 0.03)								
Eastern Time	23,972	46.4	13,800	45.9	37,772	46.2	0.5	0.2
Central Time	16,437	31.8	8,873	29.5	25,310	31.0	2.3	0.9*
Mountain Time	4,105	7.9	2,373	7.9	6,478	7.9	0.1	0.0
Pacific Time	6,553	12.7	4,646	15.4	11,199	13.7	-2.8	-1.0*
Alaska Time	289	0.6	149	0.5	438	0.5	0.1	0.0
Hawaii Time	314	0.6	237	0.8	551	0.7	-0.2	-0.1
Metropolitan Status (effect size = 0.04)								
Rural	10,942	21.2	5,088	16.9	16,030	19.6	4.3	1.6*
Urban	40,728	78.8	24,990	83.1	65,718	80.4	-4.3	-1.6*

*Statistically different from zero at the 0.05 level.
Note: The difference columns may not match their constituent parts due to rounding.

Appendix C: Item Response Tables

Table C-1. Ten Lowest Item Response Rates, Skills Questionnaire

Item	Item Description	Sampled	Response Rate
A22-Level	Writing computer programs for various purposes.	3,202	94.7
A30-Level	Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.	6,305	96.6
A19-Level	Generating or adapting equipment and technology to serve user needs.	5,984	96.9
A28-Level	Repairing machines or systems using the needed tools.	5,169	97.0
A21-Level	Installing equipment, machines, wiring, or programs to meet specifications.	4,937	97.2
A24-Level	Watching gauges, dials, or other indicators to make sure a machine is working properly.	5,655	97.2
A29-Level	Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.	6,095	97.3
A34-Level	Obtaining and seeing to the appropriate use of equipment, facilities, and materials needed to do certain work.	6,331	97.3
A33-Level	Determining how money will be spent to get the work done, and accounting for these expenditures.	5,596	97.3
A26-Level	Performing routine maintenance on equipment and determining when and what kind of maintenance is needed.	6,148	97.4

Table C-2. Ten Lowest Item Response Rates, Work Activities Questionnaire

Item	Item Description	Sampled	Response Rate
B40-Level	Recruiting, interviewing, selecting, hiring, and promoting employees in an organization.	4,266	95.3
B21-Level	Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, equipment, or structures are to be fabricated, constructed, assembled, modified, maintained, or used.	3,650	95.4
B22-Level	Servicing, repairing, adjusting, and testing machines, devices, moving parts, and equipment that operate primarily on the basis of mechanical (not electronic) principles.	3,903	95.5
B23-Level	Servicing, repairing, calibrating, regulating, fine-tuning, or testing machines, devices, and equipment that operate primarily on the basis of electrical or electronic (not mechanical) principles.	4,012	95.8
B05-Level	Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform a work activity.	7,435	96.3
B41-Level	Monitoring and controlling resources and overseeing the spending of money.	5,999	96.4
B02-Level	Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.	8,960	96.4
B06-Level	Assessing the value, importance, or quality of things or people.	8,183	96.5
B13-Level	Establishing long-range objectives and specifying the strategies and actions to achieve them.	7,427	96.6
B32-Level	Performing for people or dealing directly with the public. This includes serving customers in restaurants and stores, and receiving clients or guests.	7,313	96.6

Table C-3. Ten Lowest Item Response Rates, Work Context Questionnaire

Item	Item Description	Sampled	Response Rate
D49	How automated is the job?	10,229	97.7
D45	How serious would the result usually be if the worker made a mistake that was not readily correctable?	10,229	98.1
D55	How important is it to this job that the pace is determined by the speed of equipment or machinery? (This does not refer to keeping busy at all times on this job.)	10,229	98.7
D47	How frequently is the worker required to make decisions that affect other people, the financial resources, and/or the image and reputation of the organization?	10,229	98.7
D53	To what extent does this job require the worker to compete or to be aware of competitive pressures?	10,229	98.7
D51	How important is repeating the same physical activities (e.g., key entry) or mental activities (e.g., checking entries in a ledger) over and over, without stopping, to performing this job?	10,229	98.8
D12	How often are there conflict situations the employee has to face in this job?	10,229	99.0
D39	How much does this job require keeping or regaining your balance?	10,229	99.0
D42	How much does this job require making repetitive motions?	10,229	99.0
D09	How important is it to coordinate or lead others in accomplishing work activities in this job?	10,229	99.0

