Doctorate Recipients from U.S. Universities: 2015

Technical Notes

Data presented in *Doctorate Recipients from U.S. Universities: 2015* were collected by the Survey of Earned Doctorates (SED). The survey is sponsored by six federal agencies: the National Science Foundation (NSF), National Institutes of Health (NIH), U.S. Department of Education (ED), U.S. Department of Agriculture (USDA), National Endowment for the Humanities (NEH), and National Aeronautics and Space Administration (NASA). This report presents the summary of these survey data.

Survey Overview (2015 survey cycle)

Purpose. The Survey of Earned Doctorates (SED) collects data on the number and characteristics of individuals receiving research doctoral degrees from U.S. academic institutions.

Data collection authority. The information collected by the SED is solicited under the authority of the National Science Foundation Act of 1950, as amended. The Office of Management and Budget control number is 3145-0019, expiration date 30 June 2016.

Survey contractor. NORC at the University of Chicago.

Survey sponsors. The SED is sponsored by NSF, NIH, ED, USDA, NEH, and NASA.

Key Survey Information

Frequency. Annual.

Initial survey year. Academic year 1957–58.

Reference period. The academic year 1 July 2014 to 30 June 2015.

Response unit. Individuals.

Sample or census. Census.

Population size. Approximately 55,000.

Sample size. Not applicable.

Survey Design

Target population. The population for the 2015 SED consists of all individuals receiving a research doctorate from a U.S. academic institution in the 12-month period beginning 1 July 2014 and ending 30 June 2015. A research doctorate is a doctoral degree that (1) requires completion of an original intellectual contribution in the form of a dissertation or an equivalent culminating project (e.g., musical composition) and (2) is not primarily intended as a degree for the practice of a profession. The SED recognized 18 distinct types of research doctorates in 2015

(table A-1). Recipients of professional doctoral degrees, such as MD, DDS, DVM, JD, DPharm, DMin, and PsyD, are not included in the SED.

The doctor of philosophy (PhD) constitutes the vast majority of research doctoral degrees. Of the 55,006 new research doctorates granted in 2015, 98.0% were PhDs; in 2014, PhDs were 98.1% of new research doctorates (table A-2). The next most frequently occurring type of research doctorate was the doctor of education (EdD), which accounted for 1.1% of the total in 2015. No other type of doctoral degree accounted for as much as 0.5% of the new research doctorates in 2015.

Sample frame. The population eligible for the 2015 survey consisted of all individuals who received a research doctorate from a U.S. academic institution in the 12-month period ending 30 June 2015. The total universe consisted of 55,006 persons in 432 institutions that conferred research doctorates in 2015.

Sample design. The SED is a census of all individuals receiving a research doctorate from a research doctorate-granting U.S. academic institution in the academic year 1 July through 30 June of the next year.

Data Collection and Processing

Data collection. Paper surveys are mailed to institutional coordinators in the graduate schools who then distribute the surveys to students receiving research doctorates. The institutional coordinators collect the completed surveys and return them to the survey contractor for editing and processing.

Since 2001, a Web-based SED option has been available. When students apply for graduation, institutional coordinators at some universities give students paper surveys and the link to the survey registration website; institutional coordinators at other universities give only the link to the survey registration website. Students who sign up at the survey registration website receive PIN and password information via e-mail, as well as the URL of the Web-based SED. The proportion of completed surveys from respondents using the Web-based SED has increased each year since 2001, and it reached 93% in 2015.

Both paper and Web-based questionnaire instruments are used in follow-up mailings and e-mails to nonrespondents. If the series of follow-up mailings and e-mails is unsuccessful, the survey contractor attempts to reach nonrespondents using a computer-assisted telephone interview (CATI) abbreviated questionnaire. Approximately 1%–2% of SED completions each year use the CATI-based instrument. A paper survey is also mailed to individual respondents and institutions when critical SED questionnaire items are missing.

