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NATIONAL  
INSTITUTES OF  
HEALTH

Employment and  
Other Impacts  
Reported by NIH  
Recovery Act  
Grantees

U.S. Government Accountability Office

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ACCOUNTABILITY ★ INTEGRITY ★ RELIABILITY

## Why GAO Did This Study

The American Recovery and Reinvestment Act of 2009 (Recovery Act) included \$8.2 billion in funding for the National Institutes of Health (NIH) to be used to support additional scientific research—including extramural grants at universities and other research institutions. In 2009, the Acting Director of NIH testified that each extramural grant awarded with Recovery Act funding had the potential of supporting employment—full- or part-time scientific jobs—in addition to other impacts, such as contributing to advances in improving public health.

GAO was asked to examine the use of Recovery Act funds by NIH grantees. Specifically, GAO addresses the information available from NIH and its grantees about the extent to which NIH Recovery Act funding (1) supported jobs, and (2) had other impacts. To obtain information on job impacts, GAO reviewed a database containing information NIH Recovery Act grantees reported to the national data collection system and interviewed NIH officials. To obtain more specific jobs information about individual grants, GAO administered a Web-based data collection instrument to 50 selected principal investigators who direct research at grantee institutions—10 principal investigators at each of five selected grantee institutions. The selected principal investigators had generally received awards of \$500,000 or more. To obtain information on other Recovery Act impacts, GAO used information from the data collection instrument and interviewed NIH officials.

View [GAO-12-32](#) or key components. For more information, contact Linda T. Kohn at (202) 512-7114 or [kohnl@gao.gov](mailto:kohnl@gao.gov)

## NATIONAL INSTITUTES OF HEALTH

### Employment and Other Impacts Reported by NIH Recovery Act Grantees

## What GAO Found

Data reported by all of NIH's Recovery Act grantee institutions to the national data collection system at [www.federalreporting.gov](http://www.federalreporting.gov) and available to NIH indicate that the number of full-time equivalent (FTEs) jobs supported by NIH Recovery Act funds increased from December 2009 through September 2010, and then remained steady from December 2010 through June 2011—the most recent quarter for which data are available. The number of FTEs supported by NIH Recovery Act funds increased from about 12,000 in the reporting quarter ending December 2009 to about 21,000 in the quarter ending in June 2011. The 50 selected principal investigators who direct research at the grantee institutions in GAO's review provided additional information explaining how the Recovery Act funding supported FTEs. Nearly one-third of the selected principal investigators reported that the NIH Recovery Act funding they received supported new positions, and about half of the principal investigators reported that the funding they received allowed them to avoid reductions in jobs or avoid a reduction in the number of hours worked by current employees. The selected principal investigators also reported that the Recovery Act funding they received primarily supported scientists and other faculty.

NIH officials we interviewed reported that they receive some information from principal investigators about the other impacts of NIH-funded research, such as preliminary research results included in annual progress reports. NIH is also participating in the Star Metrics program—a multiagency venture to monitor the scientific, social, and economic impacts of federally funded science—which NIH officials expect could provide more information about these impacts. While Star Metrics is currently developing an approach to capture information about the other impacts of NIH grant funding, there is no expected completion date for reporting this information. In response to GAO's data collection instrument, selected principal investigators who direct research at the grantee institutions in GAO's review reported that the use of Recovery Act funds resulted in purchases of research supplies, equipment, laboratory testing services, and scientific training of health care professionals. The majority of the 50 selected principal investigators in GAO's review also reported preliminary results from their Recovery Act-funded research that could contribute to future scientific developments in prevention and early detection of disease, improvements in medical therapies, and improved research capabilities. The principal investigators in GAO's review and NIH officials GAO interviewed reported that they track the scientific impact of NIH research—including the impact of research funded through the Recovery Act—primarily through peer-reviewed publications, but also through other metrics such as the filing and approval of patent applications. According to NIH officials, when a sufficiently large body of research results has accumulated, NIH plans to prepare reports—similar to its existing publicly available Investment Reports—that will highlight the impact of its Recovery Act-funded research.

The Department of Health and Human Services provided technical comments on a draft of this report, which GAO incorporated as appropriate.

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## Abbreviations

CER	comparative effectiveness research
DCI	data collection instrument
FTE	full-time equivalent
GO	Grand Opportunity
HHS	Department of Health and Human Services
IC	Institutes and Centers
NIH	National Institutes of Health
OMB	Office of Management and Budget
Recovery Act	American Recovery and Reinvestment Act of 2009
Recovery Board	Recovery Accountability and Transparency Board

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G A O

Accountability \* Integrity \* Reliability

United States Government Accountability Office  
Washington, DC 20548

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November 10, 2011

The Honorable Fred Upton  
Chairman  
Committee on Energy and Commerce  
House of Representatives

The Honorable Joe Barton  
House of Representatives

The American Recovery and Reinvestment Act of 2009 (Recovery Act)<sup>1</sup> was enacted to, among other things, support job creation and preservation, infrastructure investment, energy efficiency, and scientific research. The act included \$8.2 billion in funding for the National Institutes of Health (NIH) to be used to support additional scientific research, including extramural grants at universities, medical schools, and other research institutions.<sup>2</sup> The act required that Recovery Act funds be obligated by NIH in fiscal years 2009 and 2010.

In March 2009, the Acting Director of NIH testified on the potential employment, economic, as well as scientific benefits of the Recovery Act funding NIH received.<sup>3</sup> Specifically the Acting Director testified that each research grant awarded with Recovery Act funding has the potential of supporting several full- or part-time scientific jobs. During testimony, the Acting Director also pointed out that the extramural grants made with Recovery Act funding could have other impacts, such as contributing to advances in improving public health.

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<sup>1</sup>Pub. L. 111-5, 123 Stat. 115 (Feb. 17, 2009).

<sup>2</sup>The Recovery Act also provided an additional \$2.2 billion in Recovery Act funding to NIH to support comparative effectiveness research, repairs, improvements, and construction, as well as extramural scientific equipment.

<sup>3</sup>See testimony by Dr. Raynard Kington, Acting Director of NIH before the House Subcommittee on Labor-HHS-Education Appropriations regarding the implementation of the Recovery Act, March 26, 2009. Dr. Kington also cited a study suggesting that NIH spending in local communities generates an average economic impact of three times the original amount.

