

CONTENT EXPERTISE

The Physical Exertion Requirements of Unskilled Work

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This paper develops methods for estimating the exertion (or strength) requirements of unskilled work for each detailed occupation in the federal government's Standard Occupational Classification (SOC) system. Estimates and confidence intervals from these methods are displayed in easy-to-use and publicly-available Excel files that accompany this paper. These results will be of value to vocational experts and claimant attorneys involved in Social Security's disability determination process. Data underlying the estimates come from the Occupational Requirements Survey – an important new data collection designed to replace the Dictionary of Occupational Titles in disability determinations. Beyond disability determinations, results from this paper illustrate important features of employment in the United States that will be of interest to labor economists and public policy officials.

In 2024, the federal government released data from a major new survey that allow for credible estimates of the physical demands of unskilled work in the U.S. economy. The new data were collected by the Bureau of Labor Statistics (BLS) through the agency's Occupational Requirements Survey (ORS). This paper will use the ORS to estimate the number of unskilled workers by occupation and required exertion level.

The estimates derived in this paper have direct value to key social safety net programs, specifically the disability programs administered by the Social Security Administration (SSA). These programs – Social Security Disability Insurance and Supplemental Security Income – provide \$14 billion in benefit payments per month to 10.6 million individuals aged 18 to 64 (U.S. Social Security Administration, 2024). Whether an individual qualifies for disability generally depends on whether the individual's health impairments preclude working in the national economy. SSA has mainly used data from the Dictionary of Occupational Titles (DOT) to make these disability determinations, but the DOT data were largely collected in the 1970s. The key variables SSA uses – skill and exertion – are measured in the ORS and estimates in this paper provide SSA with recent information on modern occupations.

Beyond their value for the better management of the large disability programs in the United States, the estimates presented in this paper inform policymakers about important features of the labor market. Unskilled work is an important part of the economy: the new ORS data indicate about 34.1 percent of all workers are in jobs that can be learned in one month or

less (U.S. Bureau of Labor Statistics, n.d.-e). With 154.2 million workers in the economy (U.S. Bureau of Labor Statistics, 2025b), this implies about 53 million workers are in unskilled jobs. The wide availability of work that can be quickly learned has advantages to individuals because workers may be able to switch careers or transition to other types of work due to health problems or job loss. A key issue, however, is the extent to which unskilled work has high physical demands, as such demands may make transition impractical for many individuals.

This paper also provides baseline information for researchers examining the effect of skill and exertion on the economic behavior of individuals. Economists modeling retirement decisions or labor market earnings should account for the skill and physical demands of occupations. Because the estimates in this paper are organized by occupation, they are suitable for use in studies seeking to link skill and exertion to outcomes for given occupations.

Data

The Occupational Requirements Survey (ORS) is an establishment-based survey conducted by the Bureau of Labor Statistics (BLS). A public-use version of the data, along with documentation, has been produced by BLS (U.S. Bureau of Labor Statistics, n.d.-c). BLS field economists collect data from employers on job requirements in four areas: cognitive and mental; education, training, and experience; environmental conditions; and physical demands. Several variables are measured for each area. For example, for physical demands, data are collected regarding how much weight must be lifted, time standing vs. sitting, and whether the job requires various physical actions such as stooping, crouching, reaching and fine manipulation.

For physical demands, this paper will focus on the exertion level of the job. Specifically, BLS uses variables on weight lifted/carried and sitting/standing to classify the exertion level as sedentary, light, medium, heavy or very heavy (U.S. Bureau of Labor Statistics, n.d.-f). Regarding skill requirements, this paper uses information on the amount of time required to learn the job, which is referred to as Specific Vocational Preparation (SVP) (U.S. Bureau of Labor Statistics, 2025a). Jobs that require only a short demonstration (SVP=1) or that can be learned in a month or less (SVP=2) are defined as unskilled by SSA; this paper follows SSA's definition of unskilled.

Public-use ORS data contain information summarized using the Standard Occupational Classification (SOC) system. The SOC structure maps jobs to detailed occupations, broad occupations, minor groups, and major groups. For example, fast-food cooks are a detailed occupation in the SOC. They are part of the broad occupation of "Cooks," the minor group of occupations "Cooks and Food Preparation," and the major group of occupations "Food Preparation and Serving Related Occupations." Employment numbers for each SOC level are provided by BLS through its Occupational Employment and Wage Statistics (OEWS) system (U.S. Bureau of Labor Statistics, n.d.-b).

Table 1. Example of SOC System.

	SOC	Workers
Food Preparation and Serving Related Occupations	35-0000	13,613,490
Cooks and Food Preparation	35-2000	3,632,290
Cooks	35-2010	2,743,520
Cooks, Fast Food	35-2011	668,230
Cooks, Institution, and Cafeteria	35-2012	448,260
Cooks, Private Household	35-2013	900
Cooks, Restaurant	35-2014	1,452,130
Cooks, Short Order	35-2015	150,420
Cooks, All Other	35-2019	23,590
Food Preparation Workers	35-2020	888,770
Food and Beverage Serving Workers	35-3000	7,101,010
...	...	...

