



Kem C. Gardner
POLICY INSTITUTE
THE UNIVERSITY OF UTAH

DAVID ECCLES SCHOOL OF BUSINESS

Utah's Life Sciences Industry

REMI Conference
October 19, 2023

Levi Pace, Ph.D.

INFORMED DECISIONS™

Utah's Life Sciences Industry

- Study origins and industry context
- REMI inputs and modeling
- Study results
- A methods question
- Study components besides economic impacts

Life Sciences Study Origins

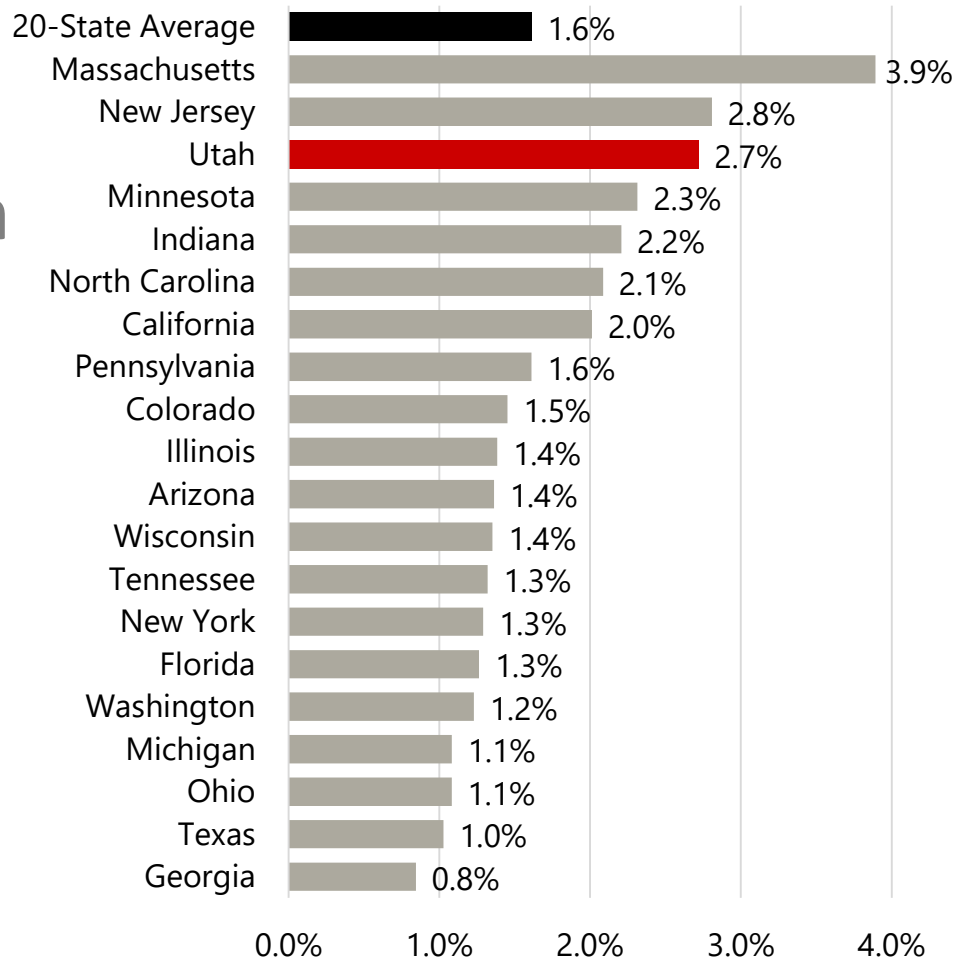
- Documenting economic impacts and trends
- Sponsorship from biosciences trade associations
- An update of a 2018 University of Utah study
- Research conducted May 2022 to October 2023

Life Sciences in Utah

Workforce Concentration

(Life Sciences Share of Total Employee Jobs;
Top 20 States by Life Sciences Employment)

