2017 Economic Impact Study of Independent Clinical Laboratories

Methodology and Documentation

Prepared for

American
Clinical Laboratory
Association

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Summary Results:

The 2017 Independent Clinical Laboratory Economic Impact study measures the combined impact of the Clinical Laboratory industry, as defined by the American Clinical Laboratory Association (ACLA). The industry contributes about $100.50 billion in output or just under 0.56 percent of GDP and, through its services to doctors' offices and hospitals, to its linkages to medical supply chains, impacts firms throughout the US economy.[1] Clinical Laboratories, as defined in this study, are medical testing laboratories including those operated by independent firms, hospitals, physicians offices, in- and out-patient medical facilities, pharmacies and various other medical sites that are defined as complex testing facilities under the Clinical Laboratory Improvement Amendments (CLIA) as maintained by the Centers for Medicare & Medicaid Services (CMS). Also included in the analysis are patient service centers operated by independent testing companies, where samples are collected by not necessarily analyzed.

There are about 37,000 labs as defined in this study in the United States, located in Hospitals, Physician Offices, Independent Facilities, and Other Facilities. Of the four categories mentioned above, Hospitals provide 119,315 jobs, Physicians' Offices provide 12,415, independent labs provide 121,335, and all other Labs provide 23,913 jobs. All told, the independent clinical laboratory industry employs 276,978 people in laboratory operations, technical support, or administrative positions.

Other firms are related to the four types of laboratories as suppliers. These firms produce and sell a broad range of items including medical equipment, packaging materials, displays, and customized medical tools. Additionally, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services or even transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the clinical laboratory industry. All told, we estimate that the clinical laboratory industry is responsible for 115,449 supplier jobs, with these firms generating over $22.52 billion in economic activity.

An economic analysis of the industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed,[2] the spending by employees of the industry and those of supplier firms whose jobs are directly dependent on laboratory operations should surely be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the "induced impact" or the multiplier effect of the industry. In other words, this spending, and the jobs it creates is induced by independent clinical laboratories, their suppliers, and the businesses that support the functioning of the labs. We estimate that the induced impact of the industry is about $39.33 billion, and generates 230,035 jobs, for a multiplier of about 1.02.[3]

An important part of an impact analysis is to calculate the contribution of the industry to the public finances of the community. In the case of the independent clinical laboratory industry, this contribution comes in two forms. First, the traditional direct taxes paid by the firms and their employees provide over $13.18 billion in revenues to the federal, state and local governments. This does not include sales taxes paid by consumers who use laboratory services (where such taxes might be collected).

Table 1 below presents a summary of the total economic impact of the industry in the United States in 2017.

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1 Based on Gross Domestic Product of $19.23 trillion from the 2nd Quarter of 2017. Available from the Bureau of Economic Analysis at: https://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm.

2 These firms would more appropriately be considered as part of the supplier firms' industries.

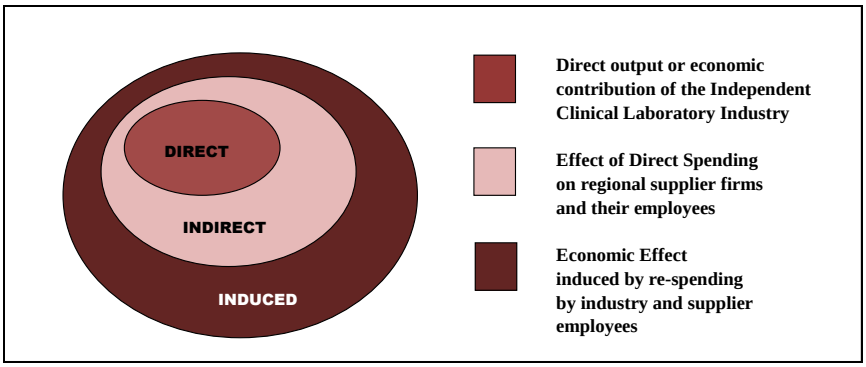
3 Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the supplier industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation to only the effect of spending by direct and supplier employees.

Table 1: Economic Impact of the Independent Clinical Laboratory Industry: 2017

($ In Billions)	Direct	Supplier	Induced
Output	$38.646	$22.523	$39.326
Jobs	276,978	115,449	230,035
Wages	$21.243	$7.506	$11.532
Business Taxes			$13.2B

Methodology

The Economic Impact of the independent clinical laboratory industry starts with an accounting of the direct employment in the various sectors. Independent clinical laboratories encompass collection, testing, research and administrative facilities, including those located in hospitals, medical centers, physicians' offices and pharmacies throughout the country. Each facility is located to a specific longitude and latitude and job numbers are assigned as per below. The data come from a variety of government and private sources.



It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. For example, at first glance it may appear that consumer (or insurance provider) expenditures for a test are the sum total of the impact on the local economy. However, this initial spending on one economic activity always leads to a ripple effect that benefits other sectors and industries. This inter-industry effect can be assessed using multipliers from regional input-output modeling.

The economic activities are linked to other industries in the state and national economies. The activities required to provide a cholesterol test, or a bacterial culture, from collection, to research to examination, to reporting, generate the direct effects on the economy. Regional (or indirect) impacts occur when these activities require purchases of goods and services such as reagents, glassware or equipment from local or regional suppliers. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages in the region. The ratio between total economic and direct impacts is termed the multiplier. The framework in the chart on the prior page illustrates these linkages.

