

Methodology for CLSA & PwC 2017 California Life Sciences Industry Report

Employment, Wages, and Industry Impacts Data

The data used to estimate employment and wages in California’s life sciences industry are made available by the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW), available at <http://www.bls.gov/cew/>. The 2015 data reflected in this report were collected in the summer of 2016.

The QCEW is a near comprehensive census of employment and wage information at the national, state, and county levels for workers covered by state unemployment insurance laws and federal workers covered by the Unemployment Compensation for Federal Employees program. It does not include the self-employed, unpaid family workers, or private household employees. Jobs are counted regardless of full-time or part-time status. Individuals who hold more than one job may be counted more than once. In order to protect the confidentiality of firms’ information, the Bureau of Labor Statistics does not disclose data that would be easily identifiable to individual participating companies. Given the smaller number of establishments that can occur at the county level, county-level totals may not represent the full number of employment positions and wages for each industry. These positions would be included by the BLS in aggregated state-level data.

The sectors of the life sciences industry that are used in this analysis are comprised of several North American Industry Classification System (NAICS) codes that are assigned to sectors based off the description of the NAICS codes provided by the U.S. Census Bureau. For the QCEW, business establishments are assigned a single NAICS code by state workforce agencies, and therefore an establishment that manufactures both pharmaceuticals and medical devices would only be classified in one of these sectors depending on which is the primary production at the establishment.

This year, the definition of the life sciences industry was updated to include recently available data from the 2012 Economic Census. The Economic Census is conducted every 5 years by the U.S. Census Bureau and provides information on the value of sales/shipments by NAICS code. The value of sales/shipments were used to update the percentage applicable used for NAICS codes 541380, 541712, and 424210 (see below). In addition, the percentage applicable for the academic research sector was also updated for this year’s report. Thus, employment and wage figures cited in this report are not comparable to those published in years past.

The following table displays the NAICS codes used to define the life sciences industry, along with the portion of the code attributable to the industry.

NAICS Code	Description	Sector	% Applicable
611310	Colleges and Universities	Academic Research	13%
325411	Medicinal and Botanical Mfg	Biopharmaceuticals	100%
325412	Pharmaceutical Preparation Mfg	Biopharmaceuticals	100%
325413	In-Vitro Diagnostic Substance Mfg	Biopharmaceuticals	100%
325414	Biological Product (except Diagnostic) Mfg	Biopharmaceuticals	100%
325193	Ethyl Alcohol Mfg	Biorenewables	100%
325199	All Other Basic Organic Chemical Mfg	Biorenewables	100%
325311	Nitrogenous Fertilizer Mfg	Biorenewables	100%
325312	Phosphatic Fertilizer Mfg	Biorenewables	100%
325314	Fertilizer (Mixing Only) Mfg	Biorenewables	100%
325320	Pesticide and Other Agricultural Chemical Mfg	Biorenewables	100%
334510	Electromedical and Electrotherapeutic Apparatus Mfg	Med Devices, Instruments, and Diagnostics	100%

334516	Analytical Laboratory Instrument Mfg	Med Devices, Instruments, and Diagnostics	100%
334517	Irradiation Apparatus Mfg	Med Devices, Instruments, and Diagnostics	100%
339112	Surgical and Medical Instrument Mfg	Med Devices, Instruments, and Diagnostics	100%
339113	Surgical Appliance and Supplies Mfg	Med Devices, Instruments, and Diagnostics	100%
339114	Dental Equipment and Supplies Mfg	Med Devices, Instruments, and Diagnostics	100%
339115	Ophthalmic Goods Mfg	Med Devices, Instruments, and Diagnostics	100%
339116	Dental Laboratories	Med Devices, Instruments, and Diagnostics	100%
541380	Testing Laboratories	Research, Testing, and Medical Labs	9%
541711	Research and Development in Biotechnology	Research, Testing, and Medical Labs	100%
541712	R&D in the Physical, Engineering, & Life Sciences (except Biotechnology)	Research, Testing, and Medical Labs	14%
621511	Medical Laboratories	Research, Testing, and Medical Labs	100%
423450	Medical, Dental, & Hospital Equipment & Supplies Merchant Wholesalers	Wholesale Trade	100%
423460	Ophthalmic Goods Merchant Wholesalers	Wholesale Trade	100%
424210	Drugs and Druggists' Sundries Merchant Wholesalers	Wholesale Trade	90%

