

Biomedical Manufacturing: Industry Profile

MAY 2023

State of Maine - DECD



**Department of Economic
& Community Development**

PROJECT OVERVIEW

Report Purpose

This document provides an in-depth analysis of the Biomedical Manufacturing Sector in Maine, including its domestic trade activity.

Industry classification ranges from 2-digit industries (most broad) to 6-digit industries (most specific) under the North American Industry Classification System (NAICS). This report focuses on the 3- to 6-digit industry level to give more detailed analysis of Maine's domestic trade activity in the Biomedical Manufacturing Sector. For details about all industries that are included in this analysis, please see the Appendix.

Project Funding

This project is commissioned by the Office of Business Development through the Domestic Trade Pilot Program and is funded in part by the American Rescue Plan Act.

Data

The most recent year of data in this report is 2022. Five-year growth rates refer to changes from 2017-2022, and five-year projections refer to 2022-2027, unless otherwise specified. For more information about the data used in this report, see the Appendix – Data Sources.



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KEY FINDINGS

Biomedical Manufacturing

Sector Activity

- **Biomedical Manufacturing is one of the fastest growing sectors in Maine**, growing by more than half in five years by increasing jobs by 60% (+2,764). It has a clear competitive advantage which is shown in its high location quotient (1.10) and competitive effect (+1,982).
- **Pharmaceutical Manufacturing has been the key**. All of the subsector groups have shown strong growth, but the largest and fastest growing of these is Pharmaceutical Manufacturing. National trends in investment and consumer behavior indicate this growth is likely to continue and the competitiveness of Maine firms should see them follow this upward trajectory.
- **Biomedical's growth has been export led**, with ample opportunity for recapture of market share from imports. For the most recent year more than 83% of sales have been for export markets. The sales that do occur in-region account for less than 25% of the local demand for these goods. However, a look at the top selling and buying markets in Maine shows that this is an industry cluster that is quickly establishing trade connections within the sector.
- Imports from outside of Maine have been highly competitive with **77% of local demand for the entire Biomedical Manufacturing sector being met by firms from other states or from foreign imports**. California is Maine's largest domestic supplier of Biomedical commodities. Maine purchased over \$400 million of Biomedical products from California in 2021, over half of which was Pharmaceuticals.

Subsectors included in this report

- **Pharmaceutical Manufacturing** – establishments engaged in manufacturing uncompounded medicinal chemicals, uncompounded botanicals, in-vitro diagnostic substances and pharmaceuticals intended for internal and external consumption in dose forms, and substances that are used for diagnostic tests. Diagnostic tests include those that are performed in test tubes, petri dishes, machines, other devices, vaccines, blood fractions, and culture media of plant or animal origin.
- **Medical Devices Manufacturing** – establishments engaged in manufacturing measuring, electromedical, and control instruments. Examples of products made by these establishments are aeronautical instruments, appliance regulators and controls (except switches), laboratory analytical instruments, navigation and guidance systems, and physical properties testing equipment.
- **Medical Equipment Manufacturing** – establishments engaged in manufacturing medical, surgical, ophthalmic, and veterinary instruments, surgical appliances and supplies, dental equipment and supplies used by dental laboratories and, offices and, specialized glass forms by melting silica sand or cullet and making pressed, blown, or shaped glass or glassware (except glass packaging containers).
- **Biomedical Manufacturing Wholesalers** – establishments engaged in the merchant wholesale distribution of biological and medical products, botanical drugs and herbs, and pharmaceutical products, professional medical equipment, instruments, and supplies, and ophthalmic equipment, and instruments.

NATIONAL TRENDS

KEY TRENDS

- Overall macro trends are driving industry demand with demographic shifts (older population), increased spending in R&D and a higher share of people with health insurance as positive factors
- Aging demographics in the US and elsewhere increase demand for industry products. This ensuing growth in emerging markets may provide opportunities to capitalize investments in product R&D.
- On the heels of expedited COVID-19 vaccine approvals, the FDA is trying to accelerate approval processes and plans to reduce time for ANDA reviews by 20% which should accelerate time to market for all products
- Advances in production techniques have allowed firms to maintain profitability with fewer high value employees
- R&D growth is a key downstream industry for glass manufacturing and its rosy forecast should spell the same for glass manufacturing

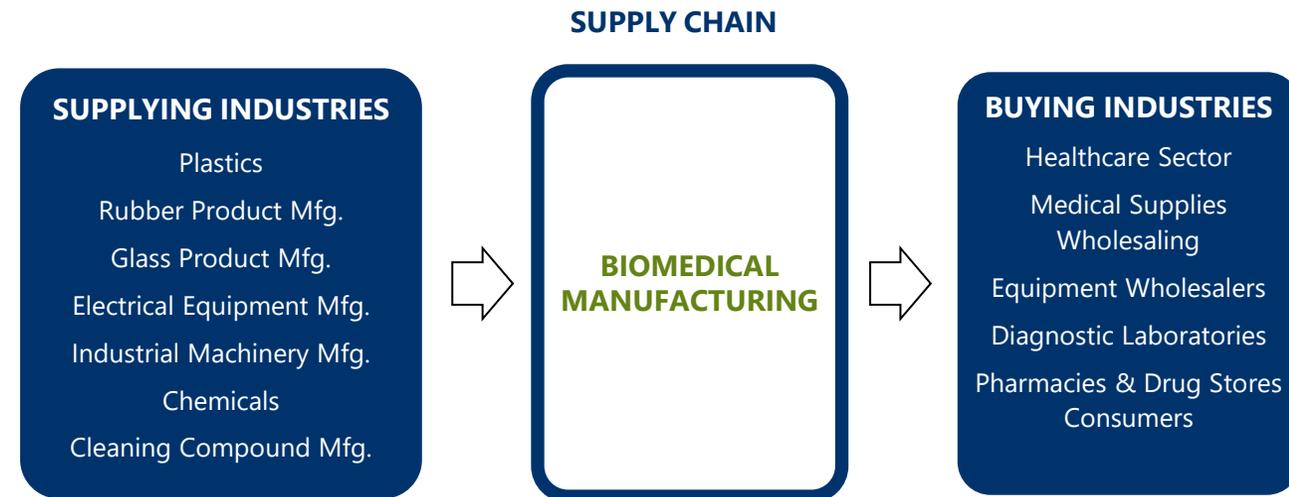
RECENT DEVELOPMENTS

- Surge in R&D investment during the recent economic cycle should continue to spur new products
- A backlog of deferred services due to the pandemic should spur demand as the economy continues to normalize
- Global demand for US vaccines should sustain export growth in the near term and then taper slowly
- Inflation Reduction Act has bolstered manufacturing sector, while the Infrastructure Investment and Jobs Act has supported supply chains and helped to facilitate trade

Source: IBISWorld

INDUSTRY DRIVERS

- Trade-weighted value of the dollar index
- Industrial production index
- Value of construction
- Per capita disposable income
- Housing starts
- Research and development expenditure
- Number of people with health insurance
- World price of crude oil
- Federal funding for Medicare and Medicaid



DATA NOTE:

This page provides a brief qualitative overview of macro trends facing this sector and structural causes of growth for the sector. A supply chain summary shows key industries upstream and downstream of the sector.

NATIONAL TRENDS



Jobs (2022)
1.3 Million



Job Growth
2017-2022: 1.3%
2022-2027 Projected: 1.5%



Establishments (2022)
33,000



Avg. earnings (2022)
\$94,112



Domestic Demand (2022)
\$817.9 Billion

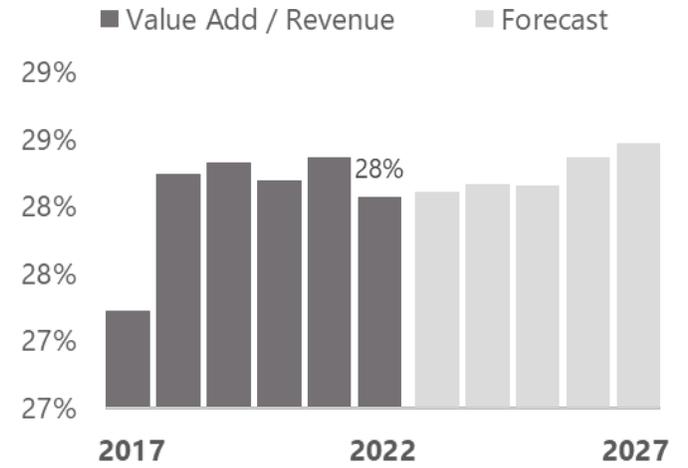
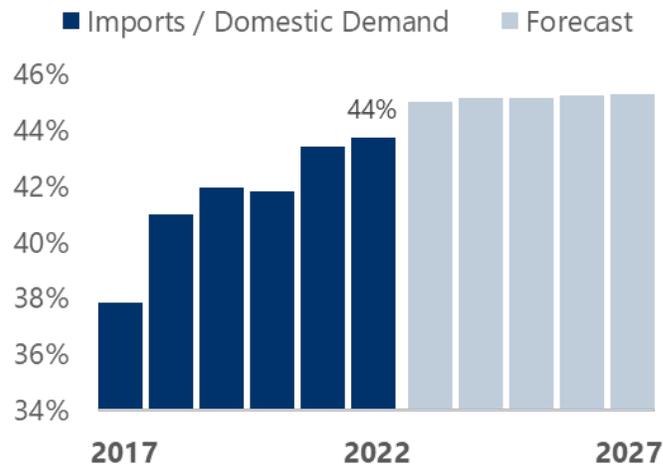


Top Partners (2022)
Imports: Ireland, China, Germany, Switzerland, Mexico
Exports: China, Canada, Netherlands, Germany, Japan

The exports share of revenue was 29% in 2022. This indicator shows the relative importance of exports to the sector's overall revenue strength.

