

Methodology/Disclaimer

Historic Analyses Immigration Wage/Salary Trends BTA's Time Series of the Data reported in the Occupational Employment Statistics Salary Surveys

www.salariesreview.com/doltrends

Use of This Data - Disclaimer

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OES Survey Job Class Description

Job Class as used by BTA denotes the fact that the Occupational Employment Statistics (OES) Salary Survey begins with the premise that it will include all workers in North America and reflect all jobs and positions. BTA's definition of a "position" is that it is a specific job held by an individual with specific duties, objectives, and responsibilities. A "job" is a grouping of similar positions, and a "job family" is a collection of jobs. The OES survey is best described as a collection of job families for higher levels (General Management), technical, and professional positions, although it may actually represent a "position" with lower level responsibilities (such as word processor). The "Job Class" term is used to denote that the OES job definition will include many different types of positions and job titles, including in some cases, that job's first line supervisory counterpart and paraprofessional peers. It will often represent a collection of job families (some 769 in all). Canadian data is even more broadly grouped (into 47 occupational classifications); each Canadian occupational classification has been crosswalked to each OES job group.

Requested OES Area

Any one of 637 different OES areas covering all of the U.S. and its territories can be selected. OES Area names are those defined and used by the U.S. Government. They represent (in most cases) a collection of counties with the exception of Connecticut, New Hampshire, and Massachusetts where counties are divided. BTA apologizes for certain assignments within New England that may not agree with State officials as published data for New England is incomplete and BTA has made its best estimate of what city or town fits in which New England area and/or township. An example would be Wilmington, MA which is within 10 miles of downtown Lowell and which we had assigned to the Lowell OES area, only to recently find that more the more distant Boston OES area claimed this city. Canadian areas are those assigned by BTA utilizing the same methodology as found with U.S. data (adding 46 additional areas). These assignments and created "OES areas" were created solely by BTA with no input from Canada Statistics. In addition, BTA provides data on a state, territory, and province summation basis with those areas' codes ending with four zero digits.

Time Series Projection

BTA calculates a linear regression line based upon up to three data points published by the Occupational Employment Statistics Salary Survey. The Institute uses July median collection dates for each of the 769 job groups found in 637 geographic areas. (OES data is collected throughout the year and adjusted by BLS to a central date.) BTA assumes that the last day of each month is used and projects data to the first of the next month for any inquiry, using an equation in the form of: $Y = a + b * X$. This equation, established from the reported weighted average of each year, is used to project means for any month (defined as the same month as the inquiry, with 1999 data being defined as $1999 \times 12 + 6 = 23994$ for the "x axis" coordinate.) If data is present for one year and not for another or is of a different "type", BTA assumes the projected rate will not be less than the most recent value gathered by OES for that job. No other assumption or methodology is used on this non-copyrighted data. The OES survey is complicated and all-inclusive (attempting to collapse over 16,000 jobs, 30,000 position titles, and 1,000's of professions in the United States into ~769 specific SOC/OES job groups). Users of this data are encouraged to read the methodology below (as found on the Government's Internet site) <http://stats.bls.gov>. BTA regresses only *like statistics* (area against area, state against state, see "Type" description below).

Survey/Type

OES reports one of four levels of data: Level: 1 = MSA, PMSA, or Balance of State Area; 2 = Contiguous Areas; 3 = Statewide; 4 = U.S. Nationwide. Overall Mean is not usable for certification purposes per GA Letter 2-98; Level I Mean is the weighed average of the first 1/3 of the survey sample; and Level II Mean is the weighted average of the remaining 2/3 (including all those positions that: "work with indirect supervision"). As of 1999, a separate database is provided by the OES for Researchers Employed by Colleges and Universities, College and University Operated Federally Funded Research and Development Centers, and Certain Research Agencies. (The data in this report are from the general OES database and not for Researchers.) Canadian data is reported by Level 1, 3, and/or 4 with data being available for most occupational classifications in almost every Census sub-division.

Survey/Source Name

BTA's Immigration Wage/Salary Trends – OES Data Analysis of the Occupational Employment Statistics Survey ("OES") and Canada Census Using Historic Data. BTA is a compensation and benefits consulting firm.

Survey Data Publishers

BTA is neither the publisher nor the conductor of this survey. The publisher and collectors of this data are the U.S. Department of Labor's Employment and Training Administration ("ETA"), the Bureau of Labor Statistics ("BLS"), and 54 State Employment Agencies ("SESAs"), all acting together to create consistent prevailing wage rates to be used as the wage component of the Bureau of Labor Statistics' expanded Occupational Employment Statistics ("OES") program. Canada data is reported as sent to BTA by Statistics Canada and is derived from Canada's 5 year census cycle.

Data Projected/Trended to:

BTA assumes that the last day of each month is used and projects data one day short of the first of the next month for any inquiry, using an equation in the form of: $y = a + bx$. This equation, established from the reported weighted average of each year, is used to project means for any month. Its "x-axis" is defined as the same month as the inquiry, with 1999 data being defined as $1998 \times 12 + 6 = 23982$ for the "x axis" coordinate for use in 2002. The resulting equation is then applied; example, a May 2002 date is defined as $2002 \times 12 + 5$ or 24029. Value = $a + b \times x$

24029. (Canadian 1991 and 1996 Census values are projected from an x-axis of 1990 x 12 and 1995 x 12.)

OES Area Reference Number

This is a six digit number. The first two digits represent the state (or territory) and the latter two represent one of the 637 geographic areas that cover and include all areas within the United States and the 46 assigned Canadian areas. Metropolitan Statistical Areas are used, as are OES self-described areas such as "Northwest Washington", which includes all counties not already included in PMSAs and/or MSA. Except for the three New England states (which divide counties), all OES areas can be defined as a collection of counties and/or Canadian Census sub-divisions. A SOC Job Reference Number is a 6 digit number assigned by OES to define the positions surveyed. For surveys conducted in the Year 2000 and thereafter (reported in the Year 2001), this number compares to the Standard Occupational Code "SOC". For this report, however, the new SOC numbers are not used. (To review OES data for the Year 2002, we refer you to www.eries.com/soctrends.)

Salary Survey Area

The collection of counties and/or sub-divisions are those found within a specified OES area. Within Canada, BTA has used the 302 Census sub-divisions/counties that differ in type among Provinces and in number among the three Census datasets provided. (Census sub-divisions differ only slightly each five years.) Canadian counties (a term used in certain provinces) and sub-divisions are typically much larger in geographic area than U.S. counties.

Job Titles Included

The titles shown are those understood by BTA to be found within the Job Class Description. Selecting any one of the underlined (blue) titles below takes one to the SalariesReview.com fee-based report for the specified position. Double clicking on the active link/ titles will take one to this separate survey (not the OES) where base salary, incentive, total compensation, and survey participant estimates may be found. If a position title is in [blue](#) and underlined, sufficient sample sizes exist to report wage/salary data. If black and not linked/underlined, sufficient sample sizes do not exist at this time in the SalariesReview.com U.S. and Canada Wage and Salary Survey.

OES Survey Job Description

Survey Descriptions are those of the OES with the additional input of qualifiers to illustrate when jobs include first-line supervision, paraprofessionals, etc. Canada Census data came without descriptions for the 47 broad occupational categories.

Methodology/Description

As found in this prose.

Report Date

Report Date is the date on which the Search Report is generated on the Internet.

Data as Reported

Each year BTA accesses the data files of the OES survey and extracts the reported means, Level I and Level II data for 637 geographic areas. These reflect all jobs and all geographic areas within the United States and its territories (634 areas in 1998; BTA counts states and national areas). BTA has titled the "Year 2000" data as "Data to be Used in 2000" even though it was collected in 1996-1998 and labeled as "1998" data by the OES. Many norms are reported for "contiguous areas" that may or may not be within the same State. These "contiguous areas" may

change from year to year. To establish meaningful trend lines, BTA has selected to focus on the "1", "3", and "4" Types that are described below.

The definitions below are taken directly from General Administrative Letter No. 2-98, the Labor Department's Guidance on New Prevailing Wage Policies for immigration programs of October 31, 1997 as enhanced by GA Letter No. 1-00 of May 16, 2000.

Type

OES reports positions within an area as either "1" (local area in which individuals may commute), "2" (contiguous/adjacent area), "3" (state-wide) or "4" (national). BTA does not necessarily show all these values and in all cases converts data to annual compensation (by multiplying hourly rates x 2080 hours). Should an area show a "4" for data in 2001, a "2" for data in 2002, and a "1" for data in the Year 2003, only the latter would be used (and the equation would be a horizontal straight line trended slightly for salary structure movement).

- 1 = MSA, PMSA, or Balance of State Area
(local area in which an individual may commute);
- 2 = Contiguous/Adjacent Areas;
- 3 = Statewide;
- 4 = U.S. Nationwide.

If no local area data existed before the most recent year, a trended line at 3.3% movement is projected. As discussed no regression trends will be employed until BTA can regress like jobs against like jobs. Only "like areas" are trended (2 vs. 2, 3 vs. 3, 1 vs. 1, or 4 vs. 4). If the Government does not report local area data (a "1" in the most recent year), a trend line and its projection may not be reported.