This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the ACLA model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This Independent Clinical Laboratory Economic Impact Model was developed by John Dunham and Associates based on data provided by the Centers for Medicare & Medicaid Services, Infogroup,[4] the

[4] Job numbers are from Infogroup the leading provider of business and consumer data for the top search engines and

ACLA, a number of major independent laboratories, and state and federal governments. The analysis utilizes the IMPLAN Model in order to quantify the economic impact of the industry on the economy of the United States. The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision – such as a laboratory opening or operating a collection facility – on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA). [5]

- Employment is based on employment at specific locations reported to Infogroup by the companies as of May 2017. The data are modified to reflect job numbers for certain facilities provided by the ACLA and its members.

- For facilities where no data are available, median job numbers (by state and lab type) are utilized. These are verified for larger facilities by ACLA or JDA staff, and adjusted where appropriate.

- In the case of multiple laboratories operating as part of a hospital, or group of hospital facilities, all laboratories are aggregated into a single facility for the purpose of the analysis. For example, if a single hospital campus has a blood lab, a pathology lab, and a drug testing laboratory, this is counted as one facility in the model.

- Employment data for laboratories operating as part of a larger facility (for example a laboratory that is part of a hospital or a physician's office, are calculated as a percentage of overall employment at that location. The percentage is based on the percentage of overall (non-labor) input costs by business type that are associated with laboratory purchases.[6] These percentages come from the IMPLAN use tables for the United States as of 2015.[7] The percentages used are outlined in Table 2 on the following page:

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output in laboratories. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993. The IMPLAN data and model closely follow the conventions used in the "Input-Output Study of the US Economy," which was developed by the BEA.

- Wages: Data from the US Department of Labor's ES-202 reports are used to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash

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leading in-car navigation systems in North America. Infogroup gathers data from a variety of sources, by sourcing, refining, matching, appending, filtering, and delivering the best quality data. Infogroup verifies its data at the rate of almost 100,000 phone calls per day to ensure absolute accuracy.

5 The IMPLAN model is based on a series of national input-output accounts known as RIMS II. These data are developed and maintained by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool.

6 Based on the following industries: Synthetic dyes and pigments, other basic inorganic chemicals, other basic organic chemicals, in-vitro diagnostic substances, biological products (except diagnostic), photographic films and chemicals, other miscellaneous chemical products, other pressed and blown glass and glassware, glass products made of purchased glass, miscellaneous nonmetallic mineral products, heating equipment (except warm air furnaces), scales, balances, and miscellaneous general purpose machinery, totalizing fluid meters and counting devices, analytical laboratory instruments, watches, clocks, and other measuring and controlling devices, gaskets, packings, and sealing devices, environmental and other technical consulting services, scientific research and development services, veterinary services, marketing research and all other miscellaneous professional, scientific, and technical services, medical and diagnostic laboratories, electronic and precision equipment repair and maintenance.

7 These tables outline all of the items and services (by percentage) that go into $1.00 of output produced by the industry in question.

wages, but health and life insurance payments, retirement payments and other non-cash compensation. They include all income paid to workers by employees. Further details are available from IMPLAN at http://www.implan.com.

- Output: Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics Growth model to estimate the missing output.

Table 2: Percentage of Facility Jobs Allocated to Clinical Laboratory Industry: 2017

Lab Type	Percent
Ambulatory Surgery Center	12.2%
Ancillary Test Site	100.0%
Assisted Living Facility	3.0%
Community Clinic	12.2%
Comprehensive Outpatient Rehab	3.0%
End Stage Renal Disease Dialysis	12.2%
Federally Qualified Health Center	12.2%
Health Fair	0.0%
Health Maintenance Organization	12.2%
Home Health Agency	3.0%
Hospice	5.8%
Hospital	5.8%
Independent	100.0%
Intermediate Care Facility/Individuals with Intellectual Disabiliti	3.0%
Mobile Lab	100.0%
Pharmacy	0.0%
Physician Office	5.6%
Other Practitioner	5.6%
Public Health Laboratory	100.0%
Rural Health Clinic	12.2%
School/Student Health Service	5.6%
Skilled Nursing/Nursing Facility	3.0%
Tissue Bank/Repositories	100.0%
Other	21.8%

- Taxes: The model includes information on income received by the Federal, State and Local Governments. The model produces estimates for the following taxes at the Federal Level: Corporate Income, Payroll, Personal Income, Estate, Gift, and Excise Taxes; Customs Duties; and Fines, Fees, etc. State and Local tax revenues include estimates of: Corporate Profits, Property, Sales, Severance, Estate, Gift and Personal Income Taxes; Licenses; Fees; and certain Payroll Taxes.

The 2017 model reflects the best data and modeling techniques available now, and should provide a very accurate measure of the economic foot print of the industry today. Any errors are unintentional and are strictly those of John Dunham & Associates.

IMPLAN Methodology:[8]

Francoise Quesnay, one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

Input-output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources – as published government data series, unpublished data, sets of relationships, ratios, or as estimates. The Minnesota IMPLAN group gathers this data, converts them into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: Federal, state and county. Most of the detailed data is available at the county level, and as such there are many issues with disclosure, especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the bases of the IMPLAN model. The Benchmark Make Table is updated to current year prices, and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of a lab test is from the purchase of electricity, then the electricity margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 536 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

Finally, one of the most important parts of the IMPLAN model, the Regional Purchase Coefficients (RPCs) must be derived. IMPLAN is derived from a national model, which represents the "average" condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 536 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.

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[8] This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.