Table 2. Example of Data from ORS (Percentages)

Cooks	Unskilled	Light	Workers
Cooks, Fast Food	89.5	34.6	668,230
Cooks, Institution, and Cafeteria	51.0	39.7	448,260
Cooks, Private Household	*	*	900
Cooks, Restaurant	48.9	38.9	1,452,130
Cooks, Short Order	68.3	28.4	150,420
Cooks, All Other	*	*	23,590

The OEWS, like the ORS, is based on a survey of establishments. [Table 1](#) provides an illustrative example of the SOC system and OEWS employment estimates.

The public-use ORS data is provided at the detailed SOC level. To illustrate, [Table 2](#) shows percentage of workers in unskilled jobs and, separately, jobs that require light strength for the six detailed Cook occupations. For example, the ORS indicates 89.5 percent of fast-food cooks are in jobs that are unskilled, and 34.6 percent are in jobs where the exertion level is light strength. Because there are 668,230 fast-food cooks, the ORS estimates imply 598,066 fast-food cooks are in unskilled positions and, separately, 231,208 are in jobs with an exertion level of light strength.

[Table 2](#) illustrates two issues that must be addressed to develop estimates of the percentage of unskilled workers by exertion level. First, there is missing data in the ORS. The OEWS data is based on a much larger sample of establishments and that data indicates, for example, there are 23,590 cooks in the “all other” occupation (not fast food, institution/cafe/teria, private, restaurant, or short order cooks). However, there is not sufficient sample in the ORS for BLS to reliably estimate the percentage of these workers who are unskilled or whose exertion level is light.

The second issue that must be addressed is that ORS estimates in the public-use file are for single job requirements (skill or exertion) and not joint requirements (skill and exertion). For example, it would be useful to know the percentage of fast food cooks whose work is both unskilled and light. The joint requirements are available, internally, to BLS because ORS data are collected at the job level. However, the public-use files provide the estimates for single requirements and methods must be employed to calculate estimates for joint requirements.

Methods

The first issue to be addressed is missing data in the ORS for detailed occupations. This issue affects many occupations, but relatively few workers. Rare or uncommon occupations account for only a small percentage of the workforce. Among the 831 detailed occupations in the OEWS system, the smallest 416 occupations, in terms of workers, account for only 4.6 percent of the workforce. The largest 415 occupations account for 95.4 percent of workers. Further, rare or uncommon occupations often require specialized training and would therefore be less likely to contain unskilled jobs (the focus of this paper). Nevertheless, for the sake of complete estimates, there is value in developing estimates for all occupations in the OEWS.

There are 257 OEWS detailed occupations in the 2023 or 2024 ORS for which BLS has provided estimates on the percentage of workers that are in unskilled jobs and the percentage with sedentary, light, and medium exertion levels.¹ These complete record cases account for 116 million workers or about 75 percent of total employment in the US. These data will provide donor data for the missing-data occupations.

To illustrate, note that in [Table 2](#), data are filled in for four detailed cook occupations (fast food, institution / cafeteria, restaurant, and short order). There are 2,719,040 workers in these four occupations and 1,016,765 of these workers face light strength requirements (based on percentages in the table). Hence, 37.4 percent of cooks in the four detailed categories have light strength requirements. That percentage is “donated” or assigned to the missing detailed cook occupations. Further, it can be found that 60.3 percent of cooks in the four detailed categories are in unskilled positions. That percentage is also assigned to the missing detailed occupations. [Table 3](#) shows results for this example.

While the example focuses on light work, the method also produces percentages for the other exertion levels: sedentary and medium work. That is, percentages for these exertion levels are directly available from the ORS for four detailed occupations and those occupations can be used to fill in data for

¹ In cases where ORS estimates are “<0.5 percent,” the estimates, for this paper, are changed to “0 percent.” In addition, “< 5 percent” is changed to “2.5 percent,” “> 95 percent” to “97.5 percent,” and “> 99.5 percent” to “100 percent.” The analysis file is composed mainly of 235 occupations from the 2023 ORS. For 22 occupations that did not have complete records in the 2023 ORS, there are complete records in the 2024 ORS. Data from these 22 occupations were added to the main file, bringing the total occupations to 257.

