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2023 Rural Report

How Rural States Benefit From Strong **NIH** Funding

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How Rural States Benefit From Strong NIH Funding

With an annual budget of more than **$40 billion**, the National Institutes of Health (NIH) is the largest single public funder of biomedical research in the world. The primary mission of the NIH is to improve health, but it also has a significant direct economic impact. Last fiscal year, the **$36.68 billion** awarded to researchers in the United States generated an estimated **$96.84 billion** in economic activity nationwide[1].

This report looks at the impact of NIH funding in rural states — where the populations and economies are far smaller and there are far fewer organizations conducting biomedical research — and how NIH research funding has an exponential impact in these states.

Alabama | Arkansas | Kentucky | Maine | Mississippi | New Hampshire | West Virginia

WHY THESE STATES?

These states are among the top 10 most rural states in the nation. In 2022, they had:

- A rural population share of 45.5%, more than **two times** the 18.5% average share of the rest of the states.
- An average total economic output (GDP) of $149 billion, just over **one-fourth** of the average GDP of the rest of the states.
- An average state population of just under 2.9 million, less than **one-half** the average population of the rest of the states.
- An average total NIH award amount of $154 million — less than **one-fifth** of the average award amount of the states not included in this report.

See Table 1

The economic analysis for this report was performed by Ronald Horst, Ph.D., Inforum, June 2023.

[1]United for Medical Research, NIH's Role in Sustaining the U.S. Economy, 2023, https://unitedformedicalresearch.org/annual-economic-report

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The Exponential Impact of NIH Research Funding

When researchers and organizations in a state are awarded **NIH funding**, the impact of that funding reaches far beyond its original recipients.

1. **Medical research improves health and provides hope** for individuals and families affected by disease. When medical research is conducted locally, it may present the opportunity to participate in clinical trials.
2. **NIH research funding directly supports jobs** in research and research-supporting businesses, helping to boost household earnings.
3. **The infusion of NIH research funding generates sales** for instate businesses and contributes to state and local economies through taxes and fees. Improved health also contributes to reduced sick days and increased productivity.
4. **NIH funding helps rural states attract highly skilled workers,** building up the quality of a state's labor force and helping to attract new businesses. This is particularly important in rural states where population growth is slowing or declining.
5. **Health benefits arising from NIH-funded medical research will have a substantially greater fiscal impact on small, rural states** (regardless of where the research is conducted). In six of the seven states examined, a higher share of the state population was enrolled in Medicare or Medicaid and a higher proportion of the state's budget was spent on these programs than in other states.

As the NIH budget has grown, rural states have benefitted

By increasing the overall amount of money available for NIH research from 2016–2022, congressional efforts have had a major, beneficial impact on smaller, rural states.

On average, each state benefited from $2.2 billion of new economic activity during this period.

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Economic Impact of NIH Funding on Selected States

As NIH funding is awarded to researchers in individual states, that funding supports employment and the purchase of research-related goods, services and materials. The income generated from these operational expenditures, along with that from capital asset expenditures (e.g., building, equipment, machinery, sophisticated software) cycles through the economy to produce new economic activity.

In 2022, that funding supported an average of **2,300 jobs** and **$353 million in new economic activity** per state, or $2.3 dollars of economic activity for each dollar of NIH research funding.

See Table 2

Every $1 NIH Funding = $2.3 of Rural State Economic Activity

Household Impact

Economic activity includes household spending, which is also positively impacted by NIH research funding. **The collective impact on households in each of the seven states in 2022 was an average of $112 million.**

See Table 11

State and Local Revenue

While many NIH-funded institutions are non-profits, their employees, their vendors and the in-state businesses patronized by these vendors and employees pay a wide range of taxes and fees. Also captured as part of the total economic activity number is **an average of $31 million in tax and fee revenue** flowing to state and local government entities in each of the selected states.

See Table 13

ABOUT THESE NUMBERS

This report differs from UMR's annual report, NIH's Role in Sustaining the U.S. Economy, in that it includes instate capital expenditures and does not include interstate effects in the "total" impact numbers. Focusing only on **intrastate** effects, including capital expenditures, allows this report to best single out the impact of NIH money that is awarded to researchers in the target states.

2022
DIRECT ECONOMIC IMPACT
AVERAGE PER STATE

$353M
New Economic Activity

2,300
Jobs Supported

$112M
Total State Household Impact

$31M
Tax and Fee Revenue

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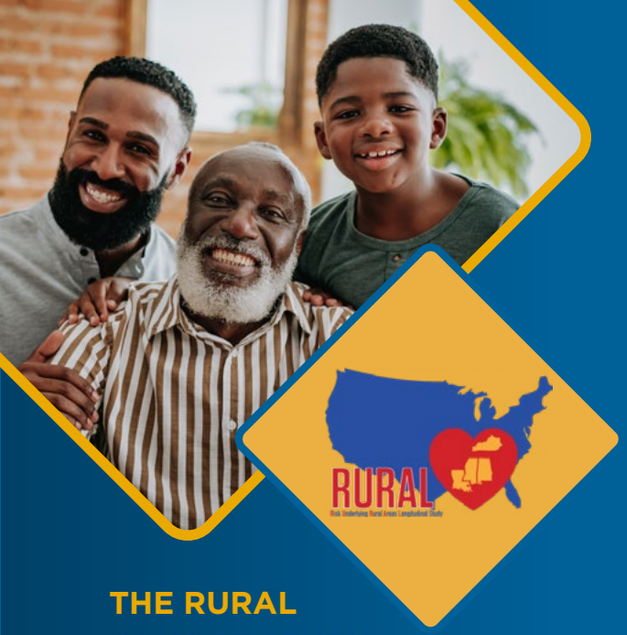


THE RURAL COHORT STUDY

Funded by NIH, the Risk Underlying Rural Areas Longitudinal (RURAL) Cohort Study is a health research project in 10 rural counties throughout Alabama, Kentucky, Louisiana and Mississippi. The study aims to address critical gaps in knowledge about heart and lung disorders in rural counties in the southeastern United States.

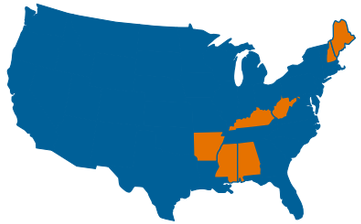
Study findings will promote the health of rural communities by identifying unique factors contributing to health disorders in these communities along with potential solutions. Learn more

Public Health Impact

Any health benefits arising from NIH-funded medical research (whether conducted in a rural state or elsewhere) will have a substantially greater fiscal impact on small, rural states.

Reducing States' Fiscal Burden

In most U.S. states, public health spending is generally second only to public education as the largest item in state and local budgets. When NIH-funded medical research results in improved treatment of disease, it helps ease this portion of states' fiscal burden. This is particularly true for small rural states like the seven states in this report.



7 STATE AVERAGE	REST OF US	
44%	41%	Enrollment in Medicare and Medicaid
8%	6%	GDP spent on public health programs

In 2020 – the most recent year for which state-specific data are available – the seven states considered in this report generally had lower average expenditures per enrollee for both Medicaid and Medicare than for the remaining states. **Yet, with the exception of New Hampshire, enrollees in these states account for a higher share of their states' populations, and the cost of the benefits they receive amount to a higher share of their state's GDPs compared to other states.** **See Table 3**

See individual **State Snapshots** for state-specific impacts

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Residents of the rural states examined have a lot to gain from medical research that provides new insights for the prevention, detection and treatment of disease.

Mary Ann Morrison Cumming is a breast cancer survivor and Maine resident. Read her story.

STATE RANK ON SELECT HEALTH INDICATORS AMONG ADULTS

	LIFE EXPECTANCY 2020		CHRONIC CONDITIONS			DEATHS BY				
STATE	Life Expectancy (Lowest)	Infant Mortality (Highest)	Obesity 2021	Diabetes 2020	Cardiovascular Disease	Alzheimer's 2019	Cancer 2021	Heart Disease 2021	Opioid Overdose 2021	Suicide 2021
Alabama	4	6	3	3	4	3	12	3	31	22
Arkansas	7	3	6	9	2	6	6	5	30	10
Kentucky	5	13	2	10	3	29	3	8	5	17
Maine	37	15	35	39	6	25	11	25	6	14
Mississippi	1	1	5	1	4	2	2	2	33	21
New Hampshire	45	41	41	47	20	30	31	39	22	25
West Virginia	2	4	1	1	1	11	1	7	1	10
SOURCE	CDC	CDC	CDC	CDC	KFF	Alz Assn	CDC	CDC	KFF	CDC

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Labor Force Impact

NIH-funded research plays an important role in the ability to recruit and attract highly skilled workers to a state, which is important in states where population growth is declining.

This benefit extends beyond the institutions where the research is conducted to the various operational and capital vendors who support that work.

Using the R&D services sector as a proxy for NIH-funded institutions in each state, it is clear that **NIH research-funded jobs are contributing to a significant improvement in the labor forces of the selected states.** The R&D sector has significantly **HIGHER PAY** and **JOB GROWTH** rates than the other sectors in these states. **See Table 4**

- In 2022, average annual pay in the R&D sector was almost **2X** the average of the other sectors in every state. **The average pay ratio ranged from 1.3 in West Virginia to 2.0 in Alabama and Kentucky.**
- From 2016–2022, job growth was significantly higher for the R&D sector for all states. **Average R&D job growth across the seven states was 36%.**
- All sectors saw pay growth between 2016–2022. **Average pay growth in the R&D sector was 28%.**

Rural America lost population over the past decade for the first time in history. Nationally, just 33.1% of rural counties gained population between 2010 and 2020, compared to 53.2% in the prior decade. Learn more

University of New Hampshire
Carsey School of Public Policy

TOP NIH-FUNDED INSTITUTIONS 2022

	ALABAMA	ARKANSAS	KENTUCKY	MAINE	MISSISSIPPI	NEW HAMPSHIRE	WEST VIRGINIA
1	University of Alabama at Birmingham	University of Arkansas for Medical Science	University of Kentucky	Jackson Lab	University of Mississippi Medical Center	Dartmouth College	West Virginia University
2	University of Alabama in Tuscaloosa	Arkansas Children's Hospital Research Institute	University of Louisville	MaineHealth	University of Mississippi	Dartmouth-Hitchcock Clinic	Marshall University
3	Tuskegee University	Intervexion Therapeutics, LLC	Enepret, Inc.	Mount Desert Island Biological Lab	Mississippi State University	University of New Hampshire	Modulation Therapeutics, Inc.
4	University of South Alabama	University of Arkansas at Fayetteville	Naprogenix, Inc.	University of New England	University of Southern Mississippi	Celdara Medical, LLC	Wheeling Jesuit University
5	Auburn University	Nephropathology Associates	Fetal Life, LLC	University of Maine Orono	Jackson State University	Lodestone Biomedical, LLC	

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What If?

The benefit to these rural states of NIH funding in fiscal year 2022 is clear, but these states have also benefited tremendously over the past seven years.

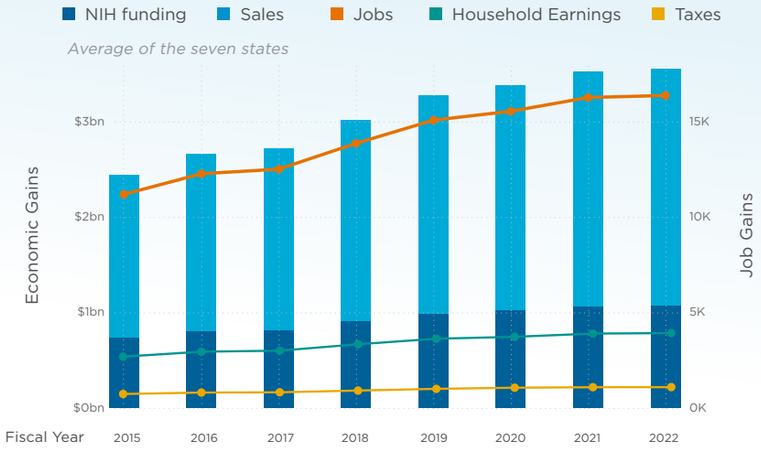
During this period, the NIH budget saw strong annual increases and the NIH was able to increase the amount of funds distributed in competitive awards to researchers in all states.

But what if this had not happened?

It is possible to measure the economic impact on these rural states — both in terms of what was GAINED due to a growing NIH budget, and what would have been LOST if the NIH budget had instead stayed flat from 2016 to 2022.

RURAL STATE GAINS 2016–2022

By increasing the overall amount of money available for NIH research from 2016–2022, congressional efforts had a significant, beneficial impact on these smaller, rural states.