Methodology

The most recent full year for which wage and employment data were available for the publication of this report was 2015. QCEW employment and wage data are identified for selected NAICS codes used to define the life sciences industry (see table above). For NAICS codes where less than 100% of the employment and wages are used, the total employment and wages reported in the QCEW are then multiplied by the portion of the industry taken into account. This portion was derived by PwC from 2012 Economic Census data. For the academic research sector, the percentage of employment used was based on the share of undergraduate and graduate degrees awarded in California during the 2013/2014 academic year for the bioengineering, biomedical, biological, and health sciences, available from the National Center for Education Statistics.

To protect the confidentiality of individual firms, QCEW data are suppressed if there are too few firms in a given industry in a given geographical area or if data could be used derive sensitive information. In California, there is a particular problem with suppression of biopharmaceutical and biorenewable employment and wages at the county level. For employment and wage statistics by regional cluster, PwC attempted to minimize the suppression issue for the biopharmaceutical and biorenewable industries by relying on state level industry employment and reported employment totals by county at the 4-digit and 3-digit NAICS code levels.

Employment data from the QCEW were also used in conjunction with the IMPLAN economic model for the state of California to quantify life sciences industry revenues, federal and state tax contributions, and the multiplier for the indirect and induced employment impacts of the industry in California. IMPLAN is a well-known modeling system developed by the Minnesota IMPLAN Group for estimating economic impacts and is similar to the Regional Input-Output Modeling System developed by the U.S. Department of Commerce. The model is primarily based on government data sources. It can address a wide range of impact topics in a given region (county, state, or the country as a whole). IMPLAN is built around an “input-output” table that relates the purchases that each industry has made from other industries to the value of the output of each industry. To meet the demand for goods and services from an industry, purchases are made in other industries according to the patterns recorded in the input-output table.



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These purchases in turn spark still more purchases by the industry's suppliers, and so on. Meanwhile, employees and business owners make personal purchases out of the additional income that is generated by this process, sending more new demands rippling through the economy. Multipliers describe these iterations. The Type I multiplier measures the direct and indirect effects of a change in economic activity. It captures the inter-industry effects only (i.e., industries buying from local industries). The Type SAM (Social Accounting Matrix) multiplier captures the direct and indirect effects. In addition, it also reflects induced effects (i.e., changes in spending from households as income increases or decreases due to the changes in production).

Investment and Financial

Data

Data on venture capital investment nationally and by state were collected from The MoneyTree™ Report from PricewaterhouseCoopers and the National Venture Capital Association based on data provided by Thomson Reuters. The data reflected in this report were collected in the summer of 2016.

Data on mergers and acquisitions and initial public offerings are from Thomson Reuters.

Data on venture capital investment in the digital health sector were collected from the Rock Health Digital Health Funding Database.

NIH Grants

Data

Data for this analysis come from the National Institutes of Health Office of Extramural Research, available at <http://grants.nih.gov/grants/oer.htm>. The data do not include research and development contracts due to the unavailability of that data for the 2016 year at the time of publication of this report. Prior year's data also do not include research and development contracts to ensure comparability across years. NIH grants funded under the American Recovery and Reinvestment Act of 2009 (ARRA) are not included in funding totals unless otherwise noted.

The data include all awards to California from NIH, some of which do not necessarily fund basic life sciences research. For example, some grants were used for training programs and projects that are designed to support the research training of scientists for careers in the biomedical and behavioral sciences, as well as to help professional schools to establish, expand, or improve programs of continuing professional education. Other grants were used to fund health policy or behavioral science research.

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