Table 3. Example of Data from ORS with Missing Data Filled In (Percentages)

Cooks	Unskilled	Light	Workers
Cooks, Fast Food	89.5	34.6	668,230
Cooks, Institution, and Cafeteria	51.0	39.7	448,260
Cooks, Private Household	60.3	37.4	900
Cooks, Restaurant	48.9	38.9	1,452,130
Cooks, Short Order	68.3	28.4	150,420
Cooks, All Other	60.3	37.4	23,590

Table 4. Example of Data from ORS with All Exertion Levels (Percentages)

Cooks	Unskilled	Sedentary	Light	Medium	Heavy/Very Heavy	Workers
Cooks, Fast Food	89.5	0.0	34.6	64.3	1.1	668,230
Cooks, Institution, and Cafeteria	51.0	0.0	39.7	57.9	2.4	448,260
Cooks, Private Household	60.3	0.0	37.4	59.4	3.2	900
Cooks, Restaurant	48.9	0.0	38.9	57.1	4.0	1,452,130
Cooks, Short Order	68.3	0.0	28.4	65.1	6.5	150,420
Cooks, All Other	60.3	0.0	37.4	59.4	3.2	23,590

the missing two detailed occupations among the broad occupation of Cooks. The residual exertion level for purposes of this paper is the heavy or very heavy strength requirement. [Table 4](#) shows full results for cooks.

In some cases, the method of using detailed occupations within a broad occupational group is not feasible. For example, consider detailed occupations in the minor group “Sales Representatives, Services” ([Table 5](#)). In the SOC, the detailed occupation “Advertising Sales Agents” is the only detailed occupation in its corresponding broad occupational group. This also occurs with the other detailed occupations in [Table 5](#). Hence, the missing ORS data in these cases cannot be donated from other detailed occupations in the broad occupational group. However, data can be donated using information on other detailed occupations in the minor group: Insurance Sales Agents, and Sales Representatives of Services (All Other). To illustrate, in these two filled-in occupations, there are 1,658,810 workers, 74.0 percent of whom have sedentary jobs. Hence the missing sedentary values are set to 74.0 percent. This approach can be used to fill in all the missing values ([Table 6](#)).

In some cases, the ORS does not have complete estimates for any detailed occupations in a minor group. For example, there are no estimates for detailed occupations in the minor group “Media and Communication Equipment Workers” (27-4000). In these cases, data are donated from all detailed occupations available in the major group “Arts, Design, Entertainment, Sports, and Media Occupations” (27-0000). To illustrate, ORS data for detailed occupations in this major group indicate 3.5 percent of workers are in unskilled jobs. Hence, all detailed occupations for the minor group “Media and Communication Equipment Workers” are assigned the 3.5 percent value

Table 5. Example of Data from ORS for Detailed Occupations in a Minor Group (Percentages)

Sales Representatives, Services (Minor Group)	Unskilled	Sedentary	Light	Medium	Heavy/ Very Heavy	Workers
Advertising Sales Agents	*	*	*	*	*	97,470
Insurance Sales Agents	30.1	96.4	3.5	0	0	469,480
Securities, Commodities, and Financial Services Sales Agents	*	*	*	*	*	472,300
Travel Agents	*	*	*	*	*	59,150
Sales Representatives of Services, All Other	19.2	65.2	34.8	0	0	1,189,330

Table 6. Example of Data from ORS for Detailed Occupations in a Minor Group with Missing Data Filled In (Percentages)

Sales Representatives, Services (Minor Group)	Unskilled	Sedentary	Light	Medium	Heavy/ Very Heavy	Workers
Advertising Sales Agents	22.3	74.0	25.9	0	0	97,470
Insurance Sales Agents	30.1	96.4	3.5	0	0	469,480
Securities, Commodities, and Financial Services Sales Agents	22.3	74.0	25.9	0	0	472,300
Travel Agents	22.3	74.0	25.9	0	0	59,150
Sales Representatives, All Other	19.2	65.2	34.8	0	0	1,189,330

for unskilled work. This approach can also be used to fill in the exertion percentages for all “Media and Communication Equipment Workers” ([Table 7](#)).

One special case arises in developing skill and exertion estimates. There are no detailed occupations in the ORS for the major group “Farming, Fishing, and Forestry Occupations.” Workers in these occupations are part of the “high” level aggregation “Natural Resources, Construction, and Maintenance Occupations,” which includes major groups 45-000 – 49-000 (U.S. Bureau of Labor Statistics, 2020). Detailed occupations in the ORS in major groups 47-000 – 49-000 are available and, along with OEWS employment counts, are used to develop the percentage unskilled, sedentary, light, and medium. These percentages are then used for each detailed occupation in major group 45-000 as approximate estimates.