Annual Mean

The OES definition of a mean is very well defined for our purposes.

Methodology in any type of survey must reflect the average (arithmetic mean) rate of wages, that is, the rate of wages to be determined, to the extent feasible, by adding the wages paid to workers similarly employed in the area of intended employment and dividing the total by the number of such workers. This will, by definition of the term arithmetic mean, usually require computing a weighted average.

That said, we refer the interested reader to the concepts of winsorized means and hot decking as described in the Government's technical Internet site and as used in the OES survey. Canadian annual means are the earnings reported for those fully employed in that occupation.

Level I

These are beginning level employees who have a basic understanding of the occupation through education or experience. They perform routine or moderately complex tasks that require limited exercise of judgment and provide experience and familiarization with the employer's methods, practices, and programs. They may assist staff performing tasks requiring skills equivalent to a Level II and may perform high level work for training and developmental purposes. These employees work under close supervision and receive specific instructions on required tasks and expected results. Work is closely monitored and previewed for accuracy. (Canadian Level I represent the average for the lowest earning census division reporting from among those fully employed within this

occupation. Note: should there be only one census division in an assigned area, then Level I, Level II, and Annual Mean Earnings will be the same for this Canadian area.)

Level II

These are fully competent employees who have sufficient experience in the occupation to plan and conduct work requiring judgment and the independent evaluation, selection, modification and application of standard procedures and techniques. Such employees use advanced skills and diversified knowledge to solve unusual and complex problems. They may supervise or provide direction to staff performing tasks requiring skills equivalent to a level I. These employees receive only technical guidance, and their work is reviewed for application of sound judgment and effectiveness in meeting the establishment's procedures and expectations.

If a baccalaureate degree is normally required for entry into the occupation, the wage rate for a job offer in that occupation requires a further advanced degree (Masters or Ph.D.) for workers performing tasks requiring skills at a level II. In this case, the requirement for advanced education substitutes for the skills required at a level II. Where an advanced job degree is normally required for entry in the occupation, the wage rate for a job offer in that occupation shall be the rate for workers performing tasks requiring skills at a level I, unless there are other requirements contained in the job offer or components thereof which require skills that are at a level II. For example, a job opportunity for a librarian, an occupation for which a Master's degree is normally required for entry into the occupation, would generally be considered to require skills at a level I, unless other requirements in the job offer or components thereof require skills at a level II.

Where States licensure is required for an individual to independently perform all of the duties encompassed by the occupation, such workers shall be considered to be performing work requiring skills at a level II, unless the employer can present sufficient evidence that the alien does not, in fact, independently perform all of the duties encompassed by the occupation.

In practical terms, if an employee utilizes any discretion or works with any freedom of action, it is most likely a Level II position. The overall Mean is not usable for certification purposes per GA Letter 2-98; Level I Mean is the weighed average of the first 1/3 of survey sample. Level II Mean is the weighted average of the remaining 2/3 (including all those positions that: "work with indirect supervision"). Canadian Level II earnings are the highest reported average for any one census sub-division within the assigned "OES" area.

Sample Size

At the time of preparing this data, OES did not publish the sample size of its survey, neither incumbents represented nor firms surveyed (this was changed in 2001). To complete this analysis, BTA has had to estimate the number of incumbents from reported "all-over" state accumulations. One of the reasons for not reporting the number of incumbents measured is perhaps that the State Labor Departments (which have a funding related, OMB- BLS goal of an 80% response rate from all mailed OES survey questionnaires) have been given guidance on "mean imputation" and "nearest neighbor hot decking".

To explain, the OES survey consists of both head count and salary data collection. When wage data is missing and head counts exist, missing data is "imputed" (from national distributions). When head counts are not reported, but wage data exists, "hot decking" is used. The closest comparable company ("donor") is selected and then that donor's wage data is used. When both total employment and wage-employment data are missing, both hot decking and imputation are used.

BTA understands, with an 80% participation goal, why *imputation* and *hot decking* have been adopted and why sample sizes are not being reported. As this survey has matured, we see evidence that mean imputation and hot decking are diminishing and populations reported.

In the interim, BTA has distributed the job class population for a state proportionately throughout the state based upon the population sums of the counties and cities represented. For example, Little Rock, Arkansas' OES area represents four of the most highly populated counties within the state. Consequently over 50% of the incumbents for job classes might be distributed within those four counties. Contrarily, Canadian Census data was provided to BTA with the populations measured (in a 20% sampling technique) reported by occupational classification and Census sub-division. In these cases, the values shown are a summation of the sub-divisions found within an BTA derived Canadian "OES area".

One final note: The OES survey recently broke apart the industries reporting and designated a special industry grouping. As of 1999, a separate database was provided by OES for Researchers Employed by Colleges and Universities, College and University Operated Federally Funded Research and Development Centers, and Certain Research Agencies. Again, data from these separate 1999 - 2001 OES database are not included in BTA surveys.

Reliability Statistics - A Note for Expert Witnesses

In 1975, the U.S. Congress passed Federal Rule of Evidence 702 so that a threshold standard for the admission of expert witness testimony might exist in Federal Courts. Based on the concept that experts should use methodologies that are "generally accepted" by a discipline's practitioners, the rule states: "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." Following this, the Supreme Court issued an opinion in *Daubert v. Merrill-Dow Pharmaceuticals*, 509 U.S. 579, 113 S. Ct. 2786, 125 L.Ed.2d 469 (1993) that has become the standard for the admission of "general acceptance". In this Case (which standard is now adopted by Federal and most State Courts), the admittance of expert witness testimony and evidence required a two-step analysis: A) Evidence must be relevant, and B) Evidence must be reliable. The "relevance" is a subjective judgment but simple logic may be applied (salary survey data for use in lost wage analyses, proxy compensation data for use in maximum reasonable compensation cases, etc.) For the latter, "reliability", the Supreme Court established four separate, non-exclusive tests: 1) it can be illustrated that the theory or technique can be tested, 2) the data has been subjected to peer review and publication, 3) there is a known or potential rate of error, and (4) there a level of general acceptance in that particular discipline's community.

In March of 1999 the United States Supreme Court issued a ruling in the *Carmichael* case that further defined when a *Daubert* reliability challenge applies. In *Carmichael*, the Supreme Court ruled that reliability must be established in all types of expert testimony, both scientific and non-scientific/technical. The Court held that the role of a trial judge was that of "gatekeeper" regarding both the relevance and reliability of all expert testimony. The Court stated that the *Daubert* case was not intended to be limited to scientific cases only. Instead, it would/should apply to all fields of expert testimony. Providers of expert witness testimony must be prepared to describe why an analysis was utilized and why the analysis and data can be considered reliably sufficient. (For further discussion, see: www.interfire.com/features/daubert.htm.)

For this Internet site's presentation, the standard errors shown are those taken directly from OES published data; see <http://workforcesecurity.doleta.gov/foreign.asp>. Standard errors for Canada are those directly supplied by Statistics Canada. (If no standard error is available, BTA's dataset defaults to 00.00, 15.00, or 22.00%. Users should disregard these preliminary numbers. Please note, however, that where Canada uses only a Long Form Census Questionnaire, they do at

times receive a 100% response rate for a census area. In this case, the standard error is also reported as 0%.)

Calculation of Populations and Standard Errors

The OES survey reported three data points for each of 769 jobs in 637 geographic areas. Level I, Level II, and Average earnings can be used to create a fourth point. (One knows that Level I represents the 16.5th percentile. Level II represents the 66.5th percentile. Their sum, plus a 4th point, should average to that reported for the job class.)

In past years state numbers were all that was reported for all classes (see: <http://www.bls.gov/oes>) and BTA divided these among the various counties for each of the OES geographic areas. A population for each area (assuming an equal distribution within a state) was projected. Thus, data points for a known number of incumbents was constructed for the calculation of both correlation and standard error. Likewise, Canada Census data, representing 47 broad occupational classifications, were analyzed within BTA defined "OES like areas". Level I and Level II data points were defined as the high and low averages found within census sub-divisions for the "full time employed".

In mid 2000, BTA began to report a Standard Error from the report page for each data presentation:

SYZ Position	
Reliability Statistics	
Data:	Total Compensation (Base Salary plus Bonus)
City:	Costa Mesa
Area:	Orange County
Survey:	OES Data Years 1998, 1999, and 2000 Canada Census 1991 and 1996
Observations	1,200
Standard Error	2.3% (As reported)
Sources:	OES – ETA – BLS and State Agencies Statistics Canada Census 1996
See Methodology	

Reliability Statistics Definitions

Data

Values include incentives (see full definition above and below).

City

Populations of employees in a job group are defined across a wide geographic area. OES reported populations are for areas from which workers may commute and typically represent much larger areas, according to the OES, than a city metropolitan area. Canadian estimates reflect a minimum of at least one census sub-division (which are, on average, much larger than any single U.S. county).

Area

These are as defined by OES; BTA divides Canada geographically using the same methodology by which BLS/ETA defines U.S. areas.

Survey

Three complete years of OES datasets and three complete Canadian Census datasets have been analyzed (1998, 1999, 2000, and 1986, 1991, 1996 respectively). Only the Canadian 1986 Census is not included.