A small but growing number of research doctoral degrees are awarded as a part of joint doctoral programs (i.e., a research doctorate recipient studied at more than one institution in pursuit of the doctoral degree). In these instances, the survey contractor relies on information provided by the institutions to appropriately attribute the doctorate to one of the doctorate-granting institutions.

The survey collects a complete college education history. To code U.S. postsecondary degree-granting institutions, survey staff use the Integrated Postsecondary Education Data System

(IPEDS). To code the degree-granting institutions of respondents from foreign countries, survey staff use the coding manual *Mapping the World of Education: The Comparative Database System,* augmented with over 3,000 additional institutions from the *Europa World of Learning* and the *International Handbook of Universities.* About one-third of U.S. doctorate recipients received undergraduate degrees from foreign institutions.[1]

Mode. Three modes of data collection are used in the SED: self-administered paper surveys, Web-based surveys, and CATI. In 2015, 93% of completed surveys were via the Web-based instrument, about 5% were via the paper instrument, and just under 2% were via CATI.

Response Rate. Of the 55,006 individuals who received a research doctorate in 2015, 90.2% completed the SED survey instrument. Additional information on response rate can be found below, under "Nonresponse error."

Data editing. Approved automated edits are applied to the SED, a number of which pertain to the education history grid. In addition, paper surveys undergo review and editing prior to data entry.

Imputation. No imputation was used in producing the 2015 SED data set.

Weighting. Survey data were not weighted.

Variance estimation. The SED is a census of all research doctorates with no weights calculated, so no variance estimation techniques were used.

Disclosure Protection. Two strategies are used in data table production to protect against the disclosure of confidential information provided by SED respondents. In the first, used since 2004, data cell values based on counts of respondents that fall below a predetermined threshold are deemed to be sensitive to potential disclosure and are suppressed. The symbol "D" replaces the cell value. If a suppressed cell does not provide sufficient disclosure protection in tables that include marginal totals, additional (complementary) suppressions of above-threshold data cells are necessary, and the suppression symbol "D" is used to replace those cell values as well.

The second disclosure protection strategy, field aggregation, was first applied in *Doctorate Recipients from U.S. Universities: Summary Report 2007–08.* Field aggregation was applied to data tables 16 and 22 in the current report, which present counts of doctorate recipients classified by fine fields of degree and by either sex (table 16) or race and ethnicity (table 22). Because some fine fields of degree award relatively few doctorates in a single year, the degree counts by race, ethnicity, or sex within these fields can be quite small, leading to extensive cell suppression. The field aggregation technique combines data from small fields of degree with the data from related fields, so that the degree counts in the aggregated fields are sufficiently large to protect the confidentiality of respondent information

Data by race, ethnicity, and sex in the fine fields shown in tables 16 and 22 are reported for fields in which at least 25 U.S. citizen or permanent resident individuals earn a doctoral degree in a given year, regardless of how small the count may be in a particular cell. Counts of doctorate recipients in fields having fewer than 25 U.S. citizen or permanent resident doctorates awarded are aggregated with those of one or more related fields until the total number of doctorates in the aggregated field reaches at least 25 U.S. citizens and permanent residents. The related fields

chosen for aggregation to protect below-threshold fields may or may not also be below-threshold. The degree count in each racial, ethnic, or sex category of these aggregated fields is reported in tables 16 and 22, but the constituent fine fields of the aggregated fields are not displayed.

In 2015, fewer than 25 doctorates were awarded to U.S. citizens or permanent residents in 68 of the 324 fine fields of degree. These below-threshold fields were combined with 81 related fields of degree to produce 47 aggregated fields in 2015. Tables 16 and 22 report data on the 47 aggregated fields and the remaining 175 unaggregated fine fields. Table A-5 lists the aggregated fields that appear in tables 16 and 22 and identifies their constituent fine fields.

Data reported for "other" fine fields are not considered confidential. The reported number of below-threshold, aggregated fields ($n = 68$) excludes seven "other" fine fields that do not require protection but are used as aggregation partner fields.