After missing data have been filled in, the next methodological issue to be addressed is estimating the percentage of workers in each detailed occupation whose jobs are unskilled and sedentary, unskilled and light, unskilled and medium, unskilled and heavy/very heavy. To do so, a method described by BLS (U.S. Bureau of Labor Statistics, n.d.-a), which will be referred to as the *product method* in this paper, is used. To illustrate, consider the detailed occupation of Office Clerks, General. The ORS indicates 35.7 percent are in unskilled positions. The OEWS indicates there are 2,510,550 workers in the occupation, implying 896,266 general office clerks are in unskilled positions. The ORS indicates 81.1 percent of general office clerks are in sedentary jobs. Assuming this percentage holds for unskilled positions, the product

Table 7. Example of Data from ORS with Data Filled in Using Occupations in a Major Group (Percentages)

Media and Communication and Equipment Workers	Unskilled	Sedentary	Light	Medium	Heavy/ Very Heavy	Workers
Audio and Video Technicians	3.5	79.9	15.3	4.8	0.0	70,080
Broadcast Technicians	3.5	79.9	15.3	4.8	0.0	21,080
Sound Engineering Technicians	3.5	79.9	15.3	4.8	0.0	13,050
Lighting Technicians	3.5	79.9	15.3	4.8	0.0	10,130
Photographers	3.5	79.9	15.3	4.8	0.0	51,230
Camera Operators, Television, Video, and Film	3.5	79.9	15.3	4.8	0.0	24,460
Film and Video Editors	3.5	79.9	15.3	4.8	0.0	28,860
Media and Communication Equipment Workers, All Other	3.5	79.9	15.3	4.8	0.0	13,020

Table 8. Joint Requirements for Office Clerks, General from Product Method (Percentages)

	Unskilled	Unskilled and Sedentary	Unskilled and Light	Unskilled and Medium	Unskilled and Heavy / Very Heavy	Workers
Office Clerks, General	35.7	29.0	5.3	1.4	0.1	2,510,550

method would imply there are 726,872 (896,266 x 81.1 percent) general office clerks who are in unskilled and sedentary jobs. See [Table 8](#) for results of all exertional levels for this detailed occupation. Note that the product method indicates 29 percent (rounded) of general office clerks, or about 728,000 individuals, are in unskilled and sedentary jobs.

Validation of Methods

BLS collects the ORS data at the job level, where joint requirements are observed (for example, the job is observed to be both unskilled and sedentary). The agency then aggregates the data at the detailed occupational level for the public-use data set. In a special publication (U.S. Bureau of Labor Statistics, n.d.-e), BLS provided estimates, based on the internal job-level ORS data, of the percentage of all workers that are unskilled, unskilled and sedentary, unskilled and light, unskilled and medium, and unskilled and heavy / very heavy (these estimates are reproduced in the “Direct” row of [Table 9](#)). To illustrate, BLS estimates that 3.6 percent of all workers, or 5.6 million individuals, in the United States are in jobs that are both unskilled and sedentary. The estimates in the Direct row can be thought of as the correct or official national estimates for joint requirements, as they are built up directly from the actual job-level observations in the internal-use ORS.

How do the direct estimates compare to various estimates using the product method? It depends on the level of aggregation. At the highest level of aggregation (national), note that BLS estimates that 34.1 percent of workers, nationally, are in jobs that are unskilled. The agency also estimates 29.3 percent of workers, nationally, are in jobs that are sedentary. Using the

Table 9. Unskilled by Exertion Level, Different Methods (Percentages)

	Unskilled and Sedentary	Unskilled and Light	Unskilled and Medium	Unskilled and Heavy / Very Heavy	Workers
Direct (Special BLS publication using job-level data)	3.6	13.5	13.4	3.6	154,187,380
Product Method Using National Percentages	10.0	11.2	9.8	3.1	154,187,380
Product Method Using Major Group Percentages	5.2	12.2	12.1	3.5	154,187,380
Product Method Using Detailed Occupation Percentages (Current Paper Methods)	3.7	11.6	13.1	3.3	154,187,380

national numbers and the product method would result in an estimate that 10.0 percent of all workers, or 15.4 million individuals, are in jobs that are both unskilled and sedentary (34.1 percent x 154 million x 29.3 percent). This estimate is far too high compared to the correct (direct) estimate. This implies that unskilled work is less likely to be sedentary work and the product method, at the national level, yields misleading estimates.

Another way to view the comparison is through laws of probability for two events (Casella & Berger, 2002, p. 20). The joint probability of unskilled and sedentary work, $P(U \text{ and } S)$ must equal the probability of sedentary work conditional on the work being unskilled $P(S|U)$ multiplied by the simple probability of unskilled work, $P(U)$. From the BLS special publication, it is known $P(S|U)$ is 0.1056 and $P(U)$ is 0.341 and, hence, $P(U \text{ and } S)$ must be 0.036. In effect, the product method replaces $P(S|U)$ with $P(S)$. This replacement is not valid, at the national level, because sedentary work and unskilled work are not independent (knowing that the work is unskilled affects the probability that it is sedentary).

