

Utah's Life Sciences Workforce and Industry Growth: 2012 to 2021

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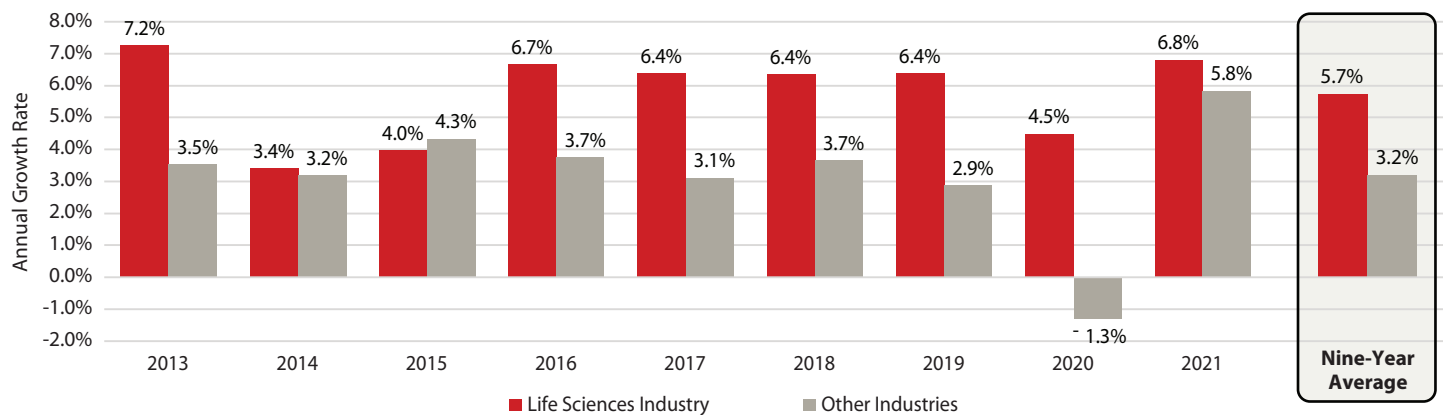
Utah's life sciences and healthcare innovation (life sciences) industry was a source of economic stability from 2012 to 2021. Job growth remained strong compared with other industries and states. Increasingly, life sciences companies provide a large share of Utah's employee workforce relative to other states with significant life sciences sectors. Nationwide, opportunities persist for broader participation in science, technology, engineering, and mathematics (STEM) jobs, which feature prominently in the life sciences industry. Women and people in some minority racial and ethnic groups are often underrepresented in STEM jobs.

This research brief features an updated life sciences industry definition for Utah and other states. In 2021, the life sciences share of Utah's employee workforce was 2.2% under the legacy definition and 2.9% under the updated definition. From 2012 to 2021, average annual job growth in Utah's life sciences industry was 5.0% under the legacy definition and 5.7% under

the updated definition. In both cases, Utah had the highest nine-year growth rate among the 20 states with the largest life sciences employment in 2021.

The Kem C. Gardner Policy Institute will update this preliminary content for a forthcoming report on the life sciences industry that will provide more comprehensive measures of Utah's life sciences activity in 2022. The report will also estimate the industry's statewide economic and fiscal impacts and address life sciences innovation at institutions of higher learning. This research brief builds on the Gardner Institute's inaugural economic report from August 2018 and three smaller publications since—an August 2021 fact sheet and life sciences chapters in the 2020 and 2022 Economic Report to the Governor—which all used the legacy industry definition.¹ This document incorporates state employment comparisons for the industry from the fact sheet and a demographic profile of STEM workers from the 2023 Economic Report to the Governor.²

Figure 1: Utah Job Growth, Life Sciences and Other Industries, 2013–2021
(Annual Percent Change in Employment)



Note: Single-year growth rates are calculated as percentage changes since the previous year; nine-year averages are compound annual growth rates since 2012. The life sciences industry provided 23,327 jobs in 2012 and 38,525 jobs in 2021, while other industries provided 982,951 jobs in 2012 and 1,305,647 jobs in 2021. Results include all employees (no self-employed workers) at life sciences companies (any occupation) in 17 NAICS industries considered to be 100% life sciences (no handpicked companies) where employment is disclosed (missing four small NAICS industries in 2021). NAICS is the North American Industry Classification System.

Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Utah's Growing Life Sciences Industry

Growth in Utah's life sciences industry regularly exceeds that of other industries in the state. From 2012 to 2021, life sciences employee job growth averaged 5.7% per year (see Figure 1). The industry's annual growth rate fluctuated between 3.4% and 7.2%. Utah companies in all other industries experienced average job growth of 3.2% per year from 2012 to 2021, ranging from -1.3% to 5.8%. Rates for other industries fell below life sciences companies' every year except 2015.