Survey Quality Measures

Sampling error. Not applicable because the SED is a census.

Coverage error. Due to the availability of comprehensive lists of doctorate-granting institutions and the institutions' high levels of participation in the survey, coverage error of institutions is minimal. Because the graduate schools collect the questionnaires from degree recipients at the time of doctorate completion, coverage error for the universe of doctorate recipients is also minimal. Comparisons of the institutions and the number of research doctorate recipients covered by the SED with the total number of doctorate recipients (including nonresearch doctorate degree recipients) reported by institutions to the National Center for Education Statistics confirm that there is minimal coverage error of doctorate recipients. Institutions that begin to confer research doctorates are asked to join the SED. If a university that confers research doctorates does not wish to participate in the SED, slight undercounts may result.

Nonresponse error.

- *Unit nonresponse.* Of the 55,006 individuals who received a research doctorate in 2015, 90.2% completed the SED survey instrument (table A-3). This percentage is referred to as the self-report rate. Limited records (doctoral institution, year of doctorate, field of doctorate, type of doctorate, and, if available, baccalaureate institution, master's degree institution, and sex) are constructed for nonrespondents from administrative records of the university (commencement programs, graduation lists, and other public records) and are included in the reported total of 55,006 doctorate recipients for 2015.

  Nonresponse was concentrated in certain institutions: 0.9% of the 432 doctorate-granting institutions accounted for 20% of the total nonrespondents, and 10% of these institutions accounted for 65% of the total nonrespondents.

  Counts for previous years were corrected by the addition of data from surveys received after the close of data collection for a given year.

- *Item nonresponse.* Item nonresponse rates in 2015 for the five key SED demographic variables—sex, citizenship, country of citizenship, race and ethnicity, and location after graduation—range from .03% for sex to 10.1% for location after graduation. Table A-4 shows item response rates for 2005–15 for all variables, by variable name (see clarifying notes in table A-4).

- *Measurement error.* Measurement error in the SED is attributable to several sources, including error in recording respondent data (calculated at less than 1%) and editing error (calculated at 0.66%).

Data Comparability

Changes in survey coverage and population. Six institutions were identified as offering eligible doctorates and added to the SED at the start of the 2015 round, for a total of 432 eligible institutions.

Changes in questionnaire. There were no significant changes to the questionnaire in 2015.

Changes in reporting procedures or classification.

- *Citizenship.* The citizenship status variable is used to identify the appropriate citizenship category of respondents, including the citizenship category of respondents who did not respond to the citizenship status survey item on the SED. The code framework for the citizenship status variable is outlined below.

Code	Citizenship category
0	U.S. native born
1	U.S. naturalized citizen
2	Non-U.S. immigrant (permanent resident)
3	Non-U.S. non-immigrant (temporary U.S. visa)
4	Non-U.S., visa status unknown
U	U.S. citizen, unspecified
Blank	Missing or citizenship unknown

Respondents who indicated a U.S. birthplace, regardless of what they reported for citizenship status, were assigned code 0.

In 1999, code 4 (non-U.S., visa status unknown) was introduced and data were back-coded through 1997. Respondents who designated a non-U.S. country for the country of citizenship item but did not respond to the citizenship status item were assigned code 4 for citizenship status. From 1997 to 2003, non-U.S.-born respondents who did not indicate their country of citizenship or citizenship status were assigned to code 4 if three out of four geographic variables—place of birth, place of high school, place of college entry, and postgraduation location—were non-U.S. locations. Beginning with the 2004 SED, the variable "place of baccalaureate institution" replaced "place of college entry" in the assignment of a citizenship code for respondents who did not indicate citizenship status.

