

# Occupational Requirements Survey

The Occupational Requirements Survey (ORS) is conducted by the U.S. Bureau of Labor Statistics (BLS) to produce estimates about the requirements of work. This establishment survey collects information about the physical demands, environmental conditions, education and training, and mental requirements for jobs in the U.S. economy. Current ORS data products and additional information can be found at [www.bls.gov/ors](http://www.bls.gov/ors).



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## Concepts

The purpose of the Occupational Requirement Survey (ORS) is to collect the various physical demands; environmental conditions; education, training, and experience; and mental requirements for occupations within the national economy. ORS provides insight into the presence and duration of specific physical demands and environmental exposures, as well as the amount of education, training, and experience needed to perform in the occupation. Additionally, ORS data give an understanding of some of the cognitive and mental requirements of a job.

The ORS data elements are grouped into four main categories:

- Physical demands
- Environmental conditions under which the work is typically performed
- Education and training, and experience, collectively known as specific vocational preparation or SVP
- Mental and cognitive demands

It is important to note that the ORS is designed to capture information regarding what is generally required by employers to perform a job at their establishment. The survey is not focused on the specific capabilities or experience of the worker if the employer does not require them. For example, a job may require a bachelor's degree, but a worker performing the job may have a doctoral degree (Ph.D.). In this case, the ORS would capture the requirement of this particular job as being a bachelor's degree. The distinction is significant because the desired outcome of the survey is to portray the *requirements* of an occupation, not necessarily the characteristics of the workers performing in that occupation. See the [Data sources](#) section for more detail on what occupational requirements are collected.

The ORS is an establishment-based survey and includes establishments in the 50 states and the District of Columbia in the private sector and state and local governments. Major exclusions from the survey are workers in federal and quasi-federal agencies, military personnel, agriculture workers, workers in private households, the self-employed, volunteers, unpaid workers, individuals receiving long-term disability compensation, and those working overseas. Individuals who set their own pay, such as business owners, and family members--paid token wages--are also excluded.

The following sections provide definitions of key concepts and further explanation regarding occupational selection and estimation processes used for this survey. For more detailed definitions of survey terminology, please refer to the [ORS Collection Manual](#).

## Key concepts and definitions

*Physical demands.* Refer to the physical activities required to perform occupational tasks. The presence and, in some cases, duration of these activities are collected. For more information on individual demands, see the [ORS Visual Overview for Physical Demands](#) or the Appendices in the [Calculation Section](#).

*Environmental conditions.* Refer to the various tangible or concrete hazards or difficulties that are in the vicinity of where a job is performed. The presence and, in most cases, duration of these conditions are collected. For more information about individual environmental elements, see the [ORS Visual Overview for Environmental Conditions](#) and the Appendices in the [Calculation Section](#).

*Education, training, and experience.* In ORS, this is known as Specific Vocational Preparation (SVP) and refers to the amount of preparation time required for a typical worker to learn the techniques, acquire the information, and develop the facility needed for average performance in a specific job. The preparation time includes all time spent acquiring the minimum level of formal education required, pre-employment training including certifications and licenses, on-the-job training, and prior work experience.

*Cognitive and mental demands.* The requirements related to a worker's need to use judgment, make decisions, and adapt to changes on the job. Specifically, ORS collects information on decision-making, work review, pace of work, adaptability to schedule changes, work location, and tasks, and information about work-related personal interactions.

*Work as generally performed.* Refers to the way in which most workers normally complete the duties, tasks, and responsibilities as assigned. Field economists collect occupational information representative of the typical duties performed in the sampled job.

*Accommodation.* A modification or adjustment to a job or change in the work environment that enables a person with a disability to compete equally or carry out the occupational tasks as generally performed. The ORS only collects requirements based on how work is generally performed without accommodations, as not all employers can offer the same accommodations.

*Job.* A position of employment at an establishment that one or more workers are employed in. It is characterized by its main function and any work tasks in support of that function. The term job refers to a single position in a single establishment, but an establishment may have more than one instance of a job on their payroll. For example, a restaurant may have twenty waiters all serving the same function and performing identical tasks. All twenty of those waiters would be considered by ORS to be duplicates of the same job at that worksite. Because ORS focuses on the requirements of a job but is weighted by the amount of workers employed in that job, "jobs" and "workers" may be used interchangeably in ORS publications.

*Occupation.* A generalized job or family of jobs common to many industries and areas, such as an economist or carpenter. An occupation is different from a job because it refers to a profession or trade in general, and not a single position in a single establishment. Occupations are classified by the [Standard Occupational Classification \(SOC\)](#) system to the six-digit level. The ORS further classifies occupations by eight-digit codes used by O\*NET's

detailed occupational taxonomy referred to as "[O\\*NET-SOC 2010 Occupations](#)", when available. Military specific occupations (55-0000.00) are out of scope for the ORS.

*Contractors.* People working onsite at a surveyed establishment, but paid by a contractor, are not included in data collection from the establishment unless the contractor is part of the sample. In this case, the ORS collects data on those jobs with employees of the contractor who are working offsite at other establishments, as well as those working onsite. To be included in the ORS, employees in sampled jobs must receive payments (cash, check, or direct deposit payments) from the establishment for services performed and the establishment must pay the employer's portion of Medicare taxes on those individuals' wages.

*Establishment.* A single economic unit that engages in one, or predominantly one, type of economic activity. For private industries in the survey, the establishment usually is at a single physical location, such as a mine, a factory, an office, or a store, that produces goods or provides services. For private industry, if a sampled establishment is owned by a larger entity with many locations, only the employment and characteristics of the establishment selected for the sample are considered for the survey. For state and local governments, an establishment can include more than one physical location, such as a school district or a police department. The number of workers in an establishment includes workers on paid vacation or other types of leave; salaried officers, executives, and staff members of incorporated firms; employees temporarily assigned to other units; and noncontract employees for whom the reporting unit is the permanent duty station, regardless of whether that unit issues their paychecks.