7-Year Cumulative Impact

Each state BENEFITTED from an average total of:

Nearly $1B
NIH Research Awards

$2.2B+
New Economic Activity (sales)

14,557
Jobs

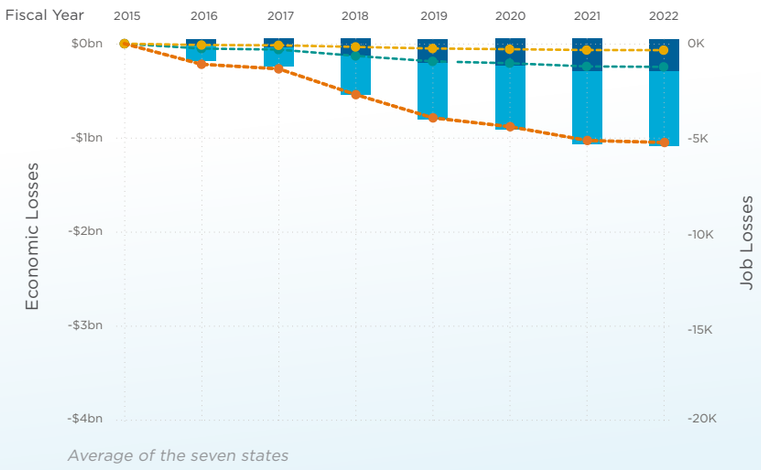
Nearly $700M
Statewide Household Earnings

$194M
Tax and Fee Revenue

See Tables 5, 7, 9, 11, 13

RURAL STATE LOSSES 2016–2022

However, had NIH funding remained flat at 2015 levels, there would have been a significant negative impact on these rural states.



7-Year Cumulative Impact

Each state would have LOST an average total of:

$220M
NIH Research Awards

$500M+
New Economic Activity (sales)

3,364
Jobs

$161M
Statewide Household Earnings

$44M
Tax and Fee Revenue

See Tables 6, 8, 10, 12, 14

See individual **State Snapshots** for state-specific impacts

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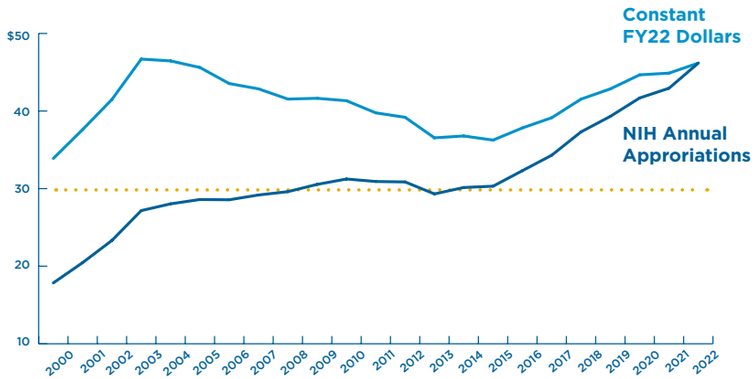
Maintaining a Strong NIH Budget

This report illustrates the very positive impact that a strong NIH budget has on smaller, rural states — even when those states may receive less NIH research funding relative to other states.

A Recovering NIH Budget

Recent increases to the NIH budget, provided with the bipartisan support of Congress, have been instrumental in helping the agency to regain lost ground during a long period of flat funding from 2004 to 2015. Factoring in inflation, NIH's actual purchasing power decreased significantly during that period with an untold impact on research, innovation and public health.

NIH APPROPRIATIONS 2000–2022



Source: Congressional Research Service

When looking at NIH funding adjusted for inflation, the agency's purchasing power peaked in FY03 and then declined for more than a decade. Funding increases in FY16 through FY22 have restored most of that purchasing power. **However, funding in FY22 was still 1.1% below the peak FY03 level.**

Maintaining the recent budget momentum, and ensuring a strong NIH, are crucial to the health and economic well-being of rural communities everywhere.

Team members of the University of Arkansas for Medical Sciences Center for Musculoskeletal Disease Research, which received an **$11.5 million** Centers of Biomedical Research Excellence (COBRE) Phase 2 grant from the NIH.

COBRE funding aims to help establish multidisciplinary, collaborative and synergistic research centers in states with lower rates of federal research funding.

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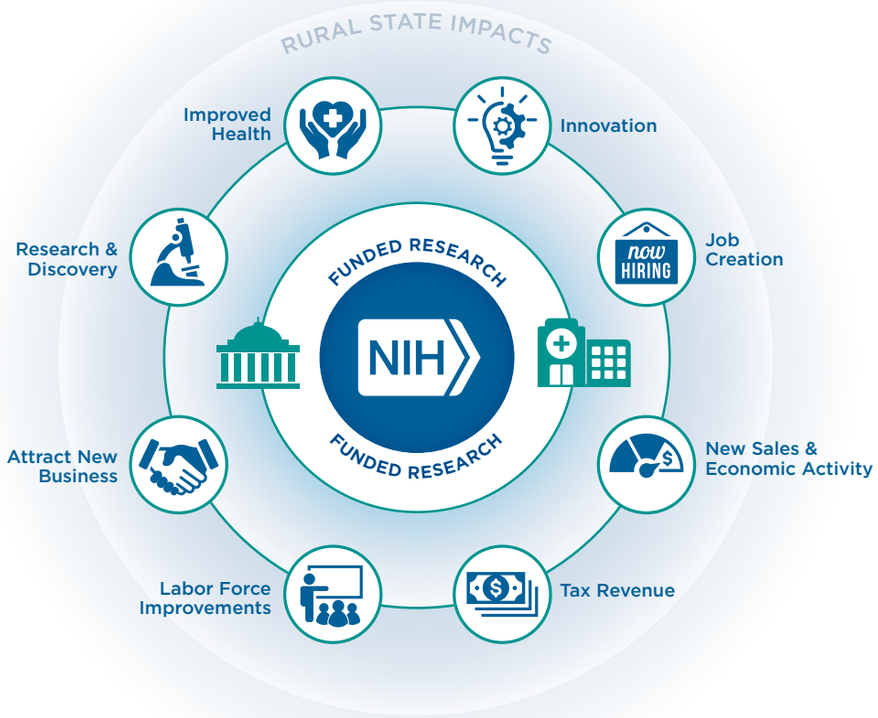
Alabama

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in Alabama has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in Alabama

$385M
NIH Research Awards

- **$917M** New Economic Activity
- **5,973** Jobs
- **$71M** Tax and Fee Revenue
- **$297M** Statewide Household Earnings

$1 NIH Funding = **$2.4** AL Economic Activity

21 ORGANIZATIONS IN ALABAMA RECEIVED A TOTAL OF **736 AWARDS**

Top recipients of NIH funding

- University of Alabama at Birmingham
- University of Alabama in Tuscaloosa
- Tuskegee University
- University of South Alabama
- Auburn University

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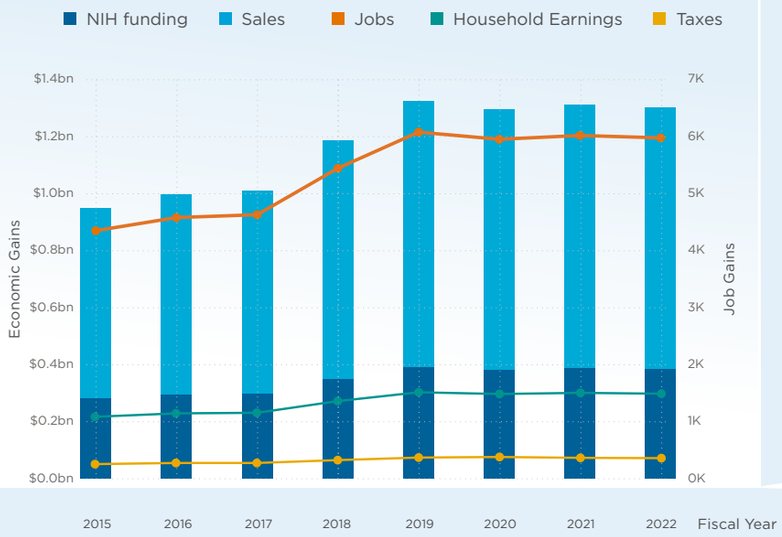
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON ALABAMA



From 2016–2022, Alabama BENEFITTED from a total of:

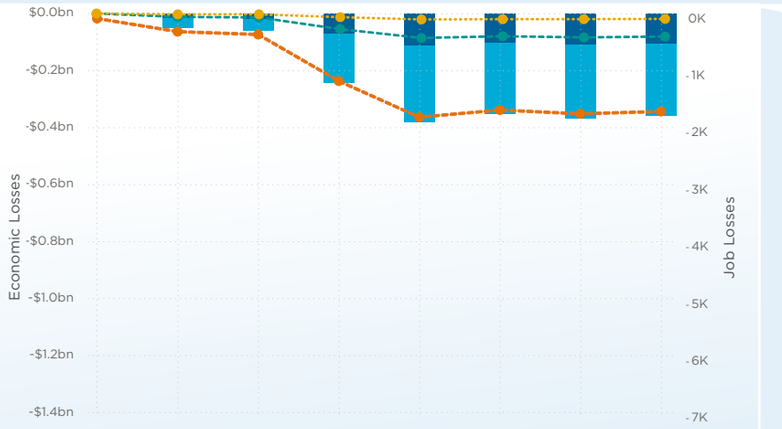
$2.492B
NIH Research Awards

$5.932B
New Economic Activity (sales)

38,650
Jobs

$1.924B
Statewide Household Earnings

$463M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to Alabama would have been the LOSS of:

$532M
NIH Research Awards

$1.263B
New Economic Activity (sales)

8,235
Jobs

$412M
Statewide Household Earnings

$99M
Tax and Fee Revenue

View data tables

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on Alabama's economy and prevented the negative economic impacts that flat funding would have caused.

Public Health Considerations

Improving Health

Alabamians have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

44% **AL** enrollment in Medicare and Medicaid

8% **AL** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW ALABAMA RANKS COMPARED TO OTHER STATES

Life Expectancy

4th lowest life expectancy
6th highest infant mortality

Chronic Conditions

4th for cardiovascular disease
3rd for diabetes
3rd for obesity

Deaths

3rd for Alzheimer's disease
12th for cancer
3rd for heart disease
31st for opioid overdose
22nd for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in Alabama pay 2X more than jobs in other sectors. Moreover, the R&D sector has seen far greater growth over the last seven years than other sectors in the state — **40% vs 7%.** These facts, combined with strong pay growth help attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in Alabama

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$116,312	$56,770	2.0	40	7	22	29

Biomedical Innovation in Alabama

MEET THE FLOW GUY

Steve McClellan's favorite aha moment came one morning while making tea — watching the leaves expand as they soaked in the hot water and then straining them out. A phone call took him away from his drink for a few moments, long enough for a fine sediment to collect on the bottom of the cup when he returned. Where most people would see the normal consequence of drinking tea made from loose leaves, McClellan saw inspiration for a better way to understand how cancer cells communicate.

In 2022, researchers at the University of South Alabama received over **$9 million** in NIH awards.

Channeling that inspiration, McClellan vowed to find a way to fine-tune the flow cytometry equipment used to analyze tiny, virus-sized particles from blood samples, called exosomes, in his lab at the University of South Alabama Mitchell Cancer Institute (MCI).

Thermo Fisher Scientific employs more than **200 people** at 4 sites in Alabama.

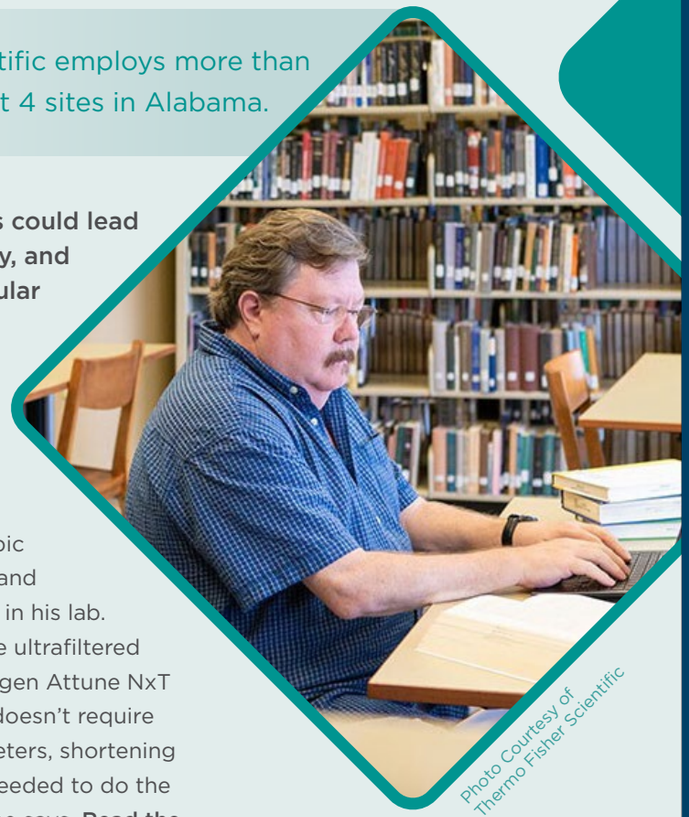

Photo Courtesy of Thermo Fisher Scientific

"A better understanding of exosomes could lead to better tests for finding cancer early, and quickly figuring out whether a particular cancer treatment is working," says McClellan, director of MCI's Flow Cytometry Core Laboratory.