The imports share of domestic demand was 44% in 2022. This demonstrates how much of demand for the sector's products in the US are met by foreign imports.

The value-add-to-revenue ratio was 28% in 2022. This indicator shows how much value the production process adds to products relative to the overall size of the sector.



SECTOR SUMMARY: MAINE PERFORMANCE

Biomedical Manufacturing Summary

Jobs: 7,407

- Data for 2022
- 1.0% of the state's total employment

Job Growth: +2,764

- Data compares 2017-2022
- Job gains are 22% of all Maine job gains since 2017

Job Growth Rate: +60%

- Data compares 2017-2022
- Sector growth in Maine is greater than the U.S. (+16%)

Concentration: 1.10

- Data for 2022
- Maine has +10% more jobs concentration than the national average

Establishments: 476

- Data for 2022
- The average firm size of 15.6 jobs makes it much higher than Maine's average for all

Average Earnings: \$125,459

- Data for 2022
- Higher than the State's Average earnings for all sectors (\$66,730) but lower than the U.S. rate for this sector (\$144,375)

Competitive Effect: +1,982

- Data compares 2017-2022
- Local Advantages contribute substantially more jobs than expected given industry

Gross Regional Product: \$3.7 Billion

- Data for 2022
- 3.3% of Maine's total GRP (greater than U.S. where this sector only makes up 2.5% of the

Productivity: \$342,018

- Data for 2022
- Lags the U.S. rate of \$364,927 GRP per worker

Total Sales: \$3.9 Billion

- Data for 2022
- 83% of sales exported out of state
- Accounts for 2.3% of All Maine sales, outperforming the U.S. (1.8% of total sales)

Demand: \$3.0 Billion

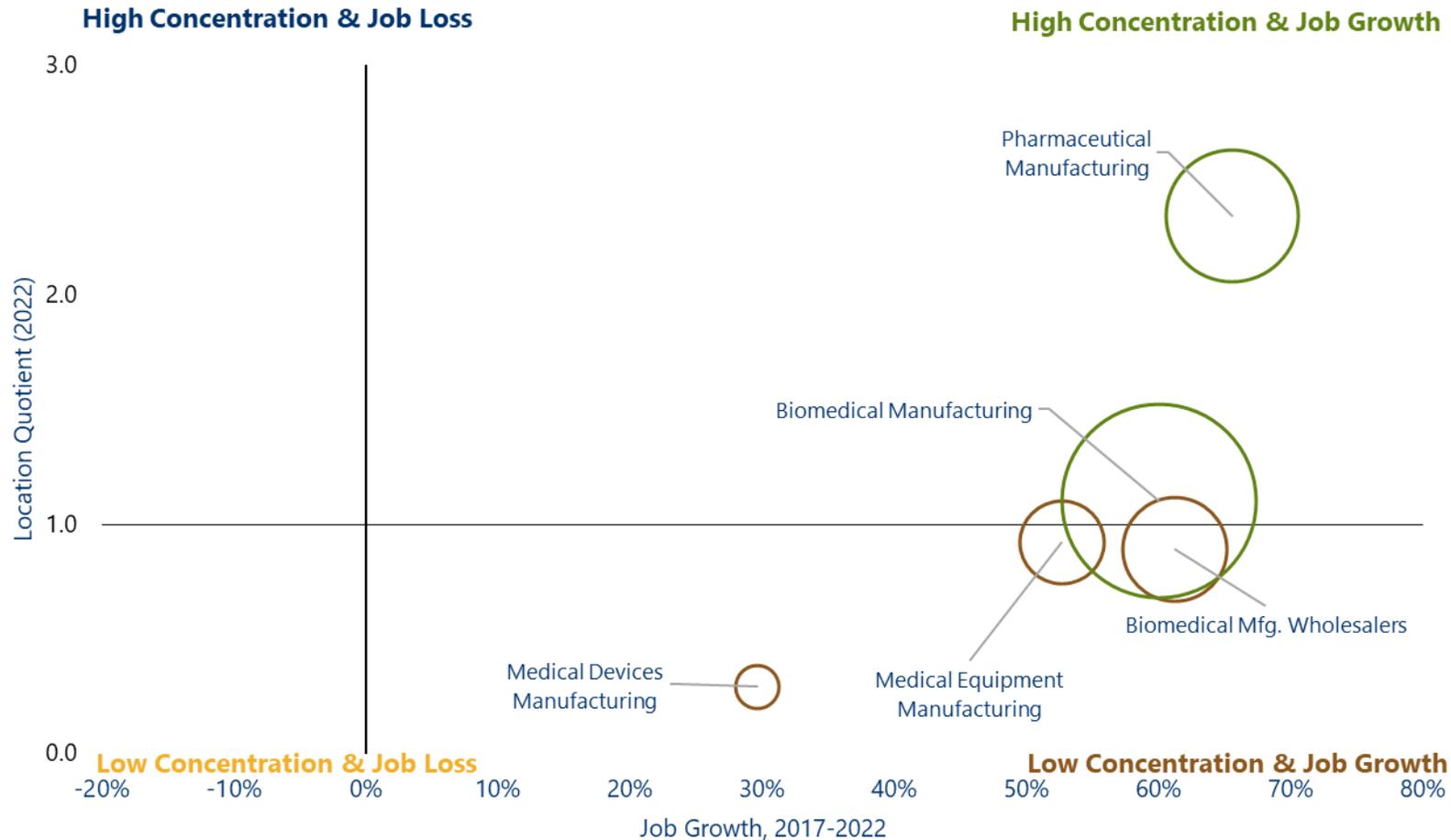
- Data for 2022
- Only 22.7% of the demand for the sector is met in-region, the remaining 77.3% is imported

Leakage: \$2.3 Billion

- Data for 2022
- An estimates \$2.3 billion could be recaptured by Maine firms

Source: Lightcast

KEY INDUSTRIES



Bubble size = 2022 jobs

Source: Lightcast, Camoin Associates

Note: Figure includes 4-digit NAICS industry groups with the bubble size related to the number of jobs in 2022

Findings:

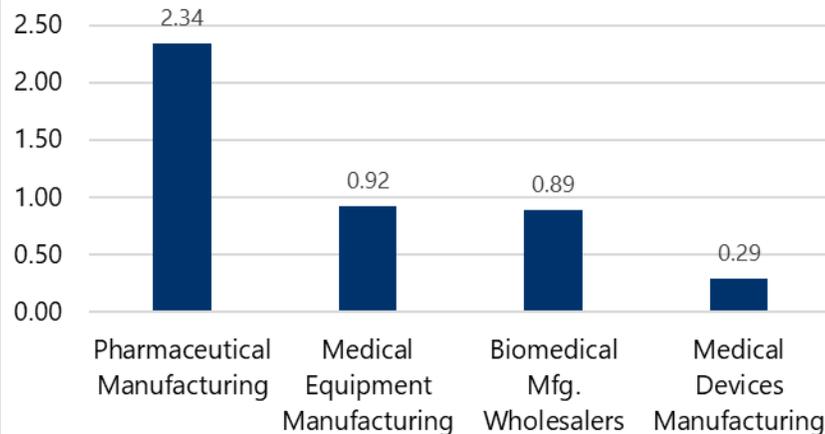
- The Biomedical Manufacturing sector added 2,764 jobs between 2017 and 2022 and Maine's sector has a higher industry concentration than the national average (U.S. location quotient = 1.00).
- Every industry group in Biomedical Manufacturing experienced jobs growth between 2017 and 2022. With Pharmaceutical Manufacturing adding the most (+1,370) and Medical Devices Manufacturing with the least (+86) but increasing by 30% compared to 2017.
- Not only did Pharmaceutical Manufacturing see expansive jobs growth, it also has an industry concentration (2.34) that is more than double the U.S. Since it is the largest component of the sector, this bodes well for the future of Biomedical Manufacturing.
- The Medical Devices Manufacturing group added 376 jobs, but has an industry concentration (0.29) that is less than a third of the national average. This may signal a growth opportunity for an activity that is competitive and growing but is currently underrepresented in Maine.