Share of Statewide Employment:
2.7% of Utah Jobs (3rd among top 20 states)
1.5% of U.S. Jobs



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

Life Sciences in Utah

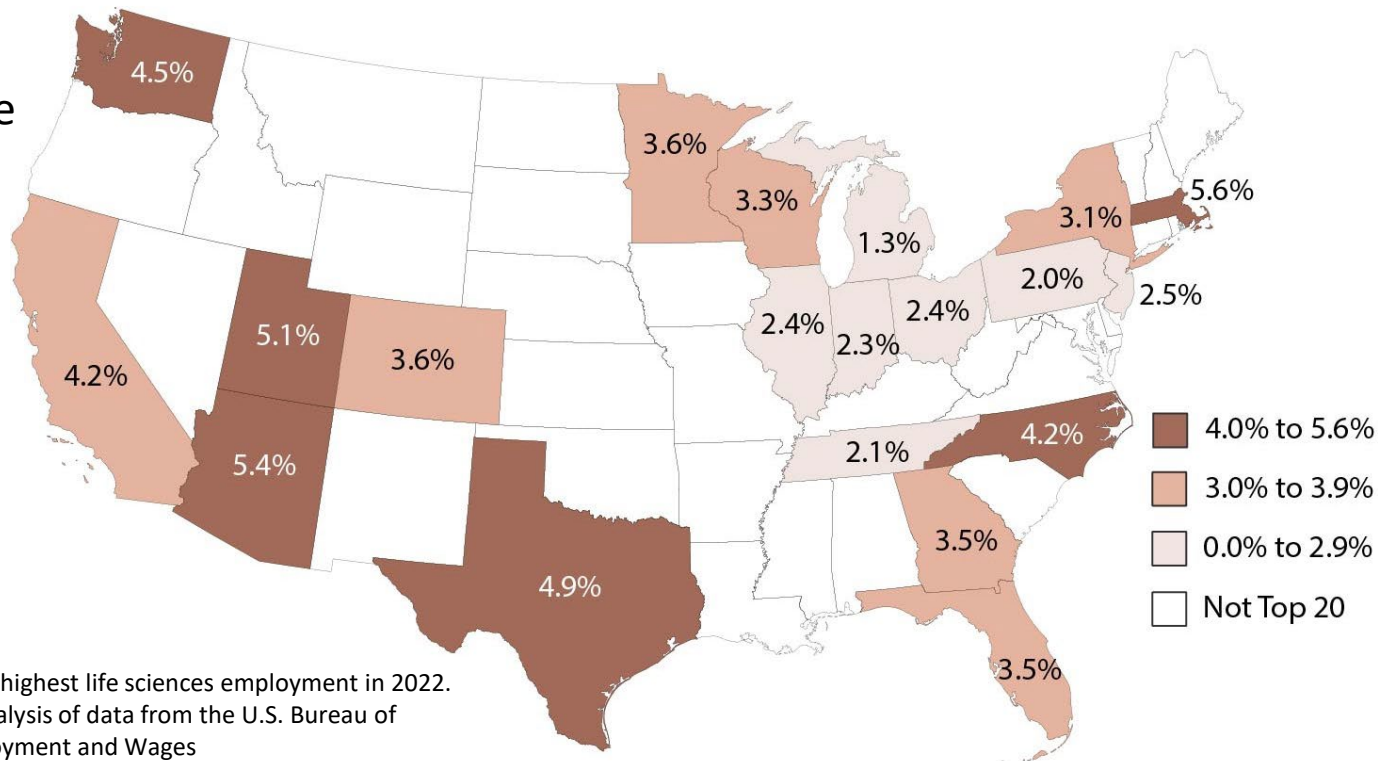
Average Job Growth Rate from 2012 to 2022

(10-Year Average Annual Percent Change in Employment)

Comparison:

Utah: 5.1%

U.S.: 3.5%



Note: Map features the 20 States with the highest life sciences employment in 2022.