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Universities or other research institutions that receive grant funding from NIH could directly support employment in a number of ways, including increasing the number of hours worked by existing part-time employees or hiring new full- or part-time employees who may work on research projects supported by one or more NIH grant awards. Recovery Act funding—including NIH Recovery Act funding—could also indirectly support jobs, such as if vendors that supply research equipment and services increased their employees due to increased business from research institutions. Any direct or indirect support of jobs could also lead to induced effects on other jobs, such as when employees make purchases at local businesses. However, past GAO reports have found that it is difficult to measure the indirect and induced impacts of Recovery Act funding, in part because the information needed to measure these impacts is often not available.<sup>4</sup> Recipients of Recovery Act funding are only required to report on jobs directly supported by Recovery Act funds. These reports do not include the employment impact on materials suppliers (indirect jobs) or on the local community (induced jobs).

To measure direct support of jobs, the Office of Management and Budget (OMB) requires recipients of Recovery Act funds—including NIH Recovery Act grantees—to report on the number of jobs supported using these funds to a nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov).<sup>5</sup> Guidance provided by OMB provides more detail on this requirement, including that recipients report on the number of full-time-equivalent (FTE) jobs that were directly funded by the Recovery Act during each quarter.<sup>6</sup> OMB's guidance also directs recipients of Recovery Act funding to report on the results of funded

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<sup>4</sup>See for example, GAO, *Recovery Act: Recipient Reported Jobs Data Provide Some Insights into Use of Recovery Act Funding, but Data Quality and Reporting Issues Need Attention*, [GAO-10-223](#) (Washington, D.C.: Nov. 19, 2009). Among other things, this report discusses the methodological challenges in measuring the indirect and induced impacts of Recovery Act funding.

<sup>5</sup>The information reported by Recovery Act recipients is available to the public for viewing and downloading on [www.recovery.gov](http://www.recovery.gov) (Recovery.gov).

<sup>6</sup>See Office of Management and Budget (OMB) *Memoranda M-10-08: Updated Guidance on the American Recovery and Reinvestment Act – Data Quality, Non-Reporting Recipients, and Reporting of Job Estimates*, (Washington, D.C.: Dec. 18, 2009). FTEs are calculated as the total number of hours worked and funded by the Recovery Act in a reporting quarter divided by the quarterly hours in a full-time schedule, as defined by the recipient. For instance, if a full-time schedule is 2,080 hours/year, the number of hours in a full-time schedule for a quarter is 520 (2,080 hours/4 quarters = 520).

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projects as well as provide narrative descriptions of the types of jobs funded by the Recovery Act, which provide information that the number of FTEs does not capture.<sup>7</sup> Federal agencies, such as NIH, and recipients, such as NIH Recovery Act grantees, may also have additional information on the other impacts of Recovery Act funding—that may include scientific impacts, impacts in the local community, and impacts on NIH Recovery Act grantees. Grant awards for scientific research supported by NIH Recovery Act funds were generally made to grantee institutions, such as universities, for research activities that are directed by a principal investigator<sup>8</sup> employed by the grantee institution. When we use the term “grantee” in this report, we are referring to the grantee institution, including the principal investigator who is designated by the grantee institution to direct the NIH Recovery Act-funded research.

You requested that we examine the use of Recovery Act funds by NIH and its grantees. In August 2010, we reported on the process and criteria NIH used to award grants with funding made available by the Recovery Act, the characteristics of the grants, and information NIH has made publicly available about the grants.<sup>9</sup> This report addresses the information available from NIH and its grantees about the extent to which (1) NIH Recovery Act funding supported jobs, and (2) NIH Recovery Act funding had other impacts.

To obtain the information NIH and selected NIH Recovery Act grantees have on the jobs supported with NIH Recovery Act funding, we interviewed NIH officials about the information they have on the FTEs supported by the Recovery Act, and reviewed (1) NIH data containing information reported to the nationwide data collection system on the FTEs

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<sup>7</sup>See OMB Memoranda M-09-21.

<sup>8</sup>NIH defines a principal investigator as the individual designated by the grantee institution (or applicant organization) to have the level of authority and responsibility to direct the project or program to be supported by the grant award. We use the term “grantee institution” to refer to the institution that employs the principal investigators.

<sup>9</sup>See GAO, *National Institutes of Health: Awarding Process, Awarding Criteria, and Characteristics of Extramural Grants Made with Recovery Act Funding*, [GAO-10-848](#) (Washington, D.C.: August 2010).



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supported by NIH Recovery Act funding, (2) annual progress reports<sup>10</sup> for fiscal year 2010 that NIH Recovery Act grantees are required to submit to NIH, and (3) other jobs information that NIH gathers from other sources. In addition, we selected five grantee institutions,<sup>11</sup> which are universities that employ principal investigators who received NIH Recovery Act funding. We obtained from NIH, information on the FTEs supported by NIH Recovery Act funding at each of these five grantee institutions as reported to the nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov).

To gather more specific information about individual grants, we disseminated a Web-based data collection instrument (DCI) to 50 selected principal investigators—10 principal investigators at each of the same five grantee institutions.<sup>12</sup> (See app. I for the selection criteria for grantee institutions and principal investigators). The Web-based DCI contained questions about the types and number of jobs supported by the Recovery Act funding received from NIH.<sup>13</sup> The selected principal investigators and their grantee institutions are not representative of all grantee institutions and principal investigators who received NIH Recovery Act funding.

The information on the number of FTEs supported by NIH Recovery Act funding reported to the nationwide data collection system by recipients of Recovery Act funding has certain limitations. First, OMB guidance requires FTE numbers to be reported quarterly, and FTEs should not be added across quarters to obtain a cumulative number of FTEs. In addition, the calculation of FTEs may reflect full-time and/or multiple part-time jobs, therefore FTEs cannot be used to determine the total number of individual jobs. Moreover, because of a change in OMB's reporting

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<sup>10</sup>These annual progress reports are used by NIH to assess the progress of funded projects, and include information such as the research goals, updates on the progress of the research, publications resulting from research findings, and personnel changes to the project team.

<sup>11</sup>The five selected grantee institutions received the largest amounts of NIH Recovery Act funding and reported the largest number of supported FTEs.

<sup>12</sup>The principal investigators at these five grantee institutions were selected based on the size and award date of the grants.

<sup>13</sup>To gather information about the grants from an institutional perspective, we also disseminated a second Web-based DCI to an administrator at each of the five selected grantee institutions.

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requirements FTE data for the first reporting quarter may not be comparable to the data reported for subsequent reporting quarters. Finally, the number of FTEs represents only the jobs directly supported by the Recovery Act but does not capture other jobs, such as those indirectly supported by the act, or other impacts of the spending.