For tabulations in this report, code 4 was combined with code 3—that is, counts of doctorate recipients in the temporary visa holder category include non-U.S. citizens with unknown visa status. This is consistent with coding procedures in previous data collections. However, the existence of code 4 allows the microdata user to exclude cases for which visa status is unknown. Prospective data users should note, however, that the number of cases in the code 4 group is not sufficient to warrant analysis as a separate citizenship category.

Non-U.S. citizens who did not report a country of citizenship but reported the same non-U.S. country for three out of four geographic variables—place of birth, place of high school, place of baccalaureate institution, and postgraduation location—were assigned that reported country as their country of citizenship.

- *Debt*. Since 2001, respondents have been asked to indicate the amount of education-related debt they owe, with separate response categories for graduate and undergraduate education. To estimate overall debt, the midpoint of the chosen range for undergraduate and for graduate debt was selected and summed to yield a total debt amount. Where mean debt levels are presented in this report (i.e., tables 38 and 40), the individual values for debt are assigned as the midpoint of the chosen range for graduate and undergraduate debt. Doctorate recipients who chose the lowest debt category (no debt) were assigned a value of $0 for the computation of mean debt levels. Doctorate recipients who chose the uppermost category ($90,001 or more) were assigned a value of $95,000 for the computation of mean debt levels. All valid responses, including "no debt," were included in the computation of all average debt figures in this report. See item A7 on the survey questionnaire for a complete listing of the debt ranges on which the midpoint figures were based.

- *Field of study*. Beginning in 2015, the broad field of study of "physical sciences" was broken out into two separate broad fields: "physical sciences and earth sciences" and "mathematics and computer sciences." Also beginning in 2015, the major fields of "mathematics and statistics" and "computer and information sciences" are listed under the new broad field of "mathematics and computer science." Prior to 2015, these major fields were listed under physical sciences.

- *Functional limitations (previously, disability)*. Beginning in 2012, item C12 (the functional limitations item) assesses both the presence and severity of functional limitations in each of several domains, which do not precisely overlap with the domains in prior surveys. Eight new variable names and their associated code frameworks were added in 2012 to capture responses to the functional limitations items.

- *Median computation*. Since 1994, medians have been computed as outlined below. When months are included, they are converted to the number of days corresponding to first day of the month, factoring in leap years.

  o *Median age*. Months (of birth and doctorate award) are included in the calculation of median age whenever available. Beginning in 2015, if birth month is missing,

the month value is randomly imputed. Prior to 2015, the missing month value was assigned to the month the doctorate was received.

- o *Time to degree from bachelor's completion*. Months are included in the calculation of total time to degree. If months are missing, month values are assigned to the modal value for doctorate recipients who provide month of bachelor's completion and converted to the number of days corresponding to that month, with a leap-year factor included (i.e., assignment to a value of 151.25, which corresponds to the month of June).

- o *Time to degree from graduate school entry*. Months are included in the calculation of graduate school time to degree. If months are missing in the calculation of graduate school time to degree, month values are assigned to the modal value for doctorate recipients who provided month of graduate entry (i.e., assignment to a value of 243.25, which corresponds to the month of September). Reports published before 2004 reported a different time-to-degree measure: registered time to degree. Comparisons of graduate school time-to-degree data with pre-2004 registered time-to-degree data should be interpreted cautiously. For an explanation of registered time to degree, see the technical notes section of any *Doctorate Recipients from United States Universities: Summary Report* published before 2004.

- o *Time to degree from doctoral program entry*. This variable was first included in 2015. Doctoral program entry is based on master's degree program entry if the master's degree was at the doctoral institution in the same fine field of study or if it was a prerequisite to the doctorate; otherwise, it is based on doctoral program entry. Months are included in the calculation of doctoral program time to degree. If the month of entry used in the calculation (master's degree program entry or doctoral program entry) was not reported, the entry month is assigned to the modal value for all cases that did report the entry month in the academic year the case was added to the doctoral records file (typically the academic year matching the graduation date of the case).