Applying the product method at a level of aggregation below the national level, however, changes results to some extent. The public-use ORS mainly provides estimates for detailed occupations, but it also shows estimates for major groups (built up from the underlying job level data). There are 22 major groups in the ORS. To illustrate the data, the ORS indicates 30.7 percent of workers in the major group “Office and Administrative Support Occupations” are in jobs that are unskilled. For this major group, 74.3 percent of workers are in jobs that are sedentary. With 18,218,070 workers in this major group, the product method would indicate 22.8 percent, or 4.2 million workers, are in jobs that are unskilled and sedentary (30.7 percent x 18.2 million x 74.3 percent = 4.2 million). Repeating this approach for each major group and adding up yields estimates, nationally, of about 5.2 percent, or 8.0 million workers, who are in unskilled and sedentary jobs (row “Product Method Using Major Group Percentages” in [Table 9](#)).

The exercise with the major group data reveals an important fact about the structure of job requirements in the United States: disaggregation reduces the bias in estimates of joint requirements. Simply disaggregating to the

major group level before applying the product method moves the estimate of unskilled and sedentary workers much closer to the correct estimate of 5.6 million unskilled and sedentary workers.

The last row of [Table 9](#) reflects the methods of this paper. Using the methods outlined in the previous section for each detailed occupation, the product method was applied and results were then added up to produce national estimates. This method yielded estimates, nationally, that indicate about 3.7 percent of workers, or 5.7 million individuals, are in jobs that are unskilled and sedentary. These estimates are very close to the correct (direct) estimates. This suggests, for an important class of work, the product method applied after disaggregating to the detailed occupational level produces reasonably valid estimates.

Results

The methods outlined in the previous section allow for estimating the percentage and number of unskilled workers by exertion level. A complete set of estimates (all 831 detailed occupations in the OEWS) are available in an Excel file at the following link: <https://docs.google.com/spreadsheets/d/1D1V5Wa1B15-rUFzrBzymSeie5H2TclTS/edit?usp=sharing&ouid=112127100870273415373&rtopof=true&sd=true>.

To illustrate, the row for Office Clerks, General in the file is:

S.O.C.	OCC_TITLE	TOT_EMP	unsk	unsk_and_sed	unsk_and_lgt	unsk_and_med	unsk_and_hvy_vhvy	method
439061	Office Clerks, General	2,510,550	35.7	29	5.3	1.4		0.1 detail

Thus, the table shows 35.7 percent of general office clerks are in unskilled jobs, 29.0 percent are in unskilled and sedentary jobs, 5.3 percent are in unskilled and light jobs, and so forth. The variable TOT_EMP shows 2,510,550 workers are in the general office clerk occupation. Using TOT_EMP and the percentages allow for estimating the number of workers in various groups. For example, there are 728,000 general office clerks in unskilled and sedentary jobs (2,510,550 x 29.0 percent). The table also shows whether the “method” is from detailed occupation data (direct from the ORS) or whether it is estimated using detailed occupations in the ORS grouped in broad, minor, or major categories. Estimates for general office clerks come directly from the ORS (“detail”).

There is a strong interest in “easy” jobs, meaning jobs that can be learned quickly (unskilled) and that have low strength requirements. These jobs are often the focus of Social Security disability decisions because those decisions often come down to whether a person, even considering health limitations, can do sedentary or light work. In addition, labor economists are often interested in whether individuals can transition to new types of work at later ages. [Table 10](#) shows the five occupations with the largest number of workers in unskilled and sedentary positions. To illustrate, there are 728,000 general office clerks in unskilled and sedentary positions and 133,000 general office clerks in unskilled and light strength positions. [Table 11](#) shows the

Table 10. Number of Workers by Selected Occupations and Requirements

Occupation	Number of Workers in Unskilled <u>and</u> Sedentary Jobs	Number of Workers in Unskilled <u>and</u> Light Strength Jobs	Number of Workers in Unskilled <u>and</u> Medium Strength Jobs
Office Clerks, General (43-9061)	728,000	133,000	35,000
Customer Service Representatives (43-4051)	720,000	68,000	63,000
Receptionists and Information Clerks (43-4171)	422,000	108,000	30,000
Secretaries and Administrative Assistants, Except Legal, Medical and Executive (43-6014)	355,000	63,000	9,000
Medical Secretaries and Administrative Assistants (43-6013)	264,000	32,000	2,000

Table 11. Number of Workers by Selected Occupations and Requirements

Occupation	Number of Workers in Unskilled <u>and</u> Sedentary Jobs	Number of Workers in Unskilled <u>and</u> Light Strength Jobs	Number of Workers in Unskilled <u>and</u> Medium Strength Jobs
Fast Food and Counter Workers (35-3023)	0	2,140,000	1,357,000
Retail Salespersons (41-2031)	76,000	1,965,000	923,000
Cashiers (41-2011)	25,000	1,923,000	1,064,000
Waiters and Waitresses (35-3031)	0	1,386,000	378,000
Security Guards (33-9032)	75,000	667,000	148,000

five occupations with the largest number of workers in unskilled and light positions. To illustrate, there are 1,923,000 cashiers in unskilled and light strength positions and 1,064,000 cashiers in unskilled and medium strength positions. Given the importance of unskilled and sedentary/light strength occupations, BLS may wish to oversample such occupations in future waves of the ORS. That would provide precise estimates of all dimensions of work, not just skill and exertion.