State Comparisons

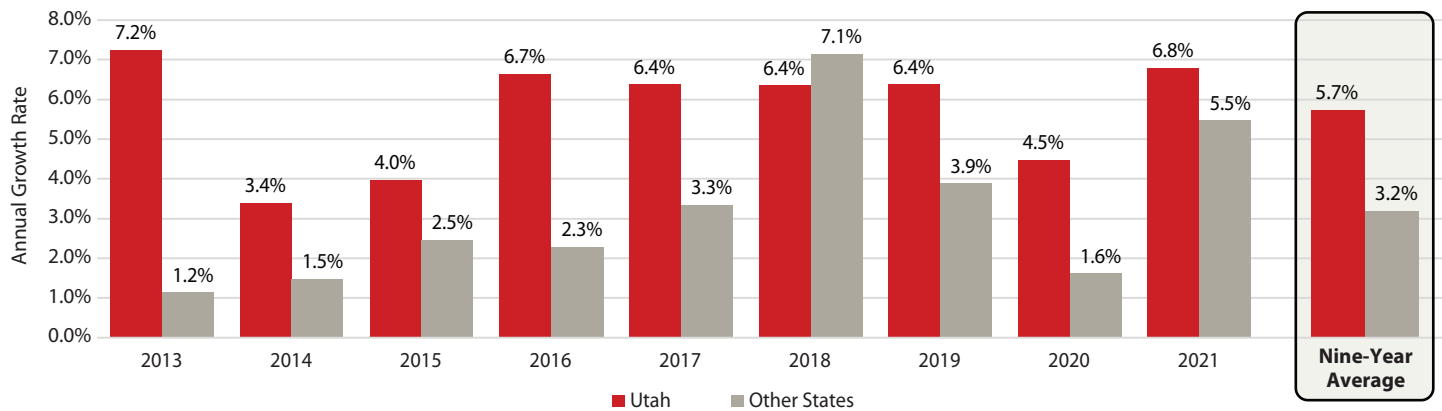
In recent years, the life sciences industry has grown more quickly in Utah than in most other states. From 2012 to 2021, Utah's average job growth of 5.7% per year exceeded the 3.2% average for all other states (see Figure 2). Compared with the rest of the U.S., the percent change in the number of life sciences jobs in Utah was higher for all years except 2018.

Among the 20 states with the largest life sciences industries by 2021 employment, Utah ranked first for its average annual job growth of 5.7% from 2012 to 2021, when other states' growth rates ranged from 0.8% to 5.2% (see Figure 3 and Table 1). In 2021, these 20 states provided 84.2% of U.S. life sciences employment, while the remaining 15.8% of jobs were in the 30 remaining states, territories, and District of Columbia.

Workforce Specialization in Life Sciences

Among the 20 largest states by life sciences employment in 2021, Utah's workforce had the second highest life sciences concentration after Massachusetts (see Figure 4). Utah's 2.9% life sciences share of employee jobs in the state was well above the 20-state average of 1.6%. From 2012 to 2016, as its life sciences share rose from 2.3% to 2.5%, Utah ranked third for workforce specialization in life sciences, and from 2017 to 2021, its share continued to increase, from 2.5% to 2.9%, and Utah ranked second each year.

Figure 2: Life Sciences Job Growth, Utah and Other States, 2013–2021
(Annual Percent Change in Employment)



Note: Single-year growth rates are calculated as percentage changes since the previous year; nine-year averages are compound annual growth rates since 2012. The life sciences industry in Utah provided 23,327 jobs in 2012 and 38,525 jobs in 2021, while in other states, the industry provided 1,316,933 jobs in 2012 and 1,747,100 jobs in 2021. Results include all employees (no self-employed workers) at life sciences companies (any occupation) in 17 NAICS industries considered to be 100% life sciences (no handicapped companies) where employment is disclosed. NAICS is the North American Industry Classification System.
Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Figure 3: Life Sciences Job Growth by State, 2012 to 2021
(Nine-Year Average Annual Percent Change in Employment for 20 States with the Highest Life Sciences Employment in 2021)

Note: Growth rates represent all employees (no self-employed workers) at life sciences companies (any occupation) in 17 NAICS industries that are 100% life sciences (no handicapped companies) where employment is disclosed. NAICS is the North American Industry Classification System.
Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