- *Salary*. Median salary is calculated from exact salary values when provided by the respondent. Salary imputation was dropped as of 2015 due to the increase in exact salary response rate. From 2011–14, if a respondent selected a salary range instead of providing an exact salary value, exact salary values were imputed for median salary calculations by applying hot-deck imputation based on salary range and other relevant respondent characteristics. Prior to 2011, median salary was calculated directly from the salary range values via interpolation methods, and exact salary values were not used in the calculation of median salary. Only salary data from doctorate recipients reporting definite commitments for employment or for a postdoc position in the United States are included in median salary calculations.

- *Postdoctoral plans to stay in the United States.* In 1997, the planned postdoctoral location of doctorate recipients began being coded in a new variable using Federal Information Processing Standards codes both for the United States and its territories and for countries.

  Also in 1997, a dichotomous variable was created to index whether the planned postdoctoral location reported by the respondent was in the United States or in a foreign location, even if the respondent did not indicate a specific state or country.

- *Race and Hispanic ethnicity.* Since 2001, respondents have been asked to first indicate whether they are Hispanic or Latino and then to check one or more racial group categories (i.e., American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, black or African American, or white).

  In data tables, doctorate recipients who report Hispanic or Latino ethnicity, regardless of race, are counted as Hispanic or Latino, and as of 2013, those who did not answer the Hispanic or Latino question are counted as "ethnicity not reported." Respondents who indicate that they are not Hispanic or Latino and indicate a single race are reported in their respective racial groups, except for those indicating Native Hawaiian or Other Pacific Islander, who are included in "other race or race not reported." Beginning in 2007, doctorate recipients who indicate they are not Hispanic or Latino and indicate more than one race are reported in the group "two or more races."

- *Research doctoral degree.* As doctoral degree programs change to meet the needs of students, the orientation of the degrees they award may change from research to professional, and vice versa. Survey staff review degree programs to ensure that the designation of research doctorate remains appropriate. As a result of degree reviews in the past two data collections, survey staff identified several research doctoral degrees that shifted to a professional orientation. The doctor of music (DM) and the doctor of industrial technology (DIT) were both dropped from the SED in 2008, and the graduates (approximately 40 to 60 per year) who earn these doctoral degrees are no longer included in the SED.

  After a multiyear review of doctoral programs offering the EdD degree, most were determined to have a professional orientation and were dropped from the SED in 2010 and 2011, and graduates earning EdD degrees from those programs are no longer included in the SED. As a result, the proportion of EdD degrees among the total number of research doctorate recipients fell from 5.5% in 2009 to 1.1% in 2015. Table A-1 lists the doctoral degrees that were eligible for inclusion in the SED in 2015.

Definitions

- *Basic annual salary*. Annual salary to be earned from the doctorate recipient's principal job in the next year after receiving the doctorate, not including bonuses or additional compensation for summertime teaching or research.

- *Carnegie classification (institution categories).* In this report, three types of doctorate-granting institutions identified in the figures and tabulations are defined according to the Carnegie classification scheme as updated in 2010: very high research universities, high

research universities, and doctoral research universities. Institutions are classified according to their aggregate and per-capita levels of research activity, using indicators of research and development expenditures and staffing (including postdoctoral appointees and other nonfaculty research staff with doctorates) in science and engineering fields and non-science and engineering fields.

- *Definite plans to stay in the United States.* A respondent is coded as having definite plans to stay in the United States if the reported postgraduation location was in the United States and the reported postgraduation plans for employment or postdoc were coded "definite."

- *Definite postgraduation plans.* The status of postgraduation plans is coded using the values from item B3 of the survey questionnaire, which indicate whether the doctorate recipient's postgraduation plans for employment or postdoc were definite at the time the survey was completed.

- *Field of study.* The SED has 324 fine fields of doctoral study, which are grouped into 35 major fields of study. The major field groupings are further aggregated into eight broad fields: life sciences, psychology and social sciences, physical sciences and earth sciences, mathematics and computer sciences, engineering, education, humanities and arts, and other fields. The levels of this variable were derived by grouping related fine fields of study from the field of study taxonomy used in the SED (table A-6). See the survey questionnaire for a full listing of the fine fields of study in 2015.