Standard Errors

To help users assess the precision of estimates, the Bureau of Labor Statistics (BLS) provides standard errors of estimates for single job requirements in the public-use Occupational Requirements Survey (ORS) (U.S. Bureau of Labor Statistics, n.d.-d). For example, the percentage of workers in sedentary jobs in the Office Clerk (General) occupation is

estimated to be 81.1 percent, and the standard error of the estimate is 1.8 percent. Some additional work, however, is required to get standard errors for joint requirements.

To illustrate, note that the Social Security Administration (SSA) considers work unskilled if it can be learned with a short demonstration (SVP=1) or beyond a short demonstration but in a month or less (SVP=2). For the Office Clerk occupation, an estimated 2.0 percent of workers are in jobs with an SVP of 1 and 33.7 percent are in jobs with an SVP of 2. The respective standard errors of the estimates from BLS are 0.6 percent and 2.3 percent. The variance sum law can be used to calculate a single standard error using two separate standard errors (Casella & Berger, 2002, p. 171). Thus, the standard error of the proportion of workers in this occupation that are in either group can be approximately estimated by $\sqrt{0.006^2 + 0.023^2}$, which gives 0.0238 or roughly 2.4 percent.² Hence, the estimated percentage of workers in this occupation that are in unskilled jobs is 35.7 percent (2.0 percent with SVP of 1 and 33.7 percent with SVP of 2), and the standard error of the estimate is 2.4 percent.

To continue with the illustration, it is possible to then estimate a standard error for the joint requirement of unskilled and sedentary work in this occupation. Using the product method described earlier, the percentage of workers with unskilled and sedentary jobs in this occupation is given by 35.7 percent x 81.1 percent or 29.0 percent. A statistical formula for the variance of a product (Goodman, 1960, Equation 2), assuming independence, can be used to calculate the standard error.³ The standard error of the proportion in unskilled and sedentary jobs is given by:

$$\sqrt{(0.357^2 * 0.018^2 + 0.811^2 * 0.024^2 + 0.024^2 * 0.018^2)} = 0.021$$

Expressed as a percentage, the standard error is 2.1 percent. In sum, 29.0 percent of workers in the Office Clerk occupation are in unskilled and sedentary jobs, and the standard error of the estimate is 2.1 percent.⁴

Confidence Intervals

Tables 12 and 13 show confidence intervals for joint requirements for selected occupations, specifically occupations listed in tables 10 and 11. Table 12 focuses on unskilled and sedentary work and Table 13 on unskilled and

2 Technically, the standard error would include a term for the covariance between estimated proportions. In this case the covariance would be negative because SVP categories are mutually exclusive. Thus, the 2.4 percent is a conservative or upper bound estimate of the standard error.

3 The assumption of independence will produce conservative or upper-bound standard errors if sedentary work is less likely in unskilled positions within a detailed occupation (that is, the covariance between estimated proportions is negative).

4 Standard errors for single requirements are generally available in the public-use ORS. In some cases, for purposes of this paper, approximations are made. For example, if an estimate for a requirement in the ORS is listed as '<0.5' percent, the estimate and the standard error are set to zero; if the estimate for a requirement is '>99.5' percent, the estimate is set to 100 percent and the standard error to zero. If the estimate for a requirement is listed as '<5', the estimate is set to 2.5 and a relatively large standard error is assumed (0.75 percent). Finally, if the standard error is listed as '<0.5', the standard error is set to 0.25.

light strength work. These intervals apply percentages to the employment totals in the Occupational Employment and Wage Statistics (OEWS) program. Sampling variability from the OEWS is ignored but is extremely limited in any event because of unusually large sample sizes. For example, in the OEWS, there are an estimated 2,510,550 workers in the Office Clerk occupation. The standard error of the estimate is only 10,042 workers. Therefore, the confidence intervals for this occupation, as calculated in this paper, take the 2,510,550 as a fixed value and the intervals reflect the sampling variability of percentages in the ORS.

To illustrate calculations, note that 29.0 percent of workers in the Office Clerk occupation are estimated to be in unskilled and sedentary jobs and that the standard error is 2.1 percent. A two-sided 95 percent confidence interval can be constructed by adding 1.96 standard errors to the estimate and subtracting 1.96 standard errors from the estimate (Hazra, 2017). The 95 percent confidence interval for the percentage of office clerks in unskilled and sedentary jobs is, therefore, 24.9 percent to 33.1 percent. Because there are 2,510,550 office clerks, the 95 percent confidence interval for the number of office clerks in unskilled and sedentary jobs is 625,000 to 831,000.