Table C-4. Ten Lowest Item Response Rates, Knowledge Questionnaire

Item	Item Description	Sampled	Response Rate
E08-Level	Knowledge of techniques and equipment for planting, growing, and harvesting food products (both plant and animal) for consumption, including storage/handling techniques.	1,635	92.1
E38	Length of apprenticeship required to perform the job?	9,823	92.3
E26-Level	Knowledge of the theory and techniques required to compose, produce, and perform works of music, dance, visual arts, drama, and sculpture.	1,735	93.5
E34	The level of education required to perform a job.	9,823	95.7
E27-Level	Knowledge of historical events and their causes, indicators, and effects on civilizations and cultures.	2,621	95.9
E12-Level	Knowledge of materials, methods, and the tools involved in the construction or repair of houses, buildings, or other structures such as highways and roads.	2,877	96.4
E17-Level	Knowledge of plant and animal organisms, their tissues, cells, functions, interdependencies, and interactions with each other and the environment.	2,922	96.5
E03-Level	Knowledge of economic and accounting principles and practices, the financial markets, banking and the analysis and reporting of financial data.	5,446	96.7
E07-Level	Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.	5,124	96.9
E28-Level	Knowledge of different philosophical systems and religions. This includes their basic principles, values, ethics, ways of thinking, customs, practices, and their impact on human culture.	3,598	97.0

Table C-5. Ten Lowest Item Response Rates, Task Questionnaire

Item	Item Description	Sampled	Response Rate
29-2011.00, Medical and Clinical Laboratory Technologists: T17-Importance	Prepare vaccines and biological serums for disease prevention.	6	0.0
29-2011.00, Medical and Clinical Laboratory Technologists: T17-Frequency	Prepare vaccines and biological serums for disease prevention.	6	0.0
33-9092.00, Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers: T9-Frequency	Drive a four-wheel drive vehicle equipped for major emergencies such as beached boats or cliff accidents.	2	0.0
29-2011.00, Medical and Clinical Laboratory Technologists: T14-Importance	Cut images of chromosomes from photograph and identify and arrange them in numbered pairs on karyotype chart, using standard practices.	6	16.7
29-2011.00, Medical and Clinical Laboratory Technologists: T14-Frequency	Cut images of chromosomes from photograph and identify and arrange them in numbered pairs on karyotype chart, using standard practices.	6	16.7
53-7111.00, Shuttle Car Operators: T10-Frequency	Place planks between coke ovens and tops of railroad cars in order to provide paths for wheelbarrows.	9	22.2
19-4092.00, Forensic Science Technicians: T1-Frequency	Test race horses and racing dogs for substances that may affect their performances.	4	25.0
43-4121.00, Library Assistants, Clerical: T22-Frequency	Drive bookmobiles to specified off-site locations following library service schedules, and to garages for preventive maintenance and repairs.	11	27.3
29-2011.00, Medical and Clinical Laboratory Technologists: T9-Importance	Prepare slide of cell culture to identify chromosomes, view and photograph slide under photo-microscope, and print picture.	7	28.6
29-2011.00, Medical and Clinical Laboratory Technologists: T9-Frequency	Prepare slide of cell culture to identify chromosomes, view and photograph slide under photo-microscope, and print picture.	7	28.6
53-3041.00, Taxi Drivers and Chauffeurs: T12-Frequency	Drive automobiles in order to escort vehicles carrying wide loads.	7	28.6

Table C-6. Response Rates, Background Questionnaire

Item	Item Description	Sampled	Response Rate
2	How long at job?	39,671	99.5
3	Employment sector	39,671	94.1
4	Family business*	39,671	81.8
5	Age group	39,671	96.8
6	Gender	39,671	98.9
7	Ethnicity	39,671	96.7
8	Race	39,671	94.7
9A	Blindness, deafness, or other severe vision or hearing impairment	39,671	98.0
9B	A condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying	39,671	98.0
10A	Difficulty learning, remembering, or concentrating	39,671	95.1
10B	Difficulty bathing, or getting around inside the home	39,671	95.1
10C	Going outside the home alone to shop or visit the doctor's office	39,671	95.0
10D	Working at a job or business	39,671	95.0
11	Education level	39,671	96.6

*Note: Item 4, Family Business, was edited differently in analysis cycle 1 than in later Analysis Cycles. The number sampled in Analysis Cycle 1 was 5,150 with response rate 93.7. The total number sampled in Analysis Cycles 2 and 3 was 34,521 with response rate 80.0.