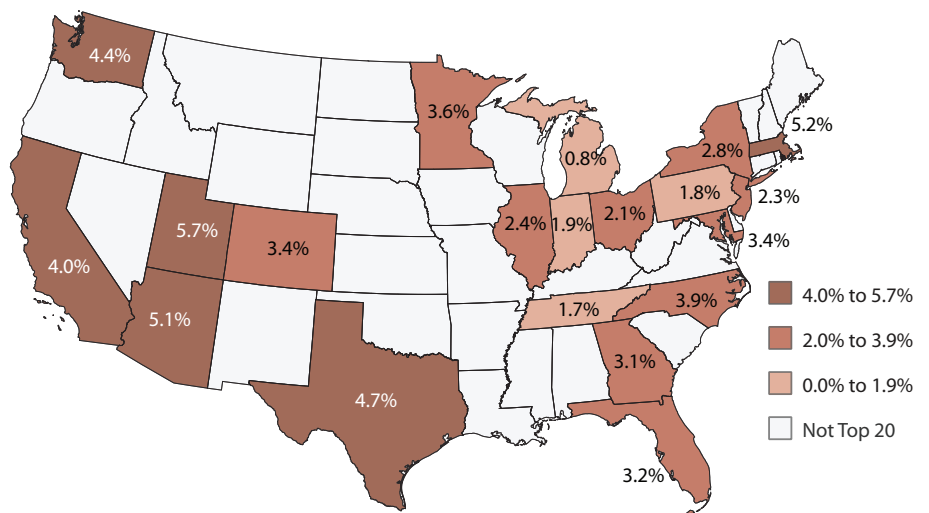


Table 1: Life Sciences Job Growth by State, 2012–2021

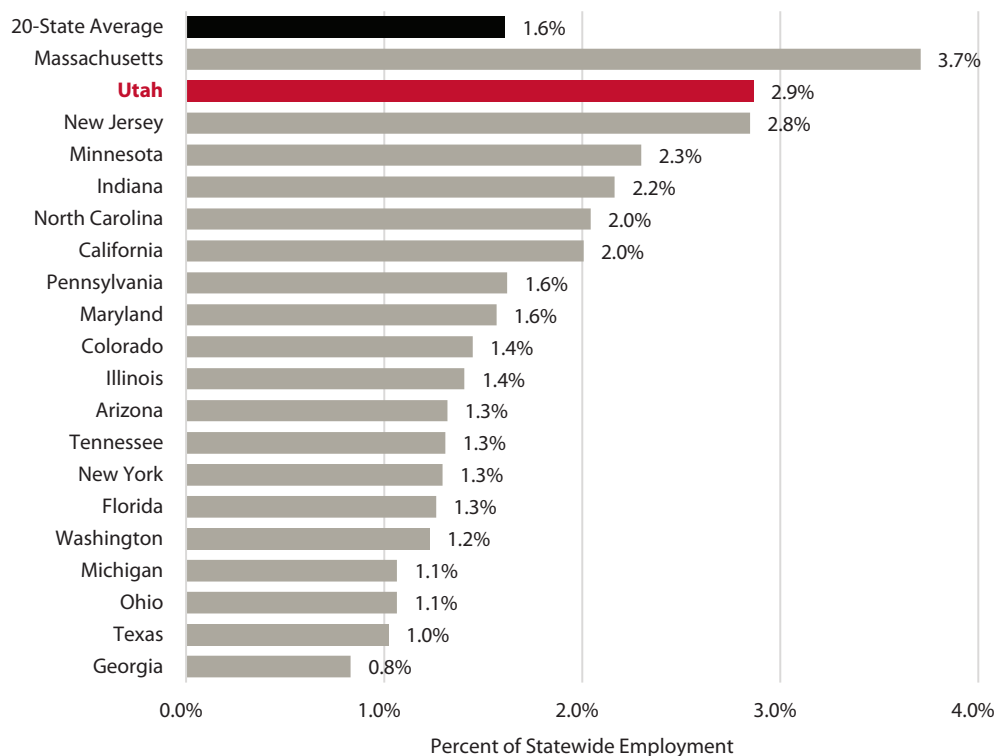
(Annual Percent Change in Employment for States with the 20 Largest Life Sciences Industries by Employment)

State	Annual Growth Rate (Since Previous Year)									Nine-Year Average Growth (2012 to 2021)		Industry Size by Employment (2021)
	2013	2014	2015	2016	2017	2018	2019	2020	2021	Rate	Rank	Rank
Utah	7.2%	3.4%	4.0%	6.7%	6.4%	6.4%	6.4%	4.5%	6.8%	5.7%	1	13
Massachusetts	1.5%	4.0%	4.2%	5.6%	2.2%	9.3%	7.6%	4.4%	8.6%	5.2%	2	2
Arizona	1.2%	0.2%	6.3%	2.4%	11.2%	11.0%	5.1%	5.0%	4.0%	5.1%	3	17
Texas	0.9%	1.6%	5.3%	3.5%	4.8%	11.3%	6.0%	3.4%	5.9%	4.7%	4	3
Washington	-2.0%	-4.0%	7.7%	6.7%	18.0%	5.4%	2.7%	2.5%	4.2%	4.4%	5	15
California	1.6%	3.2%	2.3%	4.9%	6.9%	4.7%	4.5%	1.3%	6.6%	4.0%	6	1
North Carolina	7.3%	1.6%	2.0%	-0.1%	2.7%	8.8%	3.1%	3.4%	6.9%	3.9%	7	8
Minnesota	-0.4%	3.0%	2.9%	2.9%	6.6%	8.3%	2.6%	2.4%	4.3%	3.6%	8	11
Colorado	3.4%	0.9%	2.5%	2.2%	2.2%	6.2%	5.9%	4.0%	3.8%	3.4%	9	18
Maryland	-4.1%	1.3%	-1.0%	4.5%	34.3%	-12.4%	3.8%	3.9%	5.8%	3.4%	10	19
Florida	2.5%	3.3%	3.3%	0.8%	0.9%	8.4%	2.3%	1.8%	5.7%	3.2%	11	4
Georgia	0.7%	2.1%	5.6%	6.5%	3.4%	4.8%	3.1%	-2.8%	5.2%	3.1%	12	20
New York	0.8%	0.7%	1.4%	1.2%	4.0%	11.4%	3.1%	-1.9%	5.3%	2.8%	13	5
Illinois	3.7%	1.6%	3.5%	1.2%	0.6%	7.0%	-1.2%	1.8%	3.4%	2.4%	14	9
New Jersey	1.7%	2.3%	2.5%	0.8%	-4.2%	7.4%	4.0%	-0.4%	7.1%	2.3%	15	6
Ohio	1.8%	-6.0%	3.1%	-3.5%	-0.6%	19.3%	2.8%	1.1%	3.0%	2.1%	16	12
Indiana	2.7%	-0.6%	0.6%	2.1%	1.5%	1.5%	5.1%	-0.8%	5.4%	1.9%	17	10
Pennsylvania	-2.3%	-0.7%	1.1%	3.9%	3.5%	5.5%	4.4%	0.2%	0.9%	1.8%	18	7
Tennessee	-0.7%	-1.3%	-2.1%	7.6%	0.8%	6.0%	1.7%	0.1%	3.7%	1.7%	19	16
Michigan	2.0%	3.0%	-1.0%	-0.4%	-6.6%	3.6%	1.5%	-0.6%	6.0%	0.8%	20	14
20 States	1.6%	1.5%	2.6%	2.9%	3.9%	6.9%	3.9%	1.5%	5.6%	3.4%	NA	NA
All States	1.3%	1.5%	2.5%	2.4%	3.4%	7.1%	3.9%	1.7%	5.5%	3.2%	NA	NA