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

Life Sciences & Healthcare Innovation

Industry Definition – Four Segments

1. Medical Devices and Diagnostics
2. Research, Testing, and Medical Laboratories
3. Therapeutics and Pharmaceuticals
4. Biosciences-Related Distribution

17 NAICS codes (1,508 firms)

Known companies handpicked (126 firms)

Preparing REMI Inputs

Employee Jobs and Wages

For NAICS industries and handpicked companies:

- Employee jobs (covered employment)
- Wages and salaries

Source:

- Quarterly Census of Employment and Wages (QCEW) – 2022 average jobs and total wages
- Data request to Utah’s BLS program manager at DWS based on industry and company lists

REMI NAICS	QCEW Jobs	Wages (Millions)
325	6,361	\$744.9
334	2,652	\$235.4
339	11,711	\$907.3
42	5,831	\$622.5
54	5,754	\$382.8
621	8,295	\$557.2
Total	40,604	\$3,450.2

Source: Utah Department of Workforce Services

Preparing REMI Inputs

Self-Employment

Besides life sciences companies with employees:

- Jobs for self-employed workers
- Proprietors' income

Estimates based on employee jobs and wages:

- Self-employment – QCEW jobs *times* BEA-QCEW ratios by sector
- Proprietors' income – self-employment jobs *times* average proprietors' income by sector

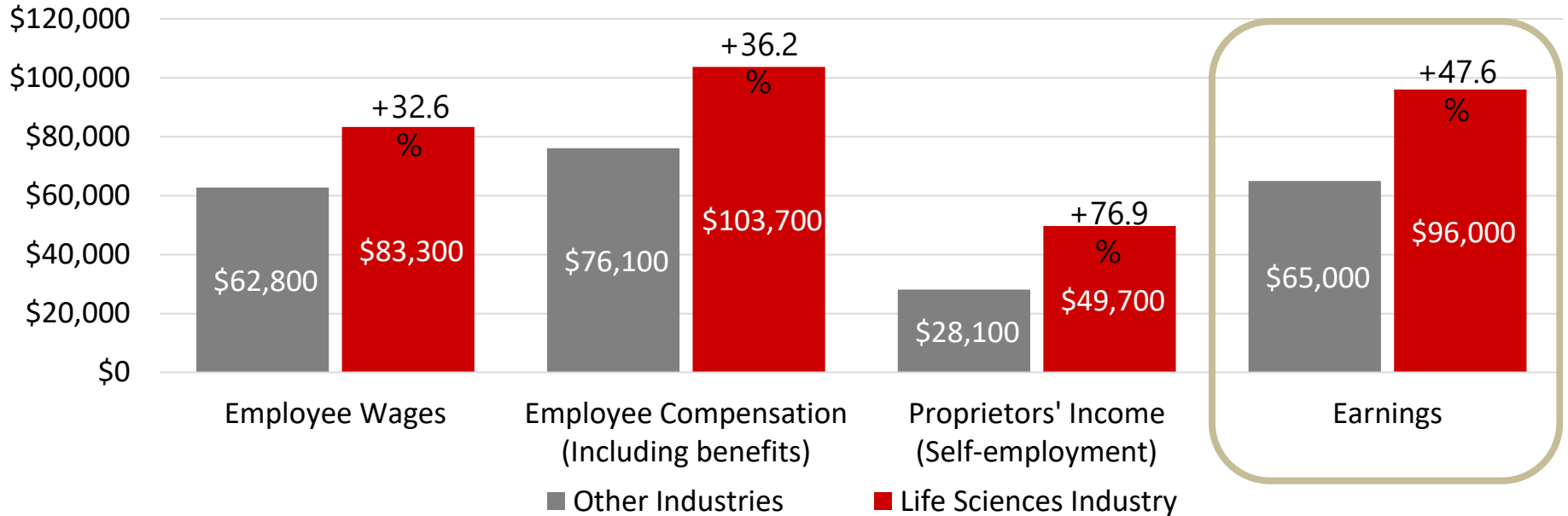
REMI NAICS	BEA-QCEW Jobs Ratio	BEA Proprietor Income, Avg.
325	1.054	\$124,435
334	1.023	\$127,452
339	1.108	\$5,464
42	1.118	\$138,584
54	1.483	\$27,598
621	1.178	\$61,275