*Duration Levels.* The scale used to categorize duration of a physical demand being performed or exposure to an environmental condition. The levels are as follows:

- Seldom (up to 2 percent of the workday)
- Occasionally (2 percent up to 1/3 of the workday)
- Frequently (1/3 up to 2/3 of the workday)
- Constantly (2/3 or more of the workday)

*Percentage of workers.* The number of workers in a given domain (such an occupation) that have a certain requirement divided by the total number of workers in that domain. For example, the number of teachers that are required to reach overhead divided by the total number of teachers equals the percentage of teachers with that requirement. More detailed information is included in the [Calculation](#) section.

*Average percent of the day.* The average portion of the workday in which workers in a given domain (such as an occupation) spend sitting or standing/walking. More detailed information is included in the [Calculation](#) section.

*Average time spent (in hours or days).* The average time in hours or days in which workers spend sitting, standing/walking, or obtaining education, experience, or training. More detailed information is included in the [Calculation](#) section.

*Average maximum weight lifted.* The average of the most weight workers in a particular occupation or occupational group are ever required to lift or carry. More detailed information is included in the [Calculation](#) section.

*Percentiles.* Percentiles (10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>-median, 75<sup>th</sup>, and 90<sup>th</sup>) are used for estimates with continuous values, such as hours spent sitting, or days of prior work experience required. More detailed information is included in the [Calculation](#) section.

*Modes.* In this survey, modes for certain job requirement categories are calculated so that the user may identify the estimate within a category that has the largest weighted number of workers - essentially the most common value within that category. See the [Calculation](#) section for more information. These estimates are presented in the data via a footnote in the on-screen data tools, as well as in the excel spreadsheet of data.

*Full-time or part-time status.* For the ORS, full-time or part-time status is not determined by the number of hours worked, but is based on the establishment's definition of those terms.

*Time-based or incentive-based pay.* Time-based workers are those whose wages are based solely on an hourly rate or salary. Incentive workers are those whose wages are based at least partially on productivity payments, such as piece rates, commissions, and production bonuses.

*Union or nonunion workers.* The ORS defines a union worker as any employee in a union occupation who satisfies all of the following conditions: a labor organization is recognized as the bargaining agent for all workers in the occupation; wage and salary rates are determined through collective bargaining or negotiations; and settlement terms, which must include earnings provisions and may include benefit provisions, are embodied in a signed, mutually binding collective bargaining agreement. A nonunion worker is an employee in an occupation not meeting all of the ORS-defined conditions for union coverage.

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## Data Sources

Bureau of Labor Statistics (BLS) field economists are extensively trained and given detailed instructions on data collection techniques. They employ a variety of methods, including personal visits, mail, telephone, and email, to obtain data from Occupational Requirements Survey (ORS) respondents. Field economists do not use a paper or an online questionnaire to collect these data; instead, they rely on a conversational interview and descriptive documents, such as task lists, to collect occupational requirements from respondents. Respondents are typically human resources managers or specialists, occupational safety managers, or supervisors. Field economists attempt to gather the following information from the respondent:

- *The primary business activity of the establishment.* The field economist verifies that the [North American Industry Classification System](#) (NAICS) industry code for the establishment is correct.
- *A list of employees or a list of job titles with employee counts.* If the field economist is provided with a list of employees, jobs are selected using equal probability sampling to select a sampled job, where each entry on the list has an equal chance of selection. If the field economist is provided a list of job titles and employee counts, jobs are selected using probability proportional to size sampling, where the greater the number of employees associated with a job title the more likely the job will be selected.
- *The tasks, knowledge required, controls and complexity, contacts, and environmental conditions of the job.* The field economist uses this information to determine the correct occupation code and work level for each sampled job based on the job description and type of work performed. (For more information on pay factors and work levels, see [National Compensation Survey: Guide for Evaluating Your Firm's Jobs and Pay](#)).
- *The amount of employees in each sampled job that is matched to an occupational description.* The field economist determines how many employees in the establishment can be defined by the occupational code for the sampled job.
- *Work attributes for the workers in the sampled job in terms of whether they work full or part time, classified as union or nonunion workers, and paid on a time or incentive basis.* The field economist determines these three work attributes of the employee in the sampled job.
- *The various occupational requirements that the employee must meet to successfully perform their job.* The field economist collects job requirements that pertain to the sampled job's physical demands, environmental conditions, education training, and experience, and mental requirements. Field economists refer to a list of tasks provided by respondents to understand the relationship between job demands and occupational data needed for collection. A task refers to a distinct activity assigned to or performed by workers.

## Collection period

A BLS field economist contacts the sampled establishment for the collection of data. The collection for ORS data is done on an annual basis, and generally runs from August to July. The 2017 estimates are from two samples of data collected from the Occupational Requirements Survey. The ORS is an establishment-based survey and uses

a national sample design. To maximize the amount of publishable information, the BLS is combining data across three annual ORS samples to produce the 2018 estimates. The number of publishable occupations and the level of occupational detail is expected to increase with the addition of each subsequent year's sample until the full ORS sample size of up to 26,500 sampled establishments is reached in 2018.

## Confidentiality

All data collected in the ORS are subject to the BLS confidentiality requirements that prevent the disclosure of identifying information. Data collected from the ORS are used solely for statistical purposes. BLS has a strict confidentiality policy which ensures that the survey sample composition, lists of reporters, and names of respondents will be kept confidential. In addition, the policy assures respondents that published figures will not reveal the identity of any specific respondent and will not allow the data of any specific respondent to be identified. Each published estimate is screened to ensure that it meets these confidentiality requirements.