Two-sided confidence intervals are common in research, but one-sided confidence intervals may be more suitable for disability determinations. With disability determinations, the issue is whether there is a minimum acceptable level of employment the claimant is capable of performing. A one-sided 95 percent confidence interval can be constructed by subtracting 1.645 standard errors from the 29.0 percent estimate to determine a lower limit and not having an upper limit to the interval. Multiplying the lower limit percentage by the total number of office clerks reveals that there are at least 641,000 workers in unskilled and sedentary jobs in this occupation (with 95 percent confidence).

The final two columns in the tables show results using a 68% level of confidence. With 68 percent confidence, the true number of office clerks in unskilled and sedentary jobs is between 675,000 and 781,000. Using a one-sided approach with 68% confidence, there are at least 703,000 workers in this occupation that are in unskilled and sedentary jobs.⁵

Confidence intervals for the number of unskilled workers by exertion level are available in an Excel file at the following link:

https://docs.google.com/spreadsheets/d/1_yxZSuj51pRfgKpJ0jYk0H3hixNDgqx/edit?usp=sharing&ouid=112127100870273415373&rtpof=true&sd=true

The file has three sheets showing intervals for sedentary, light, and medium exertion levels. To illustrate, in the sheet for medium exertion, the row for Nursing Assistants is:

⁵ A two-sided 68 percent confidence interval can be constructed by adding 1 standard error to the 29.0 percent estimate and subtracting 1 standard error from the 29.0 percent estimate. A one-sided 68 percent confidence interval can be constructed by subtracting 0.47 standard errors from the 29.0 percent to determine a lower limit and not having an upper limit to the interval.

Table 12. Confidence Intervals (CI), Two-Sided and Minimum (One-Sided)

Occupation	Number of Workers in Unskilled and Sedentary Jobs CI _{95%}	Number of Workers in Unskilled and Sedentary Jobs CI _{minimum 95%}	Number of Workers in Unskilled and Sedentary Jobs CI _{68%}	Number of Workers in Unskilled and Sedentary Jobs CI _{minimum 68%}
Office Clerks, General (43-9061)	625,000 to 831,000	641,000+	675,000 to 781,000	703,000+
Customer Service Representative (43-4051)	591,000 to 848,000	612,000+	654,000 to 785,000	689,000+
Receptionists and Information Clerks (43-4171)	383,000 to 462,000	389,000+	402,000 to 443,000	413,000+
Secretaries and Administrative Assistants, Except Legal, Medical and Executive (43-6014)	286,000 to 423,000	297,000+	320,000 to 389,000	338,000+
Medical Secretaries and Administrative Assistants (43-6013)	228,000 to 300,000	234,000+	246,000 to 282,000	256,000+

Table 13. Confidence Intervals (CI), Two-Sided and Minimum (One-Sided)

Occupation	Number of Workers in Unskilled and Light Strength Jobs CI _{95%}	Number of Workers in Unskilled and Light Strength Jobs CI _{minimum 95%}	Number of Workers in Unskilled and Light Strength Jobs CI _{68%}	Number of Workers in Unskilled and Light Strength Jobs CI _{minimum 68%}
Fast Food and Counter Workers (35-3023)	1,999,000 to 2,281,000	2,022,000+	2,068,000 to 2,212,000	2,106,000+
Retail Salespersons (41-2031)	1,764,000 to 2,166,000	1,796,000+	1,862,000 to 2,067,000	1,917,000+
Cashiers (41-2011)	1,633,000 to 2,213,000	1,680,000+	1,775,000 to 2,071,000	1,854,000+
Waiters and Waitresses (35-3031)	1,269,000 to 1,504,000	1,288,000+	1,326,000 to 1,446,000	1,358,000+
Security Guards (33-9032)	589,000 to 745,000	601,000+	627,000 to 707,000	648,000+

3.0.2	OCC_TITLE	number_med_and_unsk_workers	c95_low	c95_up	c95_minimum	c68_low	c68_up	c68_minimum
311131	Nursing Assistants	439000	357000	520000	370000	397000	480000	429000

Thus, there are an estimated 439,000 nursing assistants in jobs that are unskilled and require medium strength. The true number, with 95 percent confidence, is between 357,000 and 520,000. There are at least 370,000 nursing assistants in unskilled and medium strength jobs (using a one-sided, 95 percent confidence interval). The last three numbers reflect results using a 68 percent level of confidence instead of a 95 percent level of confidence.

Confidence intervals in the Excel file are limited to the 257 occupations directly observed from the ORS data. Further, if the lower bound of the two-sided 95 percent confidence interval is 1,000 workers or less, the confidence intervals are not displayed in the file (only the estimated number of workers is displayed).

Applications

The regulatory and sub-regulatory framework for Social Security's disability programs asserts the existence of a significant number of unskilled and sedentary jobs in the national economy. That assertion is based on an outdated data source (the Dictionary of Occupational Titles) and has left SSA's disability determination process exposed to substantial legal risk. The ORS data have directly addressed that legal risk by establishing that this type of work does exist in sizeable numbers in the economy (about 5.6 million workers are in unskilled and sedentary jobs). Additionally, [Table 10](#) illustrates that type of work exists in sizeable numbers for several detailed occupations. One general application of these findings is for SSA to move its policy framework and disability determination process from the DOT to the ORS.

