

UNEMPLOYMENT AMONG DOCTORAL SCIENTISTS AND ENGINEERS REMAINED BELOW THE NATIONAL AVERAGE IN 2008

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In 2008 approximately 752,000 individuals in the United States held research doctoral degrees in science, engineering, or health (SEH) fields, an increase of 5.6% from 2006.² Of this, 662,600 were employed or actively seeking work. In October 2008, after the start of the recent economic recession, the increase in unemployment evident in the total U.S. labor force was less apparent among the doctoral SEH labor force.³ The unemployment rate was at 1.7% for SEH doctorate recipients compared with 6.6% for the general population. Unemployment rates were not significantly different for individuals with an SEH doctorate held for 2 years or less and those who had held their degree longer. Unemployment rates ranged from 1.0% among SEH doctorate recipients in mathematics and statistics to 2.4% for the physical sciences (table 1).

Data reported here are from the 2008 Survey of Doctorate Recipients (SDR), which collects data on individuals who earn research doctorates in SEH fields from U.S. academic institutions.

Employment Characteristics

Data collected by the SDR over the period 2001 to 2008 show that approximately 1.7% of the doctoral SEH labor force reported being unemployed in October 2008, up from 1.4% in April 2006 but still lower than

the 2.1% in October 2003 (table 1). In contrast, the unemployment rate for the total U.S. labor force was 6.6% in October 2008, 4.7% in April 2006, and 6.0% in October 2003. (See section "Data Sources and Limitations.")

Of the doctorate recipient population in 2008, 88.1% was actively participating in the labor force, that is, individuals were employed full time or part time, or they were not employed but were seeking employment (table 2). Of those who were not in the labor force (11.9%), a vast majority were retired, and the rest were not employed but were not seeking work. For comparison, in April 2006 the labor force participation rate was basically the same at 88.5%.

Field of Doctoral Study and Years since Doctorate

Of the approximately 662,600 doctoral SEH degree holders in the labor force in 2008, about 651,200 (98.3%) reported being employed full time or part time (table 2). About one quarter (25.2%) of the employed population had earned a doctorate in the biological, agricultural, or environmental life sciences; 17.7% had doctorates in physical sciences; 17.8% in engineering; 15.2% in psychology; 12.5% in social sciences; 4.6% in mathematics and statistics; 4.4% in health; and 2.5% in computer and information sciences.



TABLE 1. Unemployment of holders of U.S. doctorates in science, engineering, and health fields by field of doctoral degree: 2001–08

Field of doctorate	2001	2003	2006	2008
	Number in labor force			
All fields	582,500	606,300	630,300	662,600
Biological, agricultural, and environmental life sciences	142,400	148,800	158,200	167,200
Computer and information sciences	10,900	12,300	13,700	16,400
Mathematics and statistics	26,300	29,000	29,300	30,300
Physical sciences	113,200	115,700	115,800	118,100
Psychology	89,600	93,000	97,500	100,500
Social sciences	77,200	79,600	81,100	82,700
Engineering	101,300	104,400	108,000	118,100
Health	21,500	23,600	26,500	29,300
	Unemployment rate (percent) ^a			
All fields	1.3	2.1	1.4	1.7
Biological, agricultural, and environmental life sciences	1.1	2.0	1.4	1.9
Computer and information sciences	1.3	2.5	1.1	1.1
Mathematics and statistics	1.4	2.4	1.1	1.0
Physical sciences	1.7	2.6	2.1	2.4
Psychology	0.8	1.7	1.0	1.3
Social sciences	1.3	1.5	1.0	1.3
Engineering	1.7	2.7	1.4	1.8
Health	0.5	1.4	0.9	1.2

^a Based on count of doctorate recipients in labor force; percentage unemployed reported in tables 2 and 3 is based on count of all doctorate recipients.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Doctorate Recipients: 2001, 2003, 2006, 2008.

Across SEH fields of degree, full-time employment in 2008 was 77.0%, ranging from 67.3% for psychology to 91.4% for computer and information sciences. Part-time employment was most likely among those earning doctorates in psychology (21.1%).