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# Design

Occupational Requirements Survey (ORS) data are collected from a national probability sample selected in two stages: (1) a probability sample of establishments and (2) a probability sample of occupations (PSO) within sampled establishments. Probability samples are subject to sampling and nonsampling errors, which are discussed in the Calculation section.

## Selecting sample establishments (stage 1)

In stage 1, the ORS uses a probability proportional to size (PPS) technique to select a sample of private industry and state and local government establishments from across the nation. The larger the establishment, the greater its chance of being selected. Establishments from all 50 states and the District of Columbia are eligible for selection. ORS stratifies by 23 major industry groups and ownership (private industry and state and local government) and are implicitly stratified within each sampling cell for 24 geographic areas. The 24 geographic areas represent the 15 largest metropolitan areas and the 9 census divisions. More detailed information on ORS sample design can be found in the sample design portion of the [research section](#) on the public ORS website.

Each establishment is assigned a six-digit industry code using the [North American Industry Classification System](#) (NAICS). When a single physical location encompasses two or more distinct economic activities, the industry code assigned is based on the establishment's principal product, or group of products, produced or distributed, or services rendered. When determining the principle product or service rendered, revenue generated or employment are used to determine the primary business activity and assign an industry code.

The *sampling frame*, or *universe*, is the list of establishments from which the survey sample is selected. The ORS establishment sample is drawn from the [Quarterly Census of Employment and Wages](#) (QCEW) and units reporting to the Railroad Retirement Board.

*Industry classification of establishments.* All federal statistical agencies currently use NAICS to classify survey establishments by industry. NAICS is revised every 5 years to stay current with industrial organization in North America. In selecting new establishment samples, the ORS currently uses NAICS 2012 as one of the stratification variables.

*Sample groups.* The 2017 estimates are from two samples of data collected from the Occupational Requirements Survey. The ORS is an establishment-based survey and uses a national sample design. To maximize the amount of publishable information, the BLS is combining data across three annual ORS samples to produce the 2018 estimates. The number of publishable occupations and the level of occupational detail is expected to increase with the addition of each subsequent year's sample until the full three-year ORS sample size of up to 26,500 sampled establishments is reached in 2018. Because the ORS combines data across three annual samples selected independently, there is a possibility that an establishment will be reselected in a subsequent sample. However, ORS data are not collected from the same establishment in more than one sample group. In this case, the data from the initial collection are used.

## Probability sampling of occupations within sampled establishments (stage 2)

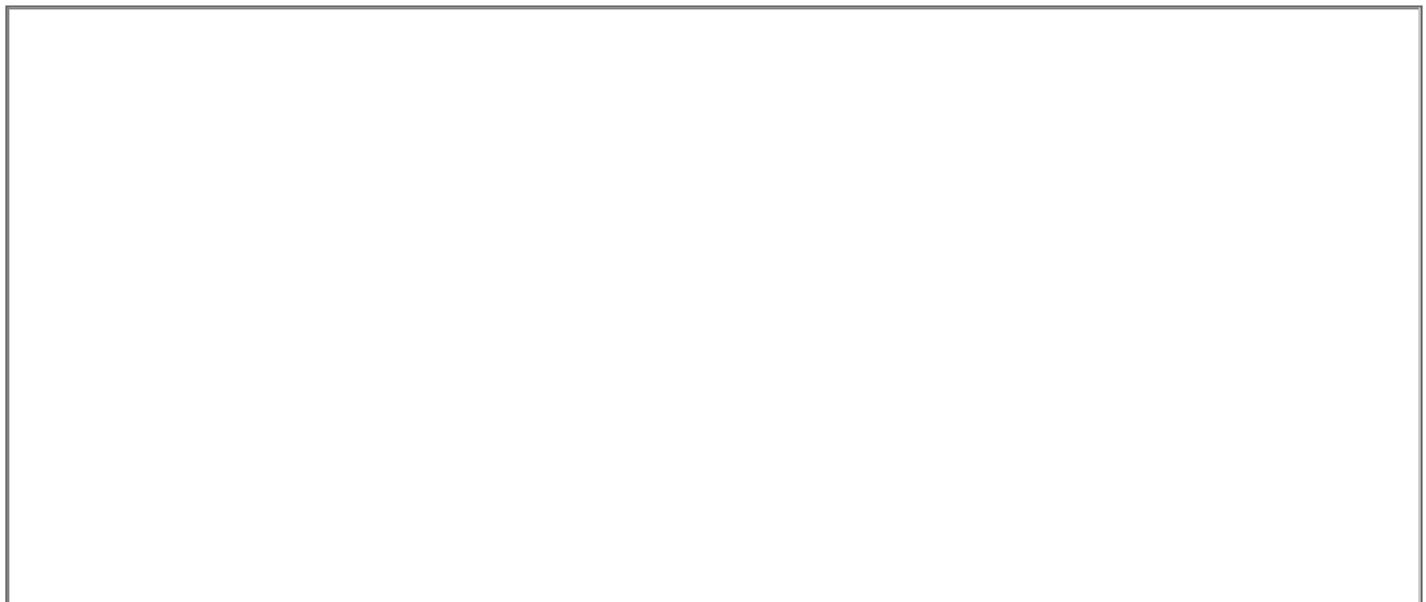
The ORS collects data about requirements of jobs from sampled establishments. In this stage (stage 2), field economists use a four-step process to select and classify jobs for which data are to be collected from the sampled establishment.

Step 1: Field economists receive the establishment’s complete list of employees and their job titles and perform the probability selection of occupations (PSO) technique. The field economists use the PSO technique to randomly select the jobs for which data are to be collected. This process ensures that the probability of selecting a given job is proportional to the number of workers in the job at the establishment. The number of jobs selected for data collection is based on the establishment’s employment size, according to the following criteria:

PSO Technique			
Number of employees	1–49	50–249	250 or more
Number of jobs selected	Up to 4	6	8

Exceptions include state and local government units, for which up to 20 jobs may be selected.