Source: U.S. Bureau of Economic Analysis 2021

Key Findings

Worker Earnings

Utah Life Sciences Industry Direct Economic Activity, 2022



Source: Kem C. Gardner Policy Institute analysis of data from Utah Department of Workforce Services, U.S. Bureau of Economic Analysis using REMI PI+ economic model

Modeling in REMI

Regional economic analysis

- *Economic impact rationales:*
out-of-state sales and import substitution
- *Modeling needs:*
full/dynamic economic impacts
population effects for in-house fiscal impact model
- *Direct effects inputs entered as negative amounts:*
jobs, wage adjustment, proprietor income
- *Replication by co-authors:*
calculations for inputs and run in REMI v3.0.2

REMI Inputs List

Employment

Life sciences

Save Forecast Import Export Print Tools

Select Inputs [Inputs List](#)

Policy Variable Inputs

Active	Edit	Group								
<input checked="" type="checkbox"/>		Employment (employees + proprietors)								
<input checked="" type="checkbox"/>		Employment	Industry Employment: 334 (Computer and electronic product manufacturing)	Utah	Units	0	-2712	0	0	
<input checked="" type="checkbox"/>		Employment	Industry Employment: 339 (Miscellaneous manufacturing)	Utah	Units	0	-14391	0	0	
<input checked="" type="checkbox"/>		Employment	Industry Employment: 325 (Chemical manufacturing)	Utah	Units	0	-8841	0	0	
<input checked="" type="checkbox"/>		Employment	Industry Employment: 42 (Wholesale trade)	Utah	Units	0	-10373	0	0	
<input checked="" type="checkbox"/>		Employment	Industry Employment: 54 (Professional, scientific, and technical services)	Utah	Units	0	-11863	0	0	
<input checked="" type="checkbox"/>		Employment	Industry Employment: 621 (Ambulatory health care services)	Utah	Units	0	-6780	0	0	
<input checked="" type="checkbox"/>		Proprietors' Income								
<input checked="" type="checkbox"/>		Wage adjustment								

REMI Inputs List

Worker Income

Life sciences

Save Forecast Import Export Print Tools Select Inputs [Inputs List](#)