KEY INDUSTRY PERFORMANCE

In 2022, Maine had 7,407 jobs in the Biomedical Manufacturing Sector

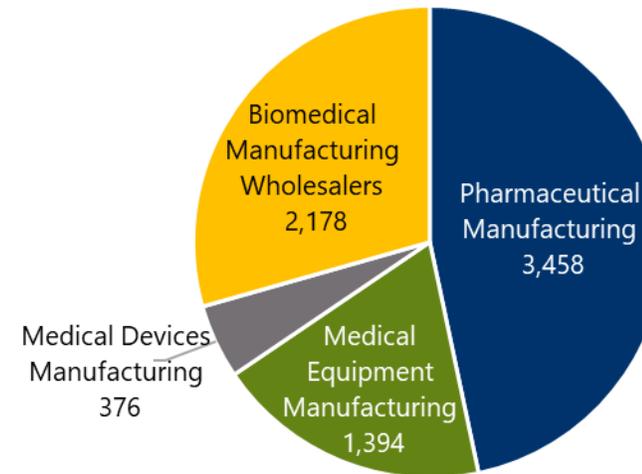
- **Pharmaceutical Manufacturing** makes up the largest key subsector, with almost 3,458 jobs in 2022. It has a Location Quotient of 2.34, meaning it has twice the amount of this activity than would be expected for an economy of Maine's size. Industries within this group have all grown since 2017 with In-Vitro Diagnostic Substance Manufacturing more than doubling adding 1,168 jobs to its base of 627 just five years ago. Along with size, concentration and growth, this industry group has the highest average earnings of the other groups in this sector.
- **Biomedical Manufacturing Wholesalers** is the next largest industry group in terms of number of jobs with 2,178. A majority of this comes from Drugs and Druggists' Sundries Merchant Wholesalers (1,621) which has the highest location quotient of the industries in this group with 1.48.
- **Medical Equipment Manufacturing** has job increases with +481 jobs or +53% since 2017. Being the third fastest growing industry group shows how high performing this sector is.
- **Medical Devices Manufacturing** is the smallest group in the sector (376 jobs) and is 'only' growing at a compound rate of 5.3% annually. It does have a much lower industry concentration compared to the others (LQ = 0.29) and the second lowest earnings and GRP per worker.

Location Quotients- Biomedical Manufacturing Industry Groups (2022)



Source: Lightcast

Jobs Distribution (2022)



Source: Lightcast

DATA NOTE:

Location quotient (LQ) is a measure of industry concentration within a region. An LQ of 1.0 means that an industry is as concentrated within the region as it is on a national level. An LQ greater than 1.0 indicates that an industry is more concentrated in a region than at the national level.

The **competitive effect** illustrates how much change in an industry is not explained by national economic or industry trends. A positive competitive effect means that the region has unique characteristics giving it a competitive advantage in that respective industry. However, a negative competitive effect indicates that an industry is either not growing as quickly or shrinking faster than national industry trends for the US.

KEY INDUSTRY PERFORMANCE

Key Industry Groups: Summary

Description	Jobs 2017	Jobs 2022	Jobs Change 2017-2022	Jobs Change % 2017-2022	Avg. Earnings Per Job 2022	Location Quotient 2022	Competitive Effect 2017-2022	Payrolled Business Locations 2022
Medical Devices Manufacturing	290	376	86	+30%	\$109,261	0.29	54	20
Medical Equipment Manufacturing	913	1,394	481	+53%	\$74,812	0.92	451	51
Pharmaceutical Manufacturing	2,089	3,458	1,370	+66%	\$141,271	2.34	1,007	46
Biomedical Mfg Wholesalers	1,351	2,178	827	+61%	\$135,879	0.89	469	359
Total for Maine	4,643	7,407	2,764	+60%	\$125,549	1.10	1,982	476
Total for United States	1.34M	1.56M	+0.22 M	+16%	\$144,375	-	-	85,758

Source: Lightcast

Continued: Key Industry Groups

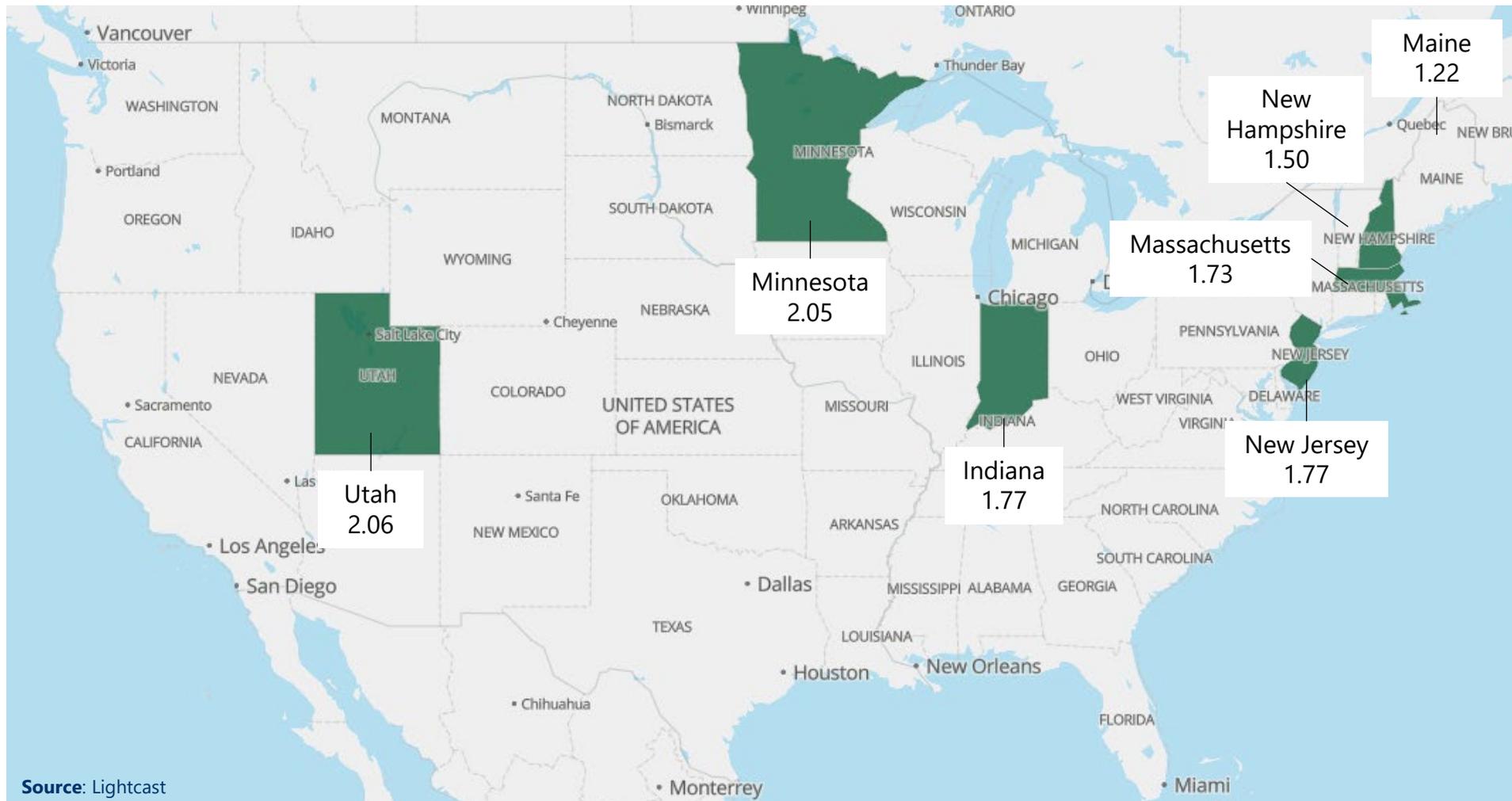
Description	Total Demand 2022	Demand met by Imports 2022	Total Sales 2022	GRP 2022	GRP per Job
Medical Devices Manufacturing	\$357,156,270	\$345,317,188	\$117,981,081	\$94,907,368	\$252,252
Medical Equipment Manufacturing	\$374,832,198	\$340,718,704	\$336,824,079	\$209,802,942	\$150,461
Pharmaceutical Manufacturing	\$916,420,003	\$552,698,538	\$2,011,007,830	\$1,392,917,813	\$402,768
Biomedical Mfg Wholesalers	\$1,373,818,149	\$1,098,010,299	\$1,457,753,855	\$835,814,433	\$383,695
Total for Maine	\$9,174,522,643	\$5,573,899,799	\$4,852,328,345	\$3,079,065,869	\$229,185
Total for United States	\$2,539,426,284,353	-	\$2,713,274,749,434	\$1,732,496,383,305	-

Source: Lightcast

- **Pharmaceutical Manufacturing** is mentioned above for its significant job growth. But this growth is even more impressive when compared to trends in the U.S. Its competitive effect of +1,007 means that it grew at almost four times the rate of its national peers.
- All of the industry groups have **positive competitive effects since 2017** meaning that each component of the sector is outperforming the national trend for industry growth.
- **Biomedical Manufacturing Wholesalers** has the second most jobs of the sector, but it has nearly ten times as many Payrolled business establishments as its fellow industry groups. This implies a fundamentally different business formation pattern compared to the other types of activity.
- **Biomedical Manufacturing Wholesalers** has the largest total demand in Maine and the largest demand value met by imports. But all of the industry groups have import ratios greater than 50%. Only **Pharmaceutical Manufacturing** is having its demand met in a significant way by local firms. Each of the other three groups is a significant opportunity to recapture market share from imports.
- At \$402,768 GRP per worker, **Pharmaceutical Manufacturing** has a highly productive workforce in Maine. This figure is higher than any other industry group and is well above the U.S. metric for Biomedical Manufacturing.