To obtain information NIH and selected NIH grantees have on the other impacts—such as impacts in the local community, scientific impacts, and impacts on grantee institutions and principal investigators of the NIH Recovery Act funding, we disseminated the Web-based DCI to the 50 principal investigators at the five selected grantee institutions and interviewed NIH officials. We also asked NIH and NIH grantees to identify the metrics they use to measure and track other impacts such as impacts on science, the local community, and on the grantee institutions and principal investigators. Finally, we reviewed relevant NIH Recovery Act grant guidance as well as OMB’s Recovery Act guidance to identify Recovery Act grantee requirements for reporting information on FTEs and on the impacts of the Recovery Act grants to the nationwide data collection system. See appendix I for more details about our scope and methodology.

To assess the reliability of the data provided by NIH, we obtained information from agency officials knowledgeable about (1) NIH grant award data, (2) NIH Recovery Act grantee recipient reports,<sup>14</sup> and (3) job information that NIH gathers from other sources. We obtained information from administrators at the selected grantee institutions about the quality of their recipient reports<sup>15</sup> and performed data quality checks to assess the reliability of the Recovery Act grants data file received from NIH. These data quality checks involved an assessment to identify incorrect and erroneous entries or outliers. Based on the information we obtained and analyses we conducted, we determined that the data were sufficiently reliable for the purposes of this report.

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<sup>14</sup>NIH officials said they conduct data quality reviews on the numbers of FTEs reported by grantee institutions. The officials also noted that at the end of each reporting period, they typically flag less than 1 percent of all grantee reports as having potential errors.

<sup>15</sup>The administrators stated that they use OMB guidance to calculate and report the number of FTEs supported by their Recovery Act grants and to perform data quality reviews. They also noted that they have centralized in-house processes for ensuring the quality of the reported FTE data.

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We conducted this performance audit from October 2010 to November 2011, in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

As of September 30, 2010—the end of the 2 fiscal years during which Recovery Act awards were made—NIH made more than 21,500 grant awards using Recovery Act funds. In August 2010, we reported that NIH used standard review processes—peer review or administrative review—and standard criteria to award extramural scientific research grants with Recovery Act funding.<sup>16</sup> These NIH Recovery Act grant awards were made to three grant categories.<sup>17</sup> The grants varied in award size, geographic distribution, award duration, and research methods, consistent with scientific research grants funded with annual appropriations. The act required that these funds be obligated by NIH within a 2-year window—specifically, in fiscal years 2009 and 2010, though the activities funded by the grant may occur after fiscal year 2010.

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## Recovery Act Reporting Requirements

OMB guidance requires recipients of Recovery Act funding—including NIH Recovery Act grantees—to report on the number of jobs supported by the Recovery Act on a quarterly basis to the nationwide data collection system. OMB developed recipient reporting guidance and deployed a nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov). According to OMB guidance, a grantee's estimate of the number of jobs supported by the Recovery Act each quarter must be expressed in terms of FTEs, which are calculated as the total number of hours worked and funded by

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<sup>16</sup>The standard criteria were scientific merit, availability of funding, and relevance to scientific priorities, and the three additional criteria were geographic distribution, potential for job creation, and the potential for making scientific progress.

<sup>17</sup>The award categories included: awards for applications that had previously been reviewed but had not received funding, awards for new grant applications, and awards for administrative supplements and competitive revisions to current active grants.

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the Recovery Act within a reporting quarter divided by the quarterly hours in a full-time schedule, as defined by the recipient.<sup>18</sup>

According to the OMB guidance, federal agencies that award Recovery Act funds should establish internal controls to ensure data quality, completeness, accuracy, and timely reports to the [www.federalreporting.gov](http://www.federalreporting.gov) Web site. In reviewing a selection of the reports submitted to [www.federalreporting.gov](http://www.federalreporting.gov) by grantees of agencies across the Department of Health and Human Services (HHS), the HHS Office of Inspector General found that HHS had processes in place for reporting the use of Recovery Act funds. NIH officials also reported that HHS assesses the quality of reports filed by NIH Recovery Act grantees. For example, using data assessments performed by NIH, HHS assesses the quality of the data reported by Recovery Act grantees.

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## Sources of Information on Jobs and Other Impacts of Recovery Act Grants

NIH and NIH Recovery Act grantees collect information about the FTEs supported by NIH Recovery Act funding as well as information on the other impacts of this funding from a variety of sources. Specifically, NIH collects information about FTEs supported by the Recovery Act from the [www.federalreporting.gov](http://www.federalreporting.gov) Web site.<sup>19</sup> NIH grantees, including NIH Recovery Act grantees, also submit annual progress reports to NIH that include information such as the goals and progress of their research. NIH is also participating in the development of a multiagency collaboration (called Star Metrics)<sup>20</sup> to track the employment, scientific, and economic impacts of its funded research projects—including Recovery Act grants.

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<sup>18</sup>FTE data provide insight into the use and impact of the Recovery Act funds, but recipient reports cover only direct jobs reported by recipients of Recovery Act funds. These reports do not include the employment impact on suppliers (indirect jobs) or on the local community (induced jobs). Both data reported by recipients and other macroeconomic data and methods are necessary to understand the overall employment effects of the Recovery Act.

<sup>19</sup>See <http://www.recovery.gov/Transparency/RecipientReportedData/Pages/RecipientLanding.aspx>.

<sup>20</sup>The Science and Technology for America's Reinvestment: Measuring the Effect of Research on Innovation, Competitiveness and Science (the Star Metrics Program) is a multiagency venture to monitor the impact of federal science investments on employment, knowledge generation, and social outcomes. The White House Office of Science and Technology Policy leads this venture. Participating agencies include: NIH, the National Science Foundation, the Environmental Protection Agency, and the Department of Energy.