Observations

OES reported job survey populations are for areas from which workers may commute and typically represent much larger areas than a city metropolitan area. As mentioned, Canadian observations reflect a minimum of at least one census sub-division. The latter population is the sum from the 1996 Census for this job class.

Standard Error

BTA considers two different types of simple standard errors that exist among the surveys analyzed. The first is the variance found for the same job across 683 "OES" areas, representing 303 Canadian Census datasets and 3,455 U.S. state and county areas. The second is the 769 and 47 different job classes as found within any one area. Both of these standard errors illustrate a fairly wide range (see: BTA's Comments Regarding OES reported Standard Error below). A third standard error measure exists, that reported by the U.S. Government on its Internet site, the "Relative Standard Error".

Early in the 2000 Year, the OES began to report "Relative Standard Error" (RSE). To explain, the particular sample used in the OES survey is one of a large number of all possible samples of the same size that could have been selected using the same sample design. To quote the OES Technical Notes:

"Estimates derived from different samples would differ from each other. The variance of a survey estimate is a measure of the variation among the estimates from all possible samples. The standard error of a survey estimate is the square root of its variance; the relative standard error is the ratio of the standard error to the estimate itself. The sample estimate and its standard error allowed OES to construct an interval estimate with a prescribed level of confidence that the interval will include the mean value of the estimates from all possible samples.

To illustrate, if all possible samples were selected, and if each of these were surveyed under essentially the same conditions, and an estimate and its estimated sampling error were calculated from each sample, then approximately 90 percent of the intervals from 1.6 standard errors below to 1.6 standard errors above the derived estimate would include the average value of the estimates from all possible samples. This interval is called a 90-percent confidence interval.

Approximately 95 percent of the intervals from two standard errors below to two standard errors above the derived estimate would include the average value of the estimates from all possible samples. This interval is called a 95-percent confidence interval. For example, suppose that an estimated occupational employment total is 5,000 with an associated relative standard error of two percent. Based on this data, the standard error of the estimate is 100 ($= 5,000 \times 0.02$) and the 95-percent confidence interval for the estimate is $(5,000 - 200)$ or $(4,800 \text{ to } 5,200)$. This confidence interval is one of many that could be constructed based on the same sample design. Approximately 95 percent of these confidence intervals would encompass the average value of the estimates from all possible samples."

The Relative Standard Errors shown are those reported by the OES for the job groups in each state or territory. While BTA distributes populations so that one might review the probable populations within an OES area for a particular job group, it illustrates the same

Standard Error for the same job group in all OES areas within a state. (One should be able to sum all the populations within a state and see a number equal to the state population reported. The Standard Error reported would be the same for all the sub group OES areas within that state. For Canadian data, BTA has no source from which to make an estimate (no Standard Error was supplied with the three Census Years of data and values are typically shown as 0.00%). Standard errors shown are BTA estimates. ("Default fields" illustrating that these calculations have not yet been finalized are indicated as 00.00, 15.00, and/or 22.00. Users should disregard these preliminary numbers.)

Canadian Standard Errors have been supplied by Statistics Canada and reflect Standard Error of Average Income by Major Occupational Groups. Standard Error of Average Income will equal zero in two instances:

If the unrounded count is less than 10, the Average Employment Income and its Standard Error was suppressed and was reported as zero by Statistics Canada.

For remote geographic regions, including the Northwest Territories and the northern parts of some Provinces, respondents received only the 2B/2D long-form questionnaire. Consequently there was a 100% sample. In this case, there is no Standard Error and it is reported as zero.

Canadian Standard Errors were supplied in whole dollars and have been converted by dividing the average into these amounts (weighted by populations) so that a standard error can be expressed as a percentage.

Sources

Only the before mentioned OES and Canada Statistics data have been used to create the values shown. Should Reliability Statistics be illustrated for areas in which there exists no predicted population, it will be because that value applies to the state/territory totals.

BTA Statement as to the Relevance and Reliability of Data

Relevance is totally determinable by the circumstances and situation presented. Reliability is described in a four part, non-exclusive summary to match the *Daubert* challenge:

Theory/Technique Demonstrations

Methodologies accompany each BTA SalariesReview.com survey and BTA's Internet presentation of OES and Canadian Census salary data used for immigration purposes. These methodologies include definitions of terms, examples of calculations, and identifications of sources and data updates.

Subject to Publication and Peer Review

SalariesReview.com surveys and BTA's Internet presentation of OES and Canadian Census salary data used for immigration purposes are constantly reviewed. Internet visits now exceed 100,000 a month to both www.salaryexpert.com and www.salariesreview.com. The "doltrends" site is one of BTA's most popular.

BTA's "peers" are its competitors, those firms that also provide data analyses to their clients. OES data as shown here has been widely used (for immigration purposes, one should use the data published for the specific year rather than BTA's trend line).

Known or Potential Rate of Error

Each BTA SalariesReview.com survey and BTA's Internet presentation of OES and Canadian Census salary data used for immigration purposes illustrate, via a "Reliability Statistics" link, the beginning of a statistical overview of BTA data.

General Level of Acceptance within the Discipline's Community

OES data is the default data for practitioners in the U.S. when private survey data is not available. This historic data was used for three years to set prevailing wage rates for immigrant workers under GAL 2-98.

Technical Notes - Occupational Employment Statistics

(collected over five years – much of these statements are no longer available on the BLS website)

Overview

The following is a combination of OES web site information. Technical notes found today are lacking much of the detail of early year notes. BTA has retained these earlier comments as they do much to describe the nature and conduct of this salary survey, the largest ever undertaken by any government in the history of the world.

Employment Estimates

Employment represents the estimate of total wage and salary employment in an occupation across the industries in which it was reported. The OES survey form sent to an establishment contains between 50 and 225 OES occupations. The number of occupations listed on a form depends on the industry classification and size class of the sampled establishments. To reduce paperwork and respondent burden, no survey form contains every OES occupation.

Wage Estimates

Wages for the OES survey are straight-time, gross pay, exclusive of premium pay. Included are base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay including commissions and production bonuses, and on-call pay. Excluded are back pay, jury duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, and tuition reimbursements.

Mean Annual Wage

Most employees are paid at an hourly rate by their employers and may work less than or more than 40 hours per week. The annual wage estimates in this release are calculated by multiplying the mean wage by a "year-round, full-time" hours figure of 2,080 hours per year (52 weeks by 40 hours). Thus, the annual wage estimates may not represent the actual annual pay received by the employee. There are a small number of occupations where only an annual wage figure is provided. The workers in these occupations are paid based on an annual amount, but generally work less than the usual 2,080 hours per year. Since the survey does not collect the actual hours worked, the hourly rate cannot be calculated with a reasonable degree of confidence from the annual wages. For this reason, only the annual salary is reported for these occupations. Occupations that typically have a work-year of less than 2,080 hours include musical and entertainment occupations, flight attendants, pilots, and teachers.

Mean Hourly Wage

The Mean hourly wage is the estimated total wages for an occupation divided by its weighted survey employment.

Median Hourly Wage

Median hourly wage is the estimated 50th percentile of the distribution of wages; 50 percent of workers in an occupation earn wages below, and 50 percent earn wages above the median wage.

Survey Method and Reliability Statement OES Survey All-Industry Wage Rate Estimates

General

The Occupational Employment Statistics (OES) survey is an annual mail survey measuring occupational employment and wage rates for wage and salary workers in non-farm establishments, by industry. The OES survey samples and contacts approximately 400,000 establishments each year and, over 3 years, contacts approximately 1.2 million establishments. The reference period for each year's survey is the fourth quarter of that year. While estimates can be made from a single year of data, the OES survey has been designed to produce estimates using the full 3 years of sample. (See Estimation methodology section.) The full sample allows the production of estimates at fine levels of geography, industry, and occupational detail. BLS and the Employment and Training Administration (ETA) provide the funding for the survey. BLS provides the procedures and technical support, while the State Employment Security Agencies (SESAs) collect the data. The SESAs produce industry-specific estimates for states and local areas. BLS produces cross industry and 2- and 3- digit SIC industry estimates for the nation, states, and metropolitan statistical areas (MSAs).

The OES survey defines employment as the number of workers who can be classified as full-time or part-time employees, including workers on paid vacations or other types of leave; workers on unpaid short-term absences; salaried officers, executives, and staff members of incorporated firms; employees temporarily assigned to other units; and employees for whom the reporting unit is their permanent duty station regardless of whether that unit prepares their paycheck. The survey excludes the self-employed, owners/partners of unincorporated firms, and unpaid family workers. Employees are reported in the occupation in which they are working, not necessarily for which they were trained.

Survey Definitions and Concepts

Many of the concepts and definitions used in the OES Survey are comparable to those in the Current Employment Statistics survey, a monthly BLS payroll survey of nonagricultural establishments. Many others, however, are unique to this survey. Key definitions are as follows:

An *establishment* is an economic unit, such as a factory, mine, or store which produces goods or services. It is generally at a single location and engaged predominantly in one economic activity.

The OES survey defines *employment* as the number of workers who can be classified as full-time or part-time employees; workers on paid vacations or other types of leave; workers on unpaid short-term absences; salaried officers, executives, and staff members of incorporated firms; employees temporarily assigned to other units; and employees for whom the reporting unit is their permanent duty station regardless of whether that unit prepares their paycheck. The survey excludes the self-employed, owners/partners of unincorporated firms, and unpaid family workers. Employees are reported in the occupation in which they are working, not necessarily for which they were trained.