Table C-7. Item Response Rates by Item Type

Item Type	Questions	Response Rate
TOTAL	5,026,182	97.8
A—Skills—Importance	348,775	99.2
A—Skills—Level	270,765	98.1
B—Work Activities—Importance	395,814	99.2
B-Work—Activities—Level	305,535	97.3
D—Work Context	583,053	99.3
E—Knowledge—Importance	324,159	99.2
E—Knowledge—Level	175,114	97.6
E—Knowledge—Education and Training	49,115	97.0
E—Knowledge—Work Styles Background	157,168	99.5
Background	555,394	95.4
Task—Relevance	757,916	98.4
Task—Frequency	551,687	95.7
Task—Importance	551,687	96.6

Table C-8. Item Response Rates by Occupation

SOC	SOC Title	Questions	Response Rate
TOTAL		5,026,182	97.8
11-1021.00	General and Operations Managers	19,320	98.2
11-2011.00	Advertising and Promotions Managers	19,660	98.3
11-2021.00	Marketing Managers	8,584	96.7
11-2022.00	Sales Managers	10,797	96.0
11-2031.00	Public Relations Managers	12,235	98.0
11-3011.00	Administrative Services Managers	12,984	98.4
11-3021.00	Computer and Information Systems Managers	14,460	97.5
11-3040.00	Human Resources Managers	14,131	97.9
11-3041.00	Compensation and Benefits Managers	15,271	98.6
11-3042.00	Training and Development Managers	8,987	97.9
11-3051.00	Industrial Production Managers	9,167	95.8
11-3061.00	Purchasing Managers	10,875	98.6
11-3071.01	Transportation Managers	12,103	99.4
11-3071.02	Storage and Distribution Managers	11,329	97.5
11-9021.00	Construction Managers	11,002	98.5
11-9041.00	Engineering Managers	9,972	96.7
11-9051.00	Food Service Managers	35,784	98.3
11-9061.00	Funeral Directors	49,066	98.3
11-9081.00	Lodging Managers	11,440	98.2
11-9111.00	Medical and Health Services Managers	8,405	98.5
11-9151.00	Social and Community Service Managers	14,278	99.1
13-1022.00	Wholesale and Retail Buyers, Except Farm Products	8,238	98.2
13-1023.00	Purchasing Agents, Except Wholesale, Retail, and Farm Products	8,741	97.7
13-1031.02	Insurance Adjusters, Examiners, and Investigators	8,537	97.2
13-1051.00	Cost Estimators	10,589	96.5
13-1071.01	Employment Interviewers	11,012	97.9
13-1071.02	Personnel Recruiters	12,008	97.5
13-1072.00	Compensation, Benefits, and Job Analysis Specialists	13,732	97.4
13-1073.00	Training and Development Specialists	9,332	97.1
13-1121.00	Meeting and Convention Planners	14,130	98.3
13-2011.01	Accountants	12,709	97.7
13-2011.02	Auditors	10,298	97.8
13-2021.01	Assessors	26,303	98.5
13-2031.00	Budget Analysts	9,184	97.8
13-2041.00	Credit Analysts	7,943	97.9
13-2053.00	Insurance Underwriters	7,410	97.3
13-2072.00	Loan Officers	10,885	98.9
15-1021.00	Computer Programmers	9,243	97.1
15-1031.00	Computer Software Engineers, Applications	13,403	97.8
15-1032.00	Computer Software Engineers, Systems Software	18,187	99.2
15-1041.00	Computer Support Specialists	8,6441	96.8
15-1051.00	Computer Systems Analysts	13,7461	98.5
15-1061.00	Database Administrators	8,3571	98.6
15-1071.00	Network and Computer Systems Administrators	68,3281	98.7

continued

Table C-8. Item Response Rates by Occupation (continued)