KEY NATIONAL PLAYERS

States with >1.5 Location Quotient for the Biomedical Manufacturing Sector



Location quotient (LQ) is a measure of industry concentration within a region. An LQ of 1.0 means that an industry is as concentrated within the region as it is on a national level. An LQ greater than 1.0 indicates that an industry is more concentrated in a region than at the national level.

Industry Demand and Purchases

Where is Maine's Biomedical Manufacturing sector buying from?

PURCHASING INDUSTRIES

Industries Maine Biomedical Manufacturing Purchases From

Top 25 Sectors the Biomedical Manufacturing Industry Purchases From (2022)

NAICS	Purchases from	In-region Purchases	% In-region Purchases	Imported Purchases	% Imported Purchases	Total Purchases
551114	Corporate, Subsidiary, and Regional Managing Offices	\$128,906,839	86.8%	\$19,656,223	13.2%	\$148,563,062
424210	Drugs and Druggists' Sundries Merchant Wholesalers	\$55,296,460	40.7%	\$80,534,043	59.3%	\$135,830,503
325414	Biological Product (except Diagnostic) Manufacturing	\$46,049,956	77.6%	\$13,314,154	22.4%	\$59,364,110
541110	Offices of Lawyers	\$24,284,468	85.6%	\$4,070,258	14.4%	\$28,354,726
561320	Temporary Help Services	\$22,657,141	98.2%	\$404,094	1.8%	\$23,061,236
531110	Lessors of Residential Buildings and Dwellings	\$22,374,388	96.9%	\$721,280	3.1%	\$23,095,668
492110	Couriers and Express Delivery Services	\$19,326,454	70.5%	\$8,106,387	29.5%	\$27,432,840
325411	Medicinal and Botanical Manufacturing	\$18,941,368	34.9%	\$35,355,333	65.1%	\$54,296,701
493110	General Warehousing and Storage	\$18,042,476	66.6%	\$9,053,588	33.4%	\$27,096,064
541611	Administrative Management and General Management Consulting Services	\$17,142,035	79.4%	\$4,436,077	20.6%	\$21,578,112
531120	Lessors of Nonresidential Buildings (except Miniwarehouses)	\$15,852,987	98.9%	\$179,733	1.1%	\$16,032,720
531210	Offices of Real Estate Agents and Brokers	\$15,444,723	80.7%	\$3,684,830	19.3%	\$19,129,553
425120	Wholesale Trade Agents and Brokers	\$15,237,694	87.0%	\$2,278,559	13.0%	\$17,516,253
541330	Engineering Services	\$14,021,220	96.9%	\$454,422	3.1%	\$14,475,642
561422	Telemarketing Bureaus and Other Contact Centers	\$12,268,392	98.5%	\$183,961	1.5%	\$12,452,353
901149	US Postal Service	\$11,137,519	100.0%	\$260	0.0%	\$11,137,780
524126	Direct Property and Casualty Insurance Carriers	\$11,068,104	91.4%	\$1,047,827	8.6%	\$12,115,931
531390	Other Activities Related to Real Estate	\$10,544,989	75.0%	\$3,519,647	25.0%	\$14,064,636
541990	All Other Professional, Scientific, and Technical Services	\$9,935,630	93.6%	\$674,269	6.4%	\$10,609,899
541512	Computer Systems Design Services	\$9,497,470	92.8%	\$734,199	7.2%	\$10,231,669
524114	Direct Health and Medical Insurance Carriers	\$9,420,701	93.0%	\$713,493	7.0%	\$10,134,193
531311	Residential Property Managers	\$8,389,832	96.2%	\$328,689	3.8%	\$8,718,521
325413	In-Vitro Diagnostic Substance Manufacturing	\$7,719,726	98.5%	\$118,817	1.5%	\$7,838,544
541613	Marketing Consulting Services	\$6,594,979	99.1%	\$60,118	0.9%	\$6,655,098
221122	Electric Power Distribution	\$6,592,479	90.0%	\$732,405	10.0%	\$7,324,884

Source: Lightcast

- The Corporate, Subsidiary, and Regional Managing Offices industry is the largest supplier of the Biomedical Manufacturing sector, accounting for \$128.9 million of in-region industry purchases in 2022. This industry supplies a significant portion (86.8%) from firms within Maine.
- The next two largest suppliers to this sector are **Drugs and Druggists' Sundries Merchant Wholesalers and Biological Product (except Diagnostic) Manufacturing, which together supplied over \$100 M in 2022.** Both industries are included in the Biomedical Manufacturing sector, along with **Medicinal and Botanical Manufacturing** (in top 10 of purchases) and **In-Vitro Diagnostic Substance Manufacturing** (top 25). Together the purchases within the sector add to \$128 M of in-region sales.
- Total purchases within the sector's industries were \$257 M, which means that **Maine firms are only providing 50%** of the purchases needed of Biomedical Manufacturing goods. **Drugs and Druggists' Sundries Merchant Wholesalers** in-region purchases only amount to 40.7% of the total which leaves \$80.5 M in imports to make up the balance, a sizeable opportunity.
- Among the largest purchases for this sector outside of Biomedical Manufacturing, the local industries are **highly competitive with only Couriers and Express Delivery Services and General Warehousing and Storage importing more than a quarter from outside of Maine.**

DATA NOTE:

This table gives greater insight into supply chain gaps within the Manufacturing Sector. Industries that have low shares of in-region purchases indicate opportunities where Maine relies heavily on imported supply, but where Maine businesses could potentially expand to recapture transactions. Industries purchased from that are within the Biomedical Manufacturing sector are highlighted in green.

DEMAND COMPARISON

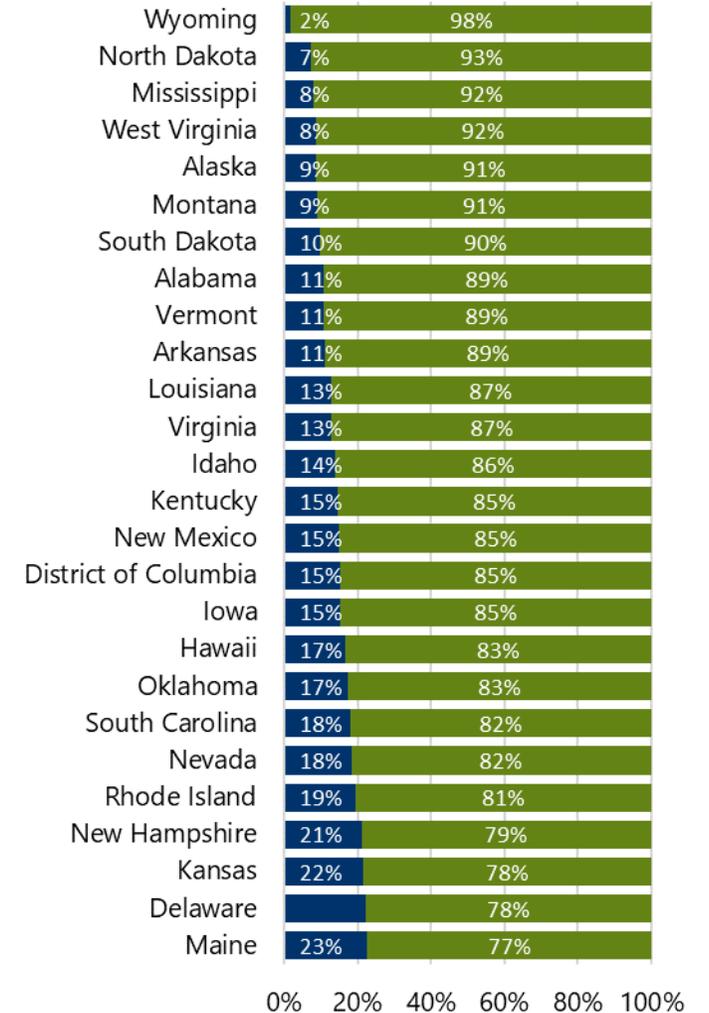
Top 10 States by Total Demand for Biomedical Manufacturing Sector (2022)

	Payrolled Business Locations	Demand met in-region	% Demand met in-region	Demand met by imports	% Demand met by imports	Total Demand
California	9,629	\$78,365,626,088	76.9%	\$23,512,115,941	23.1%	\$101,877,742,029
Texas	5,444	\$27,550,636,923	45.4%	\$33,080,398,777	54.6%	\$60,631,035,700
New York	3,969	\$20,817,256,587	40.5%	\$30,535,843,492	59.5%	\$51,353,100,079
Florida	6,540	\$21,753,091,880	49.4%	\$22,240,564,063	50.6%	\$43,993,655,943
Illinois	3,161	\$14,740,364,266	48.8%	\$15,446,617,960	51.2%	\$30,186,982,226
Pennsylvania	1,511	\$9,359,933,638	32.1%	\$19,837,617,121	67.9%	\$29,197,550,759
New Jersey	2,958	\$13,216,171,027	50.2%	\$13,133,418,229	49.8%	\$26,349,589,256
Ohio	3,215	\$7,562,436,131	31.9%	\$16,176,108,244	68.1%	\$23,738,544,375
North Carolina	3,087	\$8,854,341,834	39.7%	\$13,443,862,502	60.3%	\$22,298,204,335
Georgia	1,774	\$6,032,968,448	28.6%	\$15,055,181,195	71.4%	\$21,088,149,643

Source: Lightcast

- **Maine ranks 42nd among all states for total demand**, at \$3.0 billion in 2022
- The states with highest demand for the sector are the largest economies in the nation (by GRP). These states also meet high shares of their demand in-state.
- **While the largest importer of Biomedical Manufacturing is Texas, the state that has the largest share of demand met by imports is Wyoming**, with over 98% of total demand being met out of state.
- **Maine ranks in middle, 26th overall, for percent of demand met by imports**, with 77% of demand met elsewhere.
- The states importing Biomedical Manufacturing at high rates are **geographically varied but tend to be smaller economies** that lack an established local sector.