Step 2: Field economists classify the sampled jobs into occupations based on the workers’ actual job duties and responsibilities, not on their job titles or specific education. For example, an employee trained as an engineer, but working as a drafter, is reported as a drafter. An employee who performs the duties of two or more distinct occupations is reported as working in the occupation that requires the highest level of skill or in the occupation in which the employee spends the most time if there is no measurable difference in skill requirements. Each sampled job is classified by the [Standard Occupational Classification](#) (SOC) system to the six-digit level, and further designated by an eight-digit code in the Occupational Information Network’s (O\*NET) detailed occupational taxonomy, when available. These are referred to as [O\\*NET-SOC 2010 occupations](#). This code is part of a hierarchical structure as shown in the following exhibit.



Level of detail	O*NET-SOC 2010 code	Occupation title
2 digit	17-0000.00	Engineering occupations
3 digit	17-3000.00	Drafters, engineering technicians, and mapping technicians
5 digit	17-3010.00	Drafter
6 digit	17-3011.00	Architectural and civil drafters
8 digit	17-3011.01	Architectural drafters
	17-3011.02	Civil drafters

O\*NET-SOC 2010 occupations are grouped under and include the 840 [Standard Occupational Classification \(SOC\)](#) detailed occupations. SOC detailed occupations are grouped under broad occupations; broad occupations are part of a minor group, and minor groups are part of a major group. The example above shows the hierarchy of ‘architectural drafters’ and ‘civil drafters’ O\*NET-SOC 2010 occupations.

The SOC designates 23 major groups and there are 1,110 O\*NET-SOC 2010 occupations within these 23 groups. For the purposes of the ORS, occupations can fall into 22 major groups and 1,090 occupations; only the major group designating military-specific occupations is excluded (code 55-0000.00 and detailed occupations within this major group).

Step 3: Identification of occupational attributes of the worker in the sampled job, such as full-time or part-time status, union or nonunion status, and whether the work is paid on a time or incentive basis. The field economist records specific occupational attributes of the worker in the sampled job. For definitions of occupational attributes see the [Concepts](#) section.

Step 4: Field economists evaluate the job to determine the work level of its duties and responsibilities using a [point-factor](#) system of points based on the following factors:

- Knowledge
- Job controls and complexity
- Contacts
- Physical environment

Each factor consists of several points and a description. The duties and responsibilities of the job, along with consideration given to work performed and the skills, education, and training required for the job are evaluated. Points are then totaled to determine the overall work level for the job. Generally, the greater the impact, complexity, or difficulty of the factor, the higher the number of points assigned, and the higher the work level. As the following exhibit shows, there are some occupations that cannot be “leveled,” because for the following jobs points cannot be determined for all four factors, thus points are not assigned and a level cannot be determined.

Jobs that cannot be leveled	
O*NET-SOC 2010 code	Occupation title
11-1031.00	Legislators
27-1013.00	Fine artists, including painters, sculptors, and illustrators
23-1021.00	Administrative law judges, adjudicators, and hearing officers
23-1022.00	Arbitrators, mediators, and conciliators

<b>Jobs that cannot be leveled</b>	
23-1023.00	Judges, magistrate judges, and magistrates
27-2011.00	Actors
27-2012.00	Producers and directors
27-2012.01	Producers
27-2012.02	Directors-stage, motion pictures, television, and radio
27-2012.03	Program directors
27-2012.04	Talent directors
27-2012.05	Technical directors/managers
27-2021.00	Athletes and sports competitors
27-2022.00	Coaches and scouts
27-2023.00	Umpires, referees, and other sports officials
27-2031.00	Dancers
27-2032.00	Choreographers
27-2041.00	Music directors and composers
27-2041.01	Music directors
27-2041.04	Music composers and arrangers
27-2042.00	Musicians and singers
27-2042.01	Singers
27-2042.02	Musicians, instrumental
27-2099.00	Entertainers and performers, sports and related worker, all other
27-3011.00	Radio and television announcers
27-3012.00	Public address systems and other announcers
41-9012.00	Models

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## Calculation

The ORS estimates provide information about the physical demands; environmental conditions; education, training, and experience; and mental requirements of jobs in the U.S. economy. Job requirement categories in ORS have estimates conveyed as the percentage of workers, mean (in hours, days, pounds, or percentage of a day), percentiles, and mode estimates for each occupational definition. Most physical demands and environmental conditions have duration associated with their requirements, which are grouped within a duration level, and a percentage-of-workers estimate is calculated for each of these levels (see the “Duration Level” table below).

Some categories have estimates that use the mean to convey duration, such as sitting or standing/walking and various education, training, and experience components. For example sitting is captured using hours, so mean and percentile estimates (10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, and 90<sup>th</sup> percentiles) are calculated for both hours and the percent of day spent sitting for a specific occupation or occupational group.

Duration Level	
Not present	Requirement is not present and there is no duration
Seldom	Up to 2 percent of the workday
Occasionally	2 percent and up to 1/3 of the workday
Frequently	1/3 up to 2/3 of the workday
Constantly	2/3 or more of the workday

For physical demands and environmental conditions, the mode of the category is identified, that is, which duration level has the largest weighted number of workers. For other categories that do not have duration levels associated with them, the mode is also determined. For example, the minimum education that is the most common for security guards is a high school diploma.

Field economists collect ORS job requirements for over 70 categories; however, as explained above, many estimates can be calculated from one collected job requirement. This results in many more calculated ORS estimates per occupation (or occupational group). For a full list of calculated elements, please see [Appendix A](#) at the end of this section.

