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The Occupational Requirements Survey: estimates from preproduction testing

Preproduction testing of the BLS Occupational Requirements Survey (ORS) has generated estimates of the physical demands; exposure to environmental conditions; education, training, and experience requirements; and cognitive and mental requirements that workers encounter on the job. This article introduces these preliminary estimates and is a followup to previous articles that examined ORS data elements in the context of collection, review, and estimation.

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Since the summer of 2012, the Bureau of Labor Statistics (BLS) has been working with the Social Security Administration (SSA) to test and determine the feasibility of collecting information about the occupational requirements for workers in jobs across the United States economy.[1] As a result, the Occupational Requirements Survey (ORS) was established to gather data on the physical demands, environmental conditions, necessary vocational preparation, and mental and cognitive requirements typically characterizing a job.

In 2015, BLS completed data collection, estimation, and validation for preproduction testing of the ORS. Unlike previous tests, the preproduction test served as a “dress rehearsal,” with the sample design, collection procedures, data capture systems, and review structured to resemble as closely as possible those same aspects under production conditions.[2] The “dress rehearsal” produced estimates from data collected during the preproduction period. This article, a followup to previous articles that have described the ORS data elements in the context of collection, review, and estimation, introduces the preliminary estimates produced in that period. The focus of the article is largely on presenting the estimates as an example of what may be released in the future. The estimates are considered preliminary and are not meant to represent an exhaustive portrayal of all that has been collected or estimated. Rather, they were chosen specifically to provide a preview of ORS data and to support the discussion of key concepts in the ORS.

Collection overview

The ORS is an establishment-based survey that collects occupation-specific information on physical and cognitive demands, necessary vocational preparation (such as education, training, and experience requirements), and exposure to environmental conditions from a representative sample of establishments in the U.S. economy. To collect this information, field economists are trained to use a variety of methods, including interviewing employers, collecting job descriptions and lists of tasks, and utilizing opportunities to observe workers performing their duties.[3] Data collection for preproduction began in October 2014 and continued until May 2015. Establishments surveyed included those in private industry and in state and local governments within the 50 states and the District of Columbia.[4]

Data elements and estimates

The ORS data elements are grouped into four main categories:[5]

- Physical demands
- Environmental conditions under which the work is typically performed
- Vocational preparation, including education, experience, and training requirements
- Mental and cognitive demands

It is important to note that the ORS is designed to capture information regarding what is required to perform a job and is not focused on the specific capabilities or experience of the worker. For example, a job may require a bachelor's degree, but some workers performing the job may have a doctoral degree (Ph.D.). In this case, the ORS would capture the requirement of this particular occupation as being a bachelor's degree. The distinction is significant because the desired outcome of the survey is to portray the *requirements* of a job, not necessarily the characteristics of the worker performing that job.

Some estimates, such as the presence of a physical demand or the noise intensity level, are categorical and may be represented as percentages or modes. Continuous data elements are estimated as means and percentiles, with most also categorized by duration and represented as a percentage or a mode. Duration is estimated as hours, such as hours spent performing a physical demand, or days, such as days spent acquiring necessary training. Duration also may be represented by "duration levels,"[6] which refer to the frequency of a required physical demand or environmental exposure as a portion of a workday. The breakdown of preproduction duration levels is as follows:[7]

- Seldom: up to 2 percent of the workday
- Occasional: from 2 percent to one-third of a workday
- Frequent: from one-third to two-thirds of a workday
- Constant: two-thirds or more of a workday

In some instances, respondents may assert that a requirement is present but the duration of the activity is unknown; these requirements are captured as "present, duration unknown." For example, an occupation may

require reaching, but how often the worker reaches during the workday could not be easily derived or obtained from the respondent.

Estimates are calculated for civilian workers only (all private industry and state and local government workers) and selected occupational groups and occupations as defined by the Standard Occupational Classification (SOC) system. The system includes all civilian workers, civilian workers by major occupational group (two-digit SOC), and civilian workers by detailed occupations (eight-digit SOC).[8] The sections that follow offer more detailed information about the four main categories and their data elements and types of estimates.

Physical demands. A physical demand is considered present if the worker is required to perform the physical activity as part of the job.[9] Following are the ORS physical demands:

- Standing and walking
- Sitting
- Sitting vs. standing at will
- Hearing:
  - One on one
  - Group
  - Telephone
  - Other sounds
  - Requirement to pass a hearing test
- Vision:
  - Near visual acuity
  - Far visual acuity
  - Peripheral vision
- Communication:
  - Verbal
- Climbing:
  - Ramps/stairs: structural only
  - Ramps/stairs: work related
  - Ladders/ropes/scaffolds
- Lifting/carrying:
  - Weight (range) lifted/carried—seldom

- Weight (range) lifted/carried—occasional
- Weight (range) lifted/carried—frequent
- Weight (range) lifted/carried—constant
- Most weight ever lifted/carried (lb)

- Manipulation:
  - Foot/leg controls
    - One or both feet/legs
  - Gross manipulation
    - One or both hands
  - Fine manipulation
    - One or both hands
- Postural:
  - Crawling
  - Crouching
  - Stooping
  - Kneeling
- Pushing/pulling:
  - With hand/arm
    - With one or both hands/arms
  - With foot/leg
    - With one or both feet/legs
  - With feet only
    - With one or both feet
- Reaching:
  - Overhead
    - One or both arms
  - At or below the shoulder
    - One or both arms