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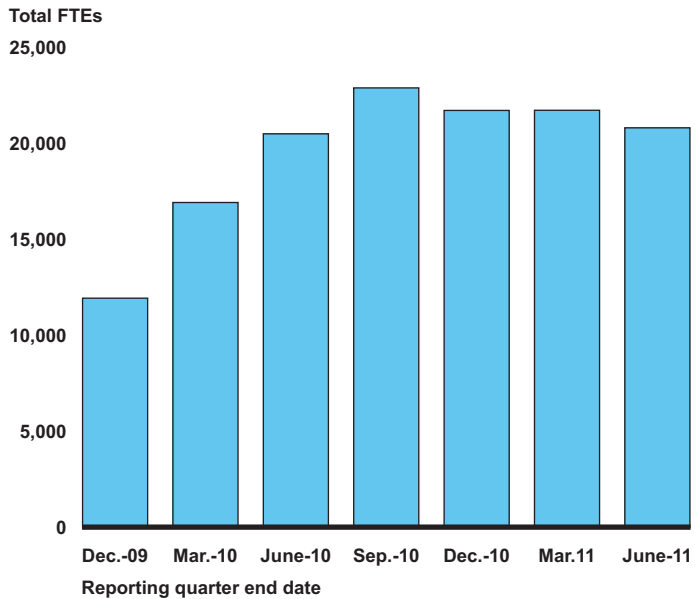
In addition, NIH gathers information from principal investigators working on priority research areas and prepares publicly available reports (known as Investment Reports) about the potential scientific impacts of NIH-funded research. NIH Institutes and Centers (IC) select the topics featured in these reports based on (1) the importance of the topic area within the body of research funded by the IC, (2) the level of funding provided by the IC to the topic area, and (3) the level of public interest in the topic area. NIH grantees also collect information about the jobs as well as other impacts of NIH grants, including those funded by the Recovery Act, using payroll records, and effort reporting systems—such as time cards, other internal accounting records, and publications.

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## **NIH and Its Grantees Reported That Recovery Act Funding Generally Increased FTEs at Grantee Institutions and Primarily Supported Scientists and Other Faculty**

Data reported by all NIH Recovery Act grantee institutions to the nationwide data collection system and available to NIH indicate that the number of FTEs supported by NIH Recovery Act funds generally increased from December 2009 through September 2010, then generally remained steady from December 2010 through June 2011—the most recent quarters for which data are available. As shown in figure 1, the number of FTEs supported by NIH Recovery Act funding ranged from about 12,000 in the reporting quarter ending December 2009 to about 21,000 in the quarter ending in June 2011.

**Figure 1: Quarterly Number of FTEs Supported by Recovery Act Grants Awarded by NIH, for Quarters Ending December 2009 through June 2011**



Source: GAO analysis of data extracted by NIH from [www.federalreporting.gov](http://www.federalreporting.gov).

Notes: Recovery Act recipients report the number of FTEs supported by the Recovery Act quarterly, and therefore these FTE numbers are reported out by quarter. FTEs supported by awards under \$25,000 may not be included in the figure because these awards are exempt from reporting requirements. About 6 percent of all NIH Recovery Act awards were for less than \$25,000. We did not include data from the first reporting quarter in 2009 due to concerns about comparability.

According to NIH officials, Recovery Act funds could eventually support a total of approximately 54,000 FTEs. This figure represents NIH's estimated total of FTEs that could be supported throughout the Recovery Act.<sup>21</sup> According to NIH officials, this estimate is projected based on the quarterly expenditure of funds reported by grantee institutions and the projected number of FTEs that NIH expects that these funds could support over the life of the Recovery Act. NIH expects that the Star Metrics program will provide additional information about the number and types of jobs funded by the Recovery Act. NIH officials reported that the

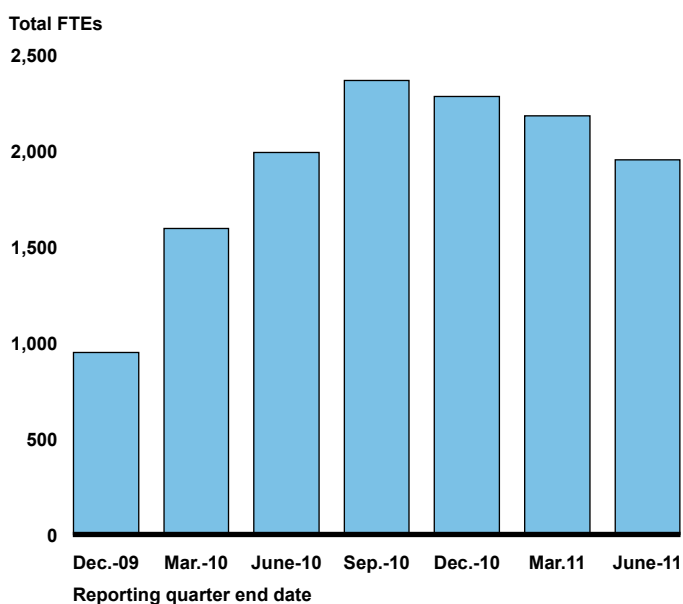
<sup>21</sup>This figure is a separate and more recent estimate (provided by NIH officials in September 2011) than the information provided by the Acting Director of NIH to the House Subcommittee on Labor-HHS-Education Appropriations in March 2009, in which he noted that on average, each research grant awarded with Recovery Act funding had the potential of supporting six to seven full- or part-time scientific jobs.

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Star Metrics program is an ongoing initiative and that the program is expected to release preliminary results regarding jobs in 2012.

Like other NIH Recovery Act grantee institutions, data reported by our five grantee institutions also showed a general increase in FTEs. Specifically, the five institutions combined reported almost 1,000 FTEs in the quarter ending in December 2009, increasing to almost 2,000 supported FTEs in the most recent quarter for which data are available that ended in June 2011. (See fig. 2).<sup>22</sup>

**Figure 2: Quarterly Number of FTEs Reported by Five Selected Grantee Institutions, for Quarters Ending December 2009 through June 2011**



Source: GAO analysis of data extracted by NIH from [www.federalreporting.gov](http://www.federalreporting.gov).

Note: Recovery Act recipients report the number of FTEs supported by the Recovery Act quarterly, and therefore these FTE numbers are reported out by quarter. FTEs supported by awards under \$25,000 may not be included in the figure because these awards are exempt from reporting requirements. About 6 percent of all NIH Recovery Act awards were for less than \$25,000. We did not include data from the first reporting quarter in 2009 due to concerns about comparability.

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<sup>22</sup>See scope and methodology for details on the selection criteria for these grantee institutions.