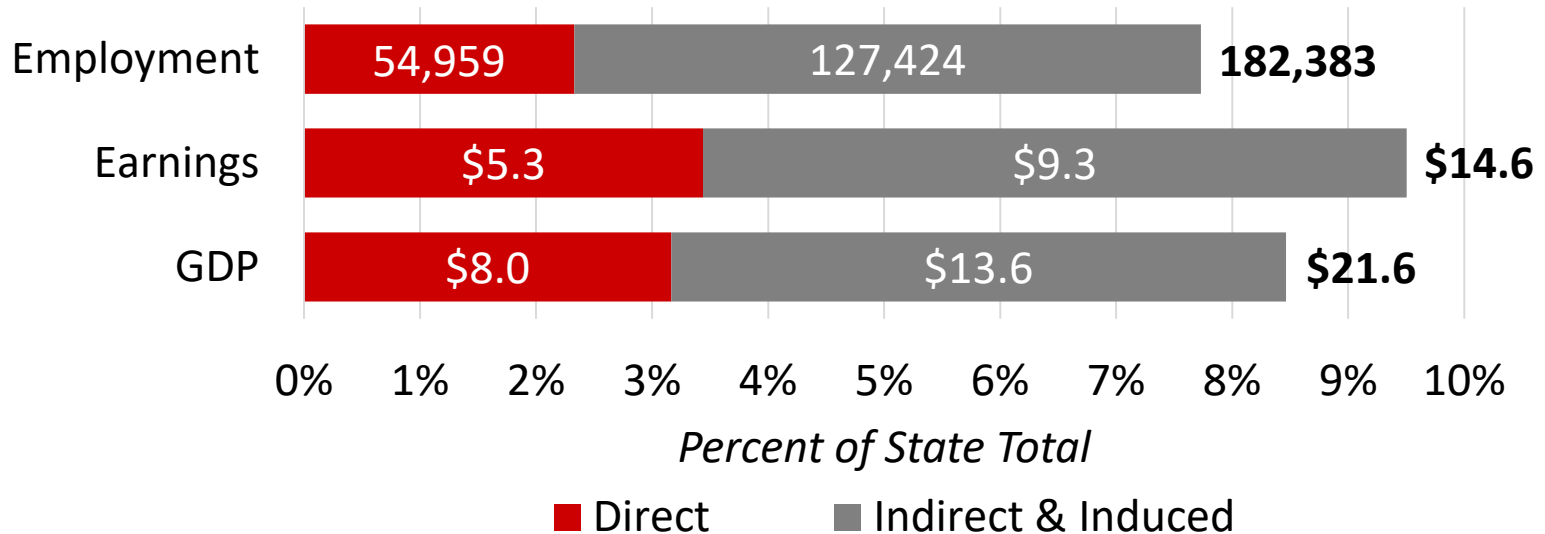
Policy Variable Inputs

Active	Edit	Group						
<input checked="" type="checkbox"/>		Employment (employees + proprietors)						
<input checked="" type="checkbox"/>		Proprietors' Income						
Active	View	Category	Detail	Region	Units	2021	2022	2023
<input checked="" type="checkbox"/>		Proprietors' Income	334 (Computer and electronic product manufacturing)	Utah	Nominal	0	-7619491.84430688	0
<input checked="" type="checkbox"/>		Proprietors' Income	339 (Miscellaneous manufacturing)	Utah	Nominal	0	-7646431.67677445	0
<input checked="" type="checkbox"/>		Proprietors' Income	325 (Chemical manufacturing)	Utah	Nominal	0	-56014984.7717464	0
<input checked="" type="checkbox"/>		Proprietors' Income	42 (Wholesale trade)	Utah	Nominal	0	-151848088.284795	0
<input checked="" type="checkbox"/>		Proprietors' Income	54 (Professional, scientific, and technical services)	Utah	Nominal	0	-106671532.13885	0
<input checked="" type="checkbox"/>		Proprietors' Income	621 (Ambulatory health care services)	Utah	Nominal	0	-62892399.0134777	0
<input checked="" type="checkbox"/>		Wage adjustment						
Active	View	Category	Detail	Region	Units	2021	2022	2023
<input checked="" type="checkbox"/>		Wages	Wage Bill: 334 (Computer and electronic product manufacturing)	Utah	Nominal	0	34084860	0
<input checked="" type="checkbox"/>		Wages	Wage Bill: 339 (Miscellaneous manufacturing)	Utah	Nominal	0	-179853509	0
<input checked="" type="checkbox"/>		Wages	Wage Bill: 325 (Chemical manufacturing)	Utah	Nominal	0	-46148	0
<input checked="" type="checkbox"/>		Wages	Wage Bill: 42 (Wholesale trade)	Utah	Nominal	0	-208401694	0
<input checked="" type="checkbox"/>		Wages	Wage Bill: 54 (Professional, scientific, and technical services)	Utah	Nominal	0	-271736512	0
<input checked="" type="checkbox"/>		Wages	Wage Bill: 621 (Ambulatory health care services)	Utah	Nominal	0	-67935520	0

Key Findings

Economic Impacts

Utah Life Sciences Industry, 2022 (Jobs; Billions of Dollars)



Source: Kem C. Gardner Policy Institute analysis of data from Utah Department of Workforce Services, U.S. Bureau of Economic Analysis using REMI PI+ economic model