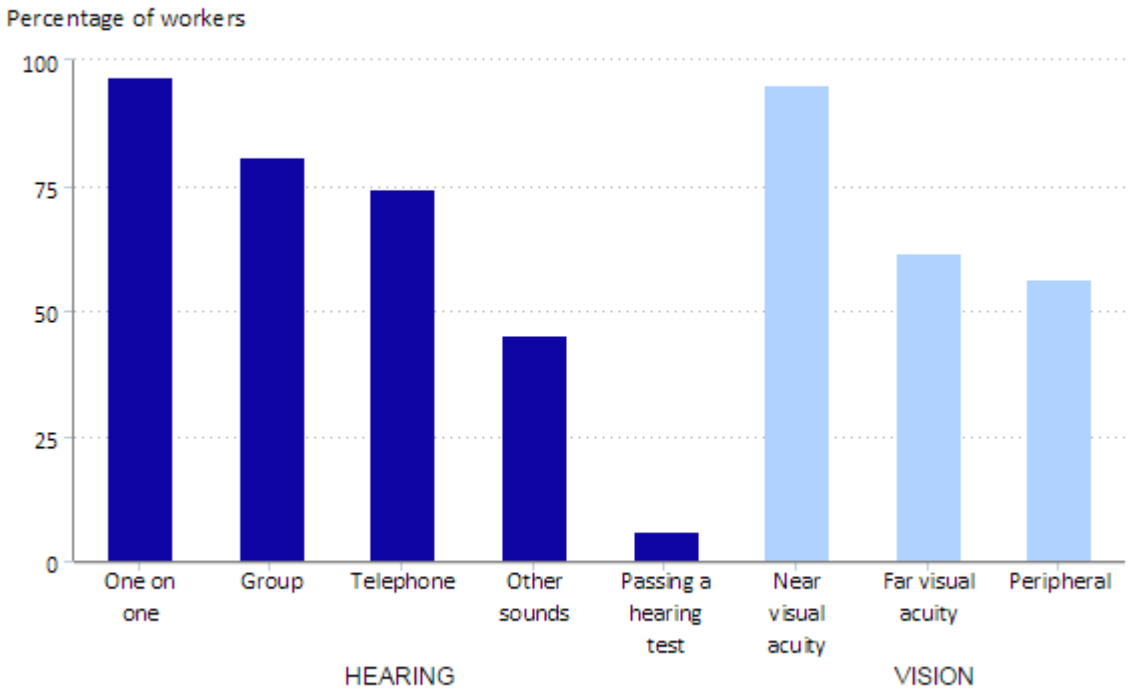
- Tasks:
  - Keyboarding: traditional
  - Keyboarding: touch screen
  - Keyboarding: 10-key
  - Keyboarding: other
  - Driving, type of vehicle

Some physical demands have subcategories that provide additional detail about the requirement. For example, pushing and pulling indicates whether a job can be performed with the hands and arms, the feet and legs, or only the feet, and whether a job requires the use of one or both of these extremities.

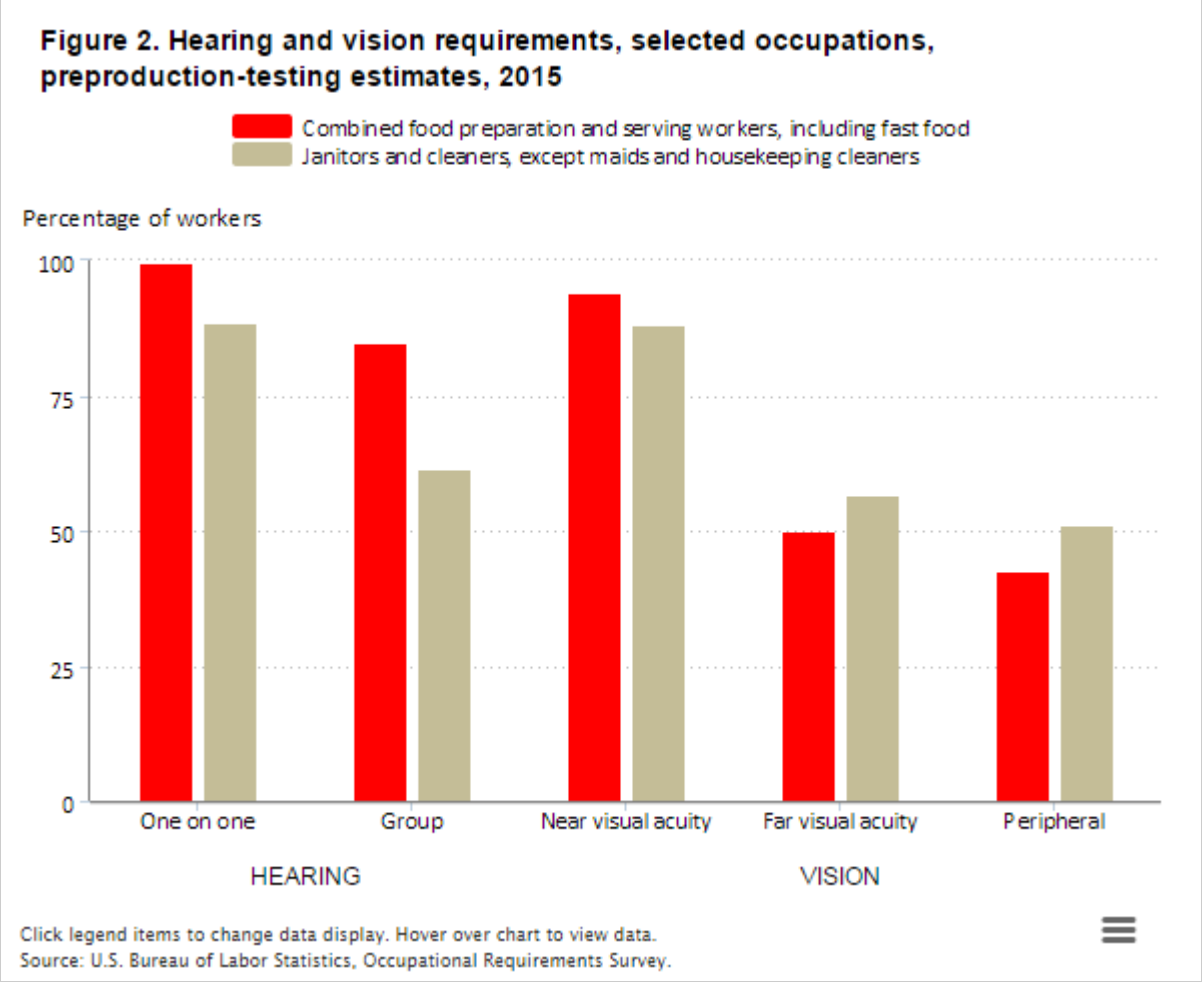
Information on the presence of physical activities and the time spent performing them (the duration) is collected and estimated. The estimates described in the sections that follow illustrate how the ORS can measure the presence and frequency of a physical requirement.