McClellan's mastery of flow cytometry over the past three decades told him he was going to have to get creative if he wanted his equipment to detect nanoscopic exosomes. Fast forward a year and a half and McClellan's aha moment became a fixture in his lab. "We've had phenomenal success using the ultrafiltered solutions with the [Thermo Fisher] Invitrogen Attune NxT Flow Cytometer because the equipment doesn't require as much sheath fluid as other flow cytometers, shortening the time needed to do the filtering," he says. Read the full story.

ThermoFisher SCIENTIFIC

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RESEARCH COLLABORATION TO REDUCE CHRONIC DISEASE DISPARITIES IN DEEP SOUTH

WHO: University of Alabama at Birmingham in partnership with Tuskegee University, the University of Mississippi Medical Center, Pennington Biomedical Research Center, a campus of Louisiana State University and regional non-academic partners

WHAT: The Deep South Center to Reduce Disparities in Chronic Diseases

HOW: Through a 2021 grant from the National Institute on Minority Health and Health Disparities, part of the NIH

WHY: The Deep South region has the highest rates of obesity, diabetes and hypertension in the nation. As a result, life expectancy in the Deep South is substantially lower than in other regions, and this discrepancy is even greater for Black Americans. Learn more

BD

In Alabama, **Becton Dickinson** (BD) has over 120 associates who advance the world of health in numerous ways. BD's HealthSight Advisor platform, founded in Birmingham, AL, allows hospitals across the country to properly report antimicrobial use and resistance data (AUR) to the CDC's National Healthcare Safety Network (NHSN). This data provides insights at both the facility and national level to better understand how antibiotic usage impacts resistance. By leveraging standardized data, the HealthSight Advisor platform expands on the AUR capability to also alert clinicians and pharmacists to manage and prevent potential adverse drug events and hospital acquired infections.

"Research like this underscores that ethnicity and genetics — more so than income or geography — should be considered when diagnosing patients, and those same ethnic and genetic markers can allow us to tailor treatments to those illnesses."

CLAYTON YATES, PhD

Professor of biology, director of Tuskegee University's Center for Biomedical Research

Led the NIH-supported research that identified a new test to detect an aggressive form of breast cancers in African-American women

Learn more

Photo Credit: Tuskegee University

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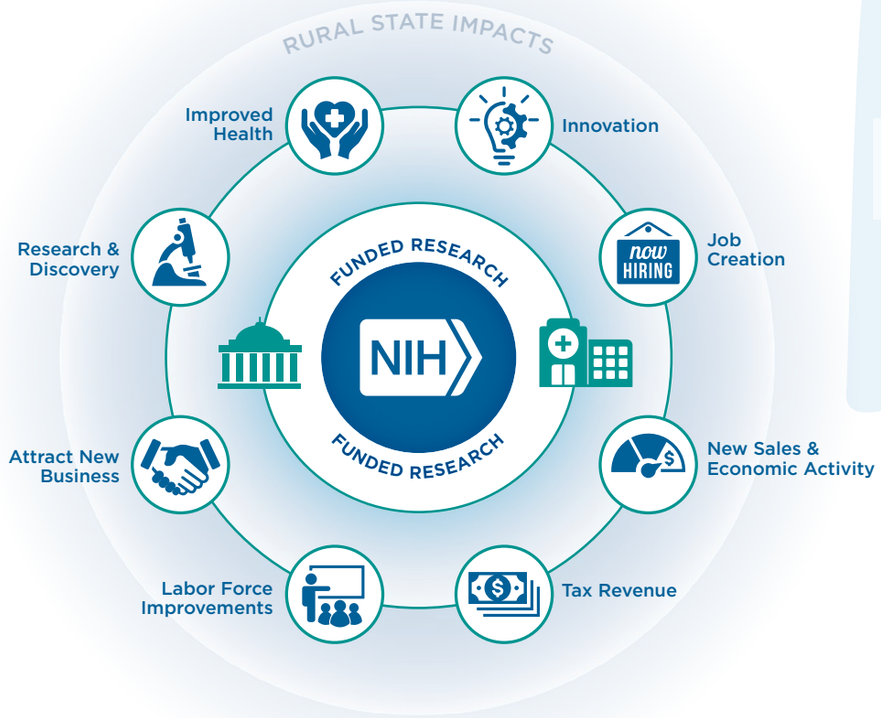
Arkansas

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in Arkansas has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in Arkansas

$104M
NIH Research Awards

- **$221M** New Economic Activity
- **1,586** Jobs
- **$22M** Tax and Fee Revenue
- **$72M** Statewide Household Earnings

$1 NIH Funding = **$2.1** AR Economic Activity

13 ORGANIZATIONS IN ARKANSAS RECEIVED A TOTAL OF **159 AWARDS**

Top recipients of NIH funding

- University of Arkansas for Medical Sciences
- Arkansas Children's Hospital Research Institute
- Intervexion Therapeutics, LLC
- University of Arkansas at Fayetteville
- Nephropathology Associates

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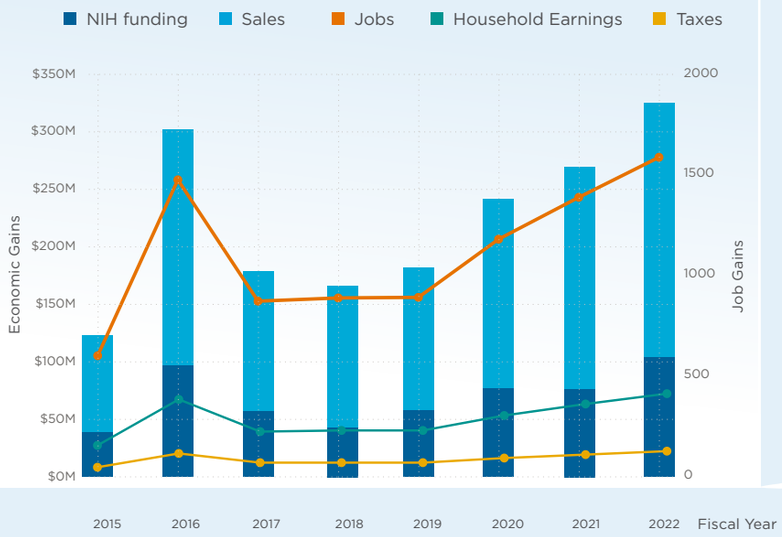
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON ARKANSAS



From 2016–2022, Arkansas BENEFITTED from a total of:

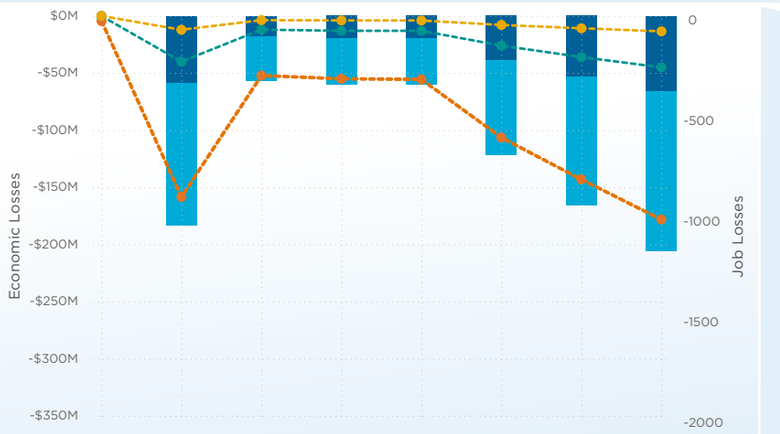
$542M
NIH Research Awards

$1.151B
New Economic Activity (sales)

8,274
Jobs

$374M
Statewide Household Earnings

$113M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to Arkansas would have been the LOSS of:

$269M
NIH Research Awards

$568M
New Economic Activity (sales)

4,074
Jobs

$185M
Statewide Household Earnings

$56M
Tax and Fee Revenue

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on Arkansas's economy and prevented the negative economic impacts that flat funding would have caused.

View data tables

Public Health Considerations

Improving Health

Arkansans have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

50% **AR** enrollment in Medicare and Medicaid

10% **AR** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW ARKANSAS RANKS COMPARED TO OTHER STATES

Life Expectancy

7th lowest life expectancy
3rd highest infant mortality

Chronic Conditions

2nd for cardiovascular disease
9th for diabetes
6th for obesity

Deaths

6th for Alzheimer's disease
6th for cancer
5th for heart disease
30th for opioid overdose
10th for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in Arkansas pay 1.5X more than jobs in other sectors. Moreover, the R&D sector has seen greater job growth over the past seven years than other sectors in the state — **20% vs 6%**. These facts, combined with strong pay growth, help to attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in Arkansas

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$82,646	$54,157	1.5	20	6	41	31

Biomedical Innovation in Arkansas

MEET ISABELLA ABUCHAIBE

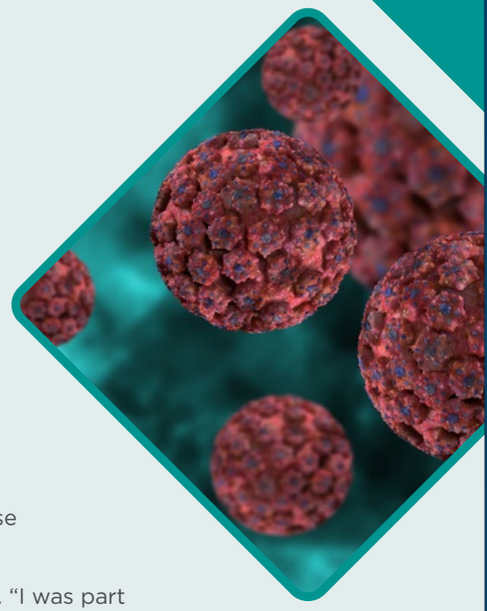
> Dr. Mayumi Nakagawa and her team at UAMS are doing big things that have the potential to change how patients are treated for cervical dysplasia. Thank you for giving me my life back."

After being diagnosed with high-grade squamous intraepithelial lesions (HSIL) after a routine pap smear and having it rapidly progress to CIN 3 (severe in nature), Isabella Abuchaibe felt completely hopeless. At just 26, she was offered a loop electrosurgical excision procedure (LEEP) to remove the abnormal cells from her cervix, which terrified her because of the potential long-term side effects.

In her search for an alternative treatment, she came across the **PepCan vaccine clinical trial at University of Arkansas for Medical Sciences (UAMS).** After speaking with clinical trial coordinators for weeks, she decided to take that "leap of faith" and join the trial.

When she received the news that her colposcopy result was negative after months of treatment, she was overjoyed. Not just because the vaccine cured her, but because she knew the vaccine could cure people with HPV-related precancer.

According to Ms. Abuchaibe, HPV prevention through current vaccines isn't enough. "I was part of the first wave of pre-teens to receive the first-generation Gardasil that protected against four HPV strains, and I contracted a high-risk HPV strain as an adult that wasn't covered by the first-generation vaccine, which is why PepCan is such a pioneering and essential vaccine."



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MAYUMI NAKAGAWA, MD, PhD

Professor, Dept. Pathology, College of Medicine

Leader, Cancer Prevention and Population Sciences Program, Winthrop P. Rockefeller Cancer Institute

Drs. Mae and Anderson Nettleship Endowed Chair in Oncologic Pathology

ABOUT THE PEPCAN VACCINE TRIAL

WHAT: A phase II clinical trial to determine the effectiveness of PepCan or Candin® adjuvant alone for treating cervical high-grade squamous intraepithelial lesions. The vaccine consists of synthetically made fragments of HPV protein called E6 and yeast extract called Candin® as a novel vaccine adjuvant.

WHY: While the current standard treatment for HSIL, loop electrical excision procedure (LEEP), is effective, it is also known to increase the risk of premature births in pregnancies following the treatment.

HOW: The study was conducted with funding from the National Cancer Institute, part of NIH. Mayumi Nakagawa, MD, PhD, led the study at the UAMS Winthrop P. Rockefeller Cancer Institute. **Learn more**

> "The clinical trial Ms. Abuchaibe participated in tested two new treatments to heal cervical pre-cancer without surgery. Participants came from 23 counties within Arkansas, including many from rural areas."

Team members of the University of Arkansas for Medical Sciences Center for Musculoskeletal Disease Research, which received an **$11.5 million** Centers of Biomedical Research Excellence (COBRE) Phase 2 grant from the NIH.