SOC	SOC Title	Questions	Response Rate
15-1081.00	Network Systems and Data Communications Analysts	12,5101	98.5
15-2011.00	Actuaries	11,2211	98.0
17-1011.00	Architects, Except Landscape and Naval	9,7501	95.7
17-1012.00	Landscape Architects	7,2821	97.4
17-1021.00	Cartographers and Photogrammetrists	21,2811	99.2
17-1022.00	Surveyors	10,8771	98.5
17-2011.00	Aerospace Engineers	9,3121	97.9
17-2041.00	Chemical Engineers	8,9751	98.9
17-2051.00	Civil Engineers	8,0531	95.5
17-2071.00	Electrical Engineers	10,1431	98.6
17-2081.00	Environmental Engineers	14,4471	98.7
17-2112.00	Industrial Engineers	10,8631	98.8
17-2141.00	Mechanical Engineers	12,8641	97.5
17-2151.00	Mining and Geological Engineers, Including Mining Safety Engineers	12,0731	99.6
17-2171.00	Petroleum Engineers	14,2781	98.7
17-3011.01	Architectural Drafters	10,2451	98.4
17-3011.02	Civil Drafters	8,2671	97.2
17-3013.00	Mechanical Drafters	9,8241	98.9
17-3022.00	Civil Engineering Technicians	10,4241	95.2
17-3023.01	Electronics Engineering Technicians	11,8641	97.5
17-3023.03	Electrical Engineering Technicians	11,3531	98.0
17-3025.00	Environmental Engineering Technicians	10,3801	98.1
17-3026.00	Industrial Engineering Technicians	9,5951	97.7
17-3027.00	Mechanical Engineering Technicians	11,4361	97.9
19-1020.01	Biologists	10,5671	96.2
19-1022.00	Microbiologists	11,2581	99.0
19-1023.00	Zoologists and Wildlife Biologists	14,6891	98.3
19-1031.03	Park Naturalists	12,1201	98.3
19-1032.00	Foresters	9,3501	98.6
19-2031.00	Chemists	7,3461	96.6
19-2041.00	Environmental Scientists and Specialists, Including Health	25,9021	98.8
19-2042.01	Geologists	18,4081	98.8
19-3051.00	Urban and Regional Planners	10,3001	97.0
19-3093.00	Historians	9,7501	98.7
19-4021.00	Biological Technicians	11,7131	96.9
19-4031.00	Chemical Technicians	13,3301	97.7
19-4091.00	Environmental Science and Protection Technicians, Including Health	11,8731	98.5
19-4092.00	Forensic Science Technicians	9,6751	99.1
21-1014.00	Mental Health Counselors	26,3341	99.0
21-1021.00	Child, Family, and School Social Workers	13,3881	95.6
21-1022.00	Medical and Public Health Social Workers	10,5141	96.5
21-1023.00	Mental Health and Substance Abuse Social Workers	20,5861	98.4
21-1092.00	Probation Officers and Correctional Treatment Specialists	15,1831	98.7
21-1093.00	Social and Human Service Assistants	11,8311	96.3
23-1011.00	Lawyers	20,9021	98.3

continued

Table C-8. Item Response Rates by Occupation (cont.)