1. Presence of hearing and vision. Figure 1 shows the percentage of workers required to perform a specific type of hearing or vision activity.[10] Satisfying the one-on-one hearing requirement is the most common requirement, with approximately 97 percent of all workers required to perform this physical activity. Passing a hearing test is not a prevalent requirement, with only about 6 percent of workers required to do so. Approximately 95 percent of workers are required to have near visual acuity on the job. Near visual acuity is important in common tasks such as using a computer screen. Figure 2 presents hearing and vision requirements by selected detailed occupations. As the figure indicates, the percentage of janitors and cleaners required to hear in a one-on-one situation or in a group is less than that of food preparation and serving workers. About 94 percent of food preparation and serving workers are required to have near visual acuity on the job, and peripheral vision is required of approximately 51 percent of janitors and cleaners.

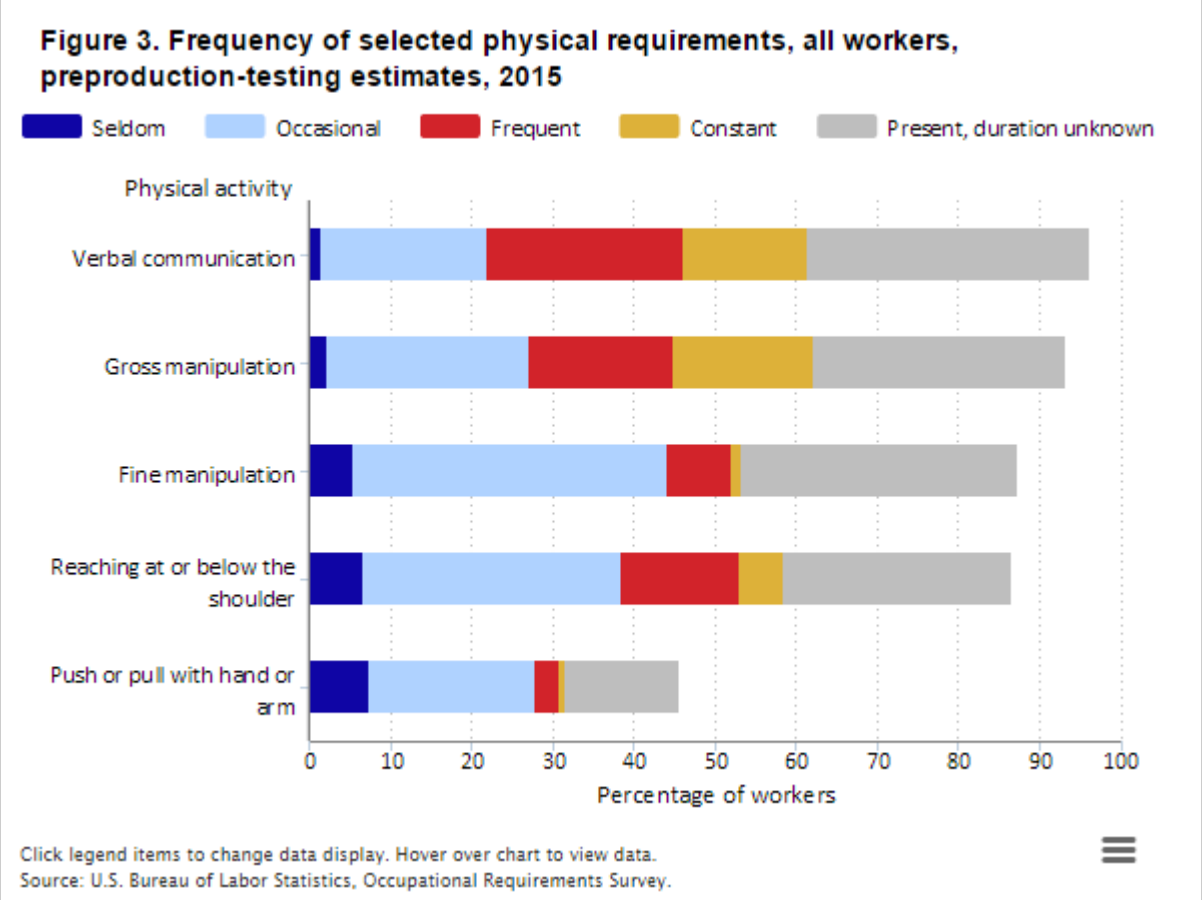
Figure 1. Hearing and vision requirements, all workers, preproduction-testing estimates, 2015



Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.



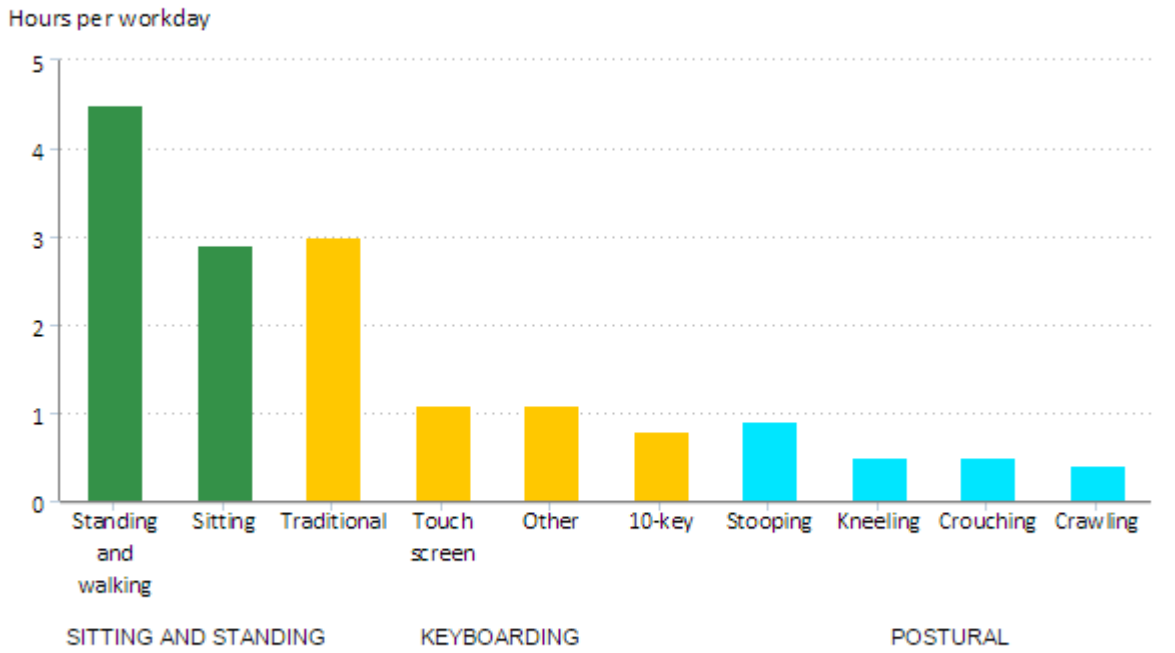
2. Frequency of selected physical activities. Some data elements can be expressed in terms of their frequency, represented as “seldom,” “occasional,” “frequent,” and “constant” in the ORS. Estimation also produces a measure that depicts the presence of a requirement, but without a specified frequency; this measure is known as “present, duration unknown.” Figure 3 shows the frequency of selected physical requirements for all civilian workers.



By looking at the frequency and prevalence of these physical requirements, users are able to get an idea of how often a worker performs such activities throughout the day. Using the four specific frequency variables together with the “present, duration unknown” variable, one also can evaluate the presence of a particular requirement among all workers. For example, figure 3 shows that almost 100 percent of all civilian workers in the U.S. economy are required to perform verbal communication. However, only about 24 percent of workers are required to do so frequently and just 15 percent constantly.

Another way to look at the duration of physical requirements is by examining the average time spent performing required activities, instead of calculating their frequency as a portion of the day as underlies the legends “seldom,” etc., in figure 3. Figure 4 shows the average time that all workers spend performing selected physical activities, grouped by type of activity and ranked by time spent, in hours per day.

Figure 4. Average time spent performing selected physical activities, all workers, preproduction-testing estimates, 2015



Note: A workday is the worker's average number of scheduled hours per day at work and may vary with the occupation or occupational group. The workday is not standardized to 8 hours.
Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.