COBRE funding aims to help establish multidisciplinary, collaborative and synergistic research centers in states with lower rates of federal research funding. **Learn more**

University of Arkansas for Medical Sciences

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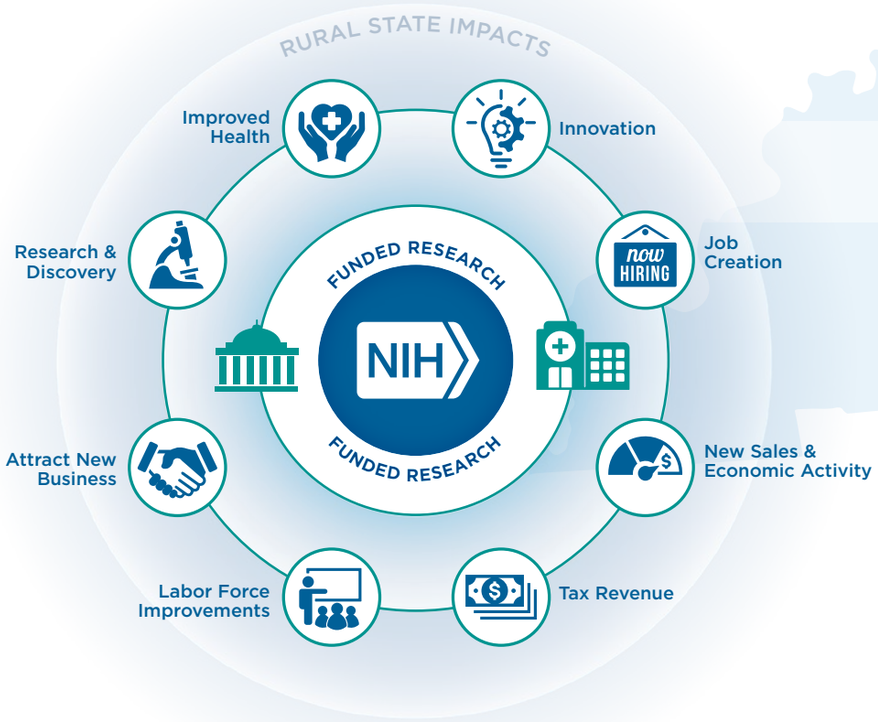
Kentucky

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in Kentucky has a significant impact across the commonwealth — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in Kentucky

$241M
NIH Research Awards

$560M New Economic Activity
3,743 Jobs
$49M Tax and Fee Revenue
$170M Statewide Household Earnings

$1 NIH Funding = **$2.3** KY Economic Activity

23 ORGANIZATIONS IN KENTUCKY RECEIVED A TOTAL OF **467 AWARDS**

Top recipients of NIH funding

- University of Kentucky
- University of Louisville
- Enepret, Inc.
- Naprogenix, Inc.
- Fetal Life, LLC

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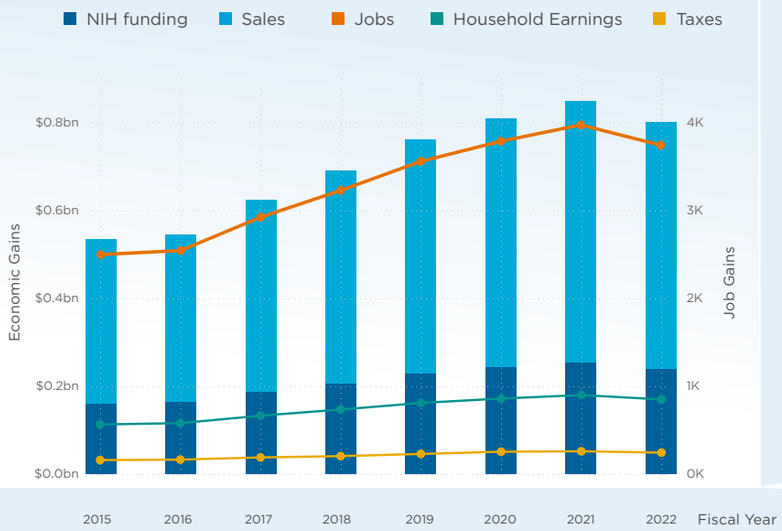
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON KENTUCKY



From 2016–2022, Kentucky BENEFITTED from a total of:

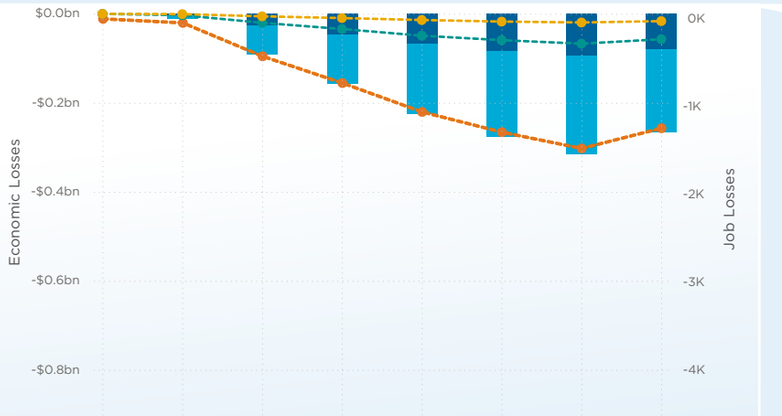
$1.529B
NIH Research Awards

$3.552B
New Economic Activity (sales)

23,757
Jobs

$1.080B
Statewide Household Earnings

$310M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to Kentucky would have been the LOSS of:

$402M
NIH Research Awards

$938M
New Economic Activity (sales)

6,268
Jobs

$289M
Statewide Household Earnings

$82M
Tax and Fee Revenue

View data tables

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on Kentucky's economy and prevented the negative economic impacts that flat funding would have caused.

Public Health Considerations

Improving Health

Kentuckians have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

52% **KY** enrollment in Medicare and Medicaid

10% **KY** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW KENTUCKY RANKS COMPARED TO OTHER STATES

Life Expectancy

5th lowest life expectancy
13th highest infant mortality

Chronic Conditions

3rd for cardiovascular disease
10th for diabetes
2nd for obesity

Deaths

29th for Alzheimer's disease
3rd for cancer
8th for heart disease
5th for opioid overdose
17th for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in Kentucky pay 2X more than jobs in other sectors. Moreover, the R&D sector has seen far greater growth over the last seven years than other sectors in the state — **45% vs 5%**. These facts, combined with strong pay growth help attract highly skilled workers and businesses to the commonwealth.

NIH research-funded jobs are helping to improve the labor force in Kentucky

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$114,180	$56,027	2.0	45	5	37	28

> **"I realized down through the years that the way we make progress is through these types of studies,"** said Jim, a retired pediatrician who received an Alzheimer's diagnosis in 2020. **"So it's very important."**

Biomedical Innovation in Kentucky

MEET JIM JACKSON

Every two weeks, Jim and Sharon Jackson travel an hour from Morehead to Lexington to help scientists better understand how to treat Alzheimer's disease.

Jim is a study participant in a clinical trial called **AHEAD**, and the University of Kentucky is one of about 75 study sites around the country.

During regular visits, Jim, 83, gets an infusion in his left arm — in a favorite vein that's a "pretty easy one to get." Other times, less frequently, he gets MRIs, PET scans, memory testing. The brain scans are meant to measure the size of the brain and its changes over time. Sharon, 74, goes with him to help answer questions about his mind and note any changes over time.

During their days in Lexington, the couple tries different restaurants, trying never to eat the same place twice. They described their trips for the trial — their first — as a rewarding experience.

This content is from an article by Sarah Ladd first published by The Kentucky Lantern. Read more

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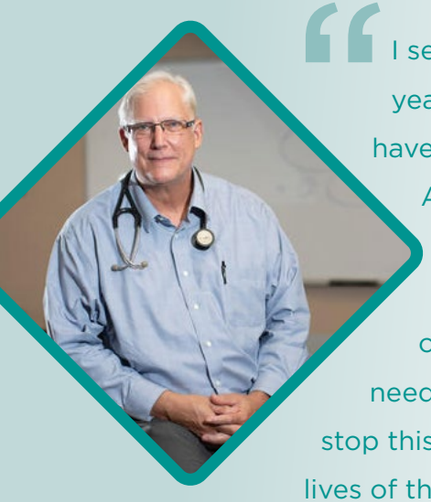

Photo credit:
Mark Cornelison
UK Photo.

"I see hundreds of patients each year that are shocked that they have received the death sentence of Alzheimer's disease. As of now, there are no cures for this fatal disease that is the sixth-leading cause of death in the U.S. We need to know if we can screen and stop this disease before it destroys the lives of those we love or takes our own lives. The **AHEAD** study is a path forward."

GREG JICHA, MD, PhD

Director of Clinical Trials at UK's Sanders-Brown Center on Aging

ABOUT THE AHEAD STUDY

WHAT: The AHEAD study is the first-ever clinical trial to test the effect of lecanemab in people who have no cognitive symptoms of Alzheimer's disease, but in whom biomarker tests indicate amyloid is present in the brain, known as "preclinical" Alzheimer's disease.

Lecanemab, marketed as Leqembi, has been shown to slow the progression of Alzheimer's and was approved by the U.S. Food and Drug Administration (FDA) in July 2023 for the treatment of Alzheimer's disease. The AHEAD study will test whether these effects in symptomatic patients are similar to those with preclinical Alzheimer's disease.

WHERE: The University of Kentucky's Sanders-Brown Center on Aging is one of more than 100 sites worldwide participating in the AHEAD study. The study seeks to enroll 1,165 participants from North America.

HOW: The AHEAD study is funded by the NIH and Eisai Inc. It is being conducted by the NIH-funded Alzheimer's Clinical Trials Consortium (ACTC), a network of leading academic Alzheimer's research centers. Learn more

THERMO FISHER SCIENTIFIC EXPANDS KENTUCKY OPERATIONS

Thermo Fisher is investing **$59 million** in the expansion and renovation of its central lab for its PPD clinical research business to provide increased testing of pharmaceutical products. New jobs created through the project will include PhD-level scientists, analytical laboratory staff and other scientific professionals. Thermo Fisher currently employs approximately 700 people across its two sites in Kentucky. **Learn more**

"Thermo Fisher's expanding footprint and the accompanying creation of more than 200 total jobs are huge wins for Kentucky."

Kentucky Governor Andy Beshear announcing the project in October 2022

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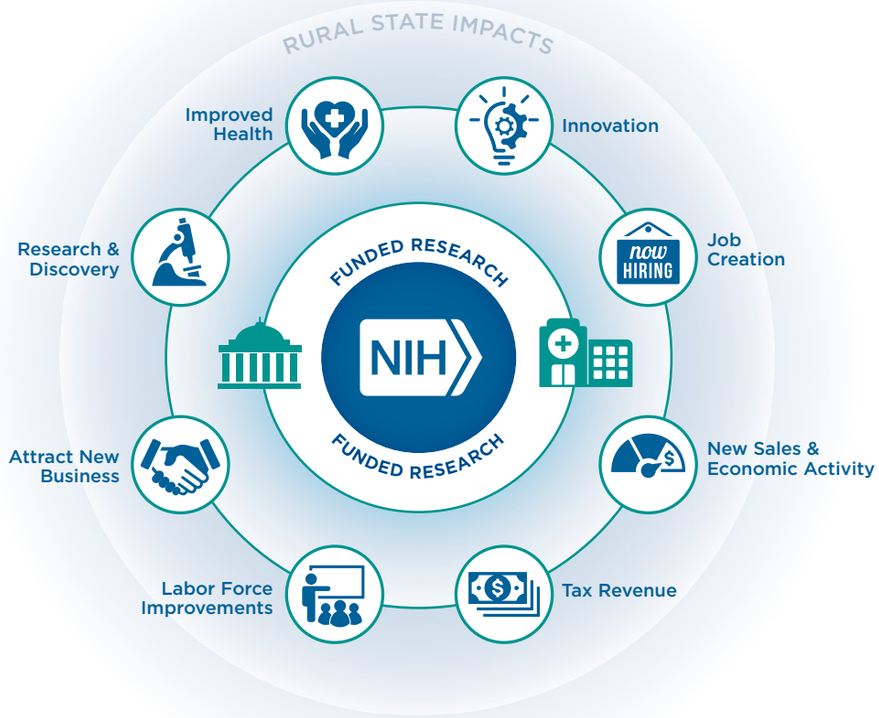
Maine

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in Maine has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in Maine

$113M
NIH Research Awards

- **$255M** New Economic Activity
- **1,890** Jobs
- **$31M** Tax and Fee Revenue
- **$85M** Statewide Household Earnings

$1 NIH Funding = **$2.3** ME Economic Activity

10 ORGANIZATIONS IN MAINE RECEIVED A TOTAL OF **172 AWARDS**

Top recipients of NIH funding

- The Jackson Laboratory
- MaineHealth
- Mount Desert Island Biological Laboratory
- University of New England
- University of Maine Orono

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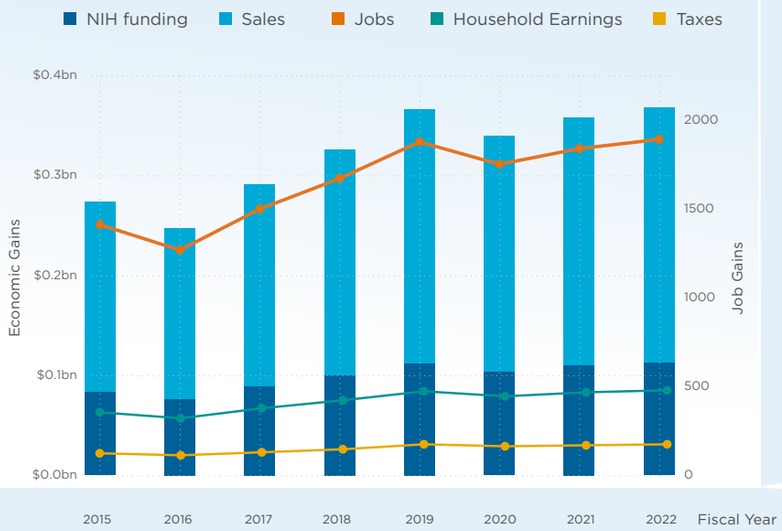
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON MAINE



From 2016–2022, Maine BENEFITTED from a total of:

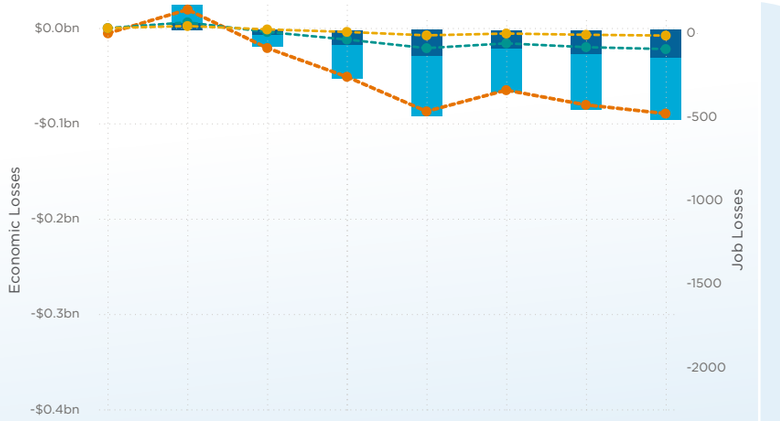
$704M
NIH Research Awards

$1.592B
New Economic Activity (sales)

11,789
Jobs

$530M
Statewide Household Earnings

$190M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to Maine would have been the LOSS of:

$116M
NIH Research Awards

$260M
New Economic Activity (sales)

1,921
Jobs

$89M
Statewide Household Earnings

$31M
Tax and Fee Revenue

View data tables

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on Maine's economy and prevented the negative economic impacts that flat funding would have caused.