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Through responses to our data collection instrument 50 selected principal investigators at five grantee institutions provided additional information explaining how the Recovery Act funding supported FTEs. Nearly 30 percent of the 50 selected principal investigators reported that the NIH funding they received supported new positions, and about half of the principal investigators reported that the funding they received allowed them to avoid reductions in the number of employees at their institution or avoid a reduction in the number of hours worked by current employees. For example, according to the selected principal investigators, 29 percent of the jobs supported by NIH Recovery Act funding at the five grantee institutions were new employees hired by the institution using Recovery Act funding, and 54 percent were current employees.<sup>23</sup> One principal investigator reported using NIH Recovery Act funding to hire more than 10 employees, many of whom had recently been laid off or had been out of work for several months. According to selected principal investigators, a majority (54 percent) of the job positions supported by NIH Recovery Act funds were parttime<sup>24</sup> and the mean number of hours worked per week for all supported positions was about 20, including for example, a mean of 9 hours per week for professors and 35 hours per week for students pursuing postgraduate degrees. (See app. II for more descriptive information about the FTEs supported by NIH Recovery Act funding.)

The 50 selected principal investigators also reported that the Recovery Act funding they received primarily supported research scientists, other faculty, and information technology jobs.<sup>25</sup> (See fig. 3 for a summary of the information the selected principal investigators reported to us on the types of jobs supported by NIH Recovery Act funding.)

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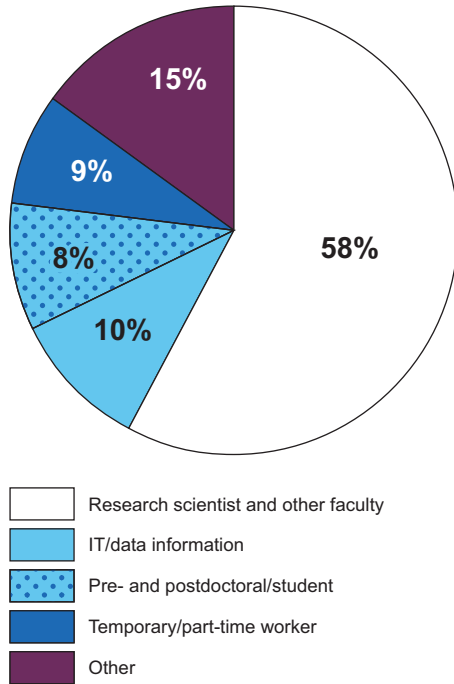
<sup>23</sup>Seventeen percent of selected principal investigators did not indicate whether the supported employees were new or existing employees.

<sup>24</sup>Nine percent of selected principal investigators did not provide information on whether the jobs supported by NIH Recovery Act funds were part time or full time.

<sup>25</sup>Scientists are typically university faculty members supported by NIH Recovery Act funds, and “other faculty” include professors and instructors.



**Figure 3: Types of Jobs Supported by Recovery Act Funds, as Reported by 50 Selected Principal Investigators during Fiscal Years 2009 and 2010**



Source: GAO analysis of information reported by selected principal investigators.

## NIH and Its Grantees Reported Other Impacts of NIH Recovery Act Funding

NIH officials currently receive some information reported by NIH grantees about other impacts of NIH's Recovery Act funding, and NIH is participating in a program that NIH officials expect could help track these other impacts. In response to our data collection instrument, two-thirds of our 50 selected principal investigators—who direct research at the grantee institutions—reported that the Recovery Act funding received in fiscal years 2009 and 2010 was used to purchase research supplies and equipment and lab testing services. In addition, the majority of our 50 selected principal investigators and NIH also reported preliminary results from research projects funded by the Recovery Act.

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## NIH Is Participating in a Program to Track Other Impacts, and Selected NIH Grantees Reported Other Impacts such as Purchases of Supplies and Equipment

NIH officials we interviewed said that principal investigators—who direct research at the grantee institutions—including those which received Recovery Act funding—currently report some information to NIH about the other impacts of NIH-funded research. This information generally includes purchases made by the principal investigators, as well as preliminary research results submitted to NIH in their annual progress reports.<sup>26</sup> NIH is participating in the Star Metrics program—a multiagency collaboration currently involving about 77 grantee institutions—to track, among other things, the scientific and nonscientific impacts of its funded research grants, including social and workforce outcomes and economic growth. NIH officials expect that the Star Metrics program could provide more information about these other impacts. Officials told us that Star Metrics is currently developing an approach to capture this information, and that they expect to pilot the approach in 2012. However, at this time there is no expected completion date for reporting this information.

In their responses to our data collection instrument, many of our 50 selected principal investigators reported that they used the Recovery Act funding they received from fiscal years 2009 through 2010 to purchase supplies, equipment, and testing services used in research. Some of the principal investigators also reported that in the course of conducting some of their Recovery Act-funded research, they were able to provide scientific training to health care professionals. The selected principal investigators provided anecdotal information about the other impacts of the selected grants. Recipients of Recovery Act funding, such as grantee institutions, do not systematically track these other impacts; however, they are not required by the Recovery Act to do so. In previous work on the Recovery Act, GAO identified difficulties in assessing other impacts, particularly in instances when data on the other impacts are not readily available.<sup>27</sup> (See app. III for more details of the other impacts of NIH Recovery Act funding as reported by selected principal investigators.)

*Purchasing Supplies and Equipment.* In their responses to our data collection instrument, two-thirds of our 50 selected principal investigators reported that they used the Recovery Act funding they received from NIH

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<sup>26</sup>NIH grantees, including NIH Recovery Act grantees, are required to report annually on the progress of their funded research, as well as provide other information that may vary depending on the specifications of the grant.

<sup>27</sup>See [GAO-11-610T](#) and [GAO-11-379](#).

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to purchase or lease laboratory equipment and supplies needed to conduct research. These transactions, which we corroborated by conducting a selected review of NIH Annual Progress Reports and Recovery Act recipient reports, could translate into additional sales and revenues for the vendors. According to the principal investigators, their transactions included biomedical equipment and supplies, office supplies, computer equipment, and software licenses. For example, one principal investigator reported purchasing highly specialized imaging equipment<sup>28</sup> for \$27,000, as well as other medical, laboratory, and office supplies.

*Purchasing Specialized Services.* Over a quarter of our 50 selected principal investigators reported that they used NIH's Recovery Act funding to purchase certain laboratory testing services—such as genetic sequencing—from other research facilities that were better equipped to perform the testing and analyses. For example, one principal investigator reported contracting with a small local research company to perform specialized DNA analysis needed to determine the causes of immune deficiency disorders. In addition, a couple of principal investigators reported that they used NIH's Recovery Act funding to contract for consultations services, such as statistical analyses and the design of models needed for their research. Some principal investigators also purchased ancillary services that they said were needed to support clinical trials, such as services providing patient transportation, recruitment, and care.