3. Maximum weight lifted or carried. The maximum weight lifted or carried differs from other physical demands in that it is measured in pounds. For all workers, the average maximum weight lifted or carried was about 38 pounds. The presence and duration of lifting or carrying at a certain weight threshold is estimated, but it focuses on weight *ranges* instead of the *maximum* weight.[11]

Exposure to environmental conditions. The ORS collects information on a variety of environmental elements to which a worker is typically exposed while performing his or her job. Exposure is measured by the experience encountered in the occupation's surroundings during the course of a typical workday. Data are captured and estimated about the following environmental conditions:

- Extreme cold (not weather related)
- Extreme heat (not weather related)
- Fumes, noxious odors, dusts, gases
- Heavy vibration
- High, exposed places
- Humidity
- Noise intensity level

· Outdoors

· Proximity to moving mechanical parts

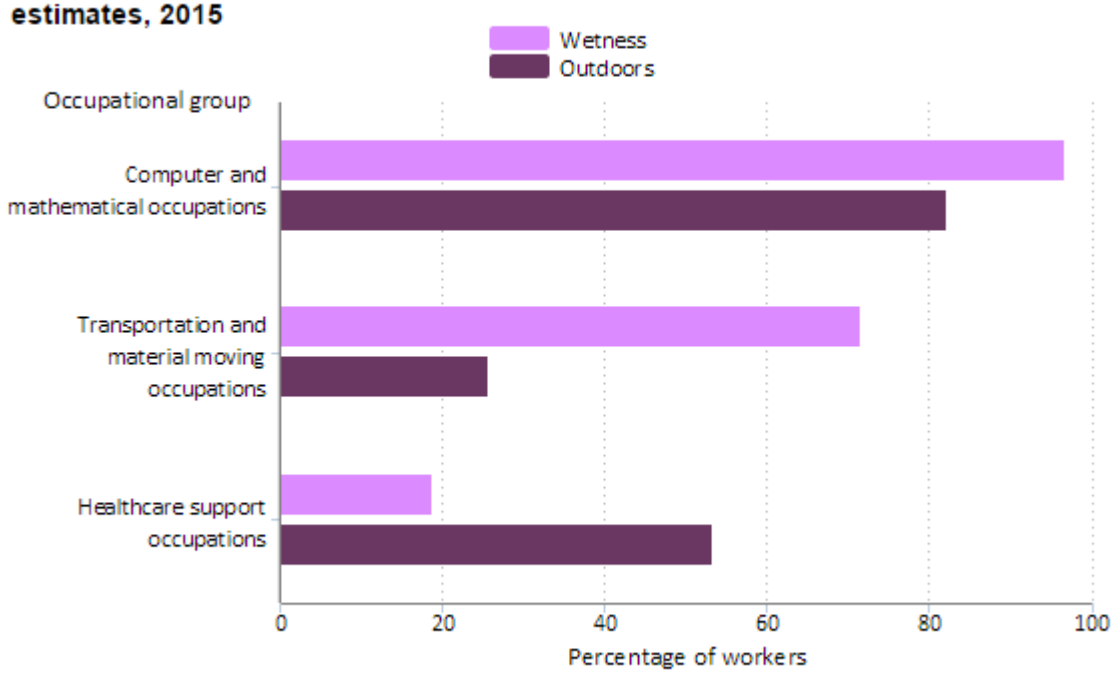
· Toxic, caustic chemicals

· Wetness (not weather related)

Similar to physical demands, environmental exposure is captured by presence and duration. “Noise intensity” is measured categorically by “quiet,” “moderate,” “loud,” or “very loud.”[12]

1. Environmental exposure by major occupational group. Like physical demand estimates, exposure to environmental conditions includes the frequency with which a worker is exposed to the particular condition. The category “not present” can be equally important in looking at occupational requirements. For example, “not present” is useful to someone interested in occupations that do not require exposure to certain environmental conditions. Figure 5 illustrates this concept by presenting selected major occupational groups whose workers are not exposed to selected environmental conditions. Thus, as the figure shows, computer and mathematical occupations could be of interest to those who seek occupations whose workers are not exposed to wetness or whose workers do not work outdoors. Conversely, transportation and material moving occupations and healthcare support occupations show a smaller instance of “not present” for wetness and outdoors.

Figure 5. Percentage of workers in selected major occupational groups not exposed to selected environmental conditions, preproduction-testing estimates, 2015