Employment represents the estimate of total wage and salary employment in an occupation across the industries in which it was reported. The OES survey form sent to an establishment contains between 50 and 225 OES occupations. The number of occupations listed on a form

depends on the industry classification and size class of the sampled establishments. To reduce paperwork and respondent burden, no survey form contains every OES occupation.

The OES classification system uses seven *occupational divisions* to categorize workers into one of 750 (or 959 according to BTA's count) detailed occupations. The seven divisions are as follows:

Managerial and Administrative;
 Professional, Paraprofessional, and Technical;
 Sales and Related;
 Clerical and Administrative Support;
 Service;
 Agricultural, Forestry, and Fishing; and
 Production, Construction, Operating, Maintenance, and Material Handling.

Wages for the OES survey are straight-time, gross pay, exclusive of premium pay. Included are base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay including commissions and production bonuses, and on-call pay. Excluded are back pay, jury duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, and tuition reimbursements.

The OES survey collects wage data in 11 intervals. Employers report the number of employees in an occupation per each wage range. The wage intervals (for 1998) were as follows:

Interval	Hourly Wages	Annual Wages
Range A	Under 6.75	Under \$14,040
Range B	\$6.75 to \$8.49	\$14,040 to \$17,659
Range C	\$8.50 to \$10.74	\$17,660 to \$22,359
Range D	\$10.75 to \$13.49	\$22,360 to \$28,079
Range E	\$13.50 to \$16.99	\$28,080 to \$35,359
Range F	\$17.00 to \$21.49	\$35,360 to \$44,719
Range G	\$21.50 to \$27.24	\$44,720 to \$56,679
Range H	\$27.250 to \$34.49	\$56,680 to \$71,759
Range I	\$34.50 to \$43.74	\$71,760 to \$90,999
Range J	\$43.25 to \$55.49	\$91,000 to \$115,439
Range K	\$55.50 to \$69.99	\$115,440 to \$145,599
Range L	\$70.01 and over	\$145,600 and over

The OES survey collects wage data in 12 intervals. Employers report the number of employees in an occupation per each wage range. The wage intervals used for the 1999 survey were as follows:

Annual wage: Most employees are paid at an hourly rate by their employers and may work less than or more than 40 hours per week. The annual wage estimates in this release are calculated by multiplying the mean wage by a "year-round, full-time" hours figure of 2,080 hours per year (52 weeks by 40 hours). Thus, the annual wage estimates may not represent the actual annual pay received by the employee. There are a small number of occupations where only an annual wage figure is provided. The workers in these occupations are paid based on an annual amount, but generally work less than the usual 2,080 hours per year. Since the survey does not collect the actual hours worked, the hourly rate cannot be calculated with a reasonable degree of confidence from the annual wages. For this reason, only the annual salary is reported for these occupations. Occupations that typically have a work-year of less than 2,080 hours include musical and entertainment occupations, flight attendants and pilots, and teachers.

Hourly versus annual wage reporting: For each occupation, respondents are asked to report the number of employees paid within specific wage intervals. The intervals are defined both as hourly rates and the corresponding annual rates, where the annual rates are constructed by multiplying the hourly wage rate for the interval by the typical work year of 2,080 hours. In reporting, the respondent can reference either the hourly or the annual rate, but is instructed to report the hourly rate for part-time workers.

The *Unemployment Insurance (UI) Address File* is a micro-level employer file prepared quarterly by each State's Employment Security Agency and submitted to the Bureau of Labor Statistics. For 1997, the file from the third quarter of 1996 is used as a sampling frame, while the fourth quarter of 1997 is used as a source of population values for employment.

Industry classifications are based on the 1987 *Standard Industrial Classification Manual*, Office of Management and Budget, 1987. Industry is classified on the basis of the major product or activity of the establishment, as determined by total sales or receipts of the calendar year prior to classification.

Scope of Survey

The OES survey currently uses the Standard Industrial Classification (SIC) system to classify all establishments. An establishment is defined as an economic unit that processes goods or provides services, such as a factory, mine, or store. The establishment is generally at a single physical location and is engaged primarily in one type of economic activity. The scope of the survey includes establishments in SIC codes 07, 10, 12 to 17, 20 to 42, 44 to 65, 67, 70, 72, 73, 75, 76, 78 to 84, 86, 87, and 89. This scope covers agricultural services; mining; construction; manufacturing; transportation and public utilities; wholesale and retail trade; finance, insurance, and real estate; and services. Data for the postal service (SIC code 43) and federal government are universe counts obtained from the Office of Personnel Management.

States' Unemployment Insurance (UI) files provide the universe from which the OES survey draws its sample. The employment benchmarks are obtained from reports submitted by employers to the UI program. In some non-manufacturing industries, supplemental sources are used for establishments not reporting to the UI program. The OES survey sample is stratified by area, industry, and size class. Size classes are defined as follows:

UI reporting units with 250 or more employees are sampled with certainty across a 3-year period. Many States sample one-third of their certainty units each year. However, there are some States that sample more than one-third of their certainty units during one survey year.

In 1997 establishments in size classes 2 to 6 were selected based on a probability sample. The sampling weights in size class 2 were adjusted to account for the employment in size class 1. In 1998, the OES survey began sampling establishments in size class 1; thus, establishments in all size classes are now represented in the probability sample.

New Occupational Classification Standards for 1999: In 1999 the OES survey began using the Office of Management and Budget's new occupational classification system -- the Standard Occupational Classification System (SOC). The SOC system is the first OMB required occupational classification system for Federal agencies. The OES survey uses 22 major occupational groups from the SOC to categorize workers in one of almost 770 detailed occupations. Previous years' data was cross-walked to the new classification system when possible and used in producing wage estimates for these occupations. Of the occupations listed in Table 1, wages for 374 of the matched occupations are estimated using data from the 1997, 1998, and 1999 surveys. The remaining occupations are either new SOC occupations, or are slightly different from similar occupations in the old OES structure; wages for these occupations are estimated from a single year of data only. In order to maintain employment additivity, all occupational employment estimates are based only on the data collected in the 1999 survey. The major groups of the new SOC system are as follows:

- * Management occupations
- * Business and financial operations occupations

- * Computer and mathematical occupations
- * Architecture and engineering occupations
- * Life, physical, and social science occupations
- * Community and social services occupations
- * Legal occupations
- * Education, training and library occupations
- * Arts, design, entertainment, sports, and media occupations
- * Healthcare practitioners and technical occupations
- * Healthcare support occupations
- * Protective service occupations
- * Food preparation and serving related occupations
- * Building and grounds cleaning and maintenance occupations
- * Personal care and service occupations
- * Sales and related occupations
- * Office and administrative support occupations
- * Farming, fishing, and forestry, occupations
- * Construction, and extraction occupations
- * Installation, maintenance, and repair occupations
- * Production occupations
- * Transportation and material moving occupations
- * Military specific occupations (not surveyed in OES).

The reference date of the 1997 survey was the week that included October 12, November 12, or December 12 of 1997. The reference date for a particular establishment in this survey is dependent on its two-digit SIC code. See the table below.

Reference Date	Industries Surveyed
October 12	07, 15-17, 41, 46, 50-62, 67, 70, 73, 79, 84
November 12	26-28, 30, 35, 36, 40, 42, 45, 47, 48, 63-65, 75, 76, 78, 80, 81, 83, 86, 87, 89
December 12	10, 12-14, 20-25, 29, 31-34, 37-39, 44, 49, 72, 82, and state and local governments

Sampling Procedures

The sampling frame for this survey was the list of establishments that reported to the state Unemployment Insurance (UI) files for the two-digit SICs listed above. For the 1997 survey, the frame's reference date was the third quarter of 1996. This frame was supplemented with a list supplying establishment information on Railroads (SIC 401).

Establishments in the universe were stratified by Metropolitan Statistical Area (MSA), three-digit SIC, and size of firm (i.e., size class). Size classes were defined as follows:

Size class	Number of Employees
1	1 to 4
2	5 to 9
3	10 to 19
4	20 to 49
5	50 to 99
6	100 to 249
7	250 and above

In 1996 and 1997, establishments in size classes 2 to 6 were selected based on a probability sample. The sampling weights in size class 2 were adjusted to account for the employment in size class 1. In 1998, the OES Survey began sampling establishments in size class 1; thus, establishments in all size classes are now represented in the probability sample. UI reporting units with 250 or more employees are sampled with certainty across the three year cycle of the survey. Approximately one third of these units are selected within each MSA/SIC/Size class each year. The above allocation resulted in a total initial sample size of 409,347. Then 408,801 UI reporting units or establishments were sampled for 1996 and 1997. The combined initial sample size for 1996 and 1997 is 811,945 UI reporting units or establishments. (Note that the combined sample size is not a simple sum of two year's samples. Some state government establishments are included in the survey each year. In the tabulations for the combined survey these establishments are only included once, from the most recent year. Federal government units are also included in the combined tabulation.)

Method of Collection

Survey schedules were initially mailed to virtually all sampled establishments. Personal visits, however, were made to some of the larger establishments.