*Scientific Training for Health Care Professionals.* Nine of our 50 selected principal investigators also reported in our data collection instrument that in the course of conducting their Recovery Act-funded research they were able to provide scientific training to health care professionals. Some of these principal investigators cited the importance of exposing current and future physicians to research-based approaches for diagnosing and treating patients. For example, one principal investigator reported that while researching how to select treatments for cancer patients, new oncology researchers—fellows and junior faculty—were trained about the effects of human genetics on care delivery for cancer patients. According to this principal investigator, understanding the effects of genetics on cancer allows physicians to personalize the treatment options they offer

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<sup>28</sup>This principal investigator purchased a dual-energy x-ray absorptiometry scanner that is typically used for measuring bone density.

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to patients. The principal investigator also noted that the next generation of physicians needs to be knowledgeable about genomic approaches to cancer care, while developing the foundation for their research careers. According to another principal investigator, as part of research to determine why certain genes contribute to Alzheimer's disease, health care professionals were trained to analyze complex genetic datasets and to develop software packages needed to efficiently perform the analysis.

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### Most NIH Grantees and NIH Reported Preliminary Research Illustrating Potential Scientific Impacts from Projects Funded by the Recovery Act

In responses to our data collection instrument, a majority of our 50 selected principal investigators who direct research at the grantee institutions reported on the preliminary results from their research projects supported with Recovery Act funds. According to the majority of our selected principal investigators these preliminary results could contribute to future scientific developments in preventive medicine, the early detection of diseases, and medical therapies. Additionally, one principal investigator reported that some of the results of their research could lead to the development of research capabilities to be used by other researchers. A few principal investigators, however, stated that it was premature to report any preliminary results from their NIH Recovery Act-funded research, because they were still conducting clinical trials and analyzing data. In general, scientific research—including NIH-funded projects—can be lengthy and complex, and take years to obtain results.

Grantee institutions and principal investigators in our review and NIH officials we interviewed reported that they track the scientific impact of NIH research—including preliminary results from research funded through the Recovery Act—primarily through peer-reviewed publications. NIH officials also reported that they track certain priority research areas and communicate potential scientific impacts through its Investment Reports.<sup>29</sup> According to NIH, when a sufficiently large body of research results have accumulated the agency plans to prepare reports (similar to its Investment Reports) that highlight the impact of its Recovery Act-funded research. Other metrics used to track scientific impacts—including for Recovery Act-funded research—as reported by principal investigators in our review include the filing and approval of patent applications, the

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<sup>29</sup>NIH Investment Reports are released periodically and typically include a description of the potential scientific impacts of NIH-funded research in relation to specific public health issues. See <http://report.nih.gov/recovery/investmentreports/> for examples of recent NIH Investment Reports.

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ability to secure future grant funding, presentations at professional meetings, utilization of products produced from their research, and changes to health care policies and clinical practices implemented as a result of their research.

As noted earlier, the majority of our selected principal investigators provided preliminary results from their research projects supported with Recovery Act funds. The following are examples of these preliminary results:

- **Prevention of Diseases.** One principal investigator reported that their Recovery Act-supported research on coronary heart disease indicated that high levels of calcified and noncalcified plaque, which can clog arteries and contribute to heart disease, is present in young healthy people who have a family history of premature coronary disease. According to this principal investigator, the results of this research could be used to identify persons who would benefit from heart imaging tests and preventative therapy for coronary heart disease.
- **Early Detection of Diseases.** One principal investigator reported that their Recovery Act-supported research resulted in the identification of several hundred proteins that are associated with chronic pancreatitis. According to this principal investigator, this research could contribute towards creating new blood tests for detecting chronic pancreatitis. Another principal investigator reported identifying the symptoms that are the most important and efficient for making a diagnosis of autism in young children.
- **Improvements in Medical Therapies.** One principal investigator reported that data collected for their Recovery Act grant has yielded results in developing personalized therapeutic approaches for patients with idiopathic pulmonary fibrosis, a fatal disorder.<sup>30</sup> This principal investigator noted that these results could help to simplify decision making regarding therapeutic interventions, such as for patients undergoing an organ transplant. Another principal investigator cited progress toward overcoming the resistance of colon cancer to existing treatment therapies, and another assessed two alternative therapies for coronary heart disease. A principal investigator also reported that

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<sup>30</sup>Idiopathic pulmonary fibrosis is a disorder that results in scarring of the lungs and breathing difficulty.

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their Recovery Act-supported research contributed to the development of a kidney dialysis monitoring device that could be less invasive and more cost-effective than the current surgically implanted monitoring systems.

- Improved Research Capabilities. One principal investigator reported that their Recovery Act-supported research contributed to the development of a new approach that is being utilized by other researchers studying the connections between different genes and traits, such as those that may lead to heart disease.

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## Agency Comments

A draft of this report was provided to HHS for review and comment. HHS provided technical comments that were incorporated as appropriate.

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As arranged with your offices, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after its issue date. At that time, we will send copies of this report to other interested congressional committees, the Secretary of Health and Human Services, and the Director of the National Institutes of Health. This report will also be available on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions regarding this report, please contact Linda T. Kohn at (202) 512-7114 or [kohnl@gao.gov](mailto:kohnl@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix IV.



Linda T. Kohn  
Director, Health Care

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# Appendix I: Scope and Methods

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To obtain the information National Institutes of Health (NIH) and selected NIH Recovery Act grantees<sup>1</sup> have on the jobs supported with NIH Recovery Act funding, we interviewed NIH officials about the information they have on the full-time-equivalents (FTE) supported by the Recovery Act, and reviewed (1) NIH data containing information reported by grantee institutions to a nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov) on the FTEs supported by NIH Recovery Act funding, (2) annual progress reports<sup>2</sup> for fiscal year 2010 that NIH Recovery Act grantees are required to submit to NIH, and (3) other jobs information that NIH gathers from other sources.

To assess the reliability of the data provided by NIH, we obtained information from agency officials knowledgeable about (1) NIH grant award data, (2) NIH Recovery Act grantee recipient reports, and (3) the jobs information that NIH gathers from other sources. We also performed data quality checks to assess the reliability of the Recovery Act grants data file received from NIH. These data quality checks involved an assessment to identify incorrect and erroneous entries or outliers. Based on the information we obtained and analyses we conducted, we determined that the data were sufficiently reliable for the purposes of this report.

