

Higher Education Research and Development Survey, Fiscal Year 2012

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Technical Notes

The National Science Foundation (NSF) Higher Education Research and Development (HERD) Survey is the primary source of information on separately budgeted research and development expenditures within higher education institutions in the United States and outlying areas. In 2010, the HERD Survey replaced a previous annual collection, the Survey of Research and Development Expenditures at Universities and Colleges (Academic R&D Expenditures Survey), which was conducted from FY 1972 through FY 2009. The HERD Survey continues to collect information on R&D expenditures by field of research and source of funds, but additional questions have been included about funding sources, types of research and expenses, and R&D personnel. Survey questions request data across all academic disciplines, not just science and engineering (S&E) disciplines. Unless otherwise noted, expenditures analyzed in this report refer to R&D activities across all fields of R&D.

For the FY 2012 collection, NSF introduced a short form of the HERD Survey that was sent to institutions that reported R&D expenditures below \$1 million during the FY 2011 data collection. The short form asks for only a subset of the data requested on the full HERD Survey. Thus, short form survey data are included in the 2012 totals only for those data tables that specify in the table titles that data were from the short form version of the survey (e.g., table 7). If aggregate totals from the short form survey population are included in the prior year totals reported in the tables, they are aggregated under “all other surveyed institutions.” The total R&D expenditures reported by institutions in the short form survey population (\$145 million) represent 0.2% of the expenditures reported by all institutions (\$65.9 billion). The FY 2012 HERD survey was conducted by ICF International, under NSF contract number DACS1068196.

Scope of the Survey

The FY 2012 HERD Survey was sent to 938 institutions of higher education in the United States, Guam, Puerto Rico, and the U.S. Virgin Islands. These institutions granted a bachelor’s degree or higher, expended at least \$150,000 in separately budgeted R&D in FY 2011, and were geographically separate campuses headed by a president, chancellor or equivalent. Institutions that expended at least \$1 million in FY 2011 were asked to complete the full version of the survey (656 institutions); institutions that expended less than \$1 million were asked to complete the short form (282 institutions).

The survey population was reviewed before data collection began to ensure that each institutional classification was accurate. Characteristics of the schools were reviewed before and during the course of the survey to determine whether changes had occurred (e.g., name; highest degree granted; and school openings, closings, or mergers). Table A-1 shows all institution name changes between the FY 2011 and FY 2012 surveys.

After data collection closed, institutions were reviewed to verify that only those reporting at least \$150,000 in separately budgeted R&D were included in the population. Of the 938 institutions surveyed, 31 reported total R&D expenditures of less than \$150,000. These 31 institutions were excluded from the

population, and their data are not included in the FY 2012 survey totals. The total and federally financed R&D expenditures for these 31 institutions are listed in table A-2.

FY 2012 Survey Frame Design

The HERD Survey is a census of the full population of eligible academic institutions. The survey is conducted annually, and its reference period is the fiscal year of the surveyed institution. The survey population includes institutions that granted a bachelor's degree or higher in any field of study. Within a university system, each campus headed by a campus-level president, chancellor, or equivalent is asked to complete a separate survey, rather than combining their response with other campuses in the university system. For data users wanting to compare HERD Survey data across university systems by aggregating member campuses, table A-3 shows all institutions in the FY 2012 population, including short form survey institutions, by state, institutional control, and system.

Each year, NSF contacts institutions that meet the degree-granting criterion but were not in the population of the previous survey to determine whether they meet the expenditure criterion for the current survey. For FY 2012, institutions that granted a bachelor's degree or higher and reported greater than \$0 for research on the Integrated Postsecondary Education Data System 2010 Finance Survey were included in the population review. All U.S. service institutions that granted a bachelor's degree or higher and were not already part of the HERD population were also included in the population review. Institutions in the population review were sent a questionnaire asking if the institution had R&D expenditures during FY 2011 and if those expenditures were less than \$150,000, \$150,000 to \$999,999, or \$1,000,000 or more. The population review screener was sent to 182 institutions. Institutions reporting expenditures of at least \$150,000 but less than \$1 million were added to the short form survey population. Institutions reporting expenditures of at least \$1 million were added to the HERD Survey population.

The overall number of academic institutions in the population decreased from 911 in FY 2011 to 907 in FY 2012 (table A-4). A total of 37 institutions were added to the survey population during the population review, but 41 were subsequently removed from the population after indicating on the HERD Survey forms (see below) that their R&D expenditures were less than \$150,000 for FY 2012.

Changes to the Survey Instrument

For the FY 2012 data collection, NSF modified the survey instructions to clarify what types of institutionally funded activities should be included in reported data. Instructions explain that all expenditures for R&D from an institution's current operating funds that are separately accounted for should be reported. This includes expenditures separately budgeted for organized research and expenditures of other funds designated for research but not categorized as organized research. The HERD Survey Questionnaires can be found at <http://www.nsf.gov/statistics/srvyherd/>.

