AAMC

Tomorrow's Doctors, Tomorrow's Cures®

The Economic Impact of Publicly Funded Research Conducted by AAMC-Member Medical Schools and Teaching Hospitals

A Report Prepared for the AAMC by Tripp Umbach

November 2011

Learn

Serve

Lead

Association of
American Medical Colleges

For additional information about this publication, please contact:

Anthony J. Mazzaschi
Senior Director, Scientific Affairs
tmazzaschi@aamc.org

Association of American Medical Colleges
2450 N Street NW
Washington, DC 20037-1134

Carrie Kennedy
Principal Project Director
CKennedy@trippumbach.com

Tripp Umbach
2359 Railroad Street #3502
Pittsburgh, PA 15222

Forward

During this time of national and global economic distress, U.S. policy makers are being forced to make difficult decisions to ensure the fiscal stability and global competitiveness of the nation. At the same time, they remain committed to protecting and advancing the health and well-being of the American people. The thread that links these challenges—fiscal stability, global competitiveness, health and well being—is medical research.

The societal health benefits of medical research are compelling. We all know patients whose survival from a devastating disease is the direct result of therapies, early diagnosis, or preventive strategies developed from medical research. In addition, medical research increasingly is improving the quality of life of all Americans.

The full economic benefits of research are extensive, difficult to quantify, and not always well understood. To add to public understanding of the economic benefits of medical research, the Association of American Medical Colleges (AAMC) commissioned Tripp Umbach, a highly respected national economic consulting firm, to examine the economic impact of federal- and state-funded medical research conducted at AAMC-member medical schools and teaching hospitals.

The Tripp Umbach report shows that federal- and state-funded research received by medical schools and teaching hospitals in 2009 added close to $45 billion to the U.S. economy. To put this in perspective, the National Institute of Health (NIH), the largest federal funding agency of medical research, invested approximately $28.5 billion in fiscal year 2009 for extramural research conducted across the nation, including American Recovery and Reinvestment Act (ARRA) funding. Of those funds, about 55 percent (or about $15.6 billion) went to medical schools and teaching hospitals, a particularly productive research environment where physicians and scientists deliver care to patients, help train the next generation of physicians and researchers, and conduct vital medical research. While NIH funding is critical, the data show that for every dollar invested in research at medical school and teaching hospitals, $2.60 of economic activity occurs.

As dramatic as the numbers are, they are a fraction of the full economic impact of research. The data do not include the incalculable impact from the saved lives and improved quality of life that results from research discoveries. To illustrate this point, according to an American Cancer Society report released in July 2010, the drop in overall mortality rates from cancer over the last 20 years has saved more than three-quarters of a million lives. Similar gains are being made in heart disease, HIV, and many other devastating diseases. All in all, millions of Americans have been able to live their lives and continue to provide for their families and contribute to the nation's economy and growth as a result of medical research.

This economic impact data also do not include the enormous commercial application of medical research, and other downstream economic impacts. For example, research investment created the biotechnology industry, and medical imaging technology has advanced the development of commercial applications far from the bedside—technologies that would have been unfathomable just a generation ago.

Full-time high-skilled jobs are an essential part of a healthy economy. The report indicates that the federal and state research funding received by medical schools and teaching hospitals directly supports nearly 300,000 full-time, mostly high-skilled, jobs, or about 1 in every 500 jobs in the United States. While the direct employment impact is significant, the actual extent of the impact is considerably larger when one considers the business volume generated. Those same physicians and scientists who conduct life-saving and life-extending medical research shop for groceries, go to restaurants, rent or own homes, and contribute to all sectors of the local and national economy.

What future benefits can medical research provide? The potential impact of future discoveries on patients, their families, reduced government expenditures and the economy is enormous. For example, with the increasing population of older Americans, by 2050 a projected 11 million to 16 million people age 65 and older will have Alzheimer's disease. The direct and indirect costs of caring for people with Alzheimer's disease and other dementias were estimated to be more than $148 billion in 2005. One estimate calculates the cumulative costs of care for people with Alzheimer's disease from 2010 to 2050 will exceed $20 trillion, in today's dollars. The impact of research advances regarding Alzheimer's disease alone would have enormous economic consequences that single-handedly could bend the health care cost curve.

The economic benefits of medical research are and will continue to be enormous and contribute greatly to U.S. fiscal stability and global competitiveness. However, such benefits are a secondary consideration. The goal of medical research remains to offer hope to patients and to improve the health of all.