Those who earned their doctorates more than 25 years ago were, as expected, more likely to be retired and out of the labor force: 28.7% of this contingent was retired in 2008 (table 2).⁴ As measured by the percentage unemployed, the most recent doctorate recipients did not differ significantly from those who received their doctorates before 2006.⁵ Part-time employment was lowest among the most recent doctorate recipients (4.9%) and was generally higher among the more experienced cohorts.

Demographics

Employed female doctorate recipients in SEH fields constituted 30.7% of all employed SEH doctorate holders in October 2008, up from 29.4% in April 2006. In 2008 the labor force participation rate among SEH doctorate holders was 89.7% for women compared with 87.4% for men (table 3). Female SEH doctorate holders (73.4%) were less likely than their male counterparts (78.5%) to be employed full time in 2008 but were more likely to be employed part time (14.7% of women, 7.4% of men). Female SEH doctorate holders (6.0%) were also less likely than their male counterparts (11.9%) to be retired. The proportions of men (1.5%) and women (1.6%) who reported themselves as in the labor force but not employed were not significantly different.

TABLE 2. Employment status of holders of U.S. doctorates in science, engineering, and health fields, by field and years since doctorate: 2008 (Percent)

Field and years since doctorate	Total (number)	In labor force					Not in labor force		
		All	Working for pay or profit		Unemployed ^a	All	Retired	Not working, not seeking work	
			Full time and part time	Full time					Part time
All U.S. SEH doctorate holders	752,000	88.1	86.6	77.0	9.6	1.5	11.9	10.1	1.8
Field of doctorate									
Biological, agricultural, and environmental life sciences	188,000	89.0	87.3	80.2	7.0	1.7	11.0	8.9	2.2
Computer and information sciences	16,900	96.8	95.7	91.4	4.4	1.0	3.2	2.1	1.1
Mathematics and statistics	35,700	84.7	83.8	75.5	8.3	0.9	15.3	13.4	1.9
Physical sciences	139,100	84.9	82.9	75.9	6.9	2.0	15.1	13.7	1.4
Psychology	112,300	89.5	88.4	67.3	21.1	1.1	10.5	8.1	2.4
Social sciences	95,900	86.1	85.0	74.4	10.5	1.2	13.9	11.9	2.0
Engineering	131,800	89.6	88.0	81.7	6.3	1.6	10.4	9.3	1.2
Health	32,100	91.1	90.0	78.4	11.6	1.1	8.9	7.4	1.5
Years since doctorate									
2 years or less	60,200	97.4	95.8	91.0	4.9	1.5	2.6	0.2	2.4
3–5 years	69,800	97.5	96.1	89.6	6.5	1.4	2.5	0.2	2.3
6–10 years	111,900	97.2	95.8	88.1	7.7	1.4	2.8	0.5	2.3
11–15 years	105,300	96.7	95.3	86.6	8.6	1.4	3.3	1.3	2.1
16–20 years	88,700	95.5	93.8	85.8	8.0	1.7	4.5	2.5	2.1
21–25 years	78,900	94.1	92.7	83.3	9.4	1.4	5.9	4.4	1.5
More than 25 years	237,200	70.2	68.6	54.7	13.8	1.6	29.8	28.7	1.1

SEH = science, engineering, health.

^a Based on count of all doctorate recipients; unemployment rate reported in table 1 is based on count of doctorate recipients in labor force.

NOTE: Numbers represent weighted counts, rounded to nearest 100.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Doctorate Recipients: 2008.

Underrepresented minorities—American Indians/Alaska Natives, blacks, Hispanics, and Native Hawaiians/Other Pacific Islanders—collectively constituted 6.4% of all SEH doctorate recipients in the labor force.⁶ A large majority of the employed SEH doctorate population was non-Hispanic white (74.5%), followed by Asian (18.0%). Of the non-Hispanic doctoral population in 2008, 1.1% identified with two or more races. Non-Hispanic white doctorate holders were less likely to be employed full time than were their minority counterparts.