Public Health Considerations

Improving Health

Mainers have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

51% **ME** enrollment in Medicare and Medicaid

9% **ME** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW MAINE RANKS COMPARED TO OTHER STATES

Life Expectancy

37th lowest life expectancy
15th highest infant mortality

Chronic Conditions

6th for cardiovascular disease
39th for diabetes
35th for obesity

Deaths

25th for Alzheimer's disease
11th for cancer
25th for heart disease
6th for opioid overdose
14th for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in Maine pay 1.4X more than jobs in other sectors. Moreover, the R&D sector has seen far greater growth over the last seven years than other sectors in the state — **38% vs 4%**. These facts, combined with strong pay growth help attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in Maine

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$84,228	$58,371	1.4	38	4	31	39

Biomedical Innovation in Maine

MEET MARY ANN

When Maine resident Mary Ann Morrison Cumming was diagnosed with breast cancer in 2016, she was all too familiar with the realities of living with cancer having grown up as caregiver to her father during his cancer treatment.

Her cancer was discovered because of her recommended screenings, and she had her tumor surgically removed. Her breast cancer was treated with MammoSite internal radiation, and she regained her health. But in 2022, her breast cancer came back.

She underwent her second surgery, and this time her doctor ordered biomarker testing on the tumor to learn more about Mary Ann's cancer and her best treatment options. Mary Ann's test results indicated that she would not benefit from chemotherapy or radiation, and she was so grateful she was able to confidently choose a different treatment option and not participate in those taxing procedures.

Mary Ann Morrison Cumming

> "I am blessed with the technology available, and biomarker testing should be performed and covered for every person facing cancer. Now I wonder how many women suffered through chemo and radiation that may not have been needed. I wonder how many women gave up or died believing those were their only choices."

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ABOUT THE TAILORX CLINICAL TRIAL

WHO: More than 10,000 women worldwide were recruited from 2006-2010 to participate who had early stage, HR-positive, HER2-negative, axillary lymph node-negative breast cancer (**including patients in Maine**).

Participants' tumors were analyzed using the Oncotype DX test (a biomarker test). Those in the low-risk range received hormone therapy only. Those in the high-risk range were treated with hormone therapy and chemotherapy. Women in the intermediate range were randomly assigned to receive hormone therapy with chemotherapy or hormone therapy alone.

WHAT: The rates of women who survived or didn't develop a recurrence or a second primary cancer, were very similar in both groups in the intermediate risk category.

Five years after treatment, the rate of invasive disease-free survival was 92.8% for hormone therapy alone and 93.1% for those who also had chemotherapy. At nine years, the rate was 83.3% for those with hormone therapy alone and 84.3% for the group that had both therapies. Results were published online in the New England Journal of Medicine on June 3, 2018.

HOW: The study was supported in part by the National Cancer Institute, part of NIH.
Learn more

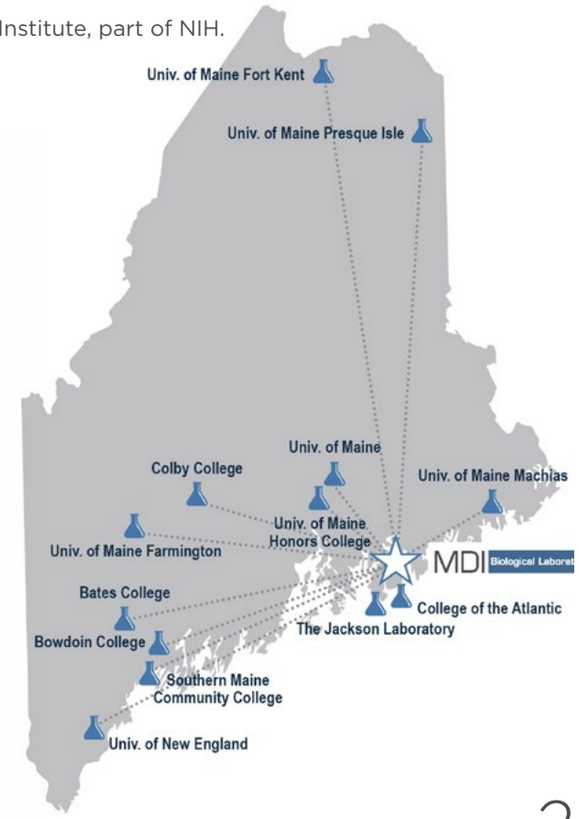
MAINE INBRE

The Maine IDeA Network of Biomedical Research Excellence (INBRE) is a collaborative network of Maine educational and research institutions led by the MDI Biological Laboratory and sponsored by the National Institute of General Medical Sciences, part of the NIH.

Maine INBRE focuses on three areas:

- Creating a technically skilled workforce in Maine through biomedical research training for undergraduates.
- Providing research support to young faculty to increase their competitiveness for federal (NIH) biomedical research grants.
- Improving the research infrastructure available to INBRE institutions through a collaborative network of core facilities with state-of-the-art equipment.

With continuous funding from the NIH since 2001, Maine INBRE has played a critical role in supporting the expansion of the biomedical and biotechnology sectors of Maine's economy. In addition to providing $86 million in direct federal funding to the state, it has attracted $80 million in additional federal grants, provided research training for approximately 2,250 Maine students and created more than 100 new jobs.
Learn more



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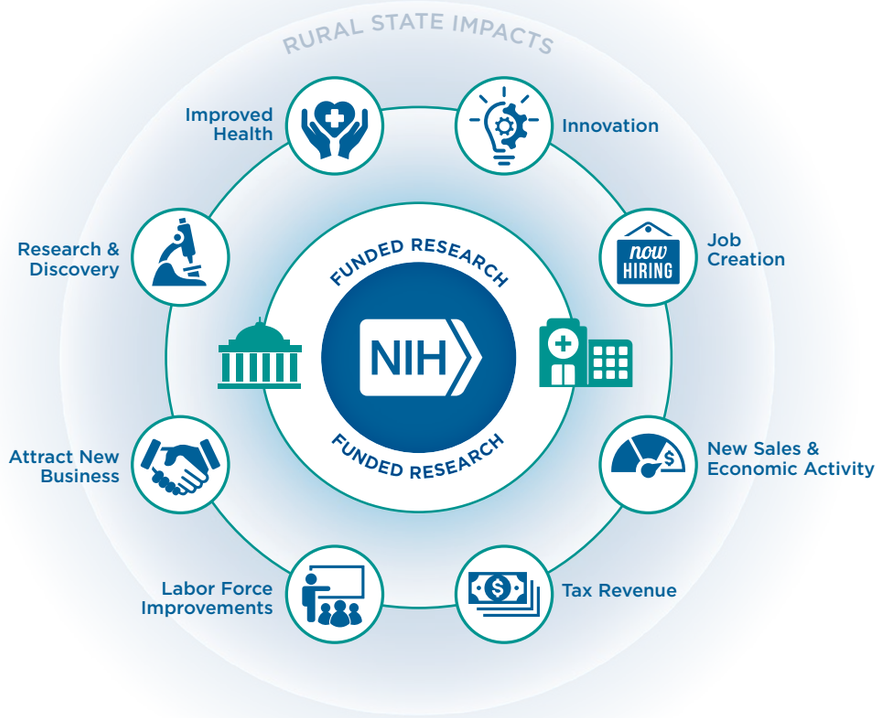
Mississippi

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in Mississippi has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in Mississippi

$61M
NIH Research Awards

- **$131M** New Economic Activity
- **929** Jobs
- **$13M** Tax and Fee Revenue
- **$42M** Statewide Household Earnings

$1 NIH Funding = **$2.2** MS Economic Activity

8 ORGANIZATIONS IN MISSISSIPPI RECEIVED A TOTAL OF **106 AWARDS**

Top recipients of NIH funding

- University of Mississippi Medical Center
- University of Mississippi
- Mississippi State University
- University of Southern Mississippi
- Jackson State University

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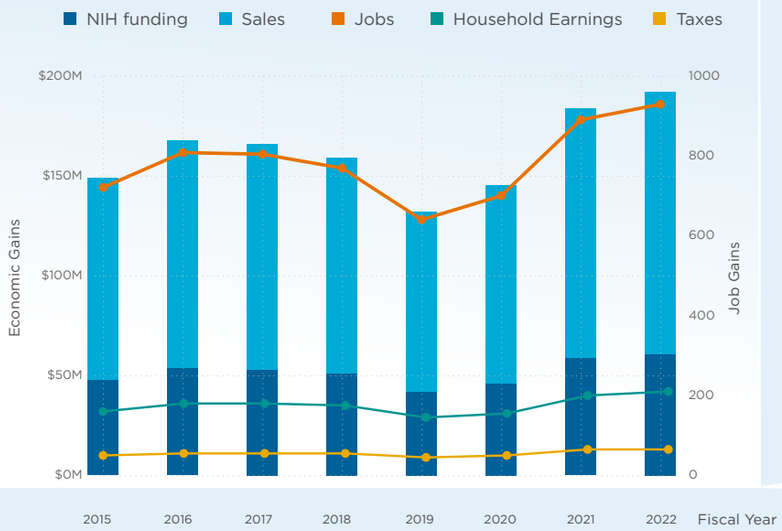
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON MISSISSIPPI



From 2016–2022, Mississippi BENEFITTED from a total of:

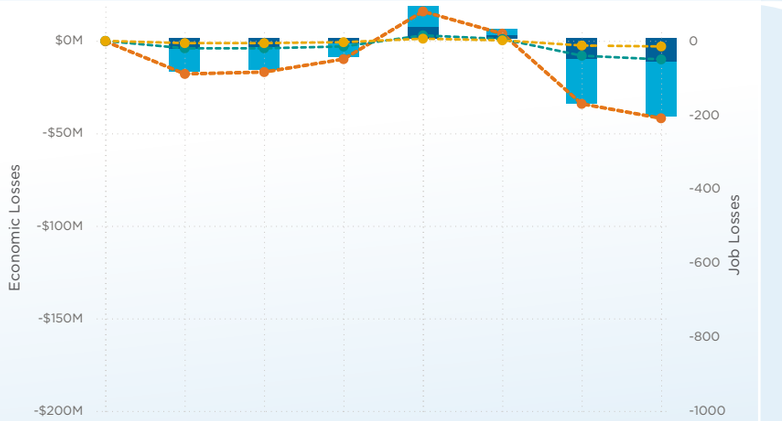
$366M
NIH Research Awards

$780M
New Economic Activity (sales)

5,540
Jobs

$249M
Statewide Household Earnings

$78M
Tax and Fee Revenue



If the NIH budget had stayed flat FY15 levels from 2016–2022, the cumulative impact to Mississippi would have been the LOSS of:

$30M
NIH Research Awards

$70M
New Economic Activity (sales)

494
Jobs

$25M
Statewide Household Earnings

$7M
Tax and Fee Revenue

View data tables

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on Mississippi's economy and prevented the negative economic impacts that flat funding would have caused.