Ann Bonham, Ph.D.
Chief Scientific Officer
Association of American Medical Colleges

In February 2011, the Association of American Medical Colleges (AAMC) retained Tripp Umbach to measure the economic impact of publicly funded research conducted at AAMC-member institutions in the 46 individual states (and the District of Columbia)[1] in which they are located, as well as the nation as a whole. This report presents the methodology and results of the combined economic impact that AAMC-member research has on individual states and the nation as a whole.

Methodology and Definitions

Tripp Umbach's economic impact methodology is based on a careful analysis of federal and state support for medical research at AAMC-member medical schools and teaching hospitals. Findings included in this report do not include research funding received from private organizations or the significant institutional investments from endowments, clinical margins, or other institutional funds. It is also important to note that the data presented in this document do not include the commercial application of research or measurable cost savings related to the application of medical research.

For the purposes of this report, "economic impact" includes both the direct and indirect business volume generated by an institution from public state and federal research funding. Direct impact includes items such as institutional spending, employee spending, and spending by visitors. The indirect impact, also known as the multiplier effect, results from the re-spending of dollars generated directly by the institution.

For this report, Tripp Umbach utilized the Regional Input-Output Modeling System (RIMS II) multiplier, developed by the Bureau of Economic Analysis of the U.S. Department of Commerce, applied to industry code 541700 (scientific research and development services) on the national level. This multiplier was used in order to measure the impact on the U.S. economy and not on each individual state.

The following definitions are used to describe key terms contained in the report:

Total Economic Impact

The total economic impact of an institution includes both the direct economic impact and the indirect economic impact, generated in the economy as a result of the direct impact. Direct impact includes items such as institutional spending, employee spending, and spending by visitors to the institution. Indirect economic impact, also known as the multiplier effect, includes the re-spending of dollars within the local economy.

Total Business Volume

Total sales receipts generated with a given geographic area. Business volume includes wholesale, retail, and service sector spending as well as value added in the manufacturing process.

Multiplier Effect

The additional economic impact created as a result of the institution's direct economic impact. Local companies that provide goods and services to an institution increase their purchasing, creating a multiplier.

[1] Medical Schools in Puerto Rico were not included in this research even though the AAMC does have members in Puerto Rico. There are no medical schools or COTH teaching hospitals in the states of Alaska, Idaho, Montana, and Wyoming.

Total Employment Impact

Total employees based on Full-Time Equivalents (FTEs) directly employed at the institution as well as the additional jobs created as a result of the institution's economic impact. Local companies that provide goods and services to an institution increase their number of employees as purchasing increases, creating an employment multiplier.

Research Commercialization

Research can be commercialized in a number of ways. In all cases, though, it typically involves defining the nature of the research being commercialized, for instance in a patent or intellectual property agreement, establishing a commercial relationship with another party such as in a sale or license, and negotiating a contract or specifically the details of compensation.

Results

The analysis found that in 2009, publicly funded research conducted at AAMC-member medical colleges and teaching hospitals had a combined $44.9 billion economic impact on individual states and the nation as a whole. Table 1 summarizes the total economic and employment impact on the top 24 states and the District of Columbia with AAMC-member medical schools and teaching hospitals. The impact on other states is available upon request.

Table 1. Summary of Economic andEmployment Impact For AAMC Members from Federal- and State-Funded Research, 2009

States	State Rank	Total Economic Impact	Total Employment Impact
California	1	$ 5,360,125,905	35,734
Massachusetts	2	$ 4,666,938,397	31,113
New York	3	$ 4,532,330,490	30,216
Pennsylvania	4	$ 2,892,439,702	19,283
Texas	5	$ 2,496,576,899	16,644
North Carolina	6	$ 2,158,422,741	14,389
Ohio	7	$ 2,045,422,508	13,636
Maryland	8	$ 1,785,291,194	11,902
Washington	9	$ 1,777,062,201	11,847
Illinois	10	$ 1,599,980,668	10,667
Missouri	11	$ 1,159,651,627	7,731
Michigan	12	$ 1,115,569,675	7,437
Connecticut	13	$ 1,044,055,338	6,960
Tennessee	14	$ 987,400,090	6,583
Minnesota	15	$ 944,632,296	6,298

Continued >>

Note: Tables include impacts of the 24 individual states and the District of Columbia where AAMC members' impact is highest plus an "all other states" total which reflects the impact of the remaining 22 states where AAMC members are located.