Note: Nine-year averages are compound annual growth rates. Industry size rankings and top 20 selection are based on 2021 employment in the life sciences industry. Growth rates represent all employees (no self-employed workers) at life sciences companies (any occupation) in 17 NAICS industries that are 100% life sciences (no handpicked companies) where employment is disclosed. See Table 3 for more details about the data and industry definition this research brief uses. NAICS is the North American Industry Classification System. Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Figure 4: Life Sciences Share of Workforce in Leading States, 2021
(Life Sciences Companies' Share of Total Employment; Top 20 States by Employment)

Note: Workforce shares reflect a life sciences industry definition that aligns with historical data availability across states (see Table 3 for details). Employment shares represent all employees (no self-employed workers) at life sciences companies (any occupation) in 17 NAICS industries considered to be 100% life sciences, excluding handpicked life sciences companies in other NAICS industries. NAICS is the North American Industry Classification System. The national average was 1.5% for all states, the District of Columbia, Puerto Rico, and the U.S. Virgin Islands. Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages



**Workforce Demographics:
Diversity and Inclusion in STEM Occupations**

As in most places in the U.S., Utah’s life sciences and other industries that highly value STEM talent do not fully match the racial, ethnic, and gender diversity of the population working in the state. Individuals, companies, and educational institutions are among those creating opportunities for broader participation in advanced roles in a dynamic industry. This section describes the characteristics of people in science, technology, engineering, and mathematics occupations, whether at life sciences companies or in other industries.

Participation in the STEM workforce varies by gender. From 2016 to 2020, 2.4% of employed Utah women were in STEM occupations, similar to the U.S. average (see Figure 5). Meanwhile, 8.8% of Utah’s male workforce held STEM jobs (versus 7.3% nationwide).

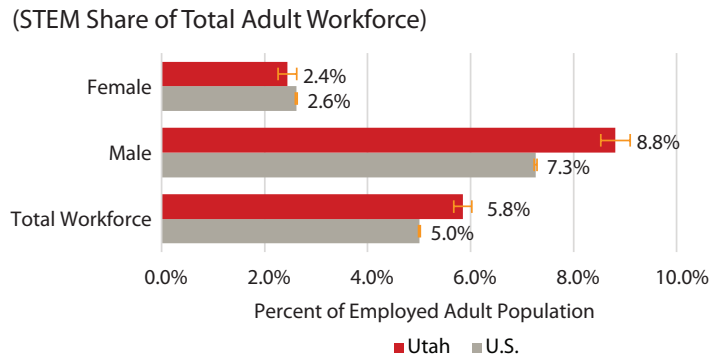
Utah and other states have also experienced racial and ethnic disparities in STEM occupations. From 2016 to 2020, an average of 4.8% of Utah’s racial or ethnic minority workers were in STEM occupations, similar to the U.S. average (see Figure 6). Utah’s most underrepresented groups were Hispanic or Latino, American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, and Some Other Race, with shares below 3.0%. Meanwhile, 6.1% of Utahns who are White and not Hispanic or Latino held jobs in STEM (versus 5.2% of the U.S. workforce). Asian and multiracial workers were also well represented in STEM jobs in the state during these five years.

Reconciliation with Previous Research

This research brief adopts an updated life sciences definition for better alignment as the industry has evolved in Utah and other states. The updated definition was developed with input and validation from BioUtah and BioHive leadership, as well as a national literature review. The authors included 17 industries under the North American Industry Classification System (NAICS), up from 15 NAICS industries in previous Gardner Institute research.