A more specific application related to the new ORS data is aiding Vocational Experts (VEs) in their testimony before Administrative Law Judges (ALJs). As part of the disability determination process, VEs respond to queries posed by the ALJ regarding the number of employed persons in jobs with certain requirements. The responses often focus on jobs that are unskilled and have modest exertion levels. Data in the Excel files that accompany this paper are of direct value for this part of the process. For example, there are an estimated 728,000 general office clerks (+/- 103,000 for 95 percent confidence) in jobs that are both unskilled and sedentary. This provides a basic framework for analyzing whether there are jobs in the economy a disability applicant can perform.

In many cases, the nature of the disability is such that even unskilled and sedentary work would not be possible. For example, from the Excel file, one can see there are 232,000 school bus drivers whose work is unskilled and sedentary. In these cases, the work is sedentary because it is seated and does not involve lifting or carrying heavy items. However, by viewing the other physical requirements documented in the ORS (such as requirements about low postures and foot / leg control), it would be clear to VEs that severe physical health problems would often preclude this type of work. More generally, VEs are specifically authorized by SSA to use their professional experience, in combination with formal data collections such as the ORS, to make informed estimates of available work.

The estimates in this paper may also aid SSA or private companies in developing or improving software to make the disability determination process more efficient. For example, the Dictionary of Occupational Titles is a hard-copy book, but over time software applications were developed to bring in and display data in a manner that made its use more efficient. In a similar

way, software could be used to display ORS data and estimates derived from that data in a user-friendly way for disability examiners, VEs, ALJs, claimant attorneys and others.

Finally, the estimates in this paper can foster additional social science research. Weaver (2020) used an earlier version of the ORS and household survey data to model the effects of physically demanding work on receipt of disability benefits and exit from the workforce. In a similar fashion, estimates from this paper can be combined with household survey data to study the effects of occupational requirements on retirement decisions and other aspects of the labor market.

Limitations

This paper has produced estimates for all 831 occupations in the OEWS, but the estimates are of uneven quality. Estimates from larger occupations will be more reliable as they are more likely to be based directly on detailed occupations in the ORS. Estimates based on occupations aggregated to the major group level will be substantially less reliable for rare occupations that may have very specific skill or strength requirements. The accompanying Excel file is structured so that users can subset the data for particular applications. For example, users can select off occupations where total employment exceeds certain thresholds, select off occupations where the estimates are directly from the ORS, and so forth.

Conclusion

This paper offers several methodological contributions for examining exertion levels for workers in unskilled jobs. These include using the SOC structure, which groups related occupations, to fill in missing data in the Occupational Requirements Survey and to use the product method at the detailed occupational level to develop estimates of joint requirements. Further, these methods are validated through comparisons with special tabulations by BLS using the internal-use, job level data. These comparisons also reveal an important feature of the workforce. Overall, unskilled work is more likely to be physically demanding. However, within an occupation (which groups similar jobs), this pattern is muted. For example, among general office clerks, there may be no reason to believe unskilled jobs are more or less likely to be sedentary.

Additionally, this paper outlines an approach to calculating standard errors and confidence intervals for joint requirements. Confidence intervals for numerous occupations are provided in an accompanying Excel file. These confidence intervals include both one-sided and two-sided intervals and different levels of confidence (95 percent and 68 percent).

This paper has focused on the exertion levels for workers in unskilled jobs. Future research could use the ORS and OEWS to examine semi-skilled or skilled jobs, physical demands beyond exertion (strength) requirements, and cognitive requirements. To aid in this type of research it would be helpful

for BLS to produce additional joint estimate tabulations from the internal-use job level data. Such tabulations would allow for validation of product method estimates by detailed SOCs.

An additional line of research could focus on improved methods for filling in missing data in the ORS. Such research could rely on professional experience of vocational experts (through surveys of experts) or could use other methods. This could be especially helpful for estimates for very rare occupations. For example, in [Table 3](#), the methods in this paper indicate that 60.3 percent of private household cooks are unskilled. This estimate is based on other cook occupations, but it is plausible household cooks are chefs with specialized training.

Future research could also explore the way work is “typically” or “generally” performed within an occupation. The Dictionary of Occupational Titles labels occupational characteristics based on the modal value of each characteristic from the sample (National Research Council, 1980). That approach or a similar approach could be adopted using the ORS data. For example, in the ORS the modal value of specific vocational preparation (time required to learn the job) for general office clerks is one month or less and the modal exertion level is sedentary. Hence, using the modal values, it could be reasonable to label this type of work as generally unskilled and sedentary. Additional research, perhaps through surveys of experts, might identify other practical approaches to assessing general patterns of work.

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