National Center for Science and Engineering Statistics

Survey

Survey of Doctorate Recipients (SDR) | 2023

The SDR provides data on the characteristics of individuals who earned a science, engineering, or health research doctorate from a U.S. academic institution.

Survey Description

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Survey Overview (2023 Survey Cycle)

Purpose

The Survey of Doctorate Recipients (SDR), conducted by the National Center for Science and Engineering Statistics (NCSES) within the U.S. National Science Foundation, provides data on the characteristics of science, engineering, and health (SEH) doctoral degree holders. It samples individuals who have earned an SEH research doctoral degree from a U.S. academic institution and are less than 76 years of age. The SDR provides data useful in assessing the supply and characteristics of U.S.-trained SEH doctorate holders employed in educational institutions, private industry, professional organizations, and government in the United States, as well as in other countries worldwide.

Data collection authority

The information is solicited under the authority of the National Science Foundation Act of 1950, as amended, the America COMPETES Reauthorization Act of 2010, and the Confidential Information Protection and Statistical Efficiency Act of 2018. The Office of Management and Budget control number is 3145-0020. The disclosure review number is NCSES-DRN24-056.

Major changes to recent survey cycle

The 2023 SDR made several changes to the data collection instruments for all modes of data collection. The survey included new questions about retirement to capture details about the job prior to retirement, factors that influenced the decision to retire, and reasons for working after retirement if it occurred. Respondents ages 55 to 75 were asked about their volunteering experiences with charitable organizations and to support family and friends. Nonworking respondents ages 55 to 75 were also asked about their physical health and capacity to work either full or part time. Questions modified for the 2021 SDR to understand the impact of the COVID-19 pandemic on SDR measures were restored to their pre-pandemic form used in the 2019 SDR cycle. Questions added to the 2021 SDR to understand how income and earnings were affected by the pandemic were removed. Questions added to the 2021 SDR about telecommuting and remote work due to the pandemic were updated to collect information about remote work in general. The Web and computer-assisted telephone interview (CATI) instruments expanded dependent interviewing (DI) methods for a targeted number of items within the employment question series to reduce respondent burden. DI is the practice of using respondents' previously reported data to aid their response when reporting on the same information in the current survey.

Key Survey Information

Frequency	Biennial.
Initial survey year	1973.
Reference period	The week of 1 February 2023.
Response unit	Individuals with an SEH research doctorate degree from a U.S. academic institution.
Sample or census	Sample.
Population size	Approximately 1,222,400 individuals.
Sample size	A total of 125,262 individuals.
Key variables	• Demographics (e.g., age, race, sex, ethnicity, and citizenship) • Educational history • Employment status • Field of degree • Occupation

Survey Design

Target population

The SDR target population includes individuals that meet the following criteria:

- Earned an SEH research doctoral degree from a U.S. academic institution prior to 1 July 2021
- Were not institutionalized or terminally ill on 1 February 2023
- Were less than 76 years of age as of 1 February 2023

Sampling frame

The SDR uses the Doctorate Records File (DRF), which is constructed from the annual Survey of Earned Doctorates (SED), a census survey of all recipients of U.S. research doctoral degrees.

Sample design

The SDR uses a fixed panel design with a sample of new doctoral graduates added to the panel in each biennial survey cycle. For the 2023 SDR, sample members from the 2021 cycle who remained age eligible were retained for the 2023 cycle apart from the following types of cases which were dropped:

- Cases selected to supplement the panel in the 2019 SDR who did not respond in the 2019 and 2021 cycles; and
- New cohort cases selected in the 2017 SDR who did not respond in the 2017, 2019, and 2021 cycles.

As with prior survey cycles, a sample of 10,000 new doctoral graduates who had earned their degrees since the last SDR survey cycle, from 1 July 2019 to 30 June 2021, was added. The sample design for the new graduates followed the same sample design and sample stratification first introduced in 2019, defined by detailed fields of study, gender, and underrepresented minority status.

Data Collection and Processing

Data collection

The SDR uses a trimodal data collection approach: self-administered online survey, self-administered paper questionnaire (via mail), and CATI.

Data processing

The data collected in the SDR are subject to both editing and imputation procedures. The SDR uses both logical imputation and statistical (hot-deck) imputation as part of the data processing effort.

Estimation techniques

Because the SDR is based on a complex sampling design and subject to nonresponse bias, sampling weights are created for each respondent to support unbiased population estimates. The final analysis weights account for the following:

- Differential sampling rates
- Adjustments for unknown eligibility
- Adjustments for nonresponse
- Adjustments to align the sample distribution with the population distribution with respect to gender, race and ethnicity, degree year, degree field, U.S. citizenship status, postgraduation location, and birthplace
- Adjustments to reduce large weights

Survey Quality Measures

Sampling error

Estimates of sampling errors associated with this survey were calculated using the successive difference replication method and are included in each table of estimates.

Coverage error

Any missed doctoral graduates within the DRF derived from the SED would create undercoverage in the SDR. Reporting errors in the SED could lead to incorrect classification of doctorates as having or not having earned an SEH research doctorate, which could result in either overcoverage or undercoverage.

Nonresponse error

The weighted and unweighted response rates for the 2023 SDR were each 65%. Analyses of SDR nonresponse trends were used to develop nonresponse weighting adjustments to minimize the potential for nonresponse bias in the SDR estimates. A hot-deck imputation method was used to compensate for item nonresponse.

Measurement error

The SDR is subject to reporting errors from differences in interpretation of questions. Although three modes of response were offered (Web, mail, and CATI), 96% of sample members chose to respond via the Web instrument. As such, reporting error due to mode differences was significantly diminished.

Data Availability and Comparability

Data availability

Data from 1993 to present are available at the SDR website.

Data comparability

Year-to-year comparisons can be made among the 1993 to 2023 survey cycles because many of the core questions remained the same. However, notable differences exist across some survey years, such as the collection of occupation data based on more recent versions of the occupation taxonomy. Also, the SDR target population definition has changed over time as follows:

- Survey data prior to 2010 did not cover SEH doctorates residing outside of the United States.
- In 2010 and 2013, full coverage of SEH doctorates residing outside of the United States included only those having graduated since 2001. For graduates from earlier years, the coverage of those residing outside of the United States is partial.
- The 2015 SDR sample design improved population coverage in the 2015 and subsequent survey cycles to include all SEH doctorates awarded by U.S. institutions, regardless of the academic year of award or the recipient's post-graduation residency location.

Caution is recommended when interpreting or analyzing trends that span pre- and post-2010 surveys and pre- and post-2015 surveys given the noted changes in the survey design and target population.

- Overlap in sample cases across survey cycles support longitudinal analysis using SDR data. A longitudinal panel representing a cohort of SEH doctorate recipients awarded their degree prior to July 2013 and aged less than 66 years in 2015 was selected, and an initial longitudinal data file with imputation and weights accurately reflecting the longitudinal design was developed. The 2015–19 survey data for this panel is available at ***Survey of Doctorate Recipients, Longitudinal Data: 2015–19***.

Data Products

Data from the SDR are published in NCSES InfoBriefs and data tables, available at https://ncses.nsf.gov/surveys/doctorate-recipients/. Information from this survey is also included in ***Science and Engineering Indicators*** and ***Women, Minorities, and Persons with Disabilities in STEM***.

Electronic access

The SDR public use data are available in the SESTAT data tool and in downloadable files through the NCSES data page. Access to restricted data for researchers interested in analyzing microdata can be arranged through a licensing agreement. For more information on licensing, see https://ncses.nsf.gov/about/licensing.