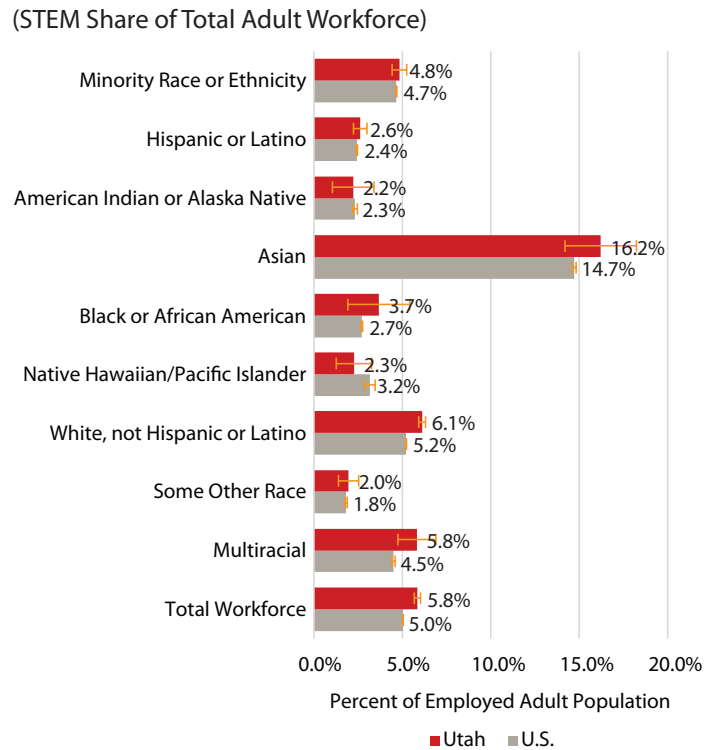
Compared with the previous (“legacy”) definition, the updated definition adds three NAICS codes that made up 24.6% of Utah’s life sciences employment in 2021: 424210 (wholesale pharmaceuticals), 541713 (research and development in nanotechnology), and 541714 (research and development in biotechnology). The updated definition leaves out NAICS 339116 (dental laboratories) from the legacy definition, which would be 3.0% of 2021 life sciences employment under the updated definition.³ The net effect of adding three NAICS codes and removing one was to increase 2021 life sciences employment by 27.5% in Utah and 38.1% in the U.S. Additional information on the industry definition change can be found in the section “Data Methods for Life Sciences Job Growth and Specialization Analysis.”

Figure 5: Women in STEM Occupations, Utah and U.S., 2016–2020



STEM = Science, Technology, Engineering, and Mathematics
 Note: Shares include people age 18 years and above, not living in group quarters, with employee or self-employed jobs in the previous five years. Markers at the end of each bar indicate a 90% confidence interval based on a systematic Utah sample of 83,768 adults, among them 941 female STEM workers.
 Source: U.S. Census Bureau, American Community Survey, Integrated Public Use Microdata Series; U.S. Bureau of Labor Statistics definition of STEM occupations

Figure 6: STEM Occupations in Racial and Ethnic Groups, Utah and U.S., 2016–2020



STEM = Science, Technology, Engineering, and Mathematics
 Note: Shares include people age 18 years and above, not living in group quarters, with employee or self-employed jobs in the previous five years. Minority aggregation includes any race besides White and any ethnicity besides Hispanic or Latino. “Hispanic or Latino” ethnicity includes people from any minority racial group. Minority races include people regardless of their ethnicity. People who are “multiracial” belong to two or more standard race groups. Markers at the end of each bar indicate a 90% confidence interval based on a systematic Utah sample of 83,768 adults. STEM minority demographic subgroups each included between 19 and 227 members of the workforce.
 Source: U.S. Census Bureau, American Community Survey, Integrated Public Use Microdata Series; U.S. Bureau of Labor Statistics definition of STEM occupations

Table 2: Selected Results Comparing Legacy and Updated Definitions for the Life Sciences Industry

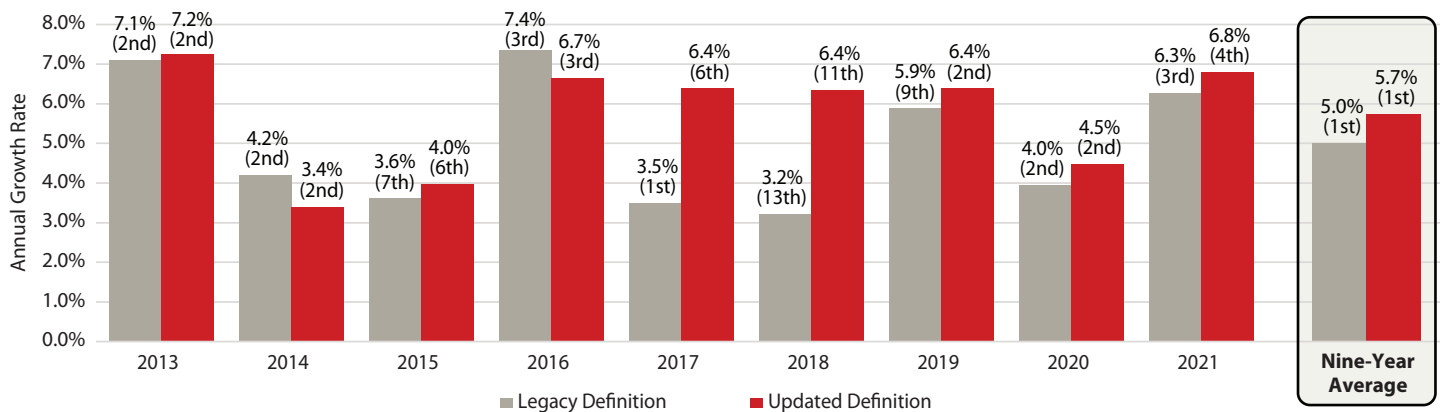
Item	Utah (Ranking Among Top 20 States)		U.S.	
	Legacy Definition	Updated Definition	Legacy Definition	Updated Definition
<i>Life Sciences Job Growth Rate (Annual Percent Change in Employment):</i>				
Nine-Year Average, 2012 to 2021	5.0% (1st)	5.7% (1st)	2.4%	3.2%
Five-Year Average, 2016 to 2021	4.6% (3rd)	7.7% (5th)	3.2%	6.7%
Single-Year Growth, 2020 to 2021	6.3% (3rd)	6.8% (4th)	5.0%	5.5%
<i>Life Sciences Share of Workforce (Percent of Total Employee Jobs):</i>				
2012	1.9% (1st)	2.3% (3rd)	1.0%	1.2%
2016	2.1% (1st)	2.5% (3rd)	0.9%	1.2%
2021	2.2% (1st)	2.9% (2nd)	1.1%	1.5%