SOC	SOC Title	Questions	Response Rate
23-2011.00	Paralegals and Legal Assistants	7,6321	95.5
23-2092.00	Law Clerks	9,7611	98.9
25-4012.00	Curators	11,4091	98.4
25-4013.00	Museum Technicians and Conservators	17,6771	97.8
25-4021.00	Librarians	47,1821	98.4
25-4031.00	Library Technicians	24,3061	98.2
25-9011.00	Audio-Visual Collections Specialists	10,7871	98.4
27-1011.00	Art Directors	8,3761	98.0
27-1023.00	Floral Designers	9,3311	97.0
27-1024.00	Graphic Designers	10,9171	96.7
27-1025.00	Interior Designers	6,9671	98.4
27-2012.01	Producers	23,3761	98.5
27-2012.02	Directors- Stage, Motion Pictures, Television, and Radio	10,9051	99.3
27-2012.05	Technical Directors/Managers	12,0281	99.0
27-2022.00	Coaches and Scouts	37,4361	98.3
27-3011.00	Radio and Television Announcers	44,3671	98.7
27-3022.00	Reporters and Correspondents	61,0101	98.7
27-3031.00	Public Relations Specialists	7,4591	97.0
27-3041.00	Editors	23,4001	98.3
27-3042.00	Technical Writers	10,6031	98.3
27-3043.04	Copy Writers	8,2341	98.2
27-4011.00	Audio and Video Equipment Technicians	23,1311	98.4
27-4012.00	Broadcast Technicians	64,4501	98.4
27-4031.00	Camera Operators, Television, Video, and Motion Picture	48,025	98.5
27-4032.00	Film and Video Editors	14,1291	99.0
29-1031.00	Dietitians and Nutritionists	9,442	98.0
29-1041.00	Optometrists	9,202	99.1
29-1051.00	Pharmacists	9,531	96.7
29-1066.00	Psychiatrists	8,325	97.9
29-1071.00	Physician Assistants	8,575	97.6
29-1111.00	Registered Nurses	43,592	97.5
29-1122.00	Occupational Therapists	10,323	98.1
29-1123.00	Physical Therapists	11,996	99.4
29-1124.00	Radiation Therapists	14,473	97.9
29-1125.00	Recreational Therapists	8,465	96.2
29-1126.00	Respiratory Therapists	12,399	98.6
29-1127.00	Speech-Language Pathologists	20,762	98.5
29-1131.00	Veterinarians	26,024	98.5
29-2011.00	Medical and Clinical Laboratory Technologists	10,722	95.3
29-2012.00	Medical and Clinical Laboratory Technicians	8,437	95.6
29-2021.00	Dental Hygienists	8,973	96.2
29-2031.00	Cardiovascular Technologists and Technicians	25,992	97.8
29-2032.00	Diagnostic Medical Sonographers	11,376	98.6
29-2033.00	Nuclear Medicine Technologists	25,680	98.5
29-2034.01	Radiologic Technologists	11,590	96.0
29-2034.02	Radiologic Technicians	11,390	96.0
29-2041.00	Emergency Medical Technicians and Paramedics	11,419	97.6

continued

Table C-8. Item Response Rates by Occupation (cont.)

SOC	SOC Title	Questions	Response Rate
29-2051.00	Dietetic Technicians	9,919	95.1
29-2052.00	Pharmacy Technicians	14,245	97.7
29-2054.00	Respiratory Therapy Technicians	9,479	97.9
29-2055.00	Surgical Technologists	9,841	97.2
29-2056.00	Veterinary Technologists and Technicians	23,547	98.9
29-2061.00	Licensed Practical and Licensed Vocational Nurses	9,229	96.2
29-2071.00	Medical Records and Health Information Technicians	14,925	95.9
29-2081.00	Opticians, Dispensing	12,285	97.2
29-9091.00	Athletic Trainers	12,293	99.3
31-1011.00	Home Health Aides	10,010	93.9
31-1012.00	Nursing Aides, Orderlies, and Attendants	10,380	96.6
31-1013.00	Psychiatric Aides	10,245	95.4
31-2011.00	Occupational Therapist Assistants	19,735	98.5
31-2021.00	Physical Therapist Assistants	9,610	96.9
31-2022.00	Physical Therapist Aides	25,135	97.0
31-9091.00	Dental Assistants	9,116	96.1
31-9092.00	Medical Assistants	11,323	97.0
31-9093.00	Medical Equipment Preparers	17,040	96.6
31-9095.00	Pharmacy Aides	9,379	97.9
31-9096.00	Veterinary Assistants and Laboratory Animal Caretakers	27,940	98.9
33-1012.00	First-Line Supervisors/Managers of Police and Detectives	14,084	98.2
33-1021.01	Municipal Fire Fighting and Prevention Supervisors	66,571	98.5
33-2011.01	Municipal Fire Fighters	17,111	97.7
33-2011.02	Forest Fire Fighters	9,803	97.9
33-2021.01	Fire Inspectors	26,911	98.9
33-3011.00	Bailiffs	8,338	95.8
33-3012.00	Correctional Officers and Jailers	37,343	97.1
33-3021.01	Police Detectives	27,383	97.4
33-3021.02	Police Identification and Records Officers	11,137	98.3
33-3051.01	Police and Highway Patrol Officers	35,729	97.7
33-9031.00	Gaming Surveillance Officers and Gaming Investigators	10,950	98.2
33-9032.00	Security Guards	9,720	97.6
33-9092.00	Lifeguards, Ski Patrol, and Other Recreational Protective Service Workers	9,836	98.4
35-1012.00	First-Line Supervisors/Managers of Food Preparation and Serving Workers	41,430	97.5
35-2011.00	Cooks, Fast Food	11,652	96.5
35-2014.00	Cooks, Restaurant	37,528	97.2
35-2015.00	Cooks, Short Order	11,981	96.7
35-2021.00	Food Preparation Workers	54,017	96.0
35-3011.00	Bartenders	41,401	97.7
35-3021.00	Combined Food Preparation and Serving Workers, Including Fast Food	27,457	97.2
35-3022.00	Counter Attendants, Cafeteria, Food Concession, and Coffee Shop	17,247	96.0
35-3031.00	Waiters and Waitresses	67,126	98.1
35-9031.00	Hosts and Hostesses, Restaurant, Lounge, and Coffee Shop	31,265	97.3

continued

Table C-8. Item Response Rates by Occupation (cont.)