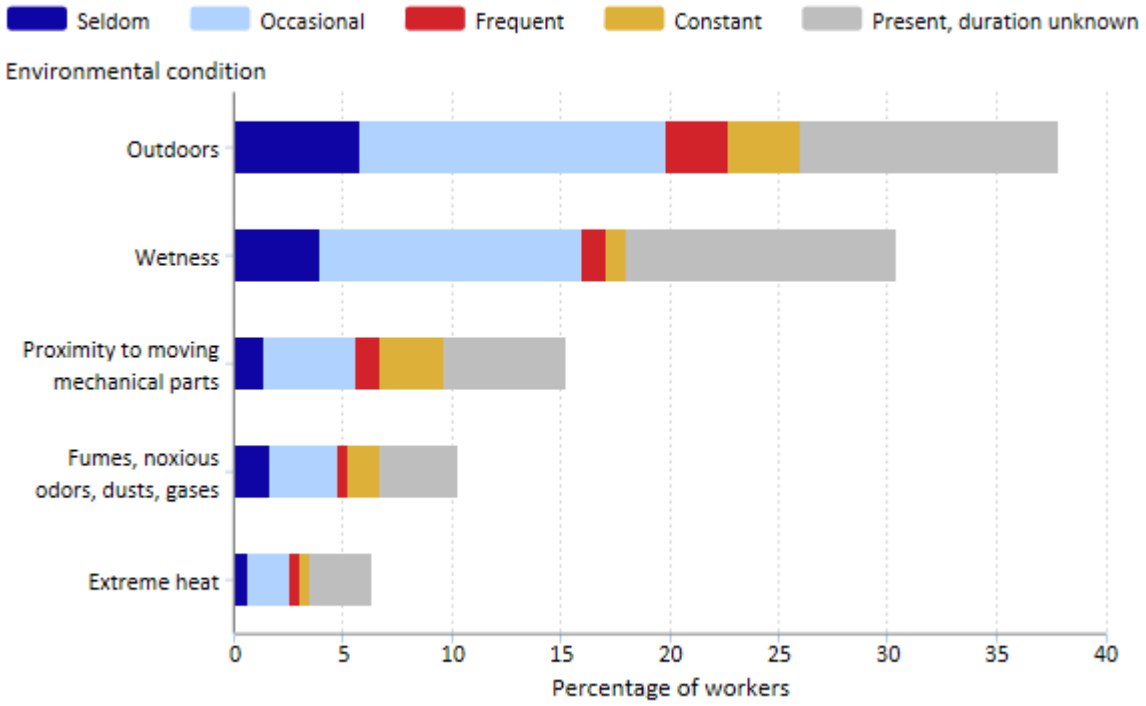


Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.

2. Frequency and duration of selected environmental conditions. In addition to the “not present” category used to indicate the absence of particular environmental conditions, the ORS measures the frequency and duration a worker may be exposed to various environmental conditions. In this regard, figure 6 shows the frequency, in terms

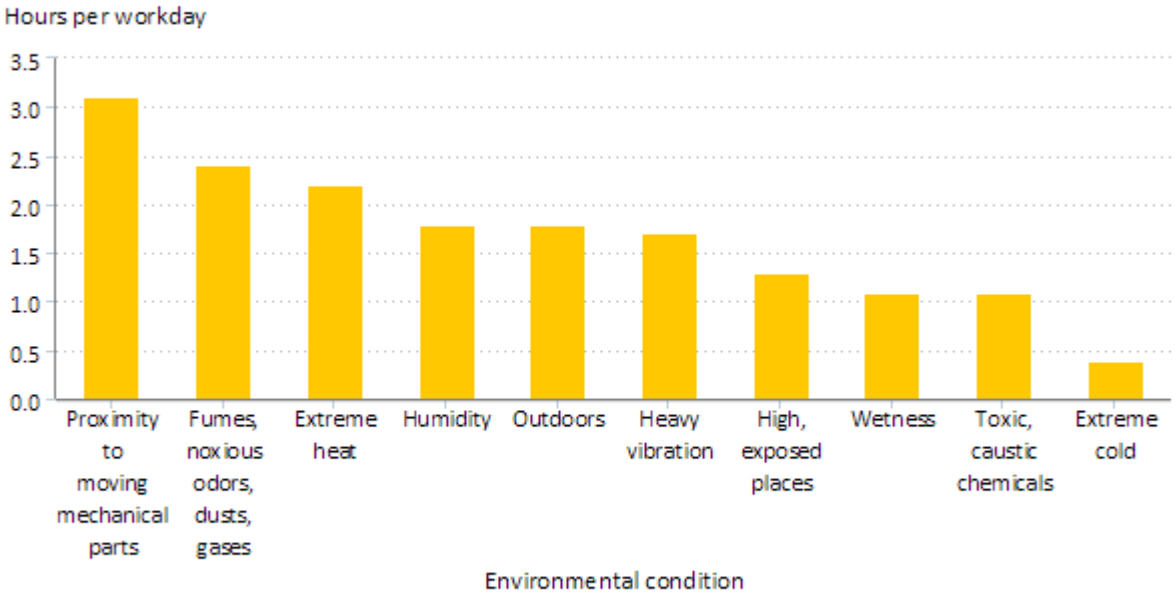
of the categories “seldom,” “occasional,” “frequent,” and “constant,” with which a worker is exposed to selected environmental elements; the category “present, duration unknown” is also used. Figure 7 shows the duration (average time exposed to the condition, in hours per day) for all workers.

Figure 6. Frequency of environmental exposure, all workers, preproduction-testing estimates, 2015



Click legend items to change data display. Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.

Figure 7. Average time exposed to selected environmental conditions, all workers, preproduction-testing estimates, 2015