Note: The Gardner Institute used its previous (“legacy”) definition for state comparisons in publications from August 2018 through January 2022. This research brief features an updated definition for Utah’s life sciences industry. Based on their 2021 life sciences employment, the almost same 20 states had the most jobs under either definition: Maryland replaced Wisconsin under the updated definition. For year-by-year Utah and U.S. job growth rates under the updated definition, see Figures 1 to 3 and Table 1. For state-by-state workforce shares under the updated definition, see Figure 4.

Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

Figure 7: Utah Life Sciences Job Growth Rate Under Legacy and Updated Industry Definitions, 2013–2021

(Percent Change in Employment Since Previous Year; Utah’s Growth Rank Among 20 States with Most Life Sciences Jobs in 2021)



Note: Nine-year averages are compound average growth rates from 2012 to 2021. All growth rates are based on employee jobs, without counting self-employment, in NAICS industries considered to be 100% life sciences, excluding handpicked companies. Also, the Bureau of Labor Statistics did not disclose Utah employment in NAICS 325413-4 or 339114-5, except partially in 2017 and 2019. Nondisclosure indicates low employment and/or company counts. Due to NAICS system changes in 2017, life sciences employment starting that year may include nanotechnology jobs that are not for nanobiotechnology. Under this incomplete but substantial measure, Utah’s life sciences employment rose from 19,476 jobs in 2012 to 30,214 jobs in 2021 for the legacy definition; for the updated definition, industry employment rose from 23,327 jobs in 2012 to 38,525 jobs in 2021. For details on legacy and updated definitions, see Table 3.

Source: Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

To illustrate how the updated definition measures industry growth and specialization differently, Table 2 presents six key findings under the legacy definition as well. For example, Utah’s average job growth rate from 2016 to 2021 was 4.6% per year (3rd among states) under the legacy definition and 7.7% (5th) under the updated definition. The state rankings are for the 20 states with the most life sciences employment in 2021. Industry workforce shares are consistently higher under the updated definition. For example, Utah’s specialization in life sciences in 2012 amounted to 1.9% of the workforce according to the legacy definition versus 2.3% under the updated definition. Figure 7 shows annual growth rates for both definitions.

Data Methods for Life Sciences Job Growth and Specialization Analysis

Based on data availability, results in Figures 1 through 4 and Tables 1 and 2 include most - but not all - employee jobs in the life sciences industry. For consistency across states and over time, this analysis does not include self-employed workers or employee counts from handpicked life sciences companies outside of specified industry codes. Also, state-level employment data is incomplete (too low) in some instances due to disclosure protocols for company-reported job counts. However, the forthcoming report will be more comprehensive and include self-employed workers, employees from industries with low employment levels, and employees from a list of handpicked companies outside of the updated NAICS definition,

Table 3: Reconciliation of Updated Life Sciences Industry Definition for State Comparisons(Component Industries with 100% of Companies Counted as Life Sciences; Employee Jobs in 2021)¹

Code ²	NAICS Industry Description ²	Definition ³		Utah Jobs		U.S. Jobs	
		Legacy	Updated	Number ⁴	Share ⁵	Number	Share ⁵
325411	Medicinal and Botanical Manufacturing	■	■	2,167	5.6%	38,100	2.1%
325412	Pharmaceutical Preparation Manufacturing	■	■	5,488	14.2%	219,438	12.3%
325413	In-Vitro Diagnostic Substance Manufacturing	■	■	ND	ND	33,830	1.9%
325414	Biological Product (except Diagnostic) Manufacturing	■	■	ND	ND	40,481	2.3%
334510	Electromedical and Electrotherapeutic Apparatus Manufacturing	■	■	1,427	3.7%	74,854	4.2%
334516	Analytical Laboratory Instrument Manufacturing	■	■	198	0.5%	40,723	2.3%
334517	Irradiation Apparatus Manufacturing	■	■	1,602	4.2%	13,896	0.8%
339112	Surgical and Medical Instrument Manufacturing	■	■	8,889	23.1%	136,318	7.6%
339113	Surgical Appliance and Supplies Manufacturing	■	■	1,162	3.0%	102,795	5.8%
339114	Dental Equipment and Supplies Manufacturing	■	■	ND	ND	15,714	0.9%
339115	Ophthalmic Goods Manufacturing	■	■	ND	ND	23,382	1.3%
339116	Dental Laboratories	■	■	1,152	NA	42,907	NA
423450	Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	■	■	2,551	6.6%	277,317	15.5%
423460	Ophthalmic Goods Merchant Wholesalers	■	■	139	0.4%	22,364	1.3%
424210	Drugs and Druggists' Sundries Merchant Wholesalers		■	3,889	10.1%	243,730	13.6%
541713	Research and Development in Nanotechnology		■	2,430	6.3%	24,174	1.4%
541714	Research and Development in Biotechnology (except Nanobiotechnology)		■	3,144	8.2%	252,515	14.1%
621511	Medical Laboratories	■	■	5,439	14.1%	225,994	12.7%
Total – Legacy Life Sciences Definition (15 NAICS Industries)		■		30,214	78.4%	1,308,113	73.3%
Total – Updated Life Sciences Definition (17 NAICS Industries)			■	38,525	100.0%	1,785,625	100.0%

