

2016 Economic Impact of the Dietary Supplement Industry

Methodology and Documentation

Prepared for

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Executive Summary

The *2016 Economic Impact of the Dietary Supplement Industry* measures the combined impact of the manufacturing, retail, wholesale, ingredient suppliers, and direct-selling industries (hereafter dietary supplement industry) to the U.S. economy in 2016. John Dunham & Associates (JDA) conducted this research, which was funded by the Council for Responsible Nutrition (CRN). This work uses standard econometric models first developed by the U.S. Forest Service, and now maintained by IMPLAN Group, LLC. Data came from industry sources, government publications, Dun & Bradstreet, Inc, and Infogroup.

The industry is defined to include not only the production of dietary supplement products, but dietary supplement wholesaling and retailing. The production process (as defined in this study) begins with ingredients (fish oils, herb and botanicals, for ex.) being purchased by manufacturers from suppliers. Ingredients are then extracted, blended, formulated, and packaged by the manufacturer.

Once dietary supplements have been produced, they enter the second tier of the industry – the wholesaling tier. Wholesalers are involved in the transportation of dietary supplements from either the producers or from a bonded warehouse operated by importers, and the storage of products for a limited period of time.

The third tier of the industry is retailing, either through brick-and-mortar sales (as in the case of a grocery store or pharmacy), or sales from direct sales companies (Amway and Nu Skin, for example).¹

Industries become linked to each other when one industry buys from another to produce its own products. Each industry in turn makes purchases from a new mix of other industries, and so on. Employees in all industries extend the economic impact by spending their earnings. Thus, economic activity started by the dietary supplement industry generates output (and jobs) in hundreds of other industries, often in sectors and states far removed from the original economic activity. The impact of indirect firms and the induced impact, is calculated using an input/output model of the United States. The study calculates the impact on a national, state, and congressional district basis.

The study also estimates taxes paid by the industry and its employees. Federal taxes include industry-specific excise, business, and personal income taxes, FICA, and unemployment insurance. The dietary supplement industry also contributes to corporate profits and personal property taxes, business income taxes, social security, and other business levies that vary in each state and municipality. State and local sales taxes are not included in the calculations.

The dietary supplement industry is a dynamic part of the U.S. economy, accounting for about **\$121.59 billion in total economic output**, or roughly 0.68 percent of GDP.² Dietary supplement manufacturers, ingredient suppliers, wholesalers, direct sellers, and retailers directly employed 383,230 Americans in 2016. These workers earned over \$16 billion in wages and benefits. When indirect and induced impacts are taken into account, the dietary supplement industry is responsible for: 754,645 jobs in the United

¹ The 185,639 total US job numbers for direct sellers in this study are full-time equivalent positions. Part-time direct sellers were not included. Job numbers were calculated from the Direct Sellers Association's *2015 Growth and Outlook Report*. Accessed April 4, 2016. Available at: <http://www.dsa.org/docs/default-source/research/2015-growth-and-outlook-report-with-cross-tabs-final.pdf>

² Based on 2015 GDP of \$18.2 trillion. See: "Gross Domestic Product: Fourth Quarter and Annual 2015 (Third Estimate)" *Bureau of Economic Analysis*. March 25, 2016. Available at: <https://www.bea.gov/newsreleases/national/gdp/gdpnewsrelease.htm>

States and \$38.36 billion in wages, as well as \$14.94 billion in Federal, state and local taxes - not including state and local sales taxes imposed on dietary supplements.

Summary Results

The *2016 Economic Impact of the Dietary Supplement Industry* measures the economic impact of dietary supplements in the United States. The industry is defined to include ingredient suppliers, manufacturers, direct-sellers, plus wholesalers and retailers. The industry contributes about \$121.59 billion in total to the U.S. Economy, or 0.68 percent of GDP and, through its production and distribution linkages, impacts firms in 515 out of the 536 sectors of the US economy.³

Table 1 – Economic Contribution of the Dietary Supplement Industry

	Direct	Indirect	Induced	Total
Jobs (FTE)	383,230	140,371	231,044	754,645
Wages	\$16,004,568,200	\$10,431,092,000	\$11,921,105,200	\$38,356,765,400
Economic Impact	\$51,255,165,500	\$31,944,697,400	\$38,393,076,200	\$121,592,939,100
Taxes				\$14,942,819,100

The production process (as defined in this study) begins with ingredients (e.g. fish oils, herb and botanicals) being purchased by manufacturers from suppliers.⁴ Ingredients are then extracted, blended, formulated, and packaged by the manufacturer. 962 firms comprise the manufacturing component of the dietary supplement industry; combined with the ingredient suppliers, the production sector employs approximately 53,589 people.⁵

Once dietary supplements have been produced or imported, they enter the second tier of the industry – the wholesaling tier. Wholesalers transport dietary supplements from the producer or a bonded warehouse operated by an importer, and may store the products for a limited period of time. The dietary supplement industry is directly responsible for approximately 5,408 jobs in the wholesaling sector.