In 2008, 3.6% of the doctoral SEH population held temporary visas (table 3). As might be expected based on U.S. visa requirements, almost all of these individuals (95.7%) were working full time; a small fraction was not in the labor force in October 2008.

Sector

Four-year educational institutions employed 41.4% of all working SEH doctorate recipients in 2008. Private for-profit firms employed the next largest share of the doctoral workforce, at 32.6% of the total (table 4). Academic employment was most common for doctorate recipients in the social sciences (61.4%). In contrast, employment in private for-profit firms was most likely for doctorate recipients in the field of engineering (57.3%) (table 4).

Data Sources and Limitations

All differences reported are significant at the 95% level. Percentage comparisons in this report are based on unrounded counts and may differ from percentages

TABLE 3. Employment status of holders of U.S. doctorates in science, engineering, and health fields, by sex, race/ethnicity, and citizenship: 2008 (Percent)

Sex, race/ethnicity, and citizenship	Total (number)	In labor force					Not in labor force		
		Working for pay or profit					All	Retired	Not working, not seeking work
		All	Full time and part time	Full time	Part time	Unemployed ^a			
All	752,000	88.1	86.6	77.0	9.6	1.5	11.9	10.1	1.8
Sex									
Male	524,900	87.4	86.0	78.5	7.4	1.5	12.6	11.9	0.7
Female	227,100	89.7	88.0	73.4	14.7	1.6	10.3	6.0	4.3
Race/ethnicity									
American Indian/Alaska Native	1,500	88.5	S	S	S	S	11.5	S	S
Asian	127,300	93.9	92.1	87.8	4.3	1.8	6.1	4.3	1.8
Black	21,100	93.8	91.9	80.9	11.0	1.9	6.2	4.6	1.6
Hispanic	21,900	94.3	92.7	82.5	10.2	1.5	5.7	4.2	1.6
White	571,300	86.3	84.9	74.1	10.8	1.4	13.7	11.9	1.8
Native Hawaiian/Other Pacific Islander	800	92.1	S	S	S	S	7.9	S	S
Two or more races	8,100	91.7	89.9	81.5	8.4	1.8	8.3	5.7	2.6
Citizenship									
U.S. citizen/permanent resident	725,000	87.7	86.2	76.3	9.9	1.5	12.3	10.5	1.8
Temporary visa holder	26,900	98.3	97.4	95.7	1.6	0.9	1.7	S	S

S = suppressed for reliability or confidentiality.

^a Based on the count of all doctorate recipients; unemployment rate reported in table 1 is based on count of doctorate recipients in labor force.

NOTE: Numbers represent weighted counts, rounded to nearest 100.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Doctorate Recipients: 2008.

TABLE 4. Employed holders of U.S. doctorates in science, engineering, and health fields, by employment sector and field of study: 2008

Field	All employed	Employment sector						
		4-year educational institution ^a	Private for-profit	Private non-profit	Federal government	State/local government	Self-employed	Other
All fields	651,200	269,400	212,200	42,900	43,700	18,900	41,000	23,100
Biological, agricultural, and environmental life sciences	164,000	77,100	43,200	13,900	14,200	4,500	5,600	5,500
Computer and information sciences	16,200	6,900	7,400	600	500	200	400	300
Mathematics and statistics	30,000	17,200	8,100	1,000	1,500	200	900	1,000
Physical sciences	115,300	38,800	50,700	6,300	8,700	2,500	4,200	4,100
Psychology	99,200	33,200	19,700	9,700	5,100	5,700	20,100	5,800
Social sciences	81,500	50,100	10,700	5,100	4,700	2,700	3,900	4,300
Engineering	116,000	30,400	66,400	3,700	7,100	2,300	5,000	1,100
Health	28,900	15,800	5,900	2,700	1,900	800	900	900

^a 4-year educational institution includes 4-year colleges or universities, medical schools (including university-affiliated hospitals or medical centers), and university-affiliated research institutes.

NOTE: Numbers represent weighted counts, rounded to nearest 100.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of Doctorate Recipients: 2008.

calculated from the rounded counts displayed in the tables.