NAICS = North American Industry Classification System

ND = Not disclosed (employment not reported for industries with too few companies and/or jobs)

NA = Not applicable (shares omitted for dental laboratories, which is not part of the updated definition)

Notes:

1. Employment includes full- and part-time employee jobs at life sciences companies. This data does not include self-employed workers.
2. Six-digit codes match descriptions for the most disaggregated level of NAICS industries available. These are components or sub-industries within the life sciences industry (or sector).
3. In November 2022, the Gardner Institute adopted an updated definition for Utah's life sciences industry. The Gardner Institute used its legacy definition for state comparisons in publications from August 2018 through January 2022.
4. A Quarterly Census of Employment and Wages (QCEW) disclosure protocol results in incomplete state-level employment data for Utah and other states. For four industries where the U.S. Bureau of Labor Statistics reported zero Utah employee jobs in 2021, the Utah Department of Workforce Services reported nonzero employment ranges and identified 10 or fewer establishments per industry. An establishment is a business entity or location; companies may have more than one in-state establishment. Total Utah employment for the four industries was 1,113 to 2,284 jobs in 2021 (2.9% to 5.9% of the life sciences industry total under the updated definition). These amounts included 32 to 76 jobs at five establishments in NAICS 325413, 25 to 69 jobs at six establishments in NAICS 325414, 1,030 to 2,077 jobs at 10 establishments in NAICS 339114 (with one establishment accounting for 93% to 99% of industry employment), and 26 to 62 jobs at three establishments in NAICS 339115. QCEW data would also be under-reported in similar circumstances in other states. Treating amounts that are not disclosed as zero is a methodology limitation. The QCEW offers the most detailed employment data available.
5. Shares are based on the updated definition, with denominators of 38,525 jobs (Utah) or 1,785,625 jobs (U.S.). Shares may not add exactly to 100% due to rounding.

Source: Kem C. Gardner Policy Institute definitions based on a national literature review and input from BioUtah, BioHive, Utah Governor's Office of Economic Opportunity, and Economic Development Corporation of Utah; for employment, Kem C. Gardner Policy Institute analysis of data from the U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages

which list is developed with input and validation from BioUtah and BioHive.

This research brief introduces an updated Gardner Institute definition for Utah's life sciences industry (see Table 3).⁴ The industry definition for this analysis includes every company in 17 industries with the following six-digit codes from the 2017 North American Industry Classification System (NAICS): 325411–4, 334510, 334516–7, 339112–5, 423450, 423460, 424210, 541713–4, and 621511.⁵ For state comparisons in publications from January 2020 to January 2022, the Gardner Institute used a different ("legacy") definition with 15 industries including NAICS 339116 and omitting NAICS 333314, 424210, and 541713–4.⁶

Meanwhile, the Gardner Institute's August 2018 life sciences report and the Institute's chapters in the 2020 and 2022 Economic Report to the Governor used a more comprehensive version of the legacy definition.⁷ Single-year Utah-only results in these three publications included many large, handpicked life sciences companies outside of the industries identified as 100% life sciences under the legacy definition. The three publications also included jobs for self-employed workers (life sciences proprietorships). The Gardner Institute is unable to replicate this level of detail for other states.

The U.S. Bureau of Labor Statistics (BLS) publishes data on employee jobs at the state level. The data tallies full- and part-time employee jobs by NAICS industry and calendar year. BLS

data reflect company-reported average employment levels over 12 months.

BLS data underreport life sciences employment somewhat for Utah and, likely, several other states. The BLS does not disclose annual employment at the state level for six-digit NAICS industries with low employment levels and few establishments. In 2021, nondisclosed data amounted to 2.9% to 5.9% of total employee jobs in Utah's life sciences industry (see Table 3 note 4).⁸ The effects of BLS disclosure protocols are not limited to Utah among the 20 states with the largest life sciences employment. Underreporting is unevenly distributed: states with more life sciences jobs are less likely to have a disclosure issue for a component NAICS industry. The nondisclosure issue is not present in custom data requests to the Utah Department of Workforce Services, the Gardner Institute approach for in-depth reports (August 2018 and forthcoming). However, the more comprehensive treatment of those is not feasible for multiple states or prior years.