SOC	SOC Title	Questions	Response Rate
39-1011.00	Gaming Supervisors	19,551	98.5
39-1012.00	Slot Key Persons	14,656	97.1
39-2021.00	Nonfarm Animal Caretakers	20,025	97.9
39-3011.00	Gaming Dealers	17,494	97.1
39-3031.00	Ushers, Lobby Attendants, and Ticket Takers	16,112	96.6
39-3091.00	Amusement and Recreation Attendants	11,810	97.1
39-3093.00	Locker Room, Coatroom, and Dressing Room Attendants	11,855	95.7
39-4011.00	Embalmers	30,116	97.9
39-4021.00	Funeral Attendants	49,514	97.6
39-5012.00	Hairdressers, Hairstylists, and Cosmetologists	8,977	94.2
39-6011.00	Baggage Porters and Bellhops	9,963	97.4
39-6012.00	Concierges	22,480	97.7
39-6021.00	Tour Guides and Escorts	18,890	98.3
39-9011.00	Child Care Workers	17,933	97.2
39-9021.00	Personal and Home Care Aides	8,912	96.8
39-9031.00	Fitness Trainers and Aerobics Instructors	13,731	98.8
39-9032.00	Recreation Workers	22,180	97.3
41-1011.00	First-Line Supervisors/Managers of Retail Sales Workers	10,715	96.9
41-2011.00	Cashiers	27,329	96.8
41-2021.00	Counter and Rental Clerks	9,128	95.2
41-2022.00	Parts Salespersons	18,081	97.9
41-2031.00	Retail Salespersons	13,805	95.0
41-3011.00	Advertising Sales Agents	10,124	98.4
41-3021.00	Insurance Sales Agents	14,702	95.6
41-3041.00	Travel Agents	7,325	97.3
41-9021.00	Real Estate Brokers	12,148	98.0
41-9022.00	Real Estate Sales Agents	11,941	97.7
41-9041.00	Telemarketers	11,343	97.6
43-2011.00	Switchboard Operators, Including Answering Service	37,822	96.8
43-3011.00	Bill and Account Collectors	22,381	97.8
43-3021.02	Billing, Cost, and Rate Clerks	24,330	98.0
43-3021.03	Billing, Posting, and Calculating Machine Operators	10,138	97.9
43-3031.00	Bookkeeping, Accounting, and Auditing Clerks	38,762	98.0
43-3041.00	Gaming Cage Workers	22,429	97.4
43-3051.00	Payroll and Timekeeping Clerks	43,386	97.7
43-3061.00	Procurement Clerks	26,749	98.4
43-3071.00	Tellers	18,857	97.2
43-4031.01	Court Clerks	25,593	97.3
43-4031.02	Municipal Clerks	10,963	98.4
43-4051.00	Customer Service Representatives	26,990	98.3
43-4071.00	File Clerks	30,935	97.4
43-4081.00	Hotel, Motel, and Resort Desk Clerks	21,419	98.2
43-4111.00	Interviewers, Except Eligibility and Loan	9,685	96.6
43-4121.00	Library Assistants, Clerical	50,289	98.1
43-4141.00	New Accounts Clerks	10,018	98.4
43-4151.00	Order Clerks	17,835	98.3

continued

Table C-8. Item Response Rates by Occupation (cont.)