Top 25 States by Share of Demand Met by Imports (2022)



Source: Lightcast

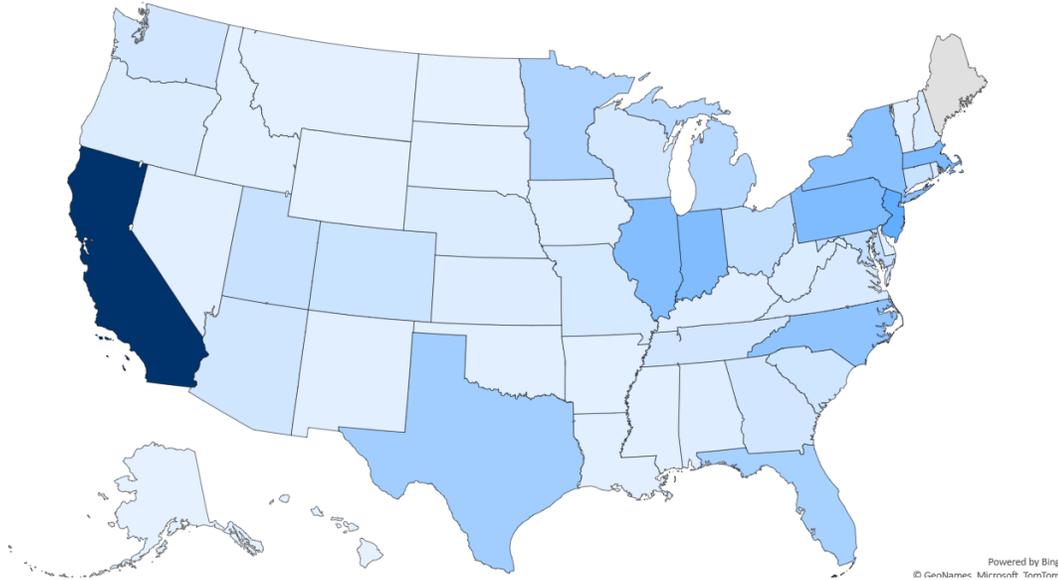
■ % Demand met in-region ■ % Demand met by imports

DATA NOTE:

Metrics for sector demand by state indicate the states that have the largest local markets for this type of activity. States whose local demand is met by imports at a high rate are using imports instead of local firms and could be a good target for Maine exports.

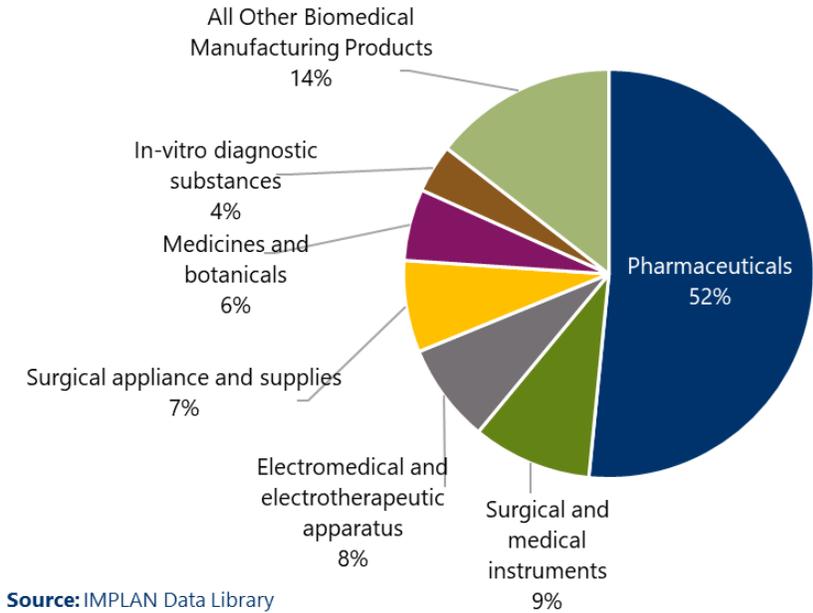
DOMESTIC IMPORTS BIOMEDICAL MANUFACTURING PRODUCTS

Out-of-State Suppliers of Biomedical Manufacturing Products



Source: IMPLAN Data Library

Import Summary for Biomedical Manufacturing Products



Source: IMPLAN Data Library

Maine imported Biomedical products from every state in 2021.

- **California was the largest overall supplier of the sector's commodities to Maine in 2021, with over \$400 million in trade value.** Other important state suppliers were New Jersey, Massachusetts, and Pennsylvania.
- **Pharmaceuticals makes over half of all Biomedical imports to Maine.** California is Maine's largest supplier of Pharmaceuticals, with over \$200 million of import value in 2021. New Jersey, Illinois, and Indiana are other top suppliers, each providing Maine with over \$90 million of Pharmaceuticals in 2021.
- **Surgical and Medical Instruments** is had the second-highest import value in 2021, accounting for 9% of domestic imports. California and Massachusetts were the largest suppliers of these goods to Maine in 2021.
- Imports of Manufacturing products **have increased an annual rate of 2.5% from 2011-2021.**

DATA NOTE: Figures on this page are from IMPLAN's Data Library and may not match other data in this report. IMPLAN domestic trade flows data covers commodities, or the products and services that are produced by a sector. This differs from other data in this report, which covers NAICS industries. Industries often produce more than one commodity.

DEMAND & IMPORTS



TOTAL DEMAND (2022)

Maine: \$3.0 Billion
United States: \$737.5 Billion

Source: Lightcast, US Census Bureau



MET BY IMPORTS (2022)

Maine: \$2.3 Billion
United States: NA

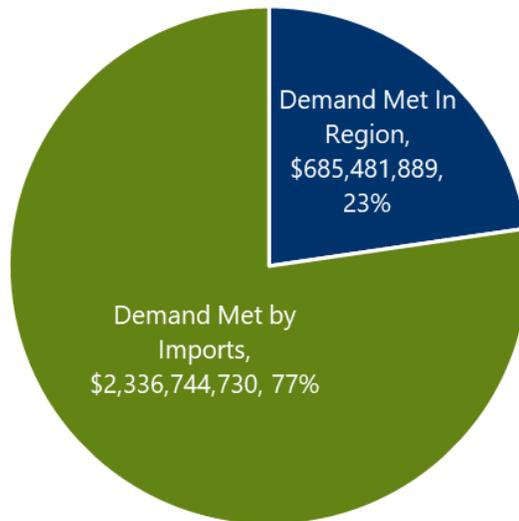


FOREIGN IMPORTS (2022)

Maine: \$120.1 Million
United States: \$328.5 Billion

- The demand for Biomedical Manufacturing Sector activity in Maine is \$3.0 billion in 2022, of which 77% (\$2.3 billion) is met out of state.
- The value of foreign imports for the Biomedical Manufacturing sector to Maine is \$120.1 million.
- Foreign imports account for 5.1% of the demand met by imports in the State of Maine, meaning 94.9% of the imports of biomedical manufacturing products are from domestic sources.
- Navigational/measuring/medical/control Instruments are the largest commodity with about \$90 million imported to Maine in 2022. This accounts for 1.1% of all foreign imports to the state in 2022.

Total Demand for Biomedical Manufacturing in Maine



Source: Lightcast

Foreign Imports by Value for Maine Biomedical Manufacturing, 2022

NAICS	Industry	Customs Value (Gen) (\$ US)	Foreign Share of Total Imports	Industry Share of Total Foreign Imports
3345	Navigational/measuring/medical/control Instrument	\$89,974,328	3.9%	1.1%
3254	Pharmaceuticals & Medicines	\$15,771,790	0.7%	0.2%
3272	Glass & Glass Products	\$7,741,520	0.3%	0.1%
3391	Medical Equipment & Supplies	\$6,607,264	0.3%	0.1%
Total		\$120,094,902	5.1%	1.5%

Source: US Census Bureau

DATA NOTE:

Maine's demand for this sector's products shows the size of the local market. The share of that market supplied in-region versus imports (either from other states in the U.S. or other countries) relates the success of local firms or the competitiveness of domestic and international import goods.