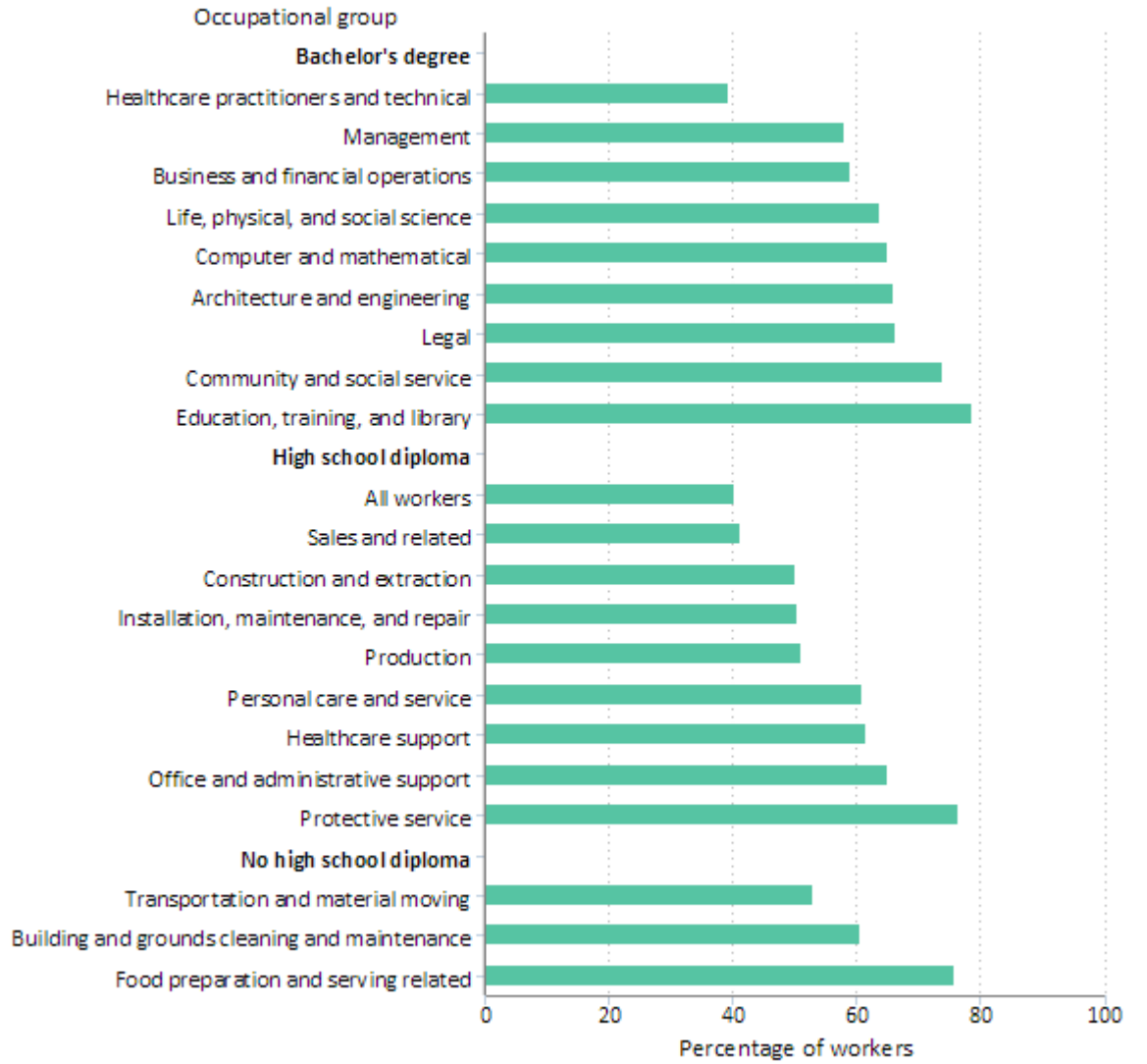
Note: A workday is the worker's average number of scheduled hours per day at work and may vary with the occupation or occupational group. The workday is not standardized to 8 hours.
Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.

Education, training, and experience requirements. The education, training, and experience requirements of an occupation are those typically required by the occupation and do not take into account any education or experience that a worker may have beyond that. Data are collected, and estimates calculated, regarding the following measures:

- Minimum formal education or literacy required
- Preemployment training (e.g., licenses or certifications)
- Prior work experience
- Postemployment training

Figure 8 depicts the most common education level required, for each of the major occupational groups shown. For all civilian workers, the most common education level required is high school: about 40 percent of workers are required to have earned a high school diploma in order to perform their jobs.

Figure 8. Most common education level required, by major occupational group, all workers, preproduction-testing estimates, 2015



Hover over chart to view data.
Source: U.S. Bureau of Labor Statistics, Occupational Requirements Survey.

As the figure shows, 76 percent of workers in the food preparation and serving related occupational group are not required to obtain a high school diploma (or higher degree). Data on workers who are required to have earned an associate's degree, a master's degree, or a professional or doctoral degree in order to perform their jobs are also collected and estimated but were not found to be common among the major occupational groups shown.

Cognitive and mental requirements. Cognitive and mental requirements are intended to provide information about workers' decision making, adapting to changes in the work routine, and nature and frequency of verbal interactions in an occupation. All cognitive data elements are captured categorically. Information about mental and cognitive abilities were gathered during preproduction testing; however, these elements were revised for production.[13] Testing of new mental and cognitive elements occurred during the summer of 2015.

Preparing for production

As the collection of production data continues, it is expected that there will be more publishable data surrounding detailed occupations, given the increasingly larger sample size. After the first year of production, a more comprehensive distribution of estimates will be available to the public.

Current and future data collection. As described earlier, collection is occurring at the eight-digit occupational level. The following tabulation demonstrates the potential number of series, based on the occupations that fall within the scope of the survey:

Classification	*Potential number of series*
Total potential number of series	1,113
All workers	1
Major occupation groups (two-digit SOCs)	22
Detailed occupations (eight-digit SOCs)	1,090

With more than 1,000 potential series paired with the occupational requirement elements listed in this article, one can see that the number of potential estimates is quite large.[14] As information gathered over the years contributes to the data used in creating estimates, more detailed information will become available.