Public Health Considerations

Improving Health

Mississippians have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

45% **MS** enrollment in Medicare and Medicaid

11% **MS** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW MISSISSIPPI RANKS COMPARED TO OTHER STATES

Life Expectancy

1st lowest life expectancy
1st highest infant mortality

Chronic Conditions

4th for cardiovascular disease
1st for diabetes
5th for obesity

Deaths

2nd for Alzheimer's disease
2nd for cancer
2nd for heart disease
33rd for opioid overdose
21st for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in Mississippi pay 1.9X more than jobs in other. Moreover, the R&D sector has seen far greater growth over the last seven years than other sectors in the state — **36% vs 3%**. These facts, combined with strong pay growth help attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in Mississippi

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$88,173	$46,845	1.9	36	3	37	26

Biomedical Innovation in Mississippi

WORKING TO BOOST THE HEALTH OF INFANTS AND MOTHERS

University of Mississippi Medical Center (UMMC) joins Neonatal Research NETWORK

UMMC has joined 14 other health centers across the country as part of the Neonatal Research Network (NRN) to study how to improve health outcomes for newborns.

The NRN, funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development, part of the NIH, was formed in 1986 to properly evaluate newborn care, especially those admitted to neonatal intensive care units upon birth. The network studies infant mortality, preterm birth rate and low birthweight rates, all areas in which Mississippi ranks the lowest in the country.

Photo Credit: UMMC

"Having our division in the NRN is a dream come true," said Mobolaji Famuyide, MD, Chief or Pediatric Neonatology at UMMC. "In Mississippi, we serve a unique population with significant health care needs and who are underserved. This allows this cohort to benefit from novel medical interventions and practices and to contribute to neonatal literature. It also affords our junior faculty with a desire for a research career the opportunity to be involved in NIH-funded studies and the prestige that comes with that." **Learn more**

DR. MOBOLAJI FAMUYIDE
Chief of Pediatric Neonatology | University of Mississippi Medical Center

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JACKSON STATE UNIVERSITY ONE OF TEN NEW MATERNAL HEALTH RESEARCH CENTERS OF EXCELLENCE

WHAT: Research will address the biological, behavioral, environmental, sociocultural and structural factors that affect pregnancy-related complications and deaths, with a focus on populations that experience health disparities, including racial and ethnic minorities, socioeconomically disadvantaged populations, those living in underserved rural areas, sexual and gender minority populations and people with disabilities.

WHY: Compared to other high-income countries, the United States has a high rate of maternal deaths, and each year many more Americans experience severe pregnancy-related complications, which can raise the risk of future health concerns, including high blood pressure, diabetes and mental health conditions. There are stark disparities in these maternal health outcomes by racial and ethnic group, age, education, socioeconomic status and geographic region.

HOW: Funded by the NIH, the new research centers of excellence are part of NIH's Implementing a Maternal Health and Pregnancy Outcomes Vision for Everyone (IMPROVE) initiative. **Learn more**

Advancing Alzheimer's and Dementia Research

Memory Impairment and Neurodegenerative Dementia (MIND) Center at the University of Mississippi Medical Center is a leader in the search to crack the code of Alzheimer's disease.

For more than a decade, MIND Center researchers have been working to unravel the underlying causes of Alzheimer's disease and other dementias through the use of pioneering research, state-of-the-art brain imaging, and powerful genetic technologies. Much of the research conducted by MIND Center researchers is funded by the NIH. **Learn more**

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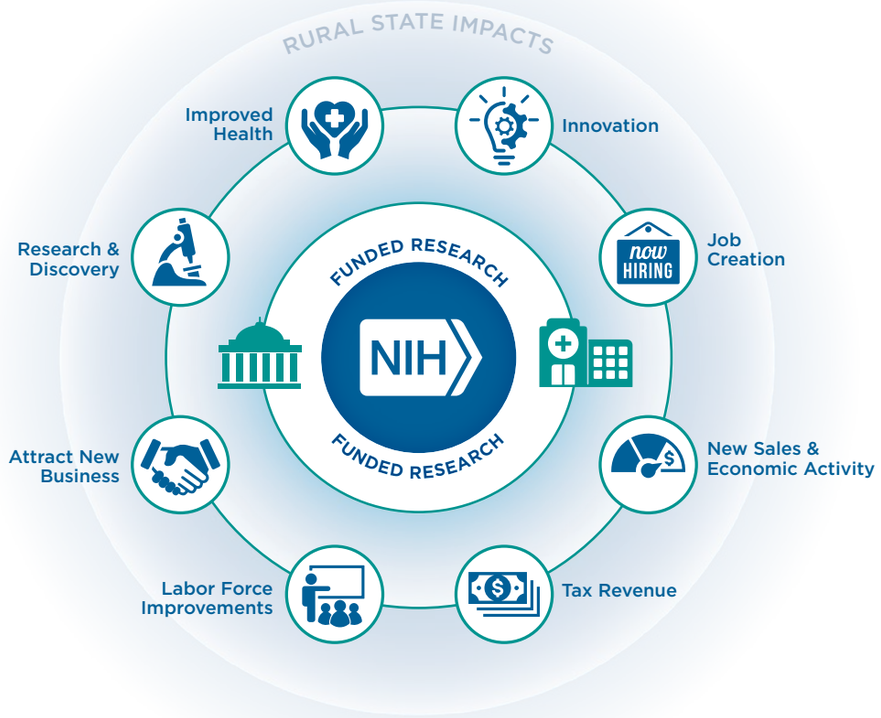
New Hampshire

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in New Hampshire has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in New Hampshire

$122M
NIH Research Awards

- **$289M** New Economic Activity
- **1,577** Jobs
- **$23M** Tax and Fee Revenue
- **$87M** Statewide Household Earnings

$1 NIH Funding = **$2.4** NH Economic Activity

19 ORGANIZATIONS IN NEW HAMPSHIRE RECEIVED A TOTAL OF **230 AWARDS**

Top recipients of NIH funding

- Darthmouth College
- Darthmouth-Hitchcock Clinic
- University of New Hampshire
- Celdara Medical, LLC
- Lodestone Biomedical, LLC

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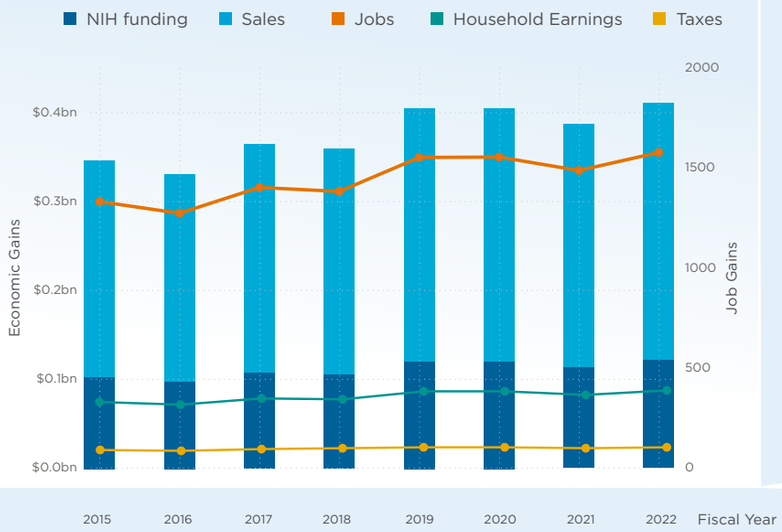
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON NEW HAMPSHIRE



From 2016–2022, New Hampshire BENEFITTED from a total of:

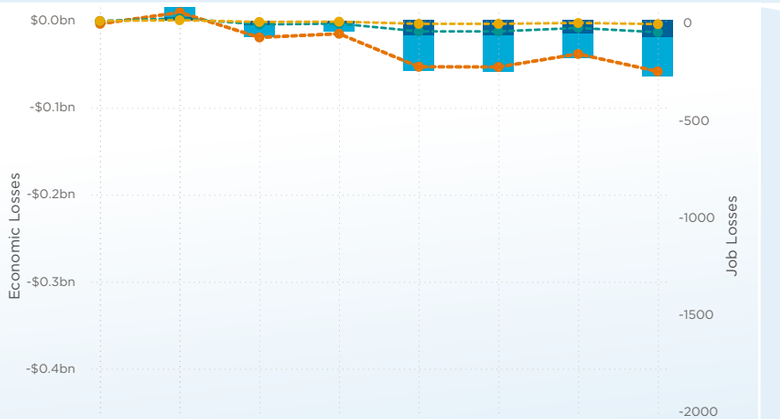
$794M
NIH Research Awards

$1.876B
New Economic Activity (sales)

10,227
Jobs

$567M
Statewide Household Earnings

$153M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to New Hampshire would have been the LOSS of:

$73M
NIH Research Awards

$165M
New Economic Activity (sales)

905
Jobs

$49M
Statewide Household Earnings

$14M
Tax and Fee Revenue

View data tables

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on New Hampshire's economy and prevented the negative economic impacts that flat funding would have caused.

Public Health Considerations

Improving Health

Granite Staters potentially have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

37% **NH** enrollment in Medicare and Medicaid

6% **NH** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW NEW HAMPSHIRE RANKS COMPARED TO OTHER STATES

Life Expectancy

45th lowest life expectancy
41st highest infant mortality

Chronic Conditions

20th for cardiovascular disease
47th for diabetes
41st for obesity

Deaths

30th for Alzheimer's disease
31st for cancer
39th for heart disease
22nd for opioid overdose
25th for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in New Hampshire pay 1.9X more than jobs in other sectors. Moreover, the R&D sector has seen far greater growth over the last seven years than other sectors in the state — **46% vs 5%**. These facts, combined with strong pay growth help attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in New Hampshire

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$144,053	$73,966	1.9	46	5	20	36

Biomedical Innovation in New Hampshire

UNH DEVELOPING ROBOTS TO HELP CARE FOR PEOPLE WITH ALZHEIMER'S DISEASE AND DEMENTIA

A recent five-year grant from the National Institute on Aging, part of the NIH, is spurring the development of social assistive robots to aid in the care of individuals with Alzheimer's disease and related dementia in the comfort of their own homes.

"Caring for aging adults, especially those dealing with progressive Alzheimer's and dementia, can place a high burden on family caregivers who cannot be with their care recipients 24/7," said Sajay Arthanat, professor of occupational therapy. **"The ultimate goal of this research is to help support those caregivers while keeping their family member healthy and active at home."**

The NIH grant will enable Arthanat and his co-principal investigator, Momotaz Begum, assistant professor of computer science to advance the capabilities of their prototype robot and eventually test it in home settings. This would include compatibility with commercial devices already found in homes, like motion control cameras and sensors, to keep older adults safe and in line with their health care.

For example, if a patient does not take their medication on time, a sensor strategically placed by their pill bottle would track the lack of movement — indicating the patient didn't take their medicine — and would alert the assistive robot. The robot would then initiate a vocal reminder to the patient. If, after a few attempts, the patient does not respond by taking their medicine, the robot would alert a remote human caregiver who would be able to intervene. Learn more

Photo credit: UNH

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Photo Credit: Dartmouth Health

NEW CENTER WILL ADVANCE DELIVERY OF RURAL HEALTH CARE

A five-year NIH award to investigators at Darthmouth Health will fund a new Center for Rural Health Care Delivery Science and support faculty research to advance the understanding of healthcare delivery in a rural setting. The award is part of the Centers of Biomedical Research Excellent (COBRE) program.

"Dartmouth Health is one of the most rural academic health systems in the U.S.," said Mark A. Creager, MD. **"We are grateful for the funding to establish a Center for Rural Health Care Delivery Science to develop a multidisciplinary research program and provide infrastructure to support the development of a critical mass of clinician-investigators who focus on the study of healthcare in rural communities. The Center will enable us to conduct innovative and compelling research that will lead to improved healthcare for our patients and others living in rural communities."** Learn more

The Center for Rural Health Care Delivery Science will be led by **Sandra L. Wong**, MD, MS, chair of surgery at Dartmouth Hitchcock Medical Center (DHMC) and the William N. and Bessie Allyn Professor of Surgery at Dartmouth Geisel School of Medicine, and **Mark A. Creager**, MD, emeritus director of the Heart and Vascular Center at DHMC and the Anna G. Huber Professor of Medicine at Geisel.

Learning How the Environment Affects the Health of Children: The New Hampshire Birth Cohort Study

Since 2009, the New Hampshire Birth Cohort Study (NHBCS) has been tracking the health of pregnant women and their children in order to learn how environmental factors, such as contaminants, affect the health and development of children. More than 2,000 mother and infant pairs from New Hampshire and Vermont are part of the study. **Learn more**

The NHBCS is a longitudinal cohort study funded by the National Institute of Environmental Health Sciences, part of the NIH. The study follows participants over time as they grow and develop - from early pregnancy and into childhood. Pregnancy and childhood are critical times in the life cycle when the vulnerability to environmental contaminants may be enhanced. Likewise, the potential for short- and long-term health effects of exposure to environmental contaminants also may be heightened during these times of rapid development and growth.