Utah's Life Sciences Industry

- Study origins and industry context
- REMI inputs and modeling
- Study results
- A methods question
- Study components besides econ. impacts

Methods Question: Concept

Indirect & induced effects in life sciences NAICS codes

REMI 70-sector industry (hypothetical share of activity)

108% > 100% of NAICS 325

Direct effects

NAICS 325 (100%)

NAICS 339 (50%)

A few other industries

Indirect & induced effects

NAICS 325 (8%)

NAICS 339 (6%)

Many other industries

Total economic impacts

NAICS 325 (108%)

NAICS 339 (56%)

Many other industries

Perhaps 3% (half of 6%) overlaps NAICS 339 direct effect

Total economic impact can exceed 100% of industry activity or overlap direct activity

Methods Question: Options

Indirect & induced effects in life sciences NAICS codes

Alternative A: Count all economic impacts for consistent “multiplier” even with impossible or overlapping indirect & induced effects

Alternative B: Constrain total economic impacts to 100% of NAICS industries to reflect Utah’s historical economy

Alternative C: Make proportional adjustments to indirect and induced effects in NAICS industries that are partially life sciences

Methods Question: Implementation

Indirect & induced effects in life sciences NAICS codes

Adjustment: We followed alternatives B and C to avoid indirect & induced effects above 100% or partially overlapping our direct effects

Implementation:

1. From REMI's total economic impacts, subtract direct effects to get indirect & induced effects for jobs, earnings, and GDP by REMI NAICS sector
2. Calculate life sciences direct effects share of each REMI NAICS sector total from the regional control, also using jobs, earnings, and GDP
3. Multiply indirect & induced amount in a NAICS sector by (1 *minus* life sciences share in step 2) and keep adjusted amount of indirect & induced effects

Outcome: Total economic impacts from REMI reduced by 4.1% of employment, 5.8% of earnings, and 4.6% of GDP