Industry Sales and Exports

Where is Maine's Biomedical Manufacturing sector selling to?

SALES INDUSTRIES Industries Maine Biomedical Manufacturing Sells To

Top 25 Sectors the Biomedical Manufacturing Industry Sells To, 2022

NAICS	Sales to	In-Region Sales	Percent of In-Region Sales
622110	General Medical and Surgical Hospitals	\$62,135,604	18.8%
325413	In-Vitro Diagnostic Substance Manufacturing	\$58,670,341	17.8%
325412	Pharmaceutical Preparation Manufacturing	\$47,187,784	14.3%
621111	Offices of Physicians (except Mental Health Specialists)	\$15,187,908	4.6%
424210	Drugs and Druggists' Sundries Merchant Wholesalers	\$11,673,713	3.5%
541940	Veterinary Services	\$8,913,810	2.7%
325414	Biological Product (except Diagnostic) Manufacturing	\$8,564,559	2.6%
621210	Offices of Dentists	\$6,895,918	2.1%
901199	Federal Government, Civilian, Excluding Postal Service	\$5,931,655	1.8%
621511	Medical Laboratories	\$5,568,647	1.7%
902999	State Government, Excluding Education and Hospitals	\$5,395,805	1.6%
325411	Medicinal and Botanical Manufacturing	\$4,597,584	1.4%
621498	All Other Outpatient Care Centers	\$3,722,887	1.1%
621420	Outpatient Mental Health and Substance Abuse Centers	\$3,558,195	1.1%
621330	Offices of Mental Health Practitioners (except Physicians)	\$3,549,718	1.1%
623110	Nursing Care Facilities (Skilled Nursing Facilities)	\$3,342,063	1.0%
621340	Offices of Physical, Occupational and Speech Therapists, and Audiologists	\$3,255,436	1.0%
903999	Local Government, Excluding Education and Hospitals	\$3,249,076	1.0%
423490	Other Professional Equipment and Supplies Merchant Wholesalers	\$2,716,127	0.8%
621399	Offices of All Other Miscellaneous Health Practitioners	\$2,701,851	0.8%
901200	Federal Government, Military	\$2,447,395	0.7%
541330	Engineering Services	\$1,907,754	0.6%
454310	Fuel Dealers	\$1,797,736	0.5%
622310	Specialty (except Psychiatric and Substance Abuse) Hospitals	\$1,707,626	0.5%
622210	Psychiatric and Substance Abuse Hospitals	\$1,620,336	0.5%

Source: Lightcast

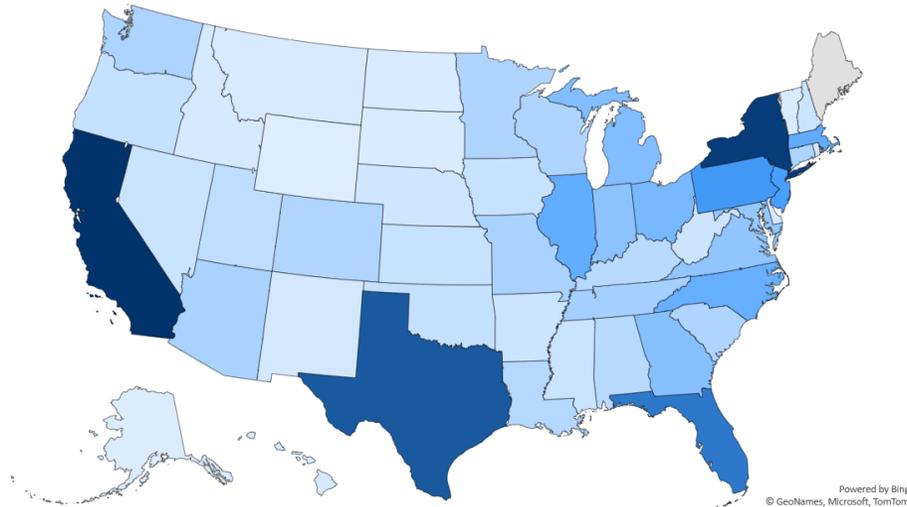
- **General Medical and Surgical Hospitals is the largest** in-region buyer of the Biomedical Manufacturing sector's products, at over \$62 M in sales in 2022 and accounting for over 18% of all in-region sales for the sector. **In-Vitro Diagnostic Substance Manufacturing** and **Pharmaceutical Preparation Manufacturing** are the next largest contributors with \$58 M and \$47M respectively. Together these three industries account for over 50% of in-region sales for the sector.
- **Four out of the top seven largest industries by sales are included in the Biomedical Manufacturing sector.** This indicates strong business to business relationship where intermediate purchases are a critical part of how the sector functions.
- Another main source of sales are **Health Services** sectors (NAICS beginning in 62) which includes everything from major hospitals to local service providers and clinics. This group of industries **makes up over a third** (34.3%) of in-region sales.

DATA NOTE:

The sales in this table do not add up to total in-region sales because it only captures sales to other industries, and not other entities like consumers. The Percent of Total In-Region Sector Sales shows the portion of sales to a given industry as it relates to total sales to *all industries*, not total in-region sales including sales to consumers. Industries sold to within the Biomedical Manufacturing sector are highlighted in green.

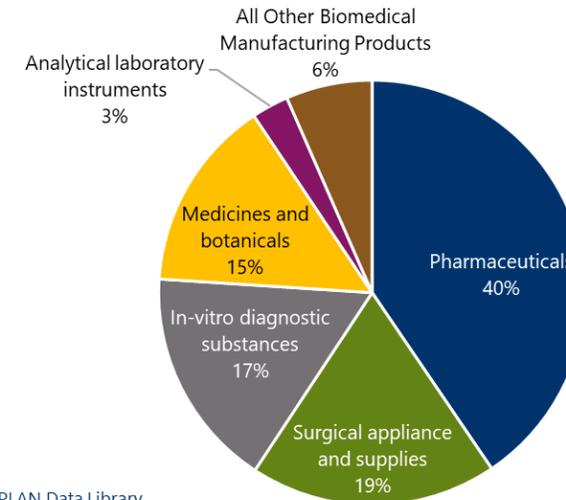
DOMESTIC EXPORTS BIOMEDICAL MANUFACTURING PRODUCTS

Out-of-State Buyers of Maine Biomedical Manufacturing Products



Source: IMPLAN Data Library

Export Summary: Maine Biomedical Manufacturing Products (2021)



Source: IMPLAN Data Library

Maine exported Biomedical Manufacturing products to every state in 2021.

- **California, New York, and Texas were the largest buyers of Maine's biomedical manufacturing products in 2021.**
- **Pharmaceuticals had the highest export value**, accounting for 40% of total biomedical manufacturing export value. Overall, California, New York, and Texas are the largest buyers of Maine's pharmaceutical products, each receiving over \$70 million worth of these products in 2021.
- **Surgical appliances and supplies accounts for about 19% of total Sector imports.** This includes products like wound dressings, orthopedic devices, personal safety devices, and more. California was the largest buyer of these products in 2021, followed by Texas and Florida.
- **In-Vitro Diagnostic Substances is a third highly-traded biomedical commodity, accounting for 17% of total exports.** These include products used in testing for medical conditions like COVID-19, pregnancy, HIV, or blood glucose monitors for diabetics, among many other products. New York was the largest buyer of Maine's In-Vitro Diagnostic Substances in 2021, followed by Florida, California, and Texas.
- Exports of Biomedical Manufacturing commodities **have increased an annual rate of 6.7% from 2011-2021** and have more than doubled over that same period. The overall Biomedical Manufacturing group of commodities has increased at a consistent rate over the period, while other products like In-vitro diagnostic substances, surgical appliances and supplies, optical instruments and lenses saw sharp increases during the pandemic years.

DATA NOTE: Figures on this page are from IMPLAN's Data Library and may not match other data in this report. IMPLAN domestic trade flows data covers commodities, or the products and services that are produced by a sector. This differs from other data in this report, which covers NAICS industries. Industries often produce more than one commodity.