The formulas used to calculate these estimates are shown below. The type of estimator used depends on the job requirement category. For categorical job requirement estimates, a percentage of workers is calculated, and a mode identified for these percentages. For continuous job requirement estimates (such as duration in hours or days and maximum weight lifted/carried elements), mean and percentile estimates are calculated. Appendix A provides the breakdown of estimate type by job requirement category.

*Percentage.* The formula for the percentage of workers with a given job requirement out of all workers in the domain (such as an occupation) is

where:

$i$  is the establishment,

$g$  is the occupation within establishment  $i$ ,

$I$  is the total number of establishments,

$G_i$  is the total number of quotes in establishment  $i$ ,

$X_{ig}$  is 1 if worker  $ig$  meets the condition set in the domain (denominator) condition and 0 otherwise.

$Z_{ig}$  is 1 if worker  $ig$  meets the condition set in the characteristic condition and 0 otherwise.

$OccFW_{ig}$  is the final quote weight for occupation  $g$  in establishment  $i$ .

*Average (mean).* The formula for the average value of a quantity for a requirement is

where:

$i$  is the establishment,

$g$  is the occupation within establishment  $i$ ,

$I$  is the total number of establishments,

$G_i$  is the total number of quotes in establishment  $i$ ,

$X_{ig}$  is 1 if worker  $ig$  meets the condition set in the domain (denominator) condition and 0 otherwise.

$Z_{ig}$  is 1 if worker  $ig$  meets the condition set in the characteristic condition and 0 otherwise.

$OccFW_{ig}$  is the final quote weight for occupation  $g$  in establishment  $i$ .

$Q_{ig}$  is the value of a quantity for a specific characteristic for occupation  $g$  in establishment  $i$ .

*Percentiles.* The grouping of various categories are used to describe the distribution of a numeric value. The following percentiles  $p$  are calculated: 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup> (median), 75<sup>th</sup>, and 90<sup>th</sup>. The  $p$ th percentile is the value  $Q_{ig}$ , where the value of a quantity is for a specific category, such that

- the sum of final quote weights ( $OccFW_{ig}$ ) across quotes with a value less than  $Q_{ig}$  is less than  $p$  percent of all final quote weights and
- the sum of final quote weights ( $OccFW_{ig}$ ) across quotes with a value more than  $Q_{ig}$  is less than  $(100 - p)$  percent of all final quote weights.

It is possible that there is no specific quote  $ig$  for which both of these properties hold. This occurs when there exists a quote for which the  $OccFW_{ig}$  of records whose value is less than  $Q_{ig}$  equals  $p$  percent of the total weighted quote employment. In that situation, the  $p$ th percentile is the average of  $Q_{ig}$  and the value on the quote with the next-lowest value.

*Mode.* The mode is the highest percentage estimate within a job requirement category. Refer to [Appendix A](#) at the end of this section for a list of elements that have mode estimates.

## Education, training, and experience

Although most of the estimates for these requirements are simply based on establishment responses about the selected jobs' various tasks, there are some that require an additional level of calculation. One of these is the Specific Vocational Preparation (SVP) level which is determined by the amount of preparation time required by the worker in order to develop the skills needed to perform the job. The job requirement categories that make up this preparation are the minimum education level with respect to formal degree types, pre-employment training, previous work experience, and on-the-job training required by a job. These categories' associated time are then aggregated and used to determine the SVP level needed for the job shown in the table below:

Specific vocational preparation level	Preparation time
1	Short demonstration only (4 hours or less)
2	Anything beyond short demonstration up to and including 1 month
3	Over 1 month up to and including 3 months
4	Over 3 months up to and including 6 months
5	Over 6 months up to and including 1 year
6	Over 1 year up to and including 2 years
7	Over 2 years up to and including 4 years
8	Over 4 years up to and including 10 years
9	Over 10 years

## Strength

Another job requirement that is based off several categories' estimates is strength. It is measured in five levels: sedentary, light work, medium work, heavy work, and very heavy work. The levels are determined by how much weight a worker is required to lift and/or carry, how often, and standing/walking in some special cases. The strength level is determined by satisfying at least one of the lifting/carrying conditions shown in the table below, or as defined by the "strength special cases" table. The highest strength level satisfied will be the level that represents that sampled job. For example, if a job requires a worker to lift or carry 11–20 pounds *occasionally*, then it would be classified as light work. However, if that same job were to require lifting or carrying that same weight *frequently*, then it would be classified as medium work.

Strength level				
Lifting/carrying	Light work	Medium work	Heavy work	Very heavy work
Seldom	11-20 pounds	21-50 pounds	51-100 pounds	>>100 pounds

Strength level				
Occasionally	11-20 pounds	21-50 pounds	51-100 pounds	" class="token entity">>100 pounds
Frequently	≤10 pounds	11-25 pounds	26-50 pounds	" class="token entity">>50 pounds
Constantly	Negligible weight	≤10 pounds	11-20 pounds	" class="token entity">>20 pounds

The following table outlines the special cases for strength. In instances where field economists are unable to determine certain job requirements from the respondent, they record these data as unknown. See the section “Weighting, Nonresponse Adjustment, Imputation, and Benchmarking” for more information.

## Reliability of ORS estimates

To assist users in ascertaining the reliability of ORS estimates, standard errors are published along with each estimate. Standard errors provide users with a measure of the precision of an estimate to ensure that it is within an acceptable range for their intended purpose. The standard errors are calculated from collected and imputed data. BLS is researching methods for estimating the variance excluding imputed values. For additional information, see [www.bls.gov/ncs/ors/or/se.htm](http://www.bls.gov/ncs/ors/or/se.htm).