Two additional mailings were sent to non-responding establishments at approximately three-week intervals. Telephone follow-ups and, in some cases, personal visits were made to non-respondents considered critical to the survey because of their size.

Response

Subsequent to the close-out date for National estimates, additional data were collected by the states and used to prepare their own estimates. Consequently, the response rates in most states are higher than the response rate used to develop estimates of all-industry wage rates for each MSA.

Estimation Methodology

Employment represents the estimate of total wage and salary employment in an occupation across the industries in which it was reported. The OES survey form sent to an establishment contains between 50 and 225 SOC occupations selected on the basis of the industry classification and size class of the sampled establishments. To reduce paperwork and respondent burden, no survey form contains every SOC occupation. Thus, data for specific occupations are collected primarily from establishments within industries that are the predominant employers of labor in those occupations.

Wages for the OES survey are straight-time, gross pay, exclusive of premium pay. Base rate, cost-of-living allowances, guaranteed pay, hazardous-duty pay, incentive pay including commissions and production bonuses, tips, and on-call pay are included. Excluded are back pay, jury duty pay, overtime pay, severance pay, shift differentials, non-production bonuses, and tuition reimbursements.

Mean wage is the estimated total wages for an occupation divided by its weighted survey employment. With the exception of the upper open-ended wage interval, interval L (\$70.00 and over), a mean wage value is calculated for each wage interval based on occupational wage data collected by the Office of Compensation and Working Conditions. The mean wage value for the upper open-ended wage interval is its lower bound (Winsorized mean). These interval mean wage values are then attributed to all workers reported in the interval. For each occupation, total weighted wages in each interval are summed across all intervals and divided by the occupation's weighted survey employment.

Annual wage: Many employees are paid at an hourly rate by their employers and may work less than or more than 40 hours per week. The annual wage estimates in this release are calculated by multiplying the mean hourly wage by a "year-round, full-time" hours figure of 2,080 hours per year (52 weeks by 40 hours). Thus, the annual wage estimates may not represent the actual

annual pay received by the employee if they work fewer than 2,080 hours per year. There are a small number of occupations in this release where only an annual wage figure is provided; the workers in these occupations are generally paid on an annual basis, and their annual wage has been directly calculated from the reported survey data.

Hourly versus annual wage reporting: For each occupation, respondents are asked to report the number of employees paid within specific wage intervals. The intervals are defined both as hourly rates and the corresponding annual rates, where the annual rates are constructed by multiplying the hourly wage rate for the interval by the typical work year of 2,080 hours. In reporting, the respondent can reference either the hourly or the annual rate, but is instructed to report the hourly rate for part-time workers.

There are workers in some occupations who are paid based on an annual amount, but generally work less than the usual 2,080 hours per year. Since the survey does not collect the actual hours worked, the hourly rate cannot be calculated with a reasonable degree of confidence from the annual wages. For this reason, only the annual salary is reported for these occupations.

Occupations that typically have a work-year of less than 2,080 hours include musical and entertainment occupations, pilots and flight attendants, and teachers.

The OES survey samples approximately 400,000 establishments each year and, over a 3-year period, contacts approximately 1.2 million establishments. Each single-year sample represents a one-third sample of both the certainty and non-certainty strata for the full 3-year sample plan. While estimates can be made from a single year of data, the OES survey has been designed to produce estimates using the full 3 years of data. The full 3-year sample allows the production of estimates at fine levels of geography, industry, and occupational detail, while estimates using any one year of data would be subject to a higher sampling error (due to the smaller sample size) and the limitations associated with having only 1/3 of the units from the certainty strata. Producing estimates using the 3 years of sample data provides significant sampling error reductions (particularly for small geographic areas and occupations); however, it also has some quality limitations in that it requires the adjustment of earlier years' data to the current reference period-- a procedure referred to as "wage updating."

Wage Updating: As noted above, combining multiple years of data has both statistical advantages and limitations. Significant reductions in sampling error can be achieved by taking advantage of 3 years of data, which covers over 70 percent of the employment in the United States. This feature is particularly important in improving the reliability of estimates for small domains in the population (that is, wage and employment estimates for detailed occupations in small areas). Combining multiple years of data also has been necessary to obtain full coverage of the certainty strata (that is, large employers with 250+ employment).

Starting with the 1997 estimates, the OES program has used the over- the-year fourth-quarter wage changes from the Bureau's Employment Cost Index to adjust prior year survey data before combining it with the current year data. The wage updating procedure assumes that each occupation's wage, as measured in the earlier years, moves according to the average movement of its occupational division and that there are no major geographic or detailed occupational differences-- and this may not be the case. The Bureau has conducted research over the past several years on the accuracy of the ECI wage-updating method versus other modeling approaches. Current research results support the continued use of the ECI wage-updating methodology.

1999 OES survey estimates: Beginning in 1999 the OES survey began using an occupational coding structure based on OMB's Standard Occupational Classification System. For 374 occupations that were one-to-one matches or direct aggregations between the two coding systems, the 1999 OES survey wage estimates are developed from the full three years of OES survey data. Wages for fifteen occupations that are one-to-one matches but had significant employment in the new wage range for workers earning \$70.00 per hour and above are estimated using the 1999 survey data only. The remaining occupational wage estimates are developed from the 1999 survey data alone, which covers approximately 400,000 establishments. The combined 1997, 1998, and 1999 data cover approximately 1.2 million sample units.

Occupations where the wage is estimated using three years of data are foot noted in Table 1. The 1999 employment estimates for all occupations are developed using the 1999 data alone.

The 1999 estimates use the wage-updating methodology introduced in 1997, which uses the over-the-year fourth-quarter wage changes from the Bureau's Employment Cost Index to adjust prior years' data before combining them with data from the current year. In addition, the 1999 estimates use the estimation methodology introduced in 1997, which uses a "nearest neighbor" imputation approach for non-respondents and applies employment benchmarks at a detailed MSA by 3-digit industry and broad size class level.

Another challenge in combining data has been the 1999 transition to a new SOC-based OES occupational coding system. 1997 and 1998 data were cross-walked to the new SOC based classification system. Although most of the old OES occupations can be cross-walked to a counterpart in the new system, many of the relations between the two coding systems are not one-to-one. Many old OES occupations are cross-walked to residual occupations, meaning that occupation is no longer surveyed as a detailed occupation. Likewise, there are occupations in the new system that were not surveyed in the old system and thus there is only one year's worth of data for those occupations. For more information about the SOC, please see the BLS website at http://stats.bls.gov/soc/soc_home.htm.

The OES survey samples approximately 400,000 establishments each year and, over a 3-year period, contacts approximately 1.2 million establishments. Each single-year sample represents one-third of both the certainty and non-certainty strata for the full 3-year sample plan. While estimates can be made from a single year of data, the OES survey has been designed to produce estimates using the full 3 years of data. The full 3-year sample allows the production of estimates at fine levels of geography, industry, and occupational detail; while estimates using any one year of data would be subject to a higher sampling error due to the smaller sample size and the limitations associated with having only 1/3 of the certainty units. Producing estimates using 3 years of sample data provides significant sampling error reductions (particularly for small geographic areas and occupations); however, it also has some quality limitations in that it requires the adjustment of earlier years' data to the current reference period--a procedure referred to as "wage updating."

The *1996 OES survey estimates*, which were published in December 1997, were from the first year of the new OES wage survey and were developed using only a single year (i.e., 400,000 sample units) of data. The initial estimation methodology used a weighting-class adjustment procedure for non-respondents and an employment benchmark at the state/industry level. Since multiple years of data were not available for the 1996 estimates, the estimation procedure did not involve "wage updating."

The *1997 OES survey estimates* represent the second year of OES estimates and have been developed using both the 1996 and 1997 surveys. The 1997 estimates also represent the first year a "wage-updating" methodology was used to develop the OES survey estimates. In addition to the wage-updating procedure, the 1997 estimates use an improved estimation methodology, which utilizes a "nearest neighbor" imputation approach for non-respondents and applies employment benchmarks at a detailed MSA by 3-digit industry and broad size class level. A variant of the imputation procedure is also used to account for item non-response. (**Note:** Because of the difference in estimation methods for these first 2 years of OES estimates, the data from 1997 are not strictly comparable with those published from 1996, as is the case for 1999 data to be used in the Year 2000.)

The *wage-updating procedure* is used to adjust prior year wages to reflect increases between the previous data and current year data. This aging of wage data is accomplished through a multiplicative factor ($1.000 + \text{rate of change}$) applied to prior year wages during the estimation process. For the 1997 estimates, the OES program has used the over-the-year fourth quarter wage changes from the Bureau's Employment Cost Index to adjust the 1996 survey data before combining it with this year's fourth quarter 1997 data. The ECI over-the-year wage changes provide the rate of change from the fourth quarter of 1996 to the fourth quarter of 1997 for the nine occupational divisions for which ECI estimates are available. Such a procedure assumes that each occupation's wage moves according to the average movement of its occupational

division and that there are no significant geographic differences. Since this may not be the case, the wage-updating procedure has some quality limitations.

