

# Long-Term Occupational Employment Projections Methodology

Data supporting industry and occupational projections were derived from the Occupational Employment Statistics (OES), Current Employment Statistics (CES), and Quarterly Census of Employment & Wages (QCEW) programs, which are cooperative efforts between the Pennsylvania Department of Labor & Industry and the U.S. Bureau of Labor Statistics.

## OES Surveys

OES mail surveys – with telephone follow-ups to key respondents – are conducted every six months on a three-year cycle. This allows for distribution of the intensive efforts involved in collecting, summarizing, analyzing and accumulating data for all industries and occupations.

Samples of employers are chosen from the QCEW files of employers covered by the state unemployment compensation law. Employers are classified using the North American Industrial Classification System (NAICS) Manual of the U.S. Department of Labor. Occupations are grouped into 23 major groups, based on the U.S. Department of Labor's Standard Occupational Classification (SOC) coding structure.

## Industry Projections

The first step in the industry projections process is the assembly of a historical series of annual average employment figures from the CES survey for total nonagricultural wage and salary employment at the four-digit NAICS code level. County level data are then summed together into substate regions such as Metropolitan Statistical Areas (MSA) and Workforce Development Areas (WDA). For each four-digit NAICS, industry projections were produced statewide and for each MSA and WDA.

Industry employment trends were obtained through multiple regression analysis, with consideration of several economic and demographic factors. This method measures the relationship between employment and one or more variables, such as population, labor force participation rate, unemployment rate and CES-based industry employment trends. Time (years) and national employment were the independent variables.

## Occupational Projections

Industries and occupations are merged using the industry-occupational matrix, which shows the occupational pattern of each industry. Occupational estimates resulting from the three year OES survey cycle were used to generate the industry-occupational matrix for the base year. Occupational patterns for industries outside the scope of the surveys (including agriculture, federal government, postal, private household, religious organizations and self-employed workers) were developed using national OES statistics, Census data, Current Population Survey data and state staffing patterns for federal government and postal workers.

Occupational ratios for each industry (four-digit NAICS) were applied to the base and projected year industry employment totals. The projected year data has been adjusted for occupational changes over the projected period based on national change factors, which show whether the current trend in a particular occupation has its share of an industry growing or declining.

## Annual Demand

Projections of job growth or decline provide valuable insight into future employment opportunities because each new job created is an opening for a worker entering an occupation. However, opportunities also arise when existing workers separate from their occupations. In most occupations, separations of existing workers provide many more opportunities than employment growth.

To project occupational openings, referred to as total demand in our publication, the Bureau of Labor Statistics (BLS) calculates an estimate of separations caused by workers exiting the workforce, due to retirement or other reasons, and separations caused by workers transferring to different occupations. Projections of separations are combined with projections of employment change to determine total demand. This estimate of openings demand does not count workers who change jobs but remain in the same occupation.

### Definitions:

**Growth.** Also referred to as the employment change, annual demand due to growth is the yearly volume change in employment during the projections period that results in job gains or losses.

**Exits.** Annual demand due to exits measures the projected number of workers leaving an occupation and exiting the workforce entirely. Exits are more common at older ages as workers retire, but can occur at any age. Exits are not necessarily permanent exits from the workforce; for example, some workers exit the workforce to pursue additional education with the intention of returning to the workforce. They do represent permanent separations from an occupation.

**Transfers.** Workers leaving an occupation and transferring to a different occupation are captured in the projected annual demand due to transfers. Transfers represent permanent separations from an occupation, not temporary movements where the worker is expected to return to the same occupation in the future.

**Total Demand.** The sum of annual openings due to growth, exits, and transfers produces a total demand of occupational openings (positions) for workers. Individuals who change jobs within an occupation are not included in total annual demand since there is no net change in openings from this movement.

**Separations.** Although not shown in our publication, another common measure published by the BLS is separations. Separations, defined as the sum of annual demand due to exits and transfers, are the projected number of workers permanently leaving an occupation. In most occupations, separations result in openings for new workers to enter the occupation, but in declining occupation, not all separations result in openings.

### Calculation:

**Total Demand = Employment Growth + Separations (Exits + Transfers)**

For more information involving the methods used to produce the new metric for occupational separations please consult the [Bureau of Labor Statistics website](#).

## Educational Attainment

The BLS provides information about entry-level education, related work experience, and typical on-the-job training requirements for each of several-hundred occupations. The following abbreviations indicate the education and experience required for entry into an occupation:

<b>Abbreviation</b>	<b>Education/Experience Level Description</b>
DOCT	Doctoral degree
MD+	Master's degree plus experience
MD	Master's degree
BD+	Bachelor's degree plus experience
BD	Bachelor's degree
AD+	Associate degree plus experience
AD	Associate degree
PS+	Postsecondary training plus experience
PS	Postsecondary training
WK EXP	HS diploma plus work experience
LT OJT	Long-term training or apprenticeship
MT OJT	Moderate-term on-the-job training
ST OJT	Short-term on-the-job training
TBD	Education level not yet determined
N/A	Education level not available at this time

## Data Limitations

This information is best used as an indicator of employment levels and trends, not as an exact count or prediction. These labor market projections should be used in conjunction with the users' knowledge of the state and local economy, and current events that may have an impact on the projections. No distinction is made between full-time and part-time jobs. Since these estimates reflect the number of jobs rather than persons, the secondary jobs of multiple jobholders are included. Changes in classification structures since development are not reflected.

In preparing these projections, the following assumptions were made:

- The historical industry employment data are correct, i.e., industries are properly classified, counted in the correct geographical area, etc.
- No dramatic changes will occur in any specific industry in the given time frame.
- The industry staffing patterns obtained by the OES survey are accurate and projected changes are reasonable.
- The staffing patterns, change factors and separation rates applied to the data are valid for Pennsylvania.
- The Pennsylvania economy and population will continue to grow, reflecting past trends, without major external factors.
- The effect of current technology and scientific trends on industrial employment will continue.

Every effort was made to ensure the reasonableness of the data. Accuracy of the data is subject to both sampling and nonsampling errors. Nonsampling errors – despite efforts to minimize them – may occur from nonresponse, errors in response such as a misunderstanding of instructions or occupational definitions, and errors in survey editing,

coding, or tabulation. Sampling errors, usually measurable as relative errors or estimates, are inherent in surveys that do not include entire populations.

For questions or more information on this methodology, please e-mail us at [workforceinfo@pa.gov](mailto:workforceinfo@pa.gov).