Data Methods for STEM Workforce Demographic Analysis

Results in Figures 5 and 6 rely on a U.S. Census Bureau survey. Each year, approximately 1% of households in Utah and other states respond to American Community Survey (ACS) questions on their employment status, occupation, race, ethnicity, and sex. The University of Minnesota compiles ACS data in its Integrated Public Use Microdata Series (IPUMS). This research

brief presents results from five years of pooled data in pursuit of reliably large sample sizes for minority demographics groups in STEM occupations.

In the five-year IPUMS data release, 2016 to 2020, the Utah sample included 83,768 adults employed in the five years prior to taking the survey.⁹ The smallest demographic group in the STEM workforce was Native Hawaiian or Other Pacific Islander with 19 responses, and there were 21 responses from Black or African American people and 22 responses from American Indian or Alaska Native people. All other groups had more than 50 responses from people in STEM occupations. Much larger sample sizes were available by sex in Utah and by race, ethnicity, and sex in the U.S. Confidence intervals in Figures 6 and 7 help readers assess inherent uncertainty in generalizing from high-quality sample data to the general population of working adults.

Specific occupations are categorized under the 2018 Standard Occupation Classification (SOC) system used by the U.S. Census Bureau and U.S. Bureau of Labor Statistics (BLS). A BLS STEM definition identifies 102 six-digit SOC codes for occupations in life and physical science, engineering, mathematics, and information technology.¹⁰ Workforce demographics results in this document do not include the social science, architecture, or health care occupations found in the BLS STEM definition, since life sciences companies are less likely to employ people in those three fields.

Endnotes

1. See Pace, L. & Spolsdoff, J. (2018, August). *Economic Impacts of Utah's Life Sciences Industry*. Kem C. Gardner Policy Institute. <https://bioutah.org/wp-content/uploads/2019/08/Aug2018-LifeSciencesReport.pdf>; Pace, L. (2020, January). "Life Sciences Industry." In Simonsen, S. (Ed.), *Economic Report to the Governor: 2020* (pp. 149–152). Utah Economic Council, David Eccles School of Business, University of Utah. <http://gardner.utah.edu/wp-content/uploads/ERG2020.pdf>; Burton, L. & Pace, L. (2021, August). *Growth Trends in Utah's Life Sciences Industry*. Kem C. Gardner Policy Institute. <https://gardner.utah.edu/wp-content/uploads/LifeSci-FS-Aug2021.pdf>; and Pace, L. (2022, January). "Life Sciences." In Simonsen, S. (Ed.), *Economic Report to the Governor: 2022* (pp. 141–144). Utah Economic Council, David Eccles School of Business, University of Utah. <https://gardner.utah.edu/wp-content/uploads/ERG2022-Full.pdf>
2. See Brandley, A. & Pace, L. (2023, January). "Life Sciences." In Simonsen, S. (Ed.), *Economic Report to the Governor: 2023* (pp. 161–164). Utah Economic Council, David Eccles School of Business, University of Utah. <https://gardner.utah.edu/wp-content/uploads/ERG2023.pdf>.
3. The value of 3.0% is offered as a ratio, since NAICS 339116 from the legacy definition is not included in the denominator of the implied employment fraction for 2021. The ratio was calculated as Utah employee jobs at dental laboratory companies *divided by* Utah employee jobs at companies in 17 other NAICS codes under the updated life sciences definition.
4. In January 2023, the Gardner Institute introduced an earlier version of the updated definition that omitted NAICS 541713, Research and Development in Nanotechnology, and included NAICS 333314, Optical Instrument and Lens Manufacturing (see Brandley and Pace, 2023). Further analysis and industry dialogue indicated that NAICS 541713 was almost entirely nanobiotechnology in Utah as of 2021, though perhaps not in some other states. Meanwhile, NAICS 333314 had fewer than 25 jobs that year and, preparing for future Gardner Institute research, did not crosswalk intact from the 2017 NAICS system into the 2022 NAICS system.
5. NAICS definitions update every five years. This analysis relied on crosswalk information to move between the 2012 NAICS system and the 2017 NAICS system. The 2017 version created NAICS 541713, Research and Development in Nanotechnology, and NAICS 541714, Research and Development in Biotechnology (except Nanobiotechnology), from two 2012 NAICS industries—all of NAICS 541711, Research and Development in Biotechnology, and part of NAICS 541712, Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology). Starting in 2022, Bureau of Labor Statistics data follows the 2022 NAICS system.
6. See Pace (2020); Burton and Pace (2021); and Pace (2022).
7. See Pace (2020); Pace (2022); and Pace and Spolsdoff (2018).
8. Utah Department of Workforce Services. (2022, March). *Firm Find*. September 2021 dataset. <https://jobs.utah.gov/jsp/firmfind/>
9. Ruggles, S., Flood, S., Goeken, R., Schouweiler, M., & Sobek, M. (2022). *IPUMS USA: Version 12.0 American Community Survey, 5-Year Sample, 2016 to 2020*. University of Minnesota. <https://usa.ipums.org>
10. U.S. Bureau of Labor Statistics. (2019, June). *Occupational Employment and Wage Statistics*. <https://www.bls.gov/oes/topics.htm#stem>

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