The *hot deck (nearest neighbor) imputation procedure* imputes for unit non-response. This type of non-response occurs when a unit reports no employment data. In hot decking, units in the sample are stratified into 'year/State/4-digit industry/size class' cells. Within each cell, a donor (i.e., responding unit) is selected to represent each non-respondent under the proviso that a donor cannot be selected twice. The sampling frame employment is used to match donors with non-respondents. Once a donor and non-respondent are matched, the occupational employment totals from the donor are copied over to the non-respondent. In the event that a donor is not available at the 'year/State/4-digit industry/size class' cell level, the procedure advances to succeeding higher level cells until a donor is found.

Occasionally a responding establishment may provide employment information, but omit wage distribution information for selected occupations. The OES survey currently uses a variation of the mean imputation procedure to impute for item non-response. This type of non-response occurs when a unit reports the total-employment for its occupations but not the corresponding employment by wage intervals. In this procedure, units in the sample are stratified into 'year/MSA/3-digit industry/size class' cells. A wage-employment distribution is then calculated for those occupations with missing wage-employment based on the usable data in the cell. Missing wage-employment is imputed using the just calculated wage-employment distribution to prorate the total-employment of those occupations with the missing data.

A separate ratio estimator is used to develop estimates of occupational employment in each wage interval. The auxiliary variable is the population value of total employment obtained from the refined Unemployment Insurance files for the 1997 reference month. Within each MSA, the estimated employment for an occupation at the reported three-digit SIC/wage interval level was calculated by multiplying the weighted employment by its ratio factor. The estimated employment for an occupation at the all-industry level was obtained by summing the occupational interval employment estimate across all industries within an MSA reporting that occupation. A further adjustment to each occupational employment total was made as described in the Reliability of the Estimates section. This adjustment did not affect the mean or median wage rates. The employment and wage data for federal government workers in each occupation were added to the survey derived data.

A *mean wage* and a *median wage* are calculated using wage data from establishments in the industries that reported employment for an occupation.

Mean wage is the estimated total wages for an occupation divided by its weighted survey employment. For the upper open-ended wage interval, a Winsorized mean procedure is used to estimate the mean wage. That is, the mean wage value for the upper open-ended wage interval is set at its lower bound (\$60.01). For the other intervals, a mean wage value is calculated based on occupational wage data collected by the Office of Compensation and Working Conditions. These interval mean wage values are then attributed to all workers reported in the interval. For each occupation, total weighted wages in each interval (i.e., mean wages times weighted employment) are summed across all intervals and divided by the occupation's weighted survey employment to obtain a mean wage.

Median wage is the estimated 50th percentile of the distribution of wages; 50 percent of workers in an occupation earn wages below, and 50 percent earn wages above the median wage. The wage interval containing the median wage is located using a cumulative frequency count of employment across wage intervals. After the targeted wage interval is identified, the median wage rate is then estimated by a linear interpolation procedure

Reliability of the Estimates

The occupational wage rates in this report are estimates derived from a sample survey. Two types of errors are possible in an estimate based on a sample survey - sampling error and non-sampling error. Sampling error occurs because the observations are based on a sample, not on the entire population. Non-sampling error is due to response, non-response, and operational errors.

Non-sampling Errors - Estimates are subject to various response, non-response, and operational errors during the survey process. Sources of possible errors are data collection, response, coding, transcription, data editing, non-response adjustment, and estimation. These errors would also occur if a complete census were conducted under the same conditions as the sample survey. Explicit measures of their effects are not available. However, it is believed that the important response and operational errors were detected and corrected during the review and validation process.

The employment total and wage data for the occupation reflect only those industries that reported the occupation. This occurs primarily in those industries where the occupation appeared on the survey form. Since every occupation does not appear on every industry-specific form, there may be a bias in the employment and wage data for some occupations. The extent of this bias is unknown.

Another source of potential bias is the limitations placed on the size of the benchmark factors. A benchmark factor is the ratio of a known employment value to a sample-derived employment estimate. This factor is used to make a post-stratification adjustment that makes the total weighted employment estimate at the state / three-digit SIC industry / Metropolitan Statistical Area (MSA) / employment size class level match the population employment at that level. The source of the population employment data is the states' Quarterly Unemployment Insurance files for the reference period of the survey. In cases where a small sample was taken, the ratio factor can become large or small. In order to prevent an establishment from contributing either too much or not enough to an MSA's wage rate estimates, the benchmark factor was not allowed to exceed a predetermined value. The total employment count for those MSAs where the benchmark factor was limited by this ceiling will be biased to a small degree in those strata. The employment not assigned to those strata because of this ceiling was then distributed across the other MSAs in the state / three-digit industry, so that the estimated employment of the State / three-digit industry would match the known employment totals at that level.

Sampling Errors--The particular sample used in this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. For example, occupational wage rate estimates derived from the different samples will differ from one another. The deviation of a sample estimate from the average of all possible sample estimates is called the sampling error. The standard error of an estimate is a measure of the variation of estimates across all possible samples and thus is a measure of the precision with which an estimate from a particular sample approximates the average result of all possible samples. Estimates of sampling errors for the occupational employment and mean wage rate estimates at the National level are available from BLS-Washington.

Quality Control Measures

Quality control measures implemented in the OES survey include:

- review of the specific occupations to be collected for each industry, and those to be collected in residual categories
- creating and validating the sample frame for all states at BLS-Washington
- allocating and selecting the sample for all states at BLS-Washington
- follow up solicitations of non-respondents (especially critical non-respondents)

- review of survey schedules to verify the accuracy and reasonableness of the reported data
- adjustments of atypical reporting units on the data file
- validation of the non-response adjustment factors
- validation of the population employment and ratio factors
- standardized data processing programs and activities

Frequently Asked Questions

(collected over five years – much of these statements are no longer available on the BLS website)

The following prose sections have been taken directly from the U.S. Government's non-copyrighted site describing this survey.

What does the OES program produce?

The OES program produces employment and wage estimates for over 750 occupations. These are estimates of the number of people employed in certain occupations, and estimates of the wages paid to them. These estimates are available for the nation as a whole, for individual States, and for selected metropolitan areas; national occupational estimates for specific industries are also available.

What basic concepts are essential to understanding the OES survey?

'Establishment,' 'Industry,' and 'Occupation' are three key concepts.

- An establishment is the physical location of a certain economic activity, for example, a factory, mine, store, or office. Generally a single establishment produces a single good or provides a single service. An enterprise (a private firm, government, or non-profit organization) could consist of a single establishment or multiple establishments. A multi-establishment enterprise could have all its establishments in one industry (i.e., a chain), or could have various establishments in different industries (i.e., a conglomerate).
- An industry is a group of establishments that produce similar products or provide similar services. For example, all establishments that manufacture automobiles are in the same industry. A given industry, or even a particular establishment in that industry, might have employees in dozens of occupations. The Standard Industrial Classification (SIC) system groups similar establishments into industries.
- An occupation is a set of activities or tasks that employees are paid to perform. Employees that perform essentially the same tasks are in the same occupation, whether or not they are in the same industry. Some occupations are concentrated in a few particular industries, other occupations are found in the majority of industries.

What are the differences between the Bureau's Occupational Employment Statistics (OES) wage estimates and National Compensation Survey (NCS) wage estimates?

Both the OES and the NCS programs provide information on wages and salaries by occupation, but they have different strengths.

- The OES survey provides earnings on an hourly and annual basis, including mean and median earnings for all areas--national, State, and MSAs--as well as

10th, 25th, 75th, and 90th percentile wage rate estimates for the nation. The NCS survey also provides mean earnings on an hourly and annual basis for all surveys and earnings distributions by the 10th, 25th, 50th, 75th, and 90th percentiles for some surveys. The OES program is the larger survey and can provide a greater range of occupations and areas, while the NCS program is conducted by personal visit and can provide greater depth by obtaining occupational work level.

The NCS occupational work level is based on the duties and responsibilities of the job. An architect, for example, who directs a major project would typically be more highly compensated than an architect preparing a small part of a project under direct supervision.

- The OES program provides information for more occupations (about 700 occupational classifications compared with about 450 occupational classifications in the NCS). The NCS program, on the other hand, provides information on the wages for the occupations it covers at specific levels of work rather than just an average for all workers in the occupation.
- The OES program provides information for the nation, for States, and for 334 metropolitan areas, as well as for the District of Columbia, Puerto Rico, the Virgin Islands, and Guam. The NCS program provides information for the nation, for 81 metropolitan areas and 73 non-metropolitan counties representing the U.S. and for the 9 Census divisions (although not all areas have information for all occupations).

The metropolitan definitions differ for the two programs: Where an area has both a primary metropolitan statistical area (PMSA) and a broader consolidated metropolitan statistical area (CMSA), the OES program uses the PMSA and the NCS program uses the CMSA.

- If you want wage estimates for pay-setting purposes, and want to set pay according to the level of work that is being performed, the NCS estimates are the better choice. If you need to know the general wage profile for a large number of occupations in a large number of areas, the OES estimates are the better choice. If you need information by State, you will need to use OES estimates.
- Both surveys include full- and part-time workers who are paid a wage or salary. The NCS program obtains actual work schedules from the establishment, while the OES program assumes standardized schedules. Thus, if you need information on occupations in which the work schedule is atypical, you need to exercise caution in using the OES estimates.
- Both surveys exclude agriculture, fishing and forestry industries and private household workers; the OES program includes federal civilian employment, except for some national security agencies, while the NCS program excludes federal government employment.
- The OES program includes establishments with 5 or more workers, while the NCS program only includes establishments with at least 50 workers. Thus, if you want pay in a broader range of workplaces, use the OES estimates; if you want information about pay in larger establishments, use the NCS estimates.