In addition, we selected five grantee institutions, which were universities that employ principal investigators who received NIH Recovery Act funding. The five selected grantee institutions met the following criteria: (1) received the largest portion of Recovery Act funds from NIH, (2) received the largest number of grants, and (3) reported the highest number of FTEs supported by NIH Recovery Act funds. The selected institutions were Johns Hopkins University, University of Michigan, University of Washington, University of Pennsylvania, and Duke University. The selected grantee institutions are not representative of all institutions that received Recovery Act funding. (See table 1 for more information about the five selected grantee institutions.)

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<sup>1</sup>When we use the term “grantee” in this report, we are referring to the grantee institution, including the principal investigator who is designated by the grantee institution to direct the NIH Recovery Act-funded research.

<sup>2</sup>These annual progress reports are used by NIH to assess the progress of funded projects, and include information such as the research goals, updates on the progress of the research, publications resulting from research findings, and personnel changes to the project team.

**Table 1: Characteristics of Five NIH Recovery Act Grantee Institutions Selected for Review**

	Number of NIH Recovery Act grants received <sup>a</sup>	Amount of NIH Recovery Act funds received <sup>a</sup> (in millions)	Number of full-time-equivalents reported for the quarter ending September 2010
Duke University	339	\$169	413
Johns Hopkins University	435	\$163	401
University of Michigan	462	\$194	544
University of Pennsylvania	428	\$189	543
University of Washington	414	\$196	464
<b>Total</b>	<b>2,078</b>	<b>\$911</b>	<b>2,365</b>

Source: GAO analysis of NIH Grant Award data and NIH Recovery Act Recipient Reports.

<sup>a</sup>The numbers of grants and funding received were as of September 30, 2010.

To gather more specific information about individual grants, we created a Web-based data collection instrument (DCI) and disseminated it to 50 selected principal investigators—10 principal investigators at each of the same five grantee institutions.<sup>3</sup> The Web-based DCI contained questions about the types and number of jobs supported by the Recovery Act funding received from NIH. The selected principal investigators received grant awards that met the following criteria: (1) the grant was a new grant award and not a supplement to an existing grant, (2) the grant award was for \$500,000 or greater (see table 2 for more details), and (3) the grant award was made on or before December 1, 2009. We reviewed the abstracts for all the grants that met the above criteria and made a judgmental selection of the final 50 grants—making sure to include a variety of grant types such as Challenge grants and Grand Opportunity (GO) grants that were developed for the Recovery Act.<sup>4</sup> The 50 selected

<sup>3</sup>NIH defines a principal investigator as the individual designated by the grantee institution (or applicant organization) to have the appropriate level of authority and responsibility to direct the project or program to be supported by the grant award. For this report all five selected grantee institutions were universities.

<sup>4</sup>The Challenge Grant program focuses on health and science problems such as cancer and autism. The GO grant program supports high-impact ideas that require significant resources for a discrete period to lay the foundation for new fields of investigation.



grant awards ranged in size from \$500,000 to about \$11,000,000. The principal investigators for these selected grants are not representative of all principal investigators who received NIH Recovery Act funding. To gather information about the grants from an institutional perspective, we also created a second Web-based DCI and disseminated it to an official involved in coordinating Recovery Act reporting at each of the five selected grantee institutions.

**Table 2: Range of 50 Selected Grant Award Amounts at Five NIH Recovery Act Grantee Institutions, Fiscal Years 2009 and 2010**

Grantee institutions (Universities)	Range of individual grant award amounts (in millions)
Duke University	\$0.5 - \$5.6
Johns Hopkins University	\$0.5 - \$3.3
University of Michigan	\$0.5 - \$9.0
University of Pennsylvania	\$0.5 - \$5.1
University of Washington	\$0.8 - \$11
Range for five selected grantee institutions	\$0.5 - \$11

Source: GAO analysis of NIH grant award data.

We performed follow-up information gathering from selected principal investigators and administrators at grantee institutions that completed the DCI to supplement the information provided in the DCI. We also obtained and reviewed information reported by grantee institutions to the nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov) about the number of jobs supported by the Recovery Act.

The information on the number of FTEs supported by NIH Recovery Act funding reported to the nationwide data collection system by recipients of Recovery Act funding has certain limitations. First, the Office of Management and Budget (OMB) guidance requires FTE numbers to be reported quarterly and FTEs should not be added across quarters to obtain a cumulative number of FTEs. In addition, the calculation of FTEs may reflect full-time and/or multiple part-time jobs, therefore FTEs cannot be used to determine the total number of individual jobs. Moreover, because of a change in OMB's reporting guidelines, FTE data for the first reporting quarter may not be comparable to the data reported for subsequent reporting quarters. The number of FTEs represents only the jobs directly supported by the Recovery Act but does not capture the jobs indirectly supported by the act or other impacts of the spending.

To identify the information NIH and selected grantee institutions and principal investigators have on the other impacts of the NIH Recovery Act funding they received, we utilized the Web-based DCI disseminated to the same 50 principal investigators—10 principal investigators at each of the five selected grantee institutions—noted earlier, and interviewed NIH officials. We asked the grantee institution and principal investigators to identify other impacts such as scientific impacts, impacts in the local community, and impacts on the grantee institution and principal investigators. We also asked NIH and principal investigators to identify the metrics they use to measure and track these other impacts. We contacted the State Recovery Act representative in two of the states in which our selected universities are located (North Carolina and Pennsylvania) to identify information on the other impacts of NIH Recovery Act funding in their jurisdictions. Finally, we reviewed relevant NIH Recovery Act grant guidance as well as OMB's Recovery Act guidance to identify Recovery Act grantee requirements for reporting information on FTEs and on the impacts of the Recovery Act grants to NIH and the nationwide data collection system at [www.federalreporting.gov](http://www.federalreporting.gov).

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# Appendix II: Analysis of Information Reported by Selected Principal Investigators on Jobs Supported by Recovery Act Funding

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We disseminated a Web-based data collection instrument (DCI) to a total of 50 selected principal investigators (10 principal investigators at each of five selected grantee institutions).<sup>1</sup> The data collection instrument included questions about the jobs supported by NIH Recovery Act funding. Detailed results from selected questions in our data collection instrument related to the jobs supported by Recovery Act funding cited in this report are listed below in tables 3-6. For example, information about (1) the number of supported positions that existed before the Recovery Act and (2) the average number of hours worked by each supported job category. Not all totals add to 100 percent because respondents were given multiple answers and asked to check all that apply.