ORS estimates are derived from sampled jobs within responding establishments. Two types of errors are possible in an estimate based on a sample survey: sampling and nonsampling errors. *Sampling errors* occur because the sample makes up only a part of the population it represents. The sample used for the survey is one of a number of possible samples that could have been selected under the sample design, each producing its own estimate. A measure of the variation among sample estimates is the *standard error*. *Nonsampling errors* are data errors that stem from any source other than sampling error, such as data collection errors and data-processing errors.

Standard errors can be used to measure the precision with which an estimate from a particular sample approximates the expected result of all possible samples. The chances are about 68 out of 100 that an estimate from the survey differs from a complete population figure by less than the standard error. The chances are about 90 out of 100 that this difference is less than 1.6 times the standard error. Statements of comparison appearing in ORS publications are significant at a level of 1.6 standard errors or better. This means that, for differences cited, the estimated difference is more than 1.6 times the standard error of the difference.

The ORS uses *balanced repeated replication* (BRR) to estimate the standard error. The procedure for BRR entails first partitioning the sample into variance strata composed of a single sampling stratum or clusters of sampling strata, and then splitting the sample units in each variance stratum evenly into two variance primary sampling units (PSUs). Next, half-samples are chosen, so that each contains exactly one variance PSU from each variance stratum. Choices are not random but are designed to yield a “balanced” collection of half-samples. By using half-samples, we can compute a “replicate” estimate with the same formula for the regular, or “full-sample,” estimate, except that the final weights are adjusted. If a unit is in the half-sample, its weight is multiplied by  $(2 - k)$ ; if not, its weight is multiplied by  $k$ . For all ORS publications,  $k = 0.5$ , so the multipliers are 1.5 and 0.5.

The BRR estimate of standard error with  $R$  half samples is

where:

the summation is over all replicates of half-samples  $r = 1, \dots, R$ ,

$\hat{Y}_r$  is the  $r$ th replicate estimate, and

$\hat{Y}$  is the full-sample estimate.

*Data collection and processing errors* are mitigated primarily through quality assurance programs that include the use of data collection reinterviews, observed interviews, computer edits of the data and systematic professional review of the data. The programs also serve as a training device to provide feedback to field economists, or data collectors, on errors and the sources of errors that can be remedied by improved collection instructions or computer-processing edits. Field economists receive extensive training to maintain high standards in data collection.

Once estimates of occupational requirements are produced, the estimates are verified, or validated. The focus of the validation is to compare the estimates with expectations for them. The expectations are based on values of the ORS estimates from prior years as well as similar estimates from other sources of data, such as the Occupational Information Network ([O\\*NET](#)). In addition, ORS estimates between similar occupations are compared.

Estimates that deviate from their expectations are further investigated to ensure that their underlying data are consistent with ORS collection procedures, and their calculation is consistent with the ORS statistical procedures. Estimates that are consistent with these procedures are designated as “fit-for-use” for publication.

Before any estimate is published, it is also reviewed to make sure that it meets specified statistical reliability and confidentiality requirements. The review prevents the publication of an estimate that could reveal information about a specific establishment or that has a large sampling error.

For additional information on data review and estimate validation, see the Data Review and Validation portion of the [research section](#) on the [ORS website](#).

## **Weighting, nonresponse adjustment, imputation, and benchmarking**

Participation in the survey is voluntary; therefore, a company official may refuse to participate in the survey. In addition, some establishments selected from the sampling frame may be out of the scope of the survey or may have gone out of business. To address the problems of nonresponse and missing data, the ORS program adjusts the weights of the remaining establishments and imputes missing values, to ensure that occupational requirement estimates are representative of requirements for civilian workers during the estimation process. This section describes the current weight adjustments, imputation, and benchmarking methods.

Weight adjustments and imputation are made in accordance with the following steps:

1. Unit nonresponse adjustment: An establishment is considered *responding* if it provided information for at least one usable quote (or sampled job). A quote is classified as usable if the following data are present: occupational attributes (full-time or part-time schedule, union or nonunion status, and time or incentive type of pay), work schedule, and occupational requirements data for any of the job requirement categories.

An establishment is considered *nonresponding* if it is unable to provide at least one usable quote. Establishment nonresponse is treated with adjustments that redistribute the weights of nonrespondents to similar respondents by characteristics such as the industry, size class, and geographic area of the establishment. For example, if the nonresponding establishment was in the manufacturing industry and had an employment of 350 workers, the ORS program would adjust the weights of responding manufacturing establishments with 250–499 workers by a nonresponse factor during estimation. This nonresponse adjustment factor (NRAF) at the establishment level is calculated using the following formula:

1. Unit nonresponse adjustment: An establishment is considered *responding* if it provided information for at least one usable quote (or sampled job). A quote is classified as usable if the following data are present: occupational attributes (full-time or part-time schedule, union or nonunion status, and time or incentive type of pay), work schedule, and occupational requirements data for any of the job requirement categories.

An establishment is considered *nonresponding* if it is unable to provide at least one usable quote. Establishment nonresponse is treated with adjustments that redistribute the weights of nonrespondents to similar respondents by characteristics such as the industry, size class, and geographic area of the establishment. For example, if the nonresponding establishment was in the manufacturing industry and had an employment of 350 workers, the ORS program would adjust the weights of responding manufacturing establishments with 250–499 workers by a nonresponse factor during estimation. This nonresponse adjustment factor (NRAF) at the establishment level is calculated using the following formula:

,

where:

$\Sigma_A$  = weighted employment of all usable establishments in the nonresponse cell

$\Sigma_B$  = weighted employment of all viable but not usable establishments in the nonresponse cell

If there are no responding establishments to reweight within the industry/employment group, then additional responding units from similar geographic areas are considered.

Establishments no longer in operation or out of the scope of the survey, and establishments with no workers within the scope of the survey, are excluded from the survey estimates.