Does the BLS have OES estimates for specific industries?

Yes, it has OES estimates, including a sample of national industry-specific occupational employment and wage estimates. The BLS produces national occupational employment and wage estimates for most 2- and 3-digit SIC industries. These estimates are available by request; there may be a charge for these data.

Industry-specific OES estimates for individual States may be available from the States' Labor Market Information (LMI) or Research, Analysis, and Statistics offices which are part of their State Employment Security Agencies (SESA's). Availability, format and medium of the data vary by State. To obtain OES data for a particular State, please contact the appropriate State office.

Does the BLS have OES estimates for individual States?

Yes, it has OES estimates, including state-wide cross-industry occupational employment and wage estimates for individual States. Additional information may be available from the State Employment Security Agency (SESA) in each State. Format and medium of the data vary by State. To obtain additional estimates for a particular State, contact the appropriate State office.

Does the BLS have OES estimates for metropolitan areas?

Yes, it has OES estimates, including cross-industry occupational employment and wage estimates for metropolitan areas.

Metropolitan areas comprise one or more entire counties, except in New England, where cities and towns are the basic geographic units. Where metropolitan areas are combined to form consolidated metropolitan areas (CMSA's) the component metropolitan areas are designated primary metropolitan statistical areas (PMSA's). Metropolitan areas that are not combined to form CMSA's are designated metropolitan statistical areas (MSA's). There is more information about metropolitan areas on the Census Bureau web site.

The OES program produces cross-industry occupational employment and wage estimates for MSA's and PMSA's. The OES program does not produce estimates for CMSA's. The metropolitan area definitions used to produce OES estimates are those that were in effect during the year prior to the survey year. The definitions of some metropolitan areas or their components may have been changed since the current OES estimates became available.

What is the difference between 'Occupational Employment and Wage estimates' and 'Industry Staffing Pattern estimates'?

The Occupational Employment Statistics program produces 'Occupational Employment and Wage estimates' and 'Industry Staffing Pattern estimates'-- both of which consist of employment and wage estimates by occupation. The 'Occupational Employment and Wage estimates' consist of national, State and metropolitan area estimates. The 'Industry Staffing Pattern estimates' contain only national estimates.

The main difference is that the 'Occupational Employment and Wage estimates' are cross-industry estimates, and the 'Industry Staffing Pattern estimates' are industry-specific estimates.

- Cross-industry estimates are calculated with data collected from establishments in all the industries in which a particular occupation is surveyed. (Not every occupation is surveyed
- in every industry.) For example, the cross-industry occupational employment estimate for mechanical engineers is the sum of all the industry-specific estimates for mechanical engineers. Likewise, cross-industry occupational wage

estimates for mechanical engineers are calculated from data collected from establishments in all the industries where mechanical engineers are surveyed.

- Industry-specific estimates are calculated with data collected from establishments in a particular industry. Industry-specific occupational employment estimates are based on the number of people employed in that occupation in a particular industry. Similarly, the industry-specific occupational wage estimates are calculated with data from establishments in one particular industry. Since different industries employ people in different occupations, the occupations in the staffing pattern for one industry will not be the same as the occupations in the staffing pattern for another industry.

Prior to 1996, national industry-specific estimates of occupational employment were the only OES estimates produced by the BLS; wage estimates were not produced.

Why are an occupation's cross-industry employment and wage estimates calculated from 'industries in which it was surveyed'?

OES estimates are calculated from data that employers provide by filling out survey forms. There are different survey forms for different industries. The occupations listed on survey forms vary depending on the industry and size of establishment. No survey form contains all 750+ OES occupations, because no industry employs workers in every occupation. Survey forms contain between 50 and 225 occupations. Customizing the survey forms reduces paper work and respondent burden, making the survey form easier for employers to fill out. This increases the response rate and allows the OES program to produce better estimates.

When an occupation's industry-specific employment estimates are summed to produce its cross-industry employment estimates, only those industry-specific estimates from industries where the occupation appeared on the survey forms are included in the summation. Similarly, the calculation of an occupation's cross-industry wage estimates is made with data from industries where that occupation was surveyed. There exists the possibility that some employment in a particular occupation could exist in an industry where it was unexpected and therefore, not surveyed -- in such cases it would be missed and not included in the calculation of that occupation's employment and wage estimates.

Why are OES estimates from the 1996 and 1997 surveys not comparable?

The 1997 OES employment and wage estimates presented on this web site are based on data from both the 1996 and 1997 OES surveys. The two years of sample responses for employment and wage data have been combined to produce the 1997 estimates. The 1996 wage data have been adjusted to the 1997 reference period by using the over-the-year wage change in the most applicable Employment Cost Index (ECI) series. The employment estimates from 1996 and 1997 have been adjusted to the full universe counts for the 1997 survey reference period based on the Covered Employment and Wages (ES-202) program. Furthermore, the estimation methodology has been improved since the 1996 estimates were prepared. Therefore the 1997 OES estimates are not strictly comparable to the 1996 OES estimates, and the Year 2000 data (collected in 1998 and 1999) are not strictly comparable either.

Why does the OES survey produce estimates from more than one year's data?

Significant reductions in sampling error can be achieved by taking advantage of a full three years of data, covering 1.2 million establishments and over 70 percent of the employment in the United States. This feature is particularly important in improving the reliability of estimates for detailed occupations in small geographical areas. Combining multiple years of data is also necessary to obtain full coverage of establishments with 250

or more workers since, in order to reduce respondent burden, the OES survey samples them only once every three years. While there are significant advantages, there are also limitations associated with this estimation procedure in that it requires "updating" for the earlier years of data.

In 1999, the OES began using the new OMB Standard Occupational Classification (SOC) system, which is not fully compatible with the OES occupational classification system used in previous year's surveys. The 1999 employment estimates were calculated using data collected in 1999. Wage estimates for the occupations that did not change in the new SOC system are estimated using data from 3 years of data (collected in 1997, 1998, and 1999) to produce estimates with smaller sampling errors. The 1997 and 1998 wage data have both been adjusted to the 1999 reference period using the over-the-year wage change in the most applicable Employment Cost Index series. Wage estimates for SOC occupations that are new are not directly comparable to occupations in the old occupational classification system were estimated with the single year of data.

The 1998 OES estimates have a fourth-quarter 1998 reference period and are based on information from the 1996, 1997, and 1998 surveys. The employment data from 1996, 1997, and 1998 have been adjusted to the full universe count for the 1998 survey reference period based on the Covered Employment and Wages (ES-202) program. (Estimates for New Jersey were adjusted to second quarter 1998, since data for fourth quarter 1998 were unavailable.) The 1996 and 1997 wage data have both been adjusted to the 1998 reference period using the over-the-year wage change in the most applicable Employment Cost Index series.

Does the OES survey produce estimates by age, race, sex, or educational attainment?

No. The OES survey program does not gather demographic information. However, the BLS' Labor Force Statistics from the Current Population Survey program provide information on employment, unemployment, and weekly earnings, by a variety of demographic characteristics.

Does the OES survey produce estimates by size of establishment?

No. The OES survey does not produce estimates based on total establishment employment. Information pertaining to the number of establishments in various employment size classes and their aggregate employment (economy wide and by industry) can be obtained by contacting the staff at the 'ES-202' or Covered Employment & Wages program.

Does the OES program have any data on unemployment for specific occupations?

No. The OES survey does not produce estimates on unemployment. However, there is some information on selected unemployment indicators (including broad occupational groups) in *The Employment Situation* news release, which is part of Labor Force Statistics from the Current Population Survey. More detailed information on characteristics of the unemployed can be obtained by contacting the Labor Force Statistics staff.

Does the OES program have any information on job vacancies?

No. The OES survey does not ask establishments for information about any vacancies they may have. The U.S. Department of Labor maintains a web site where job seekers can search America's Job Bank for job vacancies.

Does the BLS have employment projections for specific occupations?

For more than 50 years, the Bureau's Occupational Outlook Handbook has been a nationally recognized source of career information. It describes what workers do on the job, working conditions, the training and education needed, earnings, and expected job prospects for a variety of occupations.

How are “employees” defined by the OES survey?

Employees are all part-time and full-time workers who are paid a wage or salary. The survey does not cover the self-employed, owners and partners in unincorporated firms, household workers, or unpaid family workers.

Does the BLS have occupational employment estimates that include the self-employed?

The Bureau of Labor Statistics' Office of Employment Projections provides current and projected national economy-wide (across all industries, including the self-employed) occupational employment estimates for selected occupations.

How are “wages” defined by the OES survey?

Wages for the OES survey are straight-time, gross pay, exclusive of premium pay.

Included in the collection of wage data are:

- base rate,
- cost-of-living allowances,
- guaranteed pay,
- hazardous-duty pay, incentive pay including commissions and production bonuses, and
- on-call pay and
- tips

Excluded from the wage data are :

- back pay,
- jury duty pay,
- overtime pay,
- severance pay,
- shift differentials,
- non-production bonuses, and
- tuition reimbursements.