The data collected as part of the NHBCS is available to other researchers to support collaborations and ancillary studies. **Learn more**

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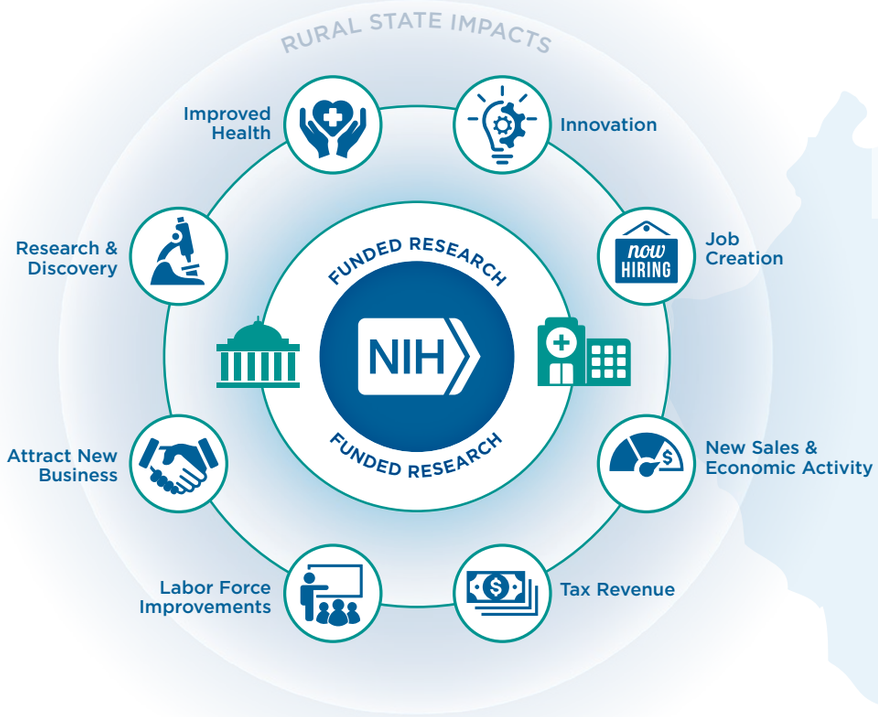
West Virginia

Research funding from the **National Institutes of Health** (NIH) that comes to institutions in West Virginia has a significant impact across the state — extending far beyond the immediate recipients of that funding.



FY22

Economic Impact of NIH Research Funding in West Virginia

$49M
NIH Research Awards

- **$101M** New Economic Activity
- **672** Jobs
- **$10M** Tax and Fee Revenue
- **$32M** Statewide Household Earnings

$1 NIH Funding = **$2.1** WV Economic Activity

4 ORGANIZATIONS IN WEST VIRGINIA RECEIVED A TOTAL OF **99 AWARDS**

Top recipients of NIH funding

- West Virginia University
- Marshall University
- Modulation Therapeutics, Inc.
- Wheeling Jesuit University

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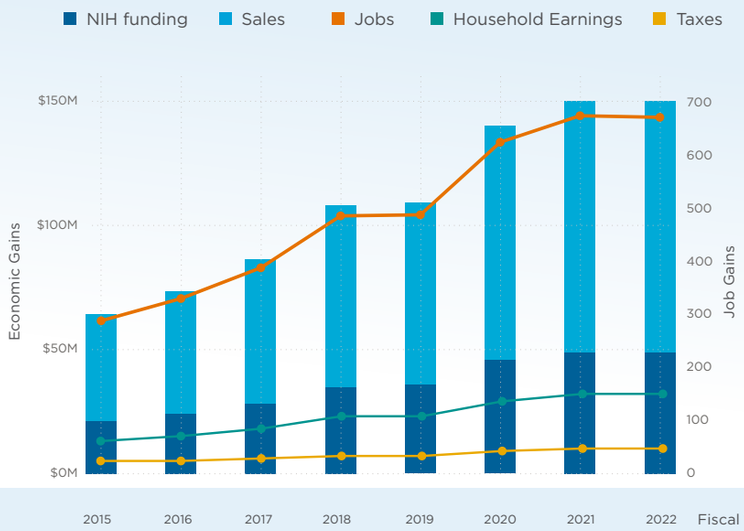
THE IMPACT OF **7 YEARS** OF NIH BUDGET INCREASES ON WEST VIRGINIA



From 2016–2022, West Virginia BENEFITTED from a total of:

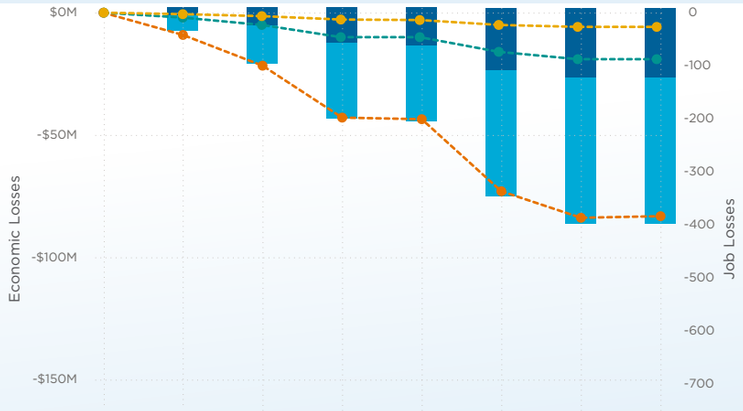
$267M
NIH Research Awards

$549M
New Economic Activity (sales)

3,664
Jobs

$172M
Statewide Household Earnings

$54M
Tax and Fee Revenue



If the NIH budget had stayed flat at FY15 levels from 2016–2022, the cumulative impact to West Virginia would have been the LOSS of:

$120M
NIH Research Awards

$247M
New Economic Activity (sales)

1,649
Jobs

$81M
Statewide Household Earnings

$24M
Tax and Fee Revenue

Congress has increased the NIH budget each year since 2016, which has had a significant, positive impact on West Virginia's economy and prevented the negative economic impacts that flat funding would have caused.

View data tables

Public Health Considerations

Improving Health

West Virginians have a lot to gain from NIH-funded medical research that results in improved treatment of disease. Improved health can also help ease the fiscal burden of spending on public health programs.

57% **WV** enrollment in Medicare and Medicaid

12% **WV** GDP spent on public health programs

41% Rest of U.S. enrollment in Medicare and Medicaid

6% Rest of U.S. spending on public health programs

HOW WEST VIRGINIA RANKS COMPARED TO OTHER STATES

Life Expectancy

2nd lowest life expectancy
4th highest infant mortality

Chronic Conditions

1st for cardiovascular disease
1st for diabetes
1st for obesity

Deaths

11th for Alzheimer's disease
1st for cancer
7th for heart disease
1st for opioid overdose
10th for suicide

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Boosting the Labor Force

NIH-funded research boosts an important sector of the labor force

Jobs in the R&D sector in West Virginia pay 1.3X more than jobs in other sectors. This, combined with strong pay growth, helps attract highly skilled workers and businesses to the state.

NIH research-funded jobs are helping to improve the labor force in West Virginia

Average Pay 2022			Employment Growth 2016–2022		Average Pay Growth 2016–2022	
R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
$67,349	$52,903	1.3	-1	-1	21	30

Biomedical Innovation in West Virginia

MAKING CARE FOR SUBSTANCE USE DISORDER AND INFECTIOUS DISEASES MORE ACCESSIBLE TO RURAL PATIENTS

WVU's **Judith Feinberg**

Photo Credit: WVU

For a hepatitis C or HIV patient who lives in rural West Virginia, a trip to the doctor can take up to a whole day. That's because the medical specialists who treat their conditions often practice in cities hours away.

With a grant from the NIH's National Institute on Drug Abuse, West Virginia University researcher Judith Feinberg is working with colleagues at Yale University to integrate services for opioid use disorder, the hepatitis C virus and HIV in 20 primary care clinics across West Virginia.

West Virginia has the highest overdose rate in the country, and the state has experienced numerous outbreaks of both HIV and hepatitis C in recent years. Because drug and alcohol use are known to place people at a higher risk for getting hepatitis C and HIV, these health conditions are deeply intertwined with the opioid crisis.

"The goal of this grant is to integrate care for substance use disorder, infectious diseases and other medical needs that people have — at the same time, in the same place — so that we don't have key aspects of people's medical care being handled in a disconnected manner," said Feinberg, the WVU Department of Medicine's vice chair for research. **"It's efficient and appropriate … you can't deal with one effectively without dealing with the other. [Additionally], there is such a paucity of specialist care here in West Virginia that we can't be sending patients hither and yon to get appropriate care."**

The researchers will use a variety of tools to empower care givers at 20 federally qualified health centers to evaluate and treat patients for substance use disorder, HIV and hepatitis C. They also will provide ongoing clinical education and support to primary care providers who may not feel expert in treating these conditions.

The researchers hope that what they learn may influence primary care in West Virginia as well as other communities aiming to address the co-occurrence of substance use disorders with HIV or hepatitis C.

Learn more

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UNDERSTANDING THE CONNECTION BETWEEN BINGE DRINKING IN TEENS AND ADULT BRAIN FUNCTION

With a two-year grant from NIH, Marshall University researcher Mary-Louise Risher, PhD, is exploring how binge drinking during teens and early twenties disrupts brain function that can persist into adulthood.

"Binge drinking accounts for the majority of alcohol consumed by adolescents in the U.S. and occurs during a critical period of brain development," Risher said. **"It is also associated with lasting cognitive impairment and increases the likelihood of developing an alcohol use disorder later in life. Our long-term goal is to understand what happens when brain development and alcohol use converge — disrupting the final stages of brain development — and how this can lead to cognitive impairment and increased prevalence of alcohol use disorder later in life."**

Risher and her team hope their work will identify potential targets and treatments for the prevention and reversal of long-term alcohol-induced cognitive dysfunction. **Learn more**

MEET JACK VICTORY

Jack Victory, a third-year medical student at the West Virginia University School of Medicine and West Virginia native, was selected as one of 50 students nationally to attend the NIH **Medical Research Scholars Program** (MRSP).

The MRSP is a 12-month intensive research program where medical scholars from across the United States participate in a variety of training and research activities under the guidance of an NIH advisor and research mentor, while living on the NIH campus in Bethesda, Maryland.

"One of the things I am passionate about is finding safer ways to provide cancer therapy," said Victory. **"With immunotherapy, the side effects are often mild in comparison to traditional chemotherapy, so advancing this research and treatment can not only help to treat cancer but can give someone their life back."**

Because cancer is a growing epidemic in the United States and particularly in West Virginia, Victory hopes that his time in the MRSP will kickstart his lifelong career of research to provide solutions to a vulnerable population and give him the opportunity to make significant contributions to the field of immunological research. **Learn more**

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Table 1 | Overview of Selected States 2022

	NIH AWARDS		GDP		POPULATION		RURAL POPULATION	
STATE	$M	Rank	$M	Rank	Total	Rank	Percent	Rank
Alabama	385	23	277,818	27	5,074,296	24	42.3	8
Arkansas	104	39	165,221	34	3,045,637	33	44.5	6
Kentucky	241	29	260,304	28	4,512,310	26	41.3	10
Maine	113	38	84,498	44	1,385,340	42	61.4	2
Mississippi	61	42	138,740	37	2,940,057	34	53.7	4
New Hampshire	122	37	105,414	40	1,395,231	41	41.7	9
West Virginia	49	44	95,588	42	1,775,156	39	55.4	3
7-STATE AVERAGE	**154**		**149,012**		**2,875,432**		**45.4**	
REST OF U.S. AVG	**$809M**		**$554,992M**		**7,117,262**		**18.5**	

Table 2 | Jobs and New Economic Activity Resulting from NIH Research Funding 2022, $M

		OPERATIONAL-RELATED		CAPEX-RELATED		TOTAL IMPACT		MULTIPLIER
STATE	NIH Awards $M	Intrastate Economic Activity $M	Intrastate Jobs	Intrastate Economic Activity $M	Intrastate Jobs	Intrastate Economic Activity $M	Intrastate Jobs	$1 NIH =
Alabama	385	764	4,977	153	995	917	5,973	2.4
Arkansas	104	184	1,322	37	264	221	1,586	2.1
Kentucky	241	466	3,119	93	624	560	3,743	2.3
Maine	113	213	1,575	43	315	255	1,890	2.3
Mississippi	61	109	774	22	155	131	929	2.2
New Hampshire	122	241	1,314	48	263	289	1,577	2.4
West Virginia	49	84	560	17	112	101	672	2.1
7-STATE AVERAGE	**154**	**294**	**1,949**	**59**	**390**	**353**	**2,338**	**2.3**
7-STATE TOTAL	**1,075**	**2,061**	**13,641**	**413**	**2,728**	**2,474**	**16,370**	

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Table 3 | Fiscal Burden of Medicare and Medicaid 2020

STATE	MEDICAID $ PER ENROLLEE	MEDICARE $ PER ENROLLEE	% POPULATION ENROLLED MEDICARE & MEDICAID	MEDICARE & MEDICAID SPENDING % GDP
Alabama	5,229	12,010	44	8
Arkansas	6,990	11,289	50	10
Kentucky	7,209	11,653	52	10
Maine	8,974	10,352	51	9
Mississippi	6,658	12,416	45	11
New Hampshire	10,130	10,098	37	6
West Virginia	6,552	11,534	57	12
7-STATE AVERAGE	**6,837**	**11,568**	**48**	**9**
REST OF U.S. AVG	**7,792**	**12,324**	**41**	**6**
7 TO REST RATIO	**88**	**94**	**117**	**148**

Table 4 | Human Capital Impacts

	AVERAGE PAY 2022, $			% EMPLOYMENT GROWTH 2016–2022		% AVERAGE PAY GROWTH 2016–2022	
STATE	R&D	All Sectors	Ratio	R&D	All Sectors	R&D	All Sectors
Alabama	116,312	56,770	2.0	40	7	22	29
Arkansas	82,646	54,157	1.5	20	6	41	31
Kentucky	114,180	56,027	2.0	45	5	37	28
Maine	84,228	58,371	1.4	38	4	31	39
Mississippi	88,173	46,845	1.9	36	3	37	26
New Hampshire	144,053	73,966	1.9	46	5	20	36
West Virginia	67,349	52,903	1.3	-1	-1	21	30
7-STATE AVERAGE	**108,631**	**56,162**	**1.9**	**36**	**5**	**28**	**30**

TABLE 4 NOTES

- 7-State average values are calculated as total wages/total employment; this is equivalent to a weighted average of the state-level pay rates.
- The 7-State average depends on the relative size of employment in each state. The weighted average is similar to, but different than, the unweighted mean of the state-level values.
- Alabama, Kentucky and New Hampshire have substantial R&D employment shares, together with high wage rates; this pushes up the employment-weighted average wage rate for all rural states.