SALES & EXPORTS



TOTAL SALES (2022)

Maine: \$3.9 Billion
United States: \$867.0 Billion

Source: Lightcast, US Census Bureau



EXPORTED SALES (2022)

Maine: \$3.2 Billion
United States: N/A

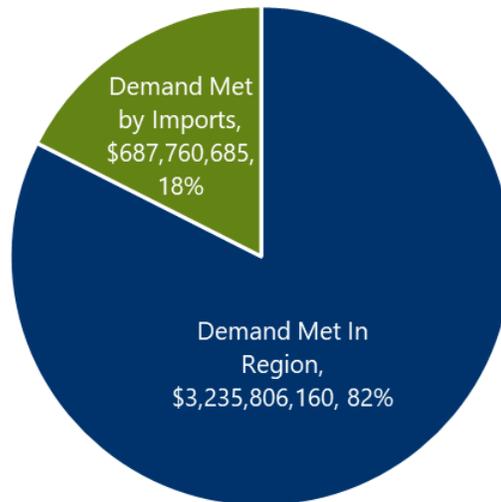


FOREIGN EXPORTS (2022)

Maine: \$224.0 Million
United States: \$201.0 Billion

- Industry sales for Biomedical Manufacturing activity in Maine reached a total of \$3.9 billion in 2022, of which 82% are exported out of state (\$3.2 billion).
- Foreign exports of Biomedical Manufacturing were valued at \$224 Million in 2022 which makes up 6.9% of sector sales, meaning that 93.1% of exports in the from the biomedical manufacturing sector are domestic. Foreign exports from the entire United States are 23% of U.S. sales.
- Top foreign exports for Maine's Biomedical Manufacturing sector are Pharmaceuticals & Medicines at \$107 M (3.3% of total sector exports) with Navigational/measuring/medical/control Instrument close behind with \$104 M in exports (3.2% of total sector exports).

Total Sales for Biomedical Manufacturing in Maine



Source: Lightcast

Foreign Exports by Value for Maine Biomedical Manufacturing, 2022

NAICS	Industry	Customs Value (Gen) (\$ US)	Foreign Share of Total Exports	Industry Share of Total Foreign Exports
3254	Pharmaceuticals & Medicines	\$106,854,638	3.3%	3.1%
3345	Navigational/measuring/medical/control Instruments	\$104,134,503	3.2%	3.0%
3391	Medical Equipment & Supplies	\$11,663,199	0.4%	0.3%
3272	Glass & Glass Products	\$1,343,092	0.0%	0.0%
Total		\$223,995,432	6.9%	6.5%

Source: US Census Bureau

DATA NOTE:

Maine sales and exports for this sector indicate the scale of the industry activity and the share of that activity that is sold locally either as an intermediate good or to end consumers. Exports include sales to domestic (U.S.) markets as well as international exports.

EMERGING TRENDS

Agricultural & Food Technology

Innovative new technology is being developed and used to create more sustainable food and harvesting practices. Similarly, new types of food are being created in the biotechnology space – from plant-based protein sources to new technology for greenhouses or aquaculture, biotechnology will continue to play a major cross-sector role in Maine’s food economy.

At-Home Medicine and Medical Testing

COVID-19 accelerated trends related to engaging with healthcare at home. This includes expanded use of products like at-home diagnostics and testing for illness, telehealth, and even app-based and smartphone treatment and monitoring of illness.

Federal initiatives to support biotechnology and biomanufacturing

A late-2022 executive order under the Biden administration launched the National Biotechnology and Biomanufacturing Initiative, which will focus a wide range of investments and resources to support the nation’s biotechnology and biomanufacturing sectors. The initiative includes over \$2 billion in funding, including \$1 billion to expand US manufacturing infrastructure.

Wearable Technology

Smart watches and other wearable technology is growing increasingly more capable to monitor biometrics. This technology, which today ubiquitously monitors signals like heart rate, sleep patterns, and exercise activity, could be leveraged to monitor other patterns such as oxygen levels, blood pressure, cardiac arrhythmia, aging, illness or injury recovery, and more.

RECENT INVESTMENTS

NIH awards \$11.3 million to University of Maine to support biomedical research

This research will support five research projects at the University of Maine and MDI Bio Lab. The award will support new biomedical researchers through Graduate assistantships at UMaine, which is currently Maine's only Ph.D.-awarding institution in the biomedical field.

MDI Bio Lab receives \$18 million through a renewed NIH grant

The grant will fund the Maine IDeA Network of Biomedical Research Excellence for five years. The program is a statewide collaborative network of 13 educational and research institutions that strengthen biomedical research and training in the state.

NIH awards \$3.5 million to infant health startup

The startup will use the funds to support development and evaluation of an innovative bassinet pad that can treat preterm newborns for use in neonatal incubators, including the funding of a clinical study to evaluate its effectiveness.

NIH awards \$5 million to support UNE chronic pain research and industry collaboration

The money will provide five years of support to the Center of Biomedical Research Excellence (COBRE) for the Study of Pain and Sensory Function at the University of New England.

NIH added \$264 million to Maine's economy in 2022

A total of \$112.7 million in grants and contracts in 2022 generated \$264 million in economic activity and supported 1,950 jobs throughout the state. In 2022, research funding was awarded to Maine's academic and research institutions, along with several private companies. NIH funding plays a strong role in supporting Maine's biomedical sector.

NSF awards UMaine \$550K for Microfluidics research and development with Sappi

The research will study how to mass-produce products that can be used for microfluidic testing using existing technology and infrastructure. The research demonstrates a collaboration between existing, legacy manufacturing in Maine and the new and growing field of biotechnology.

TRADE SHOWS

Trade shows and resources included in this report have been vetted by industry professionals and trade show specialists.

BIO INTERNATIONAL CONVENTION – Boston, MA

The BIO International Convention, one of the largest annual biotechnology conferences in the world, attracts 14,000+ biotechnology and pharma leaders for one week of intensive networking to discover new opportunities and promising partnerships.

IM ENGINEERING EAST – New York, NY

A unique mix of innovation, manufacturing and design industries, this annual conference includes specific show floors for MedTech and robotics to packaging, design plastics and quality.

FLORIDA INTERNATIONAL MEDICAL EXPO (FIME) – Miami, FL

Hosting the largest annual trade event for medical device and equipment manufacturers, suppliers and distributors in the Americas welcomed over 10,400 trade professionals from more than 110 countries across the world.

FUTURE HEALTH – London, UK

Is an annual exhibition and conference dedicated to innovations in the healthcare industry. Future Health presents products and services in categories such as: Biotechnology, Imaging & Diagnostics, Laboratory Medical Equipment & Devices, Materials & Components, Medical Services, Medical Facilities and Pharmaceuticals.

MEDTECHLIVE – Nuremberg, Germany

An annual international gathering of the entire value chain in the MedTech industry with a strong focus on manufacturing. This event has recently joined with T4M to broaden the product expertise and geographic reach even further with 430 exhibitors from 23 countries.

MEDICA TRADE FAIR – Dusseldorf, Germany

Medica is the world's largest annual medical trade fair for medical technology, electromedical equipment, laboratory equipment, diagnostics and pharmaceuticals. It provides the medical device industry a central market for innovative products and systems from areas of electromedicine and medical technology, information and communication technology, physiotherapy and orthopedic technology, disposables, commodities and consumer goods, laboratory equipment and diagnostic products

OTHER RESOURCES

Bioscience Association of Maine (BioME)

Is a trade organization which promotes the industry's steady growth, interprets its benefits to the public, and influences pertinent public policy. BioME aims to advance economic growth and opportunities within the life sciences community in Maine by allocating equal involvement in life sciences advocacy, education, economic development, workforce development, and attracting out-of-state business.

On their website, BioME <https://biomaine.org/> is an extensive list of education, R&D, and industry assets across the state.

FocusMaine

FocusMaine is a statewide economic development organization that works to create quality jobs and build a thriving workforce. With an emphasis on innovation and future readiness, they work in partnerships to accelerate Maine's food economy and bioeconomy, generating opportunity and prosperity for Maine's people, businesses, and communities.

TechPlace

TechPlace supports small business development of early-stage companies. TechPlace gives entrepreneurs a place to network, research and develop ideas, build prototypes, test products, assemble, grow, learn, and become successful manufacturing and technology companies.

INDUSTRY SECTORS

NAICS	Description
	Medical Devices Manufacturing
333314	Optical Instrument and Lens Manufacturing
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
334514	Totalizing Fluid Meter and Counting Device Manufacturing
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
334516	Analytical Laboratory Instrument Manufacturing
334517	Irradiation Apparatus Manufacturing
334519	Other Measuring and Controlling Device Manufacturing
	Medical Equipment Manufacturing
327212	Other Pressed and Blown Glass and Glassware Manufacturing
339112	Surgical and Medical Instrument Manufacturing
339113	Surgical Appliance and Supplies Manufacturing
339114	Dental Equipment and Supplies Manufacturing
339115	Ophthalmic Goods Manufacturing
339116	Dental Laboratories
	Pharmaceutical Manufacturing
325411	Medicinal and Botanical Manufacturing
325412	Pharmaceutical Preparation Manufacturing
325413	In-Vitro Diagnostic Substance Manufacturing
325414	Biological Product (except Diagnostic) Manufacturing
	Biomedical Manufacturing Wholesalers
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers
423460	Ophthalmic Goods Merchant Wholesalers
424210	Drugs and Druggists' Sundries Merchant Wholesalers