HERD Survey Questions

Question 1. For FY 2012, instructions were added specifying that funds from an institution's 501(c)3 foundation should be reported under institutionally financed research. Care should be taken when interpreting data on source of funds. Business R&D support is limited to grants and contracts for R&D activities from profit-making organizations. Total business funds exclude research funded through unrestricted accounts and from corporate foundations, endowments, and fellowships to students; those funds would be included in an institution's own funding totals.

Question 1.1. This question was asked for the first time in 2012.

Short Form Survey

The short form of the HERD Survey Questionnaire was introduced in 2012. It contains just five of the questions asked on the HERD Survey (<http://www.nsf.gov/statistics/srvyherd/>).

Data Collection

The FY 2012 survey questionnaires were sent by e-mail in November 2012. Respondents could choose to submit an Adobe PDF questionnaire downloaded from the Web or use a Web-based data collection system to respond to the survey. Every effort was made to maintain close contact with respondents in order to preserve both the consistency and continuity of the resulting data. Questionnaires were carefully examined for completeness upon receipt. Computerized facsimiles of the survey data were then prepared for each institution; these showed comparisons between the current and 2 prior years of data and noted any substantive disparities. Respondents were sent personalized e-mail messages asking them to provide any necessary revisions before final processing and tabulation of data. These e-mail messages included a link to the HERD Survey Web-based data collection system, allowing respondents to view and correct their data online.

Respondents were asked to explain significant differences between current-year reporting and established patterns of reporting verified for prior years. They were encouraged to correct prior-year data, if necessary. When respondents updated or amended figures from past years, NSF made corresponding changes to trend data in the 2012 data tables and to the underlying microdata. For accurate historical data use only the most recently released data tables.

Response Rate

By the survey's closing date in June 2013, forms had been received from 865 universities and colleges (629 HERD Surveys and 236 short form surveys) out of the population of 907, a response rate of 95.4%. Responses were received from 97.6% of all doctorate granting institutions. The R&D expenditures reported by these doctoral institutions constituted 98.2% of the estimated national R&D expenditures for FY 2012. Table A-5 displays a detailed breakdown of response rates by highest degree granted, and table A-6 displays a breakdown of response rates for each question in each of the two surveys.

National Total and Imputation

Missing values were imputed based on the previous year's data and the reported data of peer institutions in the current cycle. For the 30 institutions that had not responded by the closing date of the survey and had been included in the FY 2011 HERD Survey population, R&D expenditures were imputed by applying inflator and deflator factors to the prior year's key totals. The key totals for FY 2012 included total R&D expenditures, federal R&D expenditures, expenditures received as a subrecipient from higher education sources, expenditures received as a subrecipient from non-higher education sources, expenditures passed through to higher education entities, and expenditures passed through to non-higher education entities. Imputation factors were ratios derived from the 2-year-trend data of responding institutions with similar characteristics, including highest degree granted, type of institutional control (public or private), and level of total R&D expenditures. Other values that were not identified as key totals were imputed by applying ratios from the previous year's data.

For 12 institutions that were new to the survey population, no past-year data were available. For these institutions, total R&D expenditures were assumed to be \$150,000 or \$1 million, depending on their response to the population review screener. Other values were then imputed as a proportion of total R&D expenditures based on the data of institutions with similar characteristics. Data for partial nonresponse were imputed using similar techniques.

The imputed total R&D was \$156 million, or 0.2%, of the \$65.9 billion in total R&D expenditures (table A-7). A total of \$151 million, or 0.2%, of the \$65.8 billion reported by institutions in the HERD Survey population was imputed, and \$5 million, or 3.7%, of the \$145 million reported by institutions in the short form survey population was imputed. Tables A-7 through A-21 present imputed amounts for each applicable survey variable. The dollar amount imputed is displayed along with the percentage it represents of the national estimate for universities and colleges in a particular field.

A number of surveyed institutions have responded intermittently in past years. For years in which no response was received, data have been imputed as previously described. Although the imputation algorithm accurately reflects national trends, it cannot account for specific trends at individual institutions. For this reason, a re-imputation of institutional data for prior years is also performed. For each institution, previously imputed values from the Academic R&D Expenditures Survey and the HERD Survey were recomputed to ensure that the imputed data accurately represent the growth patterns shown by reported data from the FY 2012 HERD Survey. If, for example, data were reported for FY 2006 and FY 2012 but not for the intervening years, the difference between the reported total for each question was calculated and evenly distributed across the intervening years (FYs 2007–11). The new totals were then spread across disciplines or sources of support on the basis of the most recent reporting pattern. These procedures result in much more consistent reporting trends for individual institutions but have little effect on aggregate figures reflecting national totals. The letter “i” is used to identify imputed data.