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Table 5 | Annual NIH Funding to Institutions in the Seven States 2016–2022, $M

STATE	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	295	298	351	392	383	388	385	2,492
Arkansas	97	57	58	58	77	91	104	542
Kentucky	164	188	208	229	244	255	241	1,529
Maine	76	89	100	112	104	110	113	704
Mississippi	54	53	51	42	46	59	61	366
New Hampshire	99	109	107	121	121	115	122	794
West Virginia	24	28	35	36	46	49	49	267
7-STATE AVERAGE	**115**	**118**	**130**	**141**	**146**	**152**	**154**	**956**
7-STATE TOTAL	**809**	**822**	**910**	**990**	**1,021**	**1,067**	**1,075**	**6,694**

Table 6 | NIH Funding Loss if NIH Funding Was Flat 2016–2022, $M

		DIFFERENCE IN NIH AWARDS FROM 2015 ACTUAL							
STATE	2015 Actual	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	280	-15	-18	-71	-112	-103	-108	-105	-532
Arkansas	39	-58	-18	-19	-19	-38	-52	-65	-269
Kentucky	161	-3	-27	-47	-68	-83	-94	-80	-402
Maine	84	8	-5	-16	-28	-20	-26	-29	-116
Mississippi	48	-6	-5	-3	6	2	-11	-13	-30
New Hampshire	103	4	-6	-4	-18	-18	-12	-19	-73
West Virginia	21	-3	-7	-14	-15	-25	-28	-28	-120
7-STATE AVERAGE	**105**	**-10**	**-12**	**-25**	**-36**	**-41**	**-47**	**-48**	**-220**
7-STATE TOTAL	**736**	**-73**	**-86**	**-174**	**-254**	**-285**	**-331**	**-339**	**-1,542**

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Table 7 | New Economic Activity/Sales Resulting from NIH Research Funding 2016–2022, $M

STATE	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	702	710	835	932	913	923	917	5,932
Arkansas	205	121	123	124	164	193	221	1,151
Kentucky	380	437	483	532	566	594	560	3,552
Maine	171	202	226	254	236	248	255	1,592
Mississippi	114	113	108	90	99	125	131	780
New Hampshire	233	257	254	285	285	273	289	1,876
West Virginia	49	58	73	73	94	101	101	549
7-STATE AVERAGE	**265**	**271**	**300**	**327**	**337**	**351**	**353**	**2,205**
7-STATE TOTAL	**1,854**	**1,898**	**2,102**	**2,290**	**2,357**	**2,457**	**2,474**	**15,432**

Table 8 | Net Economic Activity/Sales Loss if NIH Funding Was Flat 2016–2022, $M

		DIFFERENCE IN NEW ECONOMIC ACTIVITY FROM 2015 ACTUAL							
STATE	2015 Actual	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	667	-35	-43	-168	-265	-246	-256	-250	-1,263
Arkansas	84	-122	-38	-40	-40	-81	-110	-137	-568
Kentucky	374	-7	-64	-109	-158	-193	-221	-186	-938
Maine	190	19	-12	-35	-63	-46	-58	-65	-260
Mississippi	101	-12	-12	-7	11	3	-24	-29	-70
New Hampshire	244	11	-13	-9	-40	-41	-28	-45	-165
West Virginia	43	-6	-15	-30	-30	-50	-58	-58	-247
7-STATE AVERAGE	**243**	**-22**	**-28**	**-57**	**-84**	**-93**	**-108**	**-110**	**-502**
7-STATE TOTAL	**1,703**	**-153**	**-196**	**-398**	**-586**	**-654**	**-755**	**-770**	**-3,512**

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Table 9 | Jobs Resulting from NIH Research Funding 2016–2022, $M

STATE	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	4,575	4,625	5,440	6,074	5,948	6,015	5,973	38,650
Arkansas	1,474	871	887	890	1,179	1,387	1,586	8,274
Kentucky	2,544	2,924	3,228	3,558	3,787	3,973	3,743	23,757
Maine	1,267	1,498	1,670	1,876	1,750	1,838	1,890	11,789
Mississippi	808	804	769	640	700	890	929	5,540
New Hampshire	1,273	1402	1,382	1,552	1,554	1,487	1,577	10,227
West Virginia	330	388	486	488	625	675	672	3,664
7-STATE AVERAGE	**1,753**	**1,787**	**1,980**	**2,154**	**2,220**	**2,324**	**2,338**	**14,557**
7-STATE TOTAL	**12,271**	**12,512**	**13,862**	**15,078**	**15,543**	**16,265**	**16,370**	**101,901**

Table 10 | Net Job Loss if NIH Funding Was Flat 2016–2022, $M

		DIFFERENCE IN JOB CREATION FROM 2015 ACTUAL							
STATE	2015 Actual	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	4,345	-230	-280	-1,095	-1,729	-1,603	-1,670	-1,628	-8,235
Arkansas	600	-874	-271	-287	-290	-579	-787	-986	-4,074
Kentucky	2,498	-46	-426	-730	-1,059	-1,289	-1,474	-1,244	-6,268
Maine	1,410	142	-88	-260	-467	-340	-428	-480	-1,921
Mississippi	721	-88	-83	-48	81	21	-169	-208	-494
New Hampshire	1,331	59	-70	-51	-221	-222	-155	-245	-905
West Virginia	288	-42	-100	-198	-201	-337	-387	-384	-1,649
7-STATE AVERAGE	**1,599**	**-154**	**-188**	**-381**	**-555**	**-621**	**-724**	**-739**	**-3,364**
7-STATE TOTAL	**11,193**	**-1,079**	**-1,318**	**-2,669**	**-3,886**	**-4,350**	**-5,072**	**-5,176**	**-23,550**

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Table 11 | Statewide Household (HH) Earnings from NIH Funding 2016–2022, $M

	2016		2017		2018		2019	
STATE	NIH Awards	Total HH Impact	NIH Awards	Total HH Impact	NIH Awards	Total HH Impact	NIH Awards	Total HH Impact
Alabama	295	228	298	230	351	271	392	302
Arkansas	97	67	57	39	58	40	58	40
Kentucky	164	116	188	133	208	147	229	162
Maine	76	57	89	67	100	75	112	84
Mississippi	54	36	53	36	51	35	42	29
New Hampshire	99	71	109	78	107	77	121	86
West Virginia	24	15	28	18	35	23	36	23
7-STATE AVERAGE	**115**	**84**	**118**	**86**	**130**	**95**	**141**	**104**
7-STATE TOTAL	**807**	**589**	**823**	**602**	**910**	**667**	**989**	**726**

	2020		2021		2022		
STATE	NIH Awards	Total HH Impact	NIH A wards	Total HH Impact	NIH Awards	Total HH Impact	TOTALS
Alabama	383	296	388	300	385	297	1,924
Arkansas	77	53	91	63	104	72	374
Kentucky	244	172	255	180	241	170	1,080
Maine	104	79	110	83	113	85	530
Mississippi	46	31	59	40	61	42	249
New Hampshire	121	86	115	82	122	87	567
West Virginia	46	29	49	32	49	32	172
7-STATE AVERAGE	**146**	**107**	**152**	**111**	**154**	**112**	**699**
7-STATE TOTAL	**1,021**	**747**	**1,067**	**779**	**1,075**	**785**	**4,896**

TABLE 11 NOTES

- Represents the total dollar change in earnings of all households employed by all industries within the state for each additional dollar of output delivered to final demand by the selected industry.
- Earnings consist of wages and salaries and of proprietors' income, which is the net earnings of sole proprietors and partnerships. Employer contributions for health insurance are also included.
- Personal contributions to social insurance, such as Social Security and Medicare, and employee pension plans are excluded to reflect only the portion of personal income that is available to spend.

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Table 12 | Lost Statewide Household Earnings with Flat NIH Funding 2016–2022, $M

		DIFFERENCE FROM 2015 ACTUAL, $M						
STATE	2015 Earnings	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	216	-12	-14	-55	-86	-80	-84	-81	-412
Arkansas	27	-40	-12	-13	-13	-26	-36	-45	-185
Kentucky	113	-3	-20	-34	-49	-59	-67	-57	-289
Maine	63	+6	-4	-12	-21	-16	-20	-22	-89
Mississippi	32	-4	-4	-3	+3	+1	-8	-10	-25
New Hampshire	74	+3	-4	-3	-12	-12	-8	-13	-49
West Virginia	13	-2	-5	-10	-10	-16	-19	-19	-81
7-STATE AVERAGE	**77**	**-7**	**-9**	**-19**	**-27**	**-30**	**-35**	**-35**	**-161**
7-STATE TOTAL	**540**	**-52**	**-63**	**-130**	**-188**	**-208**	**-242**	**-247**	**-1,130**

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Table 13 | State and Local Taxes & Fees Generated by NIH Research Funding 2016–2022, $M

	2016		2017		2018		2019	
STATE	Intrastate Econ Act	Taxes & Fees	Intrastate Econ Act	Taxes & Fees	Intrastate Econ Act	Taxes & Fees	Intrastate Econ Act	Taxes & Fees
Alabama	702	54	710	54	835	64	932	73
Arkansas	205	20	121	12	123	12	124	12
Kentucky	380	33	437	38	483	41	532	46
Maine	171	20	202	23	226	26	254	31
Mississippi	114	11	113	11	108	11	90	9
New Hampshire	233	19	257	21	254	22	285	23
West Virginia	49	5	58	6	73	7	73	7
7-STATE AVERAGE	**265**	**23**	**271**	**24**	**300**	**26**	**327**	**29**
7-STATE TOTAL	**1,856**	**163**	**1,899**	**165**	**2,101**	**182**	**2,290**	**201**

	2020		2021		2022		
STATE	Intrastate Econ Act	Taxes & Fees	Intrastate Econ Act	Taxes & Fees	Intrastate Econ Act	Taxes & Fees	TOTALS
Alabama	913	75	923	72	917	71	463
Arkansas	164	16	193	19	221	22	113
Kentucky	566	51	594	52	560	49	310
Maine	236	29	248	30	255	31	190
Mississippi	99	10	125	13	131	13	78
New Hampshire	285	23	273	22	289	23	153
West Virginia	94	9	101	10	101	10	54
7-STATE AVERAGE	**337**	**30**	**351**	**31**	**353**	**31**	**194**
7-STATE TOTAL	**2,357**	**213**	**2,458**	**218**	**2,473**	**220**	**1,362**

TABLE 13 NOTES

- Available tax data end in 2020. For 2021 and 2022, the effective tax rate for 2019 was used, as 2020 rates likely are distorted by pandemic effects.
- Effective tax rates are calculated as the portion of state and local "General revenue from own sources" that are Taxes, divided by state GDP.

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Table 14 | Lost Net Loss Taxes & Fees if NIH Funding Was Flat 2016–2022, $M

		DIFFERENCE FROM 2015 ACTUAL							
STATE	2015 Actual	2016	2017	2018	2019	2020	2021	2022	TOTALS
Alabama	50	-3	-3	-13	-21	-20	-20	-19	-99
Arkansas	8	-12.1	-3.7	-3.9	-4.0	-7.9	-10.8	-13.5	-56
Kentucky	32	-0.6	-5.5	-9.4	-13.8	-17.3	-19.3	-16.3	-82
Maine	22	2.2	-1.4	-4.0	-7.6	-5.7	-7.0	-7.8	-31
Mississippi	10	-1.2	-1.2	-0.7	1.2	0.3	-2.5	-3.0	-7
New Hampshire	20	0.9	-1.1	-0.8	-3.3	-3.3	-2.3	-3.6	-14
West Virginia	5	-0.6	-1.4	-2.8	-3.0	-5.0	-5.8	-5.8	-24
7-STATE AVERAGE	**21**	**-2**	**-2**	**-5**	**-7**	**-8**	**-10**	**-10**	**-44**
7-STATE TOTAL	**147**	**-14**	**-17**	**-34**	**-51**	**-59**	**-68**	**-69**	**-312**

TABLE 14 NOTE

- Lost state and local taxes and fees = Lost economic activity x Effective tax rate

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