Dissemination options. BLS continues to explore dissemination options for ORS data. Production data will be made available via the public database on the BLS website, as with data already available online for other programs. In addition, the variety and potential volume of data render the data amenable to exploration through articles highlighting different aspects of the data as they are released throughout the year. Articles could focus on a particular ORS category or data element, or selected occupations and occupational groups. Further, examining information from other BLS programs in conjunction with ORS data may provide a more comprehensive view of an occupation. For example, wage and benefit data from the National Compensation Survey may supplement an occupational profile, or data from the Survey of Occupational Injuries and Illnesses may provide insight into whether occupational requirements play a role in occupational risks.

Conclusion

BLS has completed preproduction testing of the ORS and has started collecting data for production. Unlike previous tests, the preproduction test served as a “dress rehearsal” to prepare for full production beginning in September 2015.

The ORS is collecting information on the four main occupational requirement categories: physical demands, exposure to environmental conditions, specific vocational preparation, and cognitive and mental demands. These four categories are aimed at capturing information on what is required for a worker to perform a job and do not focus on the specific capabilities or experience of the worker. The estimates presented in this article by no means represent a complete set of what has been calculated; rather, they provide an *introduction* to the estimates produced during preproduction testing of the ORS.

BLS continues to explore dissemination possibilities, beyond producing static data tables, to aid users in understanding the occupational requirements of jobs in the U.S. economy.

SUGGESTED CITATION

Nicole Dangermond, "The Occupational Requirements Survey: estimates from preproduction testing," *Monthly Labor Review,* U.S. Bureau of Labor Statistics, November 2015, https://doi.org/10.21916/mlr.2015.45

NOTES

[1] Background information on the partnership between BLS and SSA in the collection of occupational requirements is discussed in *Occupational Requirements Survey: pre-production testing information* (U.S. Bureau of Labor Statistics, September 30, 2015), www.bls.gov/ncs/ors/pre-production.htm. (See also Gwyn R. Ferguson, "Testing the collection of occupational requirements data" (U.S. Bureau of Labor Statistics, October 2013), https://www.bls.gov/osmr/research-papers/2013/pdf/st130220.pdf; Gwyn R. Ferguson, Erin McNulty, and Chester Ponikowski, "Occupational Requirements Survey sample design evaluation" (U.S. Bureau of Labor Statistics), https://www.bls.gov/ncs/ors/sample_design.pdf; Bradley D. Rhein, Chester H. Ponikowski, and Erin McNulty, "Estimation considerations for the Occupational Requirements Survey" (U.S. Bureau of Labor Statistics), https://www.bls.gov/ncs/ors/estimation_considerations.pdf; and Kristin N. Smyth, "Validation in the Occupational Requirements Survey: analysis of approaches" (U.S. Bureau of Labor Statistics), https://www.bls.gov/ncs/ors/validation.pdf.)

[2] *Occupational Requirements Survey: preproduction collection report* (U.S. Bureau of Labor Statistics, June 2015),https://www.bls.gov/ncs/ors/preprod_coll.pdf.

[3] *ORS collection manual: pre-production* (U.S. Bureau of Labor Statistics, September 2014).

[4] For more detailed information on sampling, collection, and data review, see *Occupational Requirements Survey: preproduction collection report*.

[5] For the full list of ORS data elements, see Appendix A in *Occupational Requirements Survey pre-production estimation and validation report* (U.S. Bureau of Labor Statistics, September 10, 2015), https://www.bls.gov/ncs/ors/pre-prod_estval.pdf.

[6] The term "duration level" is found in *ORS collection manual: production* (U.S. Bureau of Labor Statistics, September 2, 2015), https://www.bls.gov/ncs/ors/occupational_requirements_survey_collection_manual_092015.pdf.

[7] The definitions of "seldom," "occasional," "frequent," and "constant" are similar in preproduction and production.

[8] See *Standard Occupational Classification* (U.S. Bureau of Labor Statistics), https://www.bls.gov/soc. BLS typically uses six-digit codes for "detailed occupations"; however, the ORS attempts to collect at the eight-digit level, in a manner consistent with the O*Net definition, which meets SSA needs better. For more information, see *Occupational Requirements Survey: preproduction collection report* (June 2015).

[9] Rhein, Ponikowski, and McNulty, "Estimation considerations." For detailed definitions related to the ORS physical demands, see *Occupational Requirements Survey: visual aid for physical demands data elements* (U.S. Bureau of Labor Statistics, July 2015), https://www.bls.gov/ncs/ors/physical.pdf.

[10] For descriptions of the different hearing and vision categories, see ibid.

[11] See Rhein, Ponikowski, and McNulty, "Estimation considerations," for SSA categories for lifting and carrying weight.

[12] Rhein, Ponikowski, and McNulty, "Estimation considerations." For further information and definitions about environmental conditions, see *Occupational Requirements Survey: visual aid for environmental conditions data elements* (U.S. Bureau of Labor Statistics, July 2015), https://www.bls.gov/ncs/ors/environmental.pdf.

[13] For a list of cognitive and mental requirements collected during preproduction testing, see *Occupational Requirements Survey pre-production estimation and validation report*. Information on changes to the mental and cognitive elements are described in detail in *Occupational Requirements Survey: preproduction collection report*.

[14] For more detailed information on the number of potential estimates, see *Occupational Requirements Survey pre-production estimation and validation report*.

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