The racial/ethnic categories in this report are mutually exclusive. The estimates on racial backgrounds refer to individuals who were not Hispanic and who identified only one racial background. Non-Hispanic individuals who identified as two or more racial backgrounds are reported as a separate group. Hispanic ethnicity refers here to all individuals who identified a Hispanic origin regardless of racial background.

Data Sources

Data for 2008 in this report are from the 2008 Survey of Doctorate Recipients. The SDR has been conducted every 2 years since 1973 (with a 3-year period between 2003 and 2006 for survey redesign) and is sponsored by the National Science Foundation (NSF) in conjunction with the National Institutes of Health and other federal agencies on an occasional basis. October is the usual survey reference month for the SDR. However, in 2006 the survey reference month was April to accommodate the redesign of the survey. The SDR is a longitudinal panel study of individuals who have received doctorate-level degrees from U.S. academic institutions in science, engineering, or health fields and are living in the United States. SEH fields include biological/agricultural/environmental life sciences, computer and information sciences, mathematics and statistics, the physical sciences, psychology, the social sciences, engineering, and health fields. The SDR follows a sample of doctorate holders throughout their careers from the year of their degree award through age 75.

The total sample size for the 2008 survey was 40,093, of which 81% completed the questionnaire. The panel is refreshed in each survey cycle with a sample of new SEH doctoral degree earners selected from another NSF-sponsored survey, the Survey of Earned Doctorates (SED). The SED is a census of all individuals who receive a research doctorate from a U.S. academic institution in a given year (1 July through 30 June of the following year). For the 2008 cycle, a sample of individuals from the SED under the age of 76 who earned SEH doctoral degrees in academic years 2006 and 2007 was added to the existing 2006 survey panel.

Statistics on the U.S. labor force were obtained from http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?data_tool=latest_numbers&series_id=LNS14000000 on 8 December 2010. These unemployment statistics are published by the Bureau of Labor Statistics. They are calculated for the population ages 16 years and older, based on the Current Population Survey. Persons are classified as unemployed if they do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work.

Data Availability

The full set of detailed tables from the 2008 Survey of Doctorate Recipients will be available in the forthcoming report *Characteristics of Doctoral Scientists and Engineers in the United States: 2008* at <http://www.nsf.gov/statistics/doctoratework/>. Individual detailed tables may be available in advance of the full report. Please contact Lynn Milan (lmilan@nsf.gov; 703-292-2275) for more information. Data from the SDR are also available in the Scientists and Engineers Statistical Data System (SESTAT) at <http://www.nsf.gov/statistics/sestat/>. SESTAT integrates information on employment, education, and demographic characteristics of scientists and engineers in the United States collected by three NSF surveys: the SDR, the National Survey of College Graduates, and the National Survey of Recent College Graduates.

Notes

1. Thomas B. Hoffer, Carolina Milesi, Lance Selfa, and Karen Grigorian, NORC at the University of Chicago, 1155 E. 60th Street, Chicago, IL 60637. Daniel J. Foley, Lynn M. Milan, Steven L. Proudfoot, and Emilda B. Rivers, Human Resources Statistics Program, Division of Science Resources Statistics, National Science Foundation, 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230.
2. Health fields do not include medical doctors. For a listing of science, engineering, and health fields included in the 2006 Survey of Doctorate Recipients, see appendix table B-2 at <http://www.nsf.gov/statistics/nsf09317/>.

3. Labor force is a subset of the population that includes both those who are employed and those who are not working but are seeking work (unemployed); other individuals are not considered to be in the labor force.

4. The length of time since doctorate receipt is associated with age: Median age of those with more than 25 years since doctorate is 64 years, and median age is 44 years for those with 25 or fewer years since doctorate.

5. Two measures of unemployment are used in this report: (1) the unemployment rate as noted in table 1,

which is based on the count of doctorate recipients in the labor force, and (2) the percentage unemployed as noted in tables 2 and 3, which is based on the count of all doctorate recipients, regardless of whether they are in the labor force.

6. The category “underrepresented minorities” comprises the racial/ethnic groups whose representation in science, engineering, and health fields is smaller than their representation in the U.S. population.

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