Additional Study Components

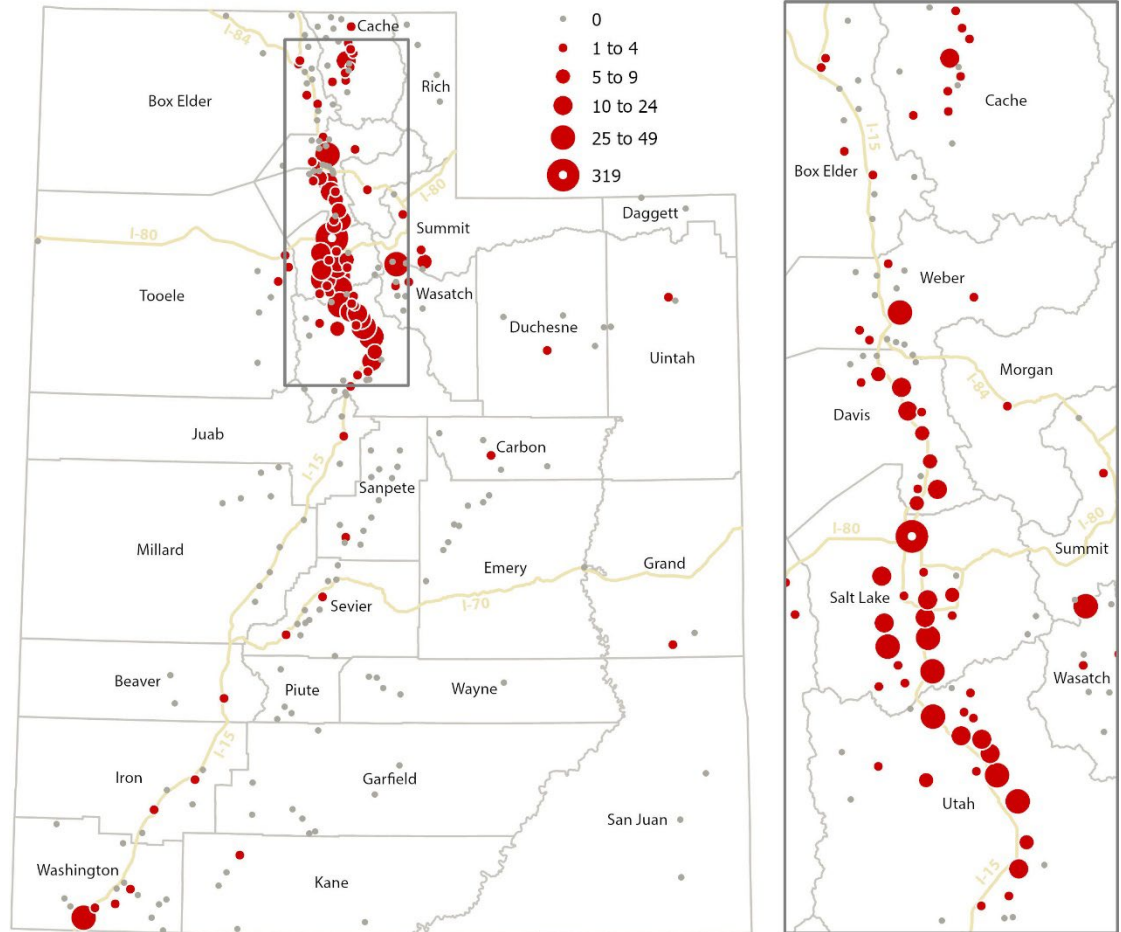
Besides economic impacts

1. Company locations
2. Sales destinations, exports from Utah
3. Job growth comparisons, historical and state (BLS QCEW)
4. Workforce demographics (ACS IPUMS)
5. Higher ed degrees, NIH funding, and tech transfer (NCES, USAspending, and university data requests)

Statewide Activity

Company locations

- Number of life sciences firms per municipality in 2022
- Companies with employees only
- ArcGIS Pro



Exports Estimated with REMI

Sales in Utah, other states, and other countries

- *Inputs:* Trade flows from regional control
- *Calculate:* Utah shares by destination
- *Estimate:* Output by life sciences segment and destination

Trade Flows						
Year	Category	Industry	Destination			
2022	<input checked="" type="checkbox"/> Trade Flows	<input checked="" type="checkbox"/> 325 (Chemical manufacturing)				
Origin	Units	Utah	Rest of Nation	Rest of World	Output	
Utah	Billions of Fixed (2012) Dollars	1.85626	1.72886	0.84610	4.43122	
Rest of Nation	Billions of Fixed (2012) Dollars	4.22407				
Rest of World	Billions of Fixed (2012) Dollars	2.59618				
Demand	Billions of Fixed (2012) Dollars	8.67651				

Publication Coming soon!

Public release planned around
life sciences summit on
November 9, 2023

*By Andrea Thomas Brandley and
Levi Pace, 37 pages*

INFORMED DECISIONS™

Levi Pace, Ph.D.
Senior Research Economist
Andrea Thomas Brandley
Senior Education Analyst

Economic Impacts of Utah's Life Sciences and Healthcare Innovation Industry

Utah's life sciences and healthcare innovation industry creates substantial economic impacts across the state through high-paying jobs at companies in research, testing, medical laboratories, medical devices, biosciences-related distribution, and therapeutics and pharmaceuticals.

November 2023

 **Kem C. Gardner
POLICY INSTITUTE**
THE UNIVERSITY OF UTAH
DAVID ECCLES SCHOOL OF BUSINESS

411 East South Temple Street
Salt Lake City, Utah 84111
801-585-5618 | gardner@utah.edu

Kem C. Gardner Policy Institute

Thomas S. Monson Center | 411 E. South Temple Street
Salt Lake City, UT 84111 | 801-585-5618 | gardner.utah.edu

DAVID ECCLES SCHOOL OF BUSINESS
UNIVERSITY OF UTAH