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**Table 3: Percent of NIH Recovery Act-Supported Jobs That Did Not Exist Prior to Receiving NIH Recovery Act Funding, as Reported by Selected Principal Investigators, through March 2011**

<b>Principal investigator's response</b>	<b>Percent</b>
Supported jobs that did not exist prior to receiving NIH funding	29
Supported jobs that existed prior to receiving NIH funding	54
No answer	17
<b>Total</b>	<b>100</b>

Source: GAO review of 50 selected principal investigators.

Note: These data are based on all of the jobs reported in our DCI by our selected principal investigators.

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<sup>1</sup>The selected grantee institutions were Johns Hopkins University, University of Michigan, University of Washington, University of Pennsylvania, and Duke University. These grantee institutions received the largest amounts of Recovery Act funding and reported the largest number of supported full-time-equivalents (FTE). The 50 principal investigators were selected based on the size and award date of the grants.

**Appendix II: Analysis of Information Reported  
by Selected Principal Investigators on Jobs  
Supported by Recovery Act Funding**

**Table 4: Number of Selected Principal Investigators Reporting a Loss of Funding from Sources Other than NIH, during Fiscal Years 2009 and 2010**

	Fiscal year 2009				Fiscal year 2010			
	Yes	No	No response	Total	Yes	No	No response	Total
The number of selected principal investigators who reported a decline in grant funding from other granting sources.	9	40	1	50	18	32	0	50
The number of selected principal investigators who reported the NIH Recovery Act funds made up for the loss of funding from other granting sources.	7	1	1	9	15	3	0	18
Average percent of lost funding replaced by NIH Recovery Act funding, as reported by our selected principal investigators.	36 %				41 %			

Source: GAO review of 50 selected principal investigators.

**Table 5: Percent of Selected Principal Investigators Who Reported Avoiding Certain Actions as a Result of Receiving NIH Recovery Act funds, during Fiscal Years 2009 and 2010**

Actions avoided	Percent of principal investigators
Avoided reducing employee hours	46
Avoided reducing the number of employees	50
Avoided seeking alternative grant funding sources	24
Avoided other cost-saving measures	22
No actions avoided beyond budgeting processes	32

Source: GAO review of 50 selected principal investigators.

Note: The total does not add to 100 percent because respondents were given multiple answers and asked to check all that apply.

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**Appendix II: Analysis of Information Reported  
by Selected Principal Investigators on Jobs  
Supported by Recovery Act Funding**

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**Table 6: Mean Number of Hours Funded by the Recovery Act Each Week by Job  
Category, as Reported by Selected Principal Investigators through March 2011**

<b>Job category</b>	<b>Mean number of hours/job category</b>
Research scientist and other faculty	21
IT/Data Information	9
Pre-Postdoctoral/Student	35
Temporary/Part-time Employee	17
Administration/Management/Executive	29
Medical Specialist	15
Sub-Contract/Sub-Awards	10
Other	5
Mean number of hours for all job categories	20

Source: GAO review of 50 selected principal investigators.

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# Appendix III: Analysis of Information Reported by Selected Principal Investigators on Other Impacts of Recovery Act Funding

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We disseminated a Web-based data collection instrument to a total of 50 selected principal investigators (10 principal investigators at each of five selected grantee institutions).<sup>1</sup> The data collection instrument included questions about the other impacts of NIH Recovery Act funding. Detailed results from selected questions in our data collection instrument related to the other impacts of Recovery Act funding cited in this report are listed in tables 7-10. For example, information about (1) the types of nonscientific impacts reported by selected principal investigators, and (2) the metrics used to track and measure scientific impacts.

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**Table 7: Number of Selected Principal Investigators That Reported Other Impacts (Not Including Scientific Impacts), during Fiscal Years 2009 and 2010**

<b>Other impacts</b>	<b>Number of principal investigators</b>
Purchases of equipment and supplies from vendors	33
Purchases of services from vendors	14
Support scientific training for health care professionals	9

Source: GAO review of 50 selected principal investigators.

Note: Respondents could report more than one other impact.

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<sup>1</sup>The selected grantee institutions were Johns Hopkins University, University of Michigan, University of Washington, University of Pennsylvania, and Duke University. These grantee institutions received the largest amounts of Recovery Act funding and reported the largest number of supported FTEs. The 50 principal investigators were selected based on the size and award date of the grants.

**Appendix III: Analysis of Information Reported  
by Selected Principal Investigators on Other  
Impacts of Recovery Act Funding**

**Table 8: Health Issues Addressed by Selected NIH Recovery Act Grants, during  
Fiscal Years 2009 and 2010**

<b>Health area/conditions</b>	<b>Percent</b>
Cardiovascular disorders	22
Cancer	18
Mental/Behavioral health	18
Neurological disorders	16
Other	16
Lung disease and/or injury	8
Autism	6
Diabetes	6
General public health	6
Kidney disease	4
Smoking	4
Obesity	4
Genetic disorders	2

Source: GAO review of 50 selected principal investigators.

Note: The total exceeds 100 percent because some NIH Recovery Act grants addressed more than one health issue.

**Table 9: Number of Selected Principal Investigators Who Reported Using Various  
Metrics for Tracking and Measuring Scientific Research**

<b>Metric</b>	<b>Number of principal investigators</b>
Peer-reviewed publications	49
Patent filings	9
Presentations at professional meetings/conferences	45
Other metrics <sup>a</sup>	17

Source: GAO review of 50 selected principal investigators.

<sup>a</sup>Other metrics reported by selected principal investigators included: the ability to secure future grant funding, and changes to health care policies and practices.

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**Appendix III: Analysis of Information Reported  
by Selected Principal Investigators on Other  
Impacts of Recovery Act Funding**

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**Table 10: Number of Selected Principal Investigators Who Reported Peer-Reviewed Publications and Patent Applications Resulting from Their Scientific Research, during Fiscal Years 2009 and 2010**

<b>Metric</b>	<b>Number of principal investigators</b>
Peer-reviewed publication submitted	24
Peer-reviewed publication approved	17
Patent application filed	1
Patent application approved	0

Source: GAO review of 50 selected principal investigators.



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# Appendix IV: GAO Contacts and Staff Acknowledgments

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## GAO Contacts

Linda T. Kohn, (202) 512-7114 or kohnl@gao.gov

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## Acknowledgments

In addition to the contact named above, Will Simerl, Assistant Director; N. Rotimi Adebajo; Leonard Brown; Carolyn Garvey; Krister Friday; Daniel S. Ries; and Monica Perez-Nelson made key contributions to this report.

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