Finally, the third tier of the industry directly sells products to the consumer. For our analysis, the retail tier is assumed to consist of firms in the following industries: Supermarkets, nutrition stores, health food markets, mail-order catalogues, websites, direct-sellers, pharmacies, warehouse stores, and other miscellaneous retail stores. The dietary supplement industry is directly responsible for approximately 324,233 jobs in the retailing sector.

Other firms are also related to the dietary supplement industry. These indirect firms produce and sell a broad range of items including machinery, tools, parts, and other materials needed to produce dietary supplements. In addition, indirect firms can provide a broad range of services, including personnel, financial, advertising, consulting, and/or transportation. Finally, a number of people are employed in government enterprises responsible for the regulation of the dietary supplement industry. All told, we estimate that the dietary supplement industry is responsible for 140,371 indirect jobs. Indirect firms generate about \$31.94 billion in economic activity.⁶

³ Economic sectors based on IMPLAN sectors.

⁴ Direct economic impact, located in Table 1, includes the output from ingredient suppliers. Output from ingredient suppliers amounts to about \$5.7 billion, thus making total output from manufacturing, wholesaling, and retailing about \$45.56 billion.

⁵ Throughout this study, the term “firms” actually refers to physical locations. One company, for example, may have facilities in dozens of locations throughout the country. Each of these facilities is included in the 962 count.

⁶ In 2016, we have relied on zip code based employment data supplied by Infogroup, the leading provider of business and consumer data for the top search engines and 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.

An economic analysis of the dietary supplement industry will also take additional linkages into account. While it is inappropriate to claim that suppliers to the industry's indirect firms are part of the industry being analyzed,⁷ the spending by employees of the industry, and that of indirect firms whose jobs are directly dependent on the dietary supplement industry, should be included. This spending - on everything from housing, to food, to education and medical care - makes up what is traditionally called the "induced impact," or multiplier effect, of the dietary supplement industry. In other words, this spending, and the jobs it creates, is induced by the manufacturing and distribution of dietary supplements. We estimate that the induced impact of the industry generates 231,044 jobs and \$38.39 billion in economic impact, for a multiplier of 0.75.⁸

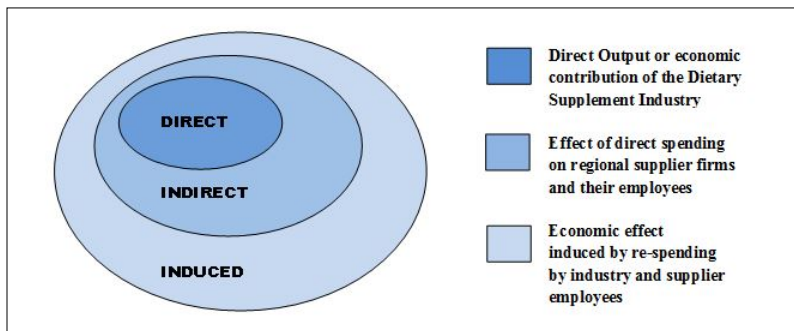
An important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the country. In the case of the dietary supplement industry, the direct taxes paid by firms and their employees provide \$14.94 billion in revenue to the Federal, state and local governments. These figures do not include state and local sales taxes paid on dietary supplements.

Table 1 on the prior page presents a summary of the total economic impact of the dietary supplement industry in the United States. Summary tables for each state are included in the Output Model, which is discussed in the following section.

Output Model

John Dunham & Associates produced the Economic Impact study for the Council for Responsible Nutrition (CRN). The analysis consists of a number of parts, each of which will be described in the following sections of this document. These include data, models, calculations and outputs. These components are joined together in an interactive system that allows CRN to examine the links between the various parts of the industry and to produce detailed output documents on an as-needed basis. As such, there is no book – no thick report – outlining the impact of the industry, but rather a system of models and equations that can be continuously queried and updated.