How long has the OES survey collected wage data?

The OES survey collected both occupational employment and occupational wage data nationwide for the first time in 1996. Prior to 1996, occupational employment estimates by industry were the only national OES estimates produced by the BLS.

What are mean wages? What are median wages?

The OES program produces estimates of wages by occupation; i.e., the wages paid to wage or salary employees in a given occupation in the U.S., in a particular state, or in a particular industry. These occupational wage estimates are either estimates of mean wages or median wages.

- A mean wage is an average wage. An occupational mean wage estimate is calculated by summing the wages of all the employees in a given occupation (either in the U.S., a particular state, or a particular industry) and then dividing the total wages by the number of employees.
- A median wage is a boundary. An occupational median wage estimate is the boundary between the highest paid 50% and the lowest paid 50% of workers in that occupation (either in the U.S., a particular state, or a particular industry). Half of the workers in a given occupation earn more than the median wage, and half the workers earn less than the median wage.

How is the OES survey conducted?

The Occupational Employment Statistics (OES) survey is an annual mail survey measuring occupational employment and wage rates for wage and salary workers in nonfarm establishments, by industry. The survey samples approximately 400,000 establishments per year, taking 3 years to fully collect the sample of 1.2 million establishments. BLS and the Employment and Training Administration (ETA) provide the funding for the survey. BLS provides the procedures and technical support, while the State Employment Security Agencies (SESAs) collect the data. The SESAs produce occupational estimates by detailed industries for local areas and the states. BLS produces similar industry-specific estimates for the nation as well as employment and wage estimates for 750 occupations across all industries for the nation, each of the 50 states plus the District of Columbia, and Metropolitan Statistical Areas (MSAs).

When will this year's OES estimates be available?

The OES program produces estimates from data collected in an annual nationwide survey. The survey begins with survey materials being sent to selected establishments during the last quarter (October, November, December) of the survey year. Data collection starts then and continues into the early months of the following year. As the data collection finishes, the data entry and estimates processing begins, and this is followed by estimates production and validation. The OES estimates are released in the last quarter of the year following the survey.

What occupations are surveyed?

An establishment responding to the OES survey should report all employment according to the OES classification system, which is an empirically-based economy-wide occupational classification system. The OES occupational classification system identifies over 750 occupations. Each OES occupational classification comprises a title, a definition, and a five-digit OES code.

How does the OES program classify occupations?

The 1999 National Occupational Employment and Wage Estimates were produced using the revised Standard Occupational Classification (SOC) system. The new SOC system, which will be used by all Federal statistical agencies for reporting occupational data, consists of 821 detailed occupations, grouped into 449 broad occupations, 96 minor groups, and 23 major groups. The OES program provides occupational employment and wage estimates at the major group and detailed occupation level. Due to the OES survey's transition to the new SOC system, the 1999 OES estimates are not directly comparable with previous years' OES estimates, which were based on a classification system having 7 major occupational groups and 770 detailed occupations. Approximately one-half of the detailed occupations were unchanged under the new SOC system, with the other half being new SOC occupations or occupations that are slightly different from

similar occupations in the old OES classification system. The detailed SOC occupations are allocated among these twenty-three major groups:

1. Management Occupations
2. Business and Financial Operations Occupations
3. Computer and Mathematical Occupations
4. Architecture and Engineering occupations
5. Life, Physical, and Social Science Occupations
6. Community and Social Services Occupations
7. Legal Occupations
8. Education, Training and Library Occupations
9. Arts, Design, Entertainment, Sports, and Media Occupations
10. Healthcare Practitioners and Technical Occupations
11. Healthcare Support Occupations
12. Protective Service Occupations
13. Food Preparation and Serving Related Occupations
14. Building and Grounds Cleaning and Maintenance Occupations
15. Personal Care and Service Occupations
16. Sales and Related Occupations
17. Office and Administrative Support Occupations
18. Farming, Fishing, and Forestry Occupations
19. Construction and Extraction Occupations
20. Installation, Maintenance, and Repair occupations
21. Production Occupations
22. Transportation and Material Moving Occupations
23. Military specific Occupations (not surveyed in OES).

The old OES occupational classification system used to produce the 1998 National, State, and Metropolitan Area Occupational Employment and Wage Estimates and 1998 National Industry Staffing Pattern Estimates (as well as earlier estimates) has these seven divisions:

1. Managerial and Administrative
2. Professional, Paraprofessional, and Technical
3. Sales and Related
4. Clerical and Administrative Support
5. Service
6. Agricultural, Forestry, and Fishing
7. Production, Construction, Operating, Maintenance, and Material Handling.

Is the OES classification system compatible with other occupational classification systems?

Yes. The 1999 OES classification system is compatible with the 2000 Standard Occupational Classification (SOC) system. The new SOC system will be used by all Federal statistical agencies for reporting occupational data. The old OES classification system is compatible with the 1980 Standard Occupational Classification system and the U.S. Bureau of the Census occupational classifications. By using a "crosswalk" to the SOC or Census system users can compare OES estimates with occupational data from other sources. The NOICC Crosswalk & Data Center Home Page is the source of various "crosswalks" that are used to link the occupational classifications of one system to those of another.

How does the OES program define industry classifications? What is the SIC?

The OES program uses definitions of industries found in the Standard Industrial Classification (SIC) system. The SIC system is used throughout the federal government to group establishments into industries. The SIC Division Structure makes it possible to collect and calculate establishment data by broad industrial divisions (labeled A through K), industrial groups (the 2- and 3-digit SIC levels), and specific industries (the 4-digit level). See the Standard Industrial Classification Manual, 1987 (Executive Office of the President, Office of Management and Budget), available in many libraries. The OES survey produces occupational employment and wage estimates for 2- and 3-digit SIC industrial groups. (Note: OES estimates of government employment and wages do not correspond to the SIC system. In the case of government, the OES survey produces occupational employment and wage estimates for Local Government, State Government, and Federal Government.)

What industries are surveyed? What industries are not surveyed?

The OES survey collects occupational employment and wage data from establishments in nonfarm industries. The OES survey produces estimates of occupational employment and wages for 2- and 3-digit industrial groups in these industrial divisions: Mining; Construction; Manufacturing; Transportation, Communication, Electric, Gas, and Sanitary Services; Wholesale Trade; Retail Trade; Finance, Insurance, and Real Estate; Services; and Government.

The OES program does not survey establishments in SIC 01 (Agricultural production--Crops); SIC 02 (Agricultural production--livestock and animals specialties); SIC 08 (Forestry); and SIC 09 (Fishing, hunting, and trapping). SIC 88 (Private households) is not surveyed.

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Alternative data sources (private surveys) may be used instead of OES data for immigration purposes. Acceptance of any data is made on a state by state basis. BTA conducts six Internet based surveys (where Internet users input their data to reduce the \$19/report charge). These include:

U.S./Canada Wage & Salary Survey

A report of any one of 4,000 position's competitive salary and incentive data in any of 5,800 locations (representing 3,000 jobs and 647 geographic areas within the U.S. and Canada).

U.S./Canada Cost-of-Living Survey

A report listing 18 key cost items affecting housing, transportation, taxes, services, and consumables for 5,800 city/locations. Each area's COL is compared to a national level.

U.S./Canada Employee Benefit Survey

48 key employee benefit practice measures, including employee and organizations' costs in 49 industries across 76 states, provinces, and territories and 647 metropolitan employment areas.

College Graduate Offer Survey

A report of salary and first year incentive offers to college graduates in any of 7,200 worldwide locations for any one of 1,800 degrees using a 5,100 worldwide college/university database.

International Cost-of-Living Survey

A report listing 18 key cost items for 1,400 locations; data are expressed in the respective country's currency, with an area's COL compared to a country's national average and the U.S. average.

International Remuneration Survey

A report of any one of 4,000 position titles shows salary and incentive national norms in any of 1,400 locations and 210 countries. (No country has less than 24 positions).

Statement Regarding BTA's Trend Analysis of OES Data

This data is presented free of charge to any Internet inquirer and is non-copyrighted. BTA cannot be liable for errors in the data download, nor does it present the "trending" of this data as acceptable to any Government agency for immigration purposes. All calculations of a "trend" average can be "reengineered" by utilizing the means shown at the bottom of each page/report (calculating the $y = a + bx$ equation). We note that there may be large differences between OES reported 1997, 1998, 1999 data with the consequence of large predictions (that may be unrealistic). BTA has not altered OES data, and presents trends as they were calculated. The same is true for Canadian Census data.

At this time BTA knows of no other source where historical 1998 and 1999 data, along with Year 2000 data, can be reviewed simultaneously. Whether any State Agency will accept a trending of data is unknown.

Finally, we apologize for this lengthy methodology. The application of OES data (with the Year 2001 complete revision of the survey using SOC codes) is an evolving process. This methodology's prose will continue to be modified as we learn and report upon the evolution of this process and survey. With the before-mentioned changing of all the position descriptions (SOC prose versus OES prose), Year 2002 data presentations likely will be even more complex (and this Methodology more lengthy).

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