(Table 1 Continued)

Table 1. Summary of Economic andEmployment Impact For AAMC Members from Federal- and State-Funded Research, 2009			
States	**State Rank**	**Total Economic Impact**	**Total Employment Impact**
Georgia	16	$ 936,334,559	6,242
Florida	17	$ 853,058,512	5,687
Wisconsin	18	$ 801,488,179	5,343
Virginia	19	$ 714,777,147	4,765
Colorado	20	$ 710,221,195	4,735
Oregon	21	$ 606,657,791	4,044
Alabama	22	$ 597,519,638	3,983
District of Columbia	23	$ 507,709,004	3,385
Rhode Island	24	$ 411,336,816	2,742
Iowa	25	$ 407,826,860	2,719
All Other States		$ 3,834,500,328	25,563
US Overall		$ 44,947,329,758	299,649

Note: Tables include impacts of the 24 individual states and the District of Columbia where AAMC members' impact is highest plus an "all other states" total which reflects the impact of the remaining 22 states where AAMC members are located.

The Direct and Indirect Expansion of the Nation's Economy Attributable to AAMC-Member Research

Direct economic impact stems from the spending by AAMC medical school and teaching hospital members from Federal and state funds allocated for research. In addition, these direct, first-round expenditures, received as income by businesses and individuals in the state, re-circulate through the economy in successive rounds of re-spending. The end result is a multiplied economic impact that is a linear result of AAMC members' presence and their research spending patterns.

Nationwide, the economic impact generated by state and federal funding for research consists of nearly $17.3 billion in direct spending and an additional $27.6 billion in indirect economic impacts accruing to the economy through the re-spending by AAMC vendors, suppliers, staff, researchers, and visitors.

Table 2 lists the business volume impact (economic impact) generated at the national and state level by state and federal funding for research in the top 24 states and the District of Columbia with AAMC-member medical schools and teaching hospitals. The impact on other states is available upon request.

Table 2. Total State Business Volume Impact of Publicly Funded Research Conducted at AAMC-Member Institutions Research, 2009

States	State Rank	Total Economic Impact	Direct Economic Impact	Indirect Economic Impact
California	1	$ 5,360,125,905	$ 2,061,586,886	$ 3,298,539,018
Massachusetts	2	$ 4,666,938,397	$ 1,794,976,306	$ 2,871,962,090
New York	3	$ 4,532,330,490	$ 1,743,204,035	$ 2,789,126,455
Pennsylvania	4	$ 2,892,439,702	$ 1,112,476,808	$ 1,779,962,893
Texas	5	$ 2,496,576,899	$ 960,221,884	$ 1,536,355,014
North Carolina	6	$ 2,158,422,741	$ 830,162,593	$ 1,328,260,148
Ohio	7	$ 2,045,422,508	$ 786,700,965	$ 1,258,721,543
Maryland	8	$ 1,785,291,194	$ 686,650,459	$ 1,098,640,734
Washington	9	$ 1,777,062,201	$ 683,485,462	$ 1,093,576,739
Illinois	10	$ 1,599,980,668	$ 615,377,180	$ 984,603,488
Missouri	11	$ 1,159,651,627	$ 446,019,857	$ 713,631,771
Michigan	12	$ 1,115,569,675	$ 429,065,259	$ 686,504,415
Connecticut	13	$ 1,044,055,338	$ 401,559,745	$ 642,495,593
Tennessee	14	$ 987,400,090	$ 379,769,265	$ 607,630,824
Minnesota	15	$ 944,632,296	$ 363,320,114	$ 581,312,182
Georgia	16	$ 936,334,559	$ 360,128,677	$ 576,205,883
Florida	17	$ 853,058,512	$ 328,099,428	$ 524,959,085
Wisconsin	18	$ 801,488,179	$ 308,264,684	$ 493,223,495
Virginia	19	$ 714,777,147	$ 274,914,287	$ 439,862,860
Colorado	20	$ 710,221,195	$ 273,161,998	$ 437,059,197
Oregon	21	$ 606,657,791	$ 233,329,920	$ 373,327,871
Alabama	22	$ 597,519,638	$ 229,815,245	$ 367,704,392
District of Columbia	23	$ 507,709,004	$ 195,272,694	$ 312,436,310
Rhode Island	24	$ 411,336,816	$ 158,206,468	$ 253,130,348
Iowa	25	$ 407,826,860	$ 156,856,485	$ 250,970,375
All Other States		$ 3,834,500,328	$ 1,474,807,818	$ 2,359,692,509
US Overall		$ 44,947,329,758	$ 17,287,434,522	$ 27,659,895,236

Note: Tables include impacts of the 24 individual states and the District of Columbia where AAMC members' impact is highest plus an "all other states" total, which reflects the impact of the remaining 22 states where AAMC members are located.

The Direct and Indirect Expansion of Employment Attributable to AAMC Members

Perhaps the benefit that comes closest to home is the sheer number of United States citizens who depend on AAMC members and their research missions, either directly or indirectly, for their jobs and livelihoods. A total of **299,649 jobs** in the United States in 2009 were directly or indirectly attributable to AAMC-member research derived from federal and state sources. More than **1 in every 500 workers** in the United States has a job supported by publicly supported medical research at AAMC-member medical schools and teaching hospitals.