Economic Impact Modeling – Summary



The Economic Impact Study begins with an accounting of the direct employment in the domestic manufacturing, wholesaling, retailing, ingredient supplying, and direct-selling of dietary supplements. The data comes 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 expenditures for a product are the sum total of the impact on the local economy. However, a single economic activity leads to a

⁷ These firms would more appropriately be considered as part of the indirect firm's industries.

⁸ Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the induced 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 only to the effect of spending by direct and indirect employees.

ripple effect wherein other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. The activities required to manufacture, distribute, and sell dietary supplements generate the direct effects on the economy. Indirect impacts occur when these activities require purchases of goods and services such as machinery or electricity from local or regional indirect firms. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages. The ratio between induced output and direct output is termed the multiplier.

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 indirect sector and of the re-spending in the economy by employees in the industry and its indirect firms. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the CRN model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This economic impact analysis was developed by JDA based on data provided by the Council for Responsible Nutrition, Nutrition Business Journal (NBJ), Dun & Bradstreet, Inc. (D&B, Inc.), Infogroup, and Federal and state governments. The analysis utilizes the IMPLAN Group, LLC's model in order to quantify the economic impact of the dietary supplement industry on the economy of the United States.⁹ 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 factory opening or operating a sports 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).¹⁰

Producer employment is based on employment data provided by D&B, Infogroup, CRN, annual financial reports, or the producer themselves. All told, there were 962 locations identified. For those establishments where a match could not be found econometric techniques were used to estimate an employee count.

The IMPLAN Group model is designed to run based on the input of specific direct economic factors. It uses a detailed methodology (see IMPLAN Methodology section) to generate estimates of the other direct impacts, tax impacts and indirect and induced impacts based on these entries. In the case of the CRN model, direct employment in the dietary supplement industry (manufacturing, wholesaling, and retailing) is a base starting point for the analysis. Direct employment is based on data provided to John Dunham & Associates by D&B, Inc. and Infogroup as of January 2016; and from industry data provided by CRN. Both D&B and Infogroup data are recognized nationally as a premier source of micro industry data. The D&B database contains information on over 17 million businesses in the United States.¹¹ It is used extensively for credit reporting, and according to the vendor, encompasses about 98 percent of all

⁹ The model uses 2014 input/output accounts.

¹⁰ 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.

¹¹ The D&B information database updates over 1 million times a day, over 350 million payment experiences are processed annually, and over 110 million phone calls are made to businesses. In addition, D&B uses a patented matching technology and over 2,000 information computer validations to ensure a high standard of data quality.

business enterprises in the country. Infogroup is the leading provider of business and consumer data for the top search engines and 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.

This data is gathered at the facility level; therefore, a company with a manufacturing plant, warehouse and sales office would have three facilities, each with separate employment counts. Since the D&B and Infogroup data are adjusted on a continual basis, staff from John Dunham & Associates scanned the data for discrepancies. In addition, for cases where employment data for CRN member firms were available, D&B or Infogroup employment figures were replaced with those from CRN.

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. Wages are derived from data from the U.S. Department of Labor's ES-202 reports that are used by IMPLAN 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 workers, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employers.

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.

The model also includes information on income received by the Federal, state and local governments, and produces estimates for the following taxes at the Federal level: Corporate income; payroll, personal income, estate and gift, and excise taxes, customs duties; and fines, fees, etc. State and local tax revenues include estimates of: Corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes.

While IMPLAN is used to calculate the state level impacts, Infogroup data provide the basis for Congressional district level estimates. Publicly available data at the county and Congressional district level is limited by disclosure restrictions, especially for smaller sectors of the economy. Our model therefore uses actual physical location data provided by Infogroup in order to allocate jobs – and the resulting economic activity – by physical address or when that is not available, zip code. For zips entirely contained in a single congressional district, jobs are allocated based on the percentage of total sector jobs in each zip. For zips that are broken by congressional districts, allocations are based on the percentage of total jobs physically located in each segment of the zip. Physical locations are based on either actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area. All ingredient supplier and indirect jobs are allocated based on the percentage of a state's employment in that sector in each of the districts. Again, these percentages are based on Infogroup data.

IMPLAN Methodology¹²

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 it 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 are available at the county level, but 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 dietary supplements is from the purchase of product, plant and equipment, then the PPE 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, the Regional Purchase Coefficients (RPCs) – essential to the IMPLAN model – 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-

¹² This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

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.