APPENDIX

Summary Metrics for the Biomedical Manufacturing Sector

NAICS	Description	Jobs 2017	Jobs 2022	Jobs Change 2017-2022	Jobs Change % 2017-2022	Avg. Earnings Per Job 2022	Location Quotient 2022	Competitive Effect 2017-2022	Payrolled Business Locations 2022	Total Demand 2022	Demand met by Imports 2022	Total Sales 2022	GRP 2022	GRP per Job
	Medical Devices Manufacturing	290	376	86	+30%	\$109,261	0.29	54	20	\$357,156,270	\$345,317,188	\$117,981,081	\$94,907,368	\$252,252
333314	Optical Instrument and Lens Manufacturing	1	69	67	+5,650%	\$105,377	0.73	67	3	\$12,477,013	\$11,092,857	\$16,207,690	\$7,855,852	\$114,586
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	111	91	(20)	-18%	\$96,473	0.28	(33)	3	\$144,656,568	\$140,573,084	\$32,625,801	\$29,684,875	\$327,988
334513	Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables	54	113	60	+111%	\$76,743	0.45	63	8	\$23,793,873	\$21,930,456	\$16,035,363	\$11,635,203	\$102,871
334514	Totalizing Fluid Meter and Counting Device Manufacturing	-	-	-	-	-	-	-	-	\$17,183,116	\$17,183,116	-	-	-
334515	Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals	24	1	(23)	-95%	\$226,990	0.01	(23)	1	\$24,147,435	\$24,023,522	\$619,856	\$450,537	\$382,342
334516	Analytical Laboratory Instrument Manufacturing	88	93	5	+6%	\$161,655	0.49	(16)	3	\$55,483,030	\$51,727,356	\$48,542,227	\$41,997,673	\$450,532
334517	Irradiation Apparatus Manufacturing	3	4	0	+5%	\$142,831	0.06	(0)	1	\$24,771,450	\$24,346,034	\$2,061,692	\$1,630,747	\$464,162
334519	Other Measuring and Controlling Device Manufacturing	10	6	(4)	-37%	\$102,933	0.04	(4)	1	\$54,643,785	\$54,440,764	\$1,888,451	\$1,652,483	\$268,215
	Medical Equipment Manufacturing	913	1,394	481	+53%	\$74,812	0.92	451	51	\$374,832,198	\$340,718,704	\$336,824,079	\$209,802,942	\$150,461
327212	Other Pressed and Blown Glass and Glassware Manufacturing	1	2	1	+86%	\$26,883	0.03	1	-	\$18,078,643	\$17,158,532	\$1,042,604	\$507,607	\$310,826
339112	Surgical and Medical Instrument Manufacturing	27	34	7	+25%	\$98,170	0.06	3	6	\$146,302,118	\$144,725,228	\$8,570,030	\$5,597,557	\$166,166
339113	Surgical Appliance and Supplies Manufacturing	758	1,271	513	+68%	\$74,501	2.81	494	20	\$139,418,715	\$112,501,936	\$314,780,552	\$196,464,689	\$154,572
339114	Dental Equipment and Supplies Manufacturing	5	1	(5)	-90%	\$70,149	0.01	(5)	2	\$14,701,348	\$14,365,818	\$777,798	\$423,593	\$847,185
339115	Ophthalmic Goods Manufacturing	9	1	(8)	-93%	\$121,691	0.01	(8)	2	\$29,583,231	\$29,433,869	\$382,881	\$255,205	\$381,460
339116	Dental Laboratories	113	87	(26)	-23%	\$70,880	0.38	(34)	21	\$26,748,142	\$22,533,322	\$11,270,214	\$6,554,292	\$75,433
	Pharmaceutical Manufacturing	2,089	3,458	1,370	+66%	\$141,271	2.34	1,007	46	\$916,420,003	\$552,698,538	\$2,011,007,830	\$1,392,917,813	\$402,768
325411	Medicinal and Botanical Manufacturing	17	111	95	+572%	\$160,982	0.64	88	20	\$109,293,274	\$77,819,845	\$73,563,645	\$45,981,008	\$412,593
325412	Pharmaceutical Preparation Manufacturing	1,233	1,314	80	+7%	\$184,384	1.35	(46)	11	\$533,732,281	\$374,273,808	\$922,823,834	\$651,722,413	\$496,155
325413	In-Vitro Diagnostic Substance Manufacturing	627	1,795	1,168	+186%	\$116,679	12.47	996	13	\$106,058,710	\$21,676,316	\$881,248,464	\$594,213,680	\$331,084
325414	Biological Product (except Diagnostic) Manufacturing	212	239	26	+12%	\$79,710	1.30	(31)	3	\$167,335,737	\$78,928,570	\$133,371,888	\$101,000,711	\$423,265
	Biomedical Manufacturing Wholesalers	1,351	2,178	827	+61%	\$135,879	0.89	469	359	\$1,373,818,149	\$1,098,010,299	\$1,457,753,855	\$835,814,433	\$383,695
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	275	543	268	+97%	\$158,474	0.43	156	191	\$394,396,823	\$340,228,810	\$253,667,005	\$152,026,455	\$280,015
423460	Ophthalmic Goods Merchant Wholesalers	28	15	(13)	-48%	\$140,322	0.15	(17)	13	\$23,282,813	\$21,543,110	\$5,715,528	\$3,387,597	\$232,820
424210	Drugs and Druggists' Sundries Merchant Wholesalers	1,048	1,621	573	+55%	\$128,271	1.48	330	155	\$956,138,513	\$736,238,379	\$1,198,371,322	\$680,400,381	\$419,778
	Total for Maine	4,643	7,407	2,764	+60%	\$125,549	1.10	1,982	476	3,022,226,620	2,336,744,730	3,923,566,845	2,533,442,557	\$342,018
	Total for United States	1,343,326	1,562,324	218,998	+16%	\$144,375	-	0	85,758	737,507,514,693	-	866,997,840,736	570,133,717,779	\$364,927

Source: Lightcast

GLOSSARY

Competitive Effect: Competitive effect indicates how much of the job change within a given region is the result of some unique competitive advantage of the region. This is because the competitive effect, by definition, measures the job change that occurs within a regional industry that cannot be explained by broader trends (i.e. the National Growth Effect and the Industrial Mix Effect). It's important to note that this effect can be positive even if regional employment is declining. This would indicate that regional employment is declining *less* than national employment.

Demand: Regional sales demand for sales of Industry

Trade-Weighted Index (TWI): Also known as the real broad index, measures the strength of the US dollar relative to the currencies of the nation's trading partners. Weightings are determined by the share of trade with each country, with the five largest allocated to the Euro, Canadian dollar, Chinese yuan, Japanese yen and Mexican peso. These five currencies account for over two-thirds of the TWI.

Exports: The amount of money that is spent by industries located outside the region in exchange for goods or services produced by an industry located in the region. Exports can be either foreign or domestic.

Earnings: Industry earnings are the total industry wages, salaries, supplements, and proprietor income in the region, divided by the number of jobs in the region.

Gross Regional Product (GRP): Gross Regional Product (GRP) is simply GDP for the region of study. More commonly, GRP is GDP for any region smaller than the United States, such as a state or metro. GRP measures the final market value of all goods and services produced in the region of study. GRP is the sum of total industry earnings, taxes on production & imports, and profits, less subsidies

Industrial Production Index: Measures the output from the mining, manufacturing, electric and gas industries.

Jobs: A job is any position in which a worker provides labor in exchange for monetary compensation. This includes those who work as employees for businesses (a.k.a. "wage and salary" employees) and proprietors who work for themselves. Lightcast reports employment as annual averages. Employment averages represent jobs, not workers, since one individual may hold multiple jobs. Due to limitations of source data, both full- and part-time jobs are included and counted equally, i.e., job counts are not adjusted to full-time equivalents. Geographically, payroll jobs are always reported by the place of work rather than the worker's place of residence.

Location quotient: Location quotient (LQ) is a way of quantifying how concentrated a particular industry, cluster, occupation, or demographic group is in a region as compared to the nation. It can reveal what makes a particular region "unique." For example, if the leather products manufacturing industry accounts for 10% of jobs in your area but 1% of jobs nationally, then the area's leather-producing industry has an LQ of 10. So, in your area, leather manufacturing accounts for a larger than average "share" of total jobs—the share is ten times larger than normal.

Payrolled Business Locations: Also referred to as a "Establishments", is a single physical location of some type of economic activity (a business), used for reporting purposes in government data sources. A single company may have multiple establishments.

Source: Lightcast Knowledge Base

DATA SOURCES



Lightcast (formerly Emsi Burning Glass) is a global leader in labor market analytics, offering a data platform that gives a comprehensive, nuanced, and up-to-date picture of labor markets at all scales from national to local. Key components of the platform include traditional labor market information, job postings analytics, talent profile data, compensation data, and skills analytics. Lightcast integrates government data with information from online job postings, talent profiles, and resumes to produce timely intelligence on the state of the labor market. Job and compensation data is available by industry, occupation, educational program, and skill type. [Click to learn more.](#)



TradeStats Express (TSE) National and State Dashboards present data on US exports and imports by trade partner and product for 2009 forward. Data are presented using two classification systems: the Harmonized System (HS) and the North American Industrial Classification System (NAICS). National trade statistics in TSE cover the physical movement of merchandise between the United States and foreign regions. State trade statistics cover the physical movement of merchandise between a given state and foreign regions. [Click to learn more.](#)



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