While reviewing the total employment impact, it is important to note that this is more than merely the number of researchers who are paid directly through the research funding of AAMC members such as regular staff, faculty, researchers, graduate students, postdoctoral scholars, independent contractors, or residents receiving training. These mostly high-skilled jobs are significant to the economy due to the higher wages which tend to be paid, in addition to the benefits provided to those who are employed with these positions.

While direct employment is significant, the actual extent of employment impact on the state and the nation stemming from AAMC members is considerably larger. The business volume generated by AAMC members creates jobs in a broad range of sectors throughout the nation's economy. These jobs are proportionate to the need to service the AAMC members themselves and their related populations (staff, physicians, researchers, students, etc.). In addition, the tax revenues generated at the state and local levels by AAMC members and their business volume also create government employment opportunities.

Table 3 lists the total employment generated at the national and state level by state and federal funding for research in the top 24 states and the District of Columbia with AAMC-member medical schools and teaching hospitals. The impact on other states is available upon request.

Table 3. AAMC Members' Total Research Employment Impact in FTEs, 2009

States	State Rank	Total Employment Impact
California	1	35,734
Massachusetts	2	31,113
New York	3	30,216
Pennsylvania	4	19,283
Texas	5	16,644
North Carolina	6	14,389
Ohio	7	13,636
Maryland	8	11,902
Washington	9	11,847
Illinois	10	10,667

Continued >>

Note: Table includes impacts of the 24 individual states and the District of Columbia where AAMC members' impact is highest plus an "all other states" total, which reflects the impact of the remaining 22 states where AAMC members are located.

(Table 3 Continued)

Table 3. AAMC Members' Total Research Employment Impact in FTEs, 2009

States	State Rank	Total Employment Impact
Missouri	11	7,731
Michigan	12	7,437
Connecticut	13	6,960
Tennessee	14	6,583
Minnesota	15	6,298
Georgia	16	6,242
Florida	17	5,687
Wisconsin	18	5,343
Virginia	19	4,765
Colorado	20	4,735
Oregon	21	4,044
Alabama	22	3,983
District of Columbia	23	3,385
Rhode Island	24	2,742
Iowa	25	2,719
All Other States		25,563
US Overall		299,649

Note: Table includes impacts of the 24 individual states and the District of Columbia where AAMC members' impact is highest plus an "all other states" total, which reflects the impact of the remaining 22 states where AAMC members are located.

Just the Tip of the Iceberg

While impressive, these economic impact and employment data are the tip of the iceberg as they represent only the spending of research dollars received by medical schools and teaching hospitals from federal and state sources as they ripple through the U.S. economy. Not included in Tripp Umbach's impact model are those economic impacts of the medical school and teaching hospital research mission that are more difficult to measure: the economic impact resulting from commercial application and costs savings to society from medical progress are many times higher than operational impacts. The size of these additional downstream economic and employment benefits demand further study and more accurate and ongoing quantification. Previous studies by Tripp Umbach and others suggest that these additional measures (outputs) may be as high as seven times greater than operational impacts (inputs).[2] Currently, we are unable to measure the evidence of programs and services that lead to measurable societal cost savings as a result of discovery and bringing research to market.

Overall Economic Impact of Medical Schools and Teaching Hospitals

Since 1995, Tripp Umbach has conducted national- and state-level economic impact studies on numerous occasions for the AAMC, measuring the total economic impact of all medical schools and major teaching hospitals. For example, in 2008, Tripp Umbach studied the combined economic impact of AAMC members **across all mission areas** and found that the impact of member institutions was over **$512 billion**. AAMC members accounted for more than **3.3 million full-time jobs**; simply stated, at that time, **one in every 43 wage earners** in the U.S. labor force worked either directly or indirectly for an AAMC-member institution.

Additionally, AAMC member institutions generated more than $22 billion in total state tax revenue generated through income taxes and sales tax, corporate net income tax, and capital stock/franchise taxes produced by businesses who receive revenue from AAMC members. The 2008 study showed the importance of AAMC institutions as a whole, while this economic impact analysis focuses on the economic impact of research conducted at these institutions with a particular focus on publicly funded research.

[2] Cost Savings Resulting from NIH Research Support, NIH Publication No. 93. Silverstein, H.H. Garrison and S.J. Heinig, 1995.

Association of
American Medical Colleges
2450 N Street, N.W., Washington, D.C. 20037-1127
T 202 828 0400 **F** 202 828 1125
www.aamc.org