2. Other response and nonresponse adjustment factors may be included for any special situations that may have occurred during data collection. For example, an establishment weight adjustment factor is applied when a sample unit is one of two establishments owned by a given company and the respondent provides data for both locations combined instead of data for the sampled unit. In this example, the weight of the sampled unit is adjusted to reflect the employment data collected.

3. *Item nonresponse* is a situation in which an establishment responds to the survey but is unable or unwilling to provide some of the occupational requirements data or worker attributes for a given sampled occupation. Item nonresponse is addressed through item imputation in certain situations. Item imputation replaces missing values for an item or items with values derived from establishments with similar establishment and worker characteristics that have a value for the item. For ORS estimates, items with missing values are imputed within groups of ORS characteristics that are related. For example, one ORS group refers to categorical variables only and includes such characteristics as hearing, vision, and driving. Within the group, values are imputed using occupational information from similar occupations in similar establishments. Imputation of one group of ORS characteristics does not affect the imputation for any other group.
4. *Poststratification, or benchmarking*, is the process of adjusting the weight of each establishment in the survey to match the most current distribution of employment by industry. The ORS establishment sample is drawn from the Quarterly Census of Employment and Wages (QCEW). Because the sample of establishments used to collect ORS data are chosen ahead of time, establishment weights reflect employment at the time of sampling, not collection. The benchmark process updates those weights by current employment. Benchmarking ensures that survey estimates reflect the most current industry– government (hereafter, ownership) employment counts in proportions consistent with the private industry, state government, and local government sectors. For example, let's say 40 private industry, 10 local government, and 5 state government units in the service sector were selected from the ORS sampling frame. These units consist of establishments employing 200,000 private workers, 30,000 local government workers, and 10,000 state government workers. If, by the time of survey processing, the private service sector experienced an employment increase of 10,000 workers (or 5 percent) and there is no increase in employment in the service sectors of state and local government, then the sample would underrepresent current employment in the private industry service sector in the absence of benchmarking. In this example, the ORS would adjust the sample weights of the 40 service sector firms in private industry to ensure that the number of workers in establishments in the sampling frame rises to 210,000. The ownership employment counts for the private industry service sector would then reflect the current proportions of 84 percent for private industry, 12 percent for local government, and 4 percent for state government employment.

Employment information is derived from the Quarterly Census of Employment and Wages (QCEW) Longitudinal Database, a file of railroad employment, and the Current Employment Survey (CES). The QCEW and the railroad information provide employment data, but since these sources do not have current employment data, the CES is used to make an adjustment to the employment.

For more information, please see [Estimation Processes Used in the Occupational Requirements Survey](#) and [Imputation Methodology for the Occupational Requirements Survey \(ORS\)](#).

*Last Modified Date: March 29, 2017*

## *Presentation*

Occupational Requirement Survey (ORS) [news releases](#), [data](#), and other information can be found at [www.bls.gov/ors](http://www.bls.gov/ors). The primary purpose of collecting ORS data is to provide a comprehensive dataset on the physical demands, environmental conditions, education and training, experience, and mental requirements for jobs in the U.S. economy, by detailed occupations. Users may include:

- Jobseekers
- Researchers
- Insurance companies
- Advocacy organizations
- Data users within nonprofits
- Employment agencies
- State and federal agencies
- Disability community
- Vocational experts
- Human resource professionals
- Medical professionals
- Actuaries

ORS data are used for a variety of purposes. Uses may include:

- Assisting the Social Security Administration in its disability adjudication process
- Using data for new opportunities in research, such as in academia or government
- Tracking the nature of work
- Benchmarking job descriptions or developing targeted recruiting plans
- Helping insurance companies assess risk management
- Assisting temporary help firms properly match an employee to job openings

## **Accessing data**

The complete set of 2017 ORS data can be found at [www.bls.gov/ors/#data](http://www.bls.gov/ors/#data). On screen query tools and flat files are available for data users. Flat files can be downloaded at <https://download.bls.gov/pub/time.series/or/>, which also includes a description of these files and the structure of ORS series. In addition, an [Excel file](#) is available, which includes all current data. Selected occupational information about 22 major occupational groups can be found in [occupational profiles](#).

Although the occupational requirements data collected may have many uses, their limitations must be kept in mind. The data are subject to sampling error, which may cause deviations from the results that would be obtained if the actual requirements for jobs in all establishments could be used. Nonsampling error is present in surveys as well. (See the Calculation section for more information.) Also, the current imputation process used by ORS remains under development and may be refined in the future. To assist users in ascertaining the reliability of the ORS estimates, standard errors are available with the estimates released through the public data query tools and Excel file.

*Last Modified Date: June 13, 2018*

# *History*

## **Timeline Events:**

**October 2012:** Occupational Requirements Survey established as a test survey

**November 2012:** Phase 1 test: Initial proof of concept

**January 2013:** Phase 2 test: Collection protocol testing

**April 2013:** Phase 3 test: Broad scale testing

**November 2013:** Observations Test conducted concurrently with other FY 2014 tests

**November 2013:** ORS-Only Efficiency Innovations Test

**December 2013:** NCS/ORS Joint Collection Test

**December 2013:** New Data Element Tests

**November 2013:** Central Office Elements Test

**February 2014:** Alternative Modes Test

**October 2014 – September 2015:** Pre-production testing

**June 2015:** Job Observations Pilot Test

**September 2015 – December 2016:** First year of production data collection and estimation

**December 2016:** Published estimates from first production sample

**June 2017 – September 2017:** Job Observations Test

**September 2017:** Testing of the revised mental and cognitive demands questions

**November 2017:** Published estimates combining two samples of collected data

The Social Security Administration (SSA) contracted with BLS to produce occupational data that would describe the requirements of an occupation. These data would aid SSA in determining eligibility for Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI) disability benefits for applicants. During the developmental stages of the Occupational Requirements Survey (ORS), BLS identified its existing infrastructure