In the data tables, R&D expenditures from unspecified federal agencies (Question 10) and from ARRA (Question 11) and capitalization thresholds for software and equipment (Question 14) were not imputed.

Additional Analyses

Federally Financed R&D (Question 10)

The portion of federally financed R&D expenditures not financed by the U.S. Department of Agriculture, Department of Defense, Department of Energy, Department of Health and Human Services, National Aeronautics and Space Administration, and the National Science Foundation (that is, R&D expenditures financed by federal agencies not listed in Question 9), \$3.7 billion, represents 9.1% of all federally financed R&D expenditures reported by institutions in the HERD Survey population. The majority of these expenditures were financed by the Department of Education (\$724 million), Department of Commerce (\$549 million), and Department of Transportation (\$359 million) (table A-22).

American Recovery and Reinvestment Act of 2009 (Question 11)

Question 11, federally financed R&D expenditures from ARRA, was completed by 98.7% of respondents in the HERD Survey population (table A-23). The portion of federally financed R&D expenditures received from ARRA, \$2.5 billion (see data tables for additional details), represents 6.1% of all survey respondents’ separately budgeted higher education R&D expenditures (\$40.1 billion) in FY 2012. Doctorate-granting institutions reported a higher portion of funds received from ARRA (6.1%, or \$2.4 billion) than non doctorate-granting institutions (5.5%, or \$36 million). Public institutions reported a slightly higher portion of funds received from ARRA (6.4%, or \$1.6 billion), compared to those from private institutions (5.6%, or \$834 million).

Capitalization Thresholds for Software and Equipment (Question 14)

Question 14, capitalization thresholds for software and equipment, was completed by 95.1% of respondents in the HERD Survey population (table A-6). Of these respondents, 3 reported that they do not capitalize equipment, and 95 reported that they do not capitalize software (table A-24). Of those reporting capitalization thresholds, 78.8% reported a threshold for equipment of \$5,000, and 51.1% reported a threshold for software of \$5,000.

Cautions when Using the Data

The 282 institutions included in the FY 2012 short form survey population are generally not included in the data tables or represented in the aggregate totals unless specifically mentioned in the table title (e.g., table 7).

When analyzing data at the detailed discipline level (Questions 9 and 12), analysts should keep in mind that there is considerable interdisciplinary and multidisciplinary activity.

Analysts should be cautious when examining trend data from the Academic R&D Expenditures Survey and the HERD Survey. Although many variables are similar across the two surveys, because of changes in the definition of R&D and the inclusion of non S&E expenditures, exact comparisons may be misleading. In prior years, the Academic R&D Expenditures Survey collected expenditures for S&E and non-S&E fields separately. Institutions were not always able to provide non-S&E expenditures, and those data were not previously imputed. Also, revisions to the definition of R&D in 2010 may have influenced reported values to varying degrees, depending on the amounts of clinical trials and training grants at a particular institution.

It should also be noted that because institutions are asked to include funds passed through to higher education institutions as well as subrecipient funding from higher education institutions, there is double counting included in national and group totals. For example, Institution A's survey will include the \$2 million passed through to Institution B, and Institution B's survey will also include that \$2 million in subrecipient funding. Overall, institutions reported \$2.9 billion in expenditures from subrecipient funding received from other universities and \$3.1 billion in funds passed through to higher education subrecipients.

Washington State University (WSU) is a multicampus university system that continues to report as one unit to the HERD Survey. In addition to the main campus in Pullman, WSU Spokane, WSU Tri-Cities, and WSU Vancouver are separate campuses that grant bachelor's degrees and are headed by chancellors. The institution has been asked to report expenditures separately for each campus, but the records needed to comply are not yet available. Representatives of the university have indicated that R&D expenditures are concentrated at the Pullman and Spokane campuses. Because the expenditures reported represent all campuses, WSU's ranking in expenditure tables is higher than would be expected if the campuses reported separately.

Data Availability

The data tables from this survey (<http://www.nsf.gov/statistics/srvyherd/>) are dynamically generated and are similar to those published for recent survey years.

Data from this and other NSF academic surveys (the Survey of Graduate Students and Postdoctorates in Science and Engineering; Survey of Federal Science and Engineering Support to Universities, Colleges, and Nonprofit Institutions; and Survey of Earned Doctorates) are contained in academic institutional profiles, available at <http://www.nsf.gov/statistics/profiles/>. The profiles are linked to the corresponding ranking table for each survey.

HERD Survey data also available through the Web-Based Computer-Aided Science Policy Analysis and Research (WebCASPAR) database system at <http://webcaspar.nsf.gov/>. Longitudinal data are available at the institution, state, and national levels. WebCASPAR also includes data from the National Center for Education Statistics surveys of universities and colleges. These data include information on earned degrees, opening fall enrollment, tuition, faculty salaries, tenure and fringe benefits, and financial statistics.