- Doctorate recipients indicate their fields of specialty. Their choices may differ from departmental names. Field groupings may differ from those in other reports published by federal sponsors of the SED. The "general" field categories (e.g., "chemistry, general") include individuals who either received the doctorate in the general subject area or who did not indicate a particular specialty field. The "other" field categories (e.g., "chemistry, other") include individuals whose specified doctoral discipline was not among the specialty fields listed.

- *Median age at doctorate.* One-half of the respondents received the doctorate at or before this age. A recipient's age is obtained by subtracting the month and year of birth from the month and year of doctorate.

- *Percentage with master's.* This variable is the percentage of doctorate recipients in a field who received a master's degree in any field before earning the doctorate.

- *Research doctorate.* A research doctoral degree is oriented toward preparing students to make original intellectual contributions in a field of study and is not primarily intended for the practice of a profession. Research doctorates require the completion of a dissertation or equivalent project.

- *Time to doctorate.* The SED measures the time it takes to complete a doctoral degree in three ways: (1) the time elapsed from completion of the baccalaureate to completion of the doctorate (total time to degree), (2) the time elapsed from the start of any graduate

school program to completion of the doctorate (graduate school time to degree), and (3) the time elapsed from the start of the doctoral program. Time-to-doctorate measures herein are reported as medians.

- o *Total time to degree.* This variable is the total elapsed time between the baccalaureate and the doctorate, including time not enrolled in school. It can be computed only for individuals whose baccalaureate year is known. Baccalaureate year is often obtained from commencement programs or doctorate institutions when not reported by the recipient.

- o *Graduate school time to degree.* This variable is the elapsed time from the initiation of graduate study, in any program or capacity at any university, and the award of the doctorate. This variable can be computed only for individuals who provided the year they started graduate school. If an individual did not respond to question A11, which asks for the month and year of first entry into any graduate school, and did not report a graduate school degree program in question A9, which asks for additional postsecondary degrees, then values for graduate school month and year of entry are imputed from the month and year of entry into the most recent master's degree program (A8) or, if that is missing, the month and year of entry into the doctoral degree program (A8). Months are included in the computation.

- o *Doctoral program time to degree.* This variable is either (1) the elapsed time from the master's degree program entry, if the master's degree was awarded at the doctoral institution and was in the same fine field as the doctorate or if the master's degree was a prerequisite to the doctoral program until doctorate completion; otherwise, it is (2) the elapsed time from the doctoral program entry until doctorate completion. This variable is only computed for academic year (AY) 2015 and later doctorates.

- *U.S. regions of employment.* This variable is used to classify the location of U.S. employment after award of the doctorate.

New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont
Middle Atlantic	New Jersey, New York, Pennsylvania
East North Central	Illinois, Indiana, Michigan, Ohio, Wisconsin
West North Central	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota
South Atlantic	Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia

East South Central	Alabama, Kentucky, Mississippi, Tennessee
West South Central	Arkansas, Louisiana, Oklahoma, Texas
Mountain	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming
Pacific and Insular	Alaska, California, Hawaii, Oregon, Washington, American Samoa, Guam, Puerto Rico, Trust Territories, Virgin Islands

Notes

[1] U.S. Department of Education. 1996. *Mapping the World of Education: The Comparative Database System (CDS)*. Vols. 1, 2, and 3. Arlington, VA: National Science Foundation. Available at https://www.nsf.gov/statistics/mapping/. 2015. *Europa World of Learning*. London: Routledge-Taylor & Francis Group. Serial and online database available at http://www.worldoflearning.com/. 2015. *International Handbook of Universities 2016*. London: Palgrave Macmillan UK. Serial and online database available at http://www.whed.net/home.php.