already available to coordinate with the ORS. That framework had the capability to manage and implement a new survey to meet data needs as well as systems and processes to support all the steps of the survey. In addition, field economists who work on the National Compensation Survey (NCS) were already familiar with collecting data elements similar to those ORS captures. For example, the NCS classifies each job selected using the [Standard Occupational Classification System](#) (SOC), collects worker characteristics (such as bargaining status and part-time or full-time workers), and determines industry classification using the North American Industry Classification System (NAICS) for sampled establishments. BLS has experience collecting and reviewing information on the knowledge required to perform the job, job controls provided, the complexity of tasks, the contacts made by workers, and the physical environment where the work is performed—all similar to the types of data ORS would be designed to collect. This initial determination eventually led to formalized testing that would determine if the existing infrastructure can be used to collect data on occupational requirements.

## Testing

BLS established ORS as a test survey in FY 2013 (that is, during October 1, 2012– September 30, 2013). In FY 2013 and 2014, several feasibility tests were performed to assess the viability of collecting data on occupational requirements using the platform currently used by the NCS.

In FY 2013, testing was conducted in three phases: The main objective of phase 1 was to ensure that BLS field economists knew how to describe the survey and find respondents for the ORS data elements. BLS also created and tested an initial set of data collection protocols and collection aides. In phase 2, BLS expanded the number of field economists that could describe and collect ORS data while obtaining additional information not included in phase 1. That test also evaluated the effectiveness of collection tools. The primary goal of phase 3 was to test whether field economists could collect ORS data elements and relevant information across the country in a uniform and efficient manner. Also during phase 3, BLS tested the feasibility of collecting both ORS and NCS elements; adding more ways to conduct ORS interviews; including new data capture systems and review procedures; and establishing the Central Office Collection (COC). Some companies have special arrangements with BLS, regarding the manner in which data should be collected for their individual establishments and a COC may require permission and coordination from headquarters in order to proceed with collecting data. Test objectives were successfully met in these phases, and the findings from these tests suggested that the collection of the ORS data was viable.

As a result of FY 2013 testing, areas were identified where further testing was needed before moving to full-scale production. In FY 2014, five feasibility tests were completed to refine ORS methodology tested in previous phases:

1. ORS Only Efficiency Innovations Test – refined the methods to develop more efficient approaches for data collection as identified during FY 2013 testing
2. NCS/ORS Joint Collection Test – determined how best to collect occupational requirements data elements and NCS data elements from the same establishment

3. New Data Element Tests – determined the new mental and cognitive demands of work data elements and evaluated the use of occupational task lists as developed by the Department of Labor, Employment and Training Administration (ETA), Occupational Information Network (O\*NET) program during data collection
4. Central Office Collection (COC) Test – determined how best to collect occupational requirements data elements from large firms and state governments
5. Alternative Modes Test – determined how to collect occupational requirements data elements efficiently when a personal visit is not optimal via phone, email, or fax

These tests provided evidence that the NCS platform could be adapted to ORS data collection and demonstrated the effectiveness of the revised materials and procedures.

Testing activities in FY 2013 and 2014 laid the foundation for the preproduction test conducted in FY 2015. Unlike the earlier tests, which were small-scale, testing a subset of data elements or the viability of different collection methods, the preproduction test was designed as a relatively large-scale, nationally representative test of ORS data collection. ORS preproduction data collection began in October 2014 and continued until May 2015. The sampling, data collection, procedures, and review were designed to mimic what will occur during ORS production. The results from the ORS preproduction test demonstrated that data on occupational requirements could be collected using the processes established by BLS. As a result of the preproduction test, some changes and refinements to several of the elements were made before the implementation of a move to production.

Additional tests that run concurrent with data collection are ongoing, such as job observation tests and the testing of a set of revised mental and cognitive demand questions. Detailed information on completed tests and other testing activities can be found in the [research section](#) of the ORS website.

## Publication

The November 2017 estimates are from two samples of collected data. Many job requirement categories remained the same between the two releases, with the exception of the mental and cognitive elements. Specific durations in hours and percent of day for almost all of the physical demands and environmental conditions were excluded in this release. Although these types of estimates are no longer available for physical and environmental requirements, an estimate related to the duration level is still provided when publication criteria is met. In addition, new estimates providing information about the types of pre-employment training were added to this release. For more information on the types of estimates that were eligible for publication, see the [Calculation](#) section.

*Last Modified Date: June 13, 2018*

## *More Information*

Additional information on the Occupational Requirements Survey (ORS) is available on the ORS website: [www.bls.gov/ors/](http://www.bls.gov/ors/).

ORS estimates are available on the BLS website:

- Time series data from the BLS LABSTAT database: [www.bls.gov/ors/#data](http://www.bls.gov/ors/#data)
- Latest news release: [www.bls.gov/news.release/ors.nr0.htm](http://www.bls.gov/news.release/ors.nr0.htm)
- Excel spreadsheet with all current data: [www.bls.gov/ors/#tabs-1](http://www.bls.gov/ors/#tabs-1)
- Occupation group profiles: [www.bls.gov/ncs/ors/orsprofiles.htm](http://www.bls.gov/ncs/ors/orsprofiles.htm)

For a listing of frequently asked questions, see [www.bls.gov/ors/#faq](http://www.bls.gov/ors/#faq).

Please contact us for questions about any of the components of the Occupational Requirements Survey.

Email: [Contact us](#)

Telephone: (202) 691-6199 (Monday–Friday, 8:30 a.m.–4:30 p.m. ET)

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Information voice phone: (202) 691-5200 The Federal Relay Service: 1-800-877-8339

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