SOC	SOC Title	Questions	Response Rate
43-4161.00	Human Resources Assistants, Except Payroll and Timekeeping	37,080	98.0
43-4171.00	Receptionists and Information Clerks	24,297	96.9
43-5031.00	Police, Fire, and Ambulance Dispatchers	27,162	98.2
43-5032.00	Dispatchers, Except Police, Fire, and Ambulance	10,579	98.0
43-5071.00	Shipping, Receiving, and Traffic Clerks	13,660	96.3
43-5081.01	Stock Clerks, Sales Floor	10,626	97.4
43-5081.03	Stock Clerks- Stockroom, Warehouse, or Storage Yard	25,870	96.8
43-5081.04	Order Fillers, Wholesale and Retail Sales	7,424	98.0
43-6011.00	Executive Secretaries and Administrative Assistants	97,577	98.5
43-6012.00	Legal Secretaries	8,279	96.4
43-6013.00	Medical Secretaries	10,535	97.0
43-6014.00	Secretaries, Except Legal, Medical, and Executive	112,420	98.2
43-9011.00	Computer Operators	16,315	97.2
43-9022.00	Word Processors and Typists	12,214	97.5
43-9031.00	Desktop Publishers	8,734	95.7
43-9041.02	Insurance Policy Processing Clerks	8,316	96.5
43-9061.00	Office Clerks, General	30,345	96.4
43-9081.00	Proofreaders and Copy Markers	12,943	98.3
47-2021.00	Brickmasons and Blockmasons	10,442	97.5
47-2031.01	Construction Carpenters	11,216	95.0
47-2031.02	Rough Carpenters	10,122	96.7
47-2041.00	Carpet Installers	11,883	96.8
47-2044.00	Tile and Marble Setters	11,898	98.6
47-2071.00	Paving, Surfacing, and Tamping Equipment Operators	17,645	96.5
47-2111.00	Electricians	14,585	97.1
47-2152.01	Pipefitters and Steamfitters	11,975	98.3
47-2152.02	Plumbers	9,949	96.6
47-2211.00	Sheet Metal Workers	23,639	97.4
47-3013.00	Helpers—Electricians	10,726	97.8
47-3015.00	Helpers—Pipelayers, Plumbers, Pipefitters, and Steamfitters	9,033	98.2
47-4011.00	Construction and Building Inspectors	9,503	96.9
47-4051.00	Highway Maintenance Workers	29,998	96.6
47-5061.00	Roof Bolters, Mining	12,787	96.8
49-1011.00	First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	59,153	98.7
49-2094.00	Electrical and Electronics Repairers, Commercial and Industrial Equipment	11,122	97.8
49-3021.00	Automotive Body and Related Repairers	13,238	95.9
49-3023.01	Automotive Master Mechanics	18,487	98.8
49-3031.00	Bus and Truck Mechanics and Diesel Engine Specialists	12,943	98.6
49-3042.00	Mobile Heavy Equipment Mechanics, Except Engines	11,650	98.3
49-3091.00	Bicycle Repairers	10,076	98.2
49-9021.01	Heating and Air Conditioning Mechanics	12,832	96.5
49-9021.02	Refrigeration Mechanics	12,379	97.7
49-9042.00	Maintenance and Repair Workers, General	52,170	98.0
49-9044.00	Millwrights	11,783	97.0

continued

Table C-8. Item Response Rates by Occupation (cont.)

SOC	SOC Title	Questions	Response Rate
49-9062.00	Medical Equipment Repairers	13,005	96.9
49-9098.00	Helpers—Installation, Maintenance, and Repair Workers	24,171	98.0
51-3092.00	Food Batchmakers	14,860	97.7
51-3093.00	Food Cooking Machine Operators and Tenders	14,235	98.7
51-4041.00	Machinists	14,522	98.1
51-8031.00	Water and Liquid Waste Treatment Plant and System Operators	6,464	97.4
51-9051.00	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	11,878	98.0
51-9111.00	Packaging and Filling Machine Operators and Tenders	8,615	95.0
53-3021.00	Bus Drivers, Transit and Intercity	14,097	97.2
53-3031.00	Driver/Sales Workers	9,180	96.6
53-3041.00	Taxi Drivers and Chauffeurs	12,318	96.8
53-6021.00	Parking Lot Attendants	11,413	98.0
53-7041.00	Hoist and Winch Operators	8,678	97.5
53-7051.00	Industrial Truck and Tractor Operators	18,431	97.3
53-7061.00	Cleaners of Vehicles and Equipment	12,966	97.9
53-7064.00	Packers and Packagers, Hand	13,911	97.0
53-7073.00	Wellhead Pumpers	14,001	97.9
53-7111.00	Shuttle Car Operators	11,979	96.2