

# APPENDIX A. TECHNICAL NOTES

## SURVEY DESCRIPTION

All statistical data presented in this paper are from the Survey of Earned Doctorates (SED). This survey, which is conducted annually under the sponsorship of the National Science Foundation (NSF) and four other Federal agencies, is a census of recipients of research doctorates at all accredited universities and colleges in the United States. Research doctorates include doctoral degrees such as the Ph.D. and D.Sc., but exclude first-professional degrees such as the J.D. and the M.D.

The survey data are collected directly from the individual research doctorate recipients. Questionnaires are distributed, with the cooperation of the various graduate schools, to those people completing their research doctorates. The data for a given year include responses from all persons whose doctorates were awarded in the 12-month period ending on June 30 of that year. A copy of the questionnaire used for the 1994-95 survey is attached as Exhibit A.

Approximately 94 percent of the 1994-95 cohort of doctorate recipients responded to the questionnaire. Since partial data from public sources are obtained for survey nonrespondents, the counts for conferred doctorates by field are considered relatively complete. Data for this report were drawn from the responses to items 5, 7, 9, 10, 13, and 17 of the 1995 questionnaire.

## MISSING DATA

Missing data items are coded as missing and are not imputed. In item 17, respondents were asked to indicate their primary and secondary sources of support and to check all other sources from which support was received. The overall response rate to the sources of support was 94 percent, but only 76 percent reported a primary source of support and 63 percent a secondary source. That is, 63 percent indicated both a primary and secondary source of support, 13 percent indicated a primary source of support, but not a secondary source of support, and an additional 18 percent checked multiple boxes on the source of support question, but did not indicate which were primary or secondary sources of support. Thus, a total of 94 percent either checked a box and/or indicated one or more modes of support as primary or secondary. The 13 percent who indicated a primary source of support but

not a secondary source of support includes both people who had no other support and also those who checked other sources of support, but did not designate a secondary source. Respondents not reporting any source are excluded from the tables presenting any source of support, those not reporting a secondary source are excluded from tables reporting secondary source of support, and those not reporting a primary source are excluded from tables reporting primary source of support. See appendix tables A2 and A3 for differences between those missing and not missing primary source of support and any source of support on other variables used in this report.

<u>Item</u>	<u>Response rate (percent)</u>
5 (Sex)	100
7 (Citizenship)	97.9
9 (Race/ethnicity)	98.9
13 (Field of study)	100.0
17 (Any source of support)	93.6
17 (Primary source of support)	76.2
17 (Secondary source of support)	63.2

## VALIDITY OF DATA ON SOURCES OF SUPPORT

The National Research Council (NRC), at the request of the Federal sponsors of the SED conducted a study in 1994 to assess the validity of item 17, sources of support. In the study, responses to the SED were matched with records of grantors of support money to graduate students. The study found that doctorate recipients can reasonably accurately identify the type of financial support they had in graduate school (e.g., RA, TA) but not necessarily the source of that support (e.g., NSF, National Institutes of Health, Ford Foundation, university funds). (NRC 1994.) For this reason, the 32 possible responses to item 17 were recoded into 7 "modes" of support that reflect the type of funding but not the source of funding. (The question on sources of support was changed in later versions of the SED.)

## DATA RECODES

Data from the file were recoded into the categories used in this report as follows.

**Support mode** was determined from item 17 as follows:

<u>Mode</u>	<u>Code on questionnaire:</u>
Fellowship	33 <sup>24</sup> , 53, 70, 71, 73, and 78
Traineeship	12, 21, 40, and 44
Research assistantship	11, 22, 32, 52, and 62
Teaching assistantship	10
Own funds	01, 02, and 03
Loans	80, 81, and 89
Other	14, 19, 29, 49, 60, 69, 90, 91, 92, and 99
Missing	None specified

**Primary mode of support** was determined from item 17, source indicated as primary; if no primary source was specified, it was considered missing.

**Secondary mode of support** was determined from item 17, source indicated as secondary; if no secondary source was specified, it was considered missing.

**Discipline** was determined from item 13, field of doctorate study. The National Research Council's Office of Scientific and Engineering Personnel field codes used to indicate study field were assigned to the discipline codes reported herein using the NSF Computer-Aided Science Policy Analysis and Research (CASPAR) database crosswalk shown in Exhibit B.

**Citizenship** was determined from item 7 using the following crosswalk:

<u>Citizenship</u>	<u>Code on questionnaire:</u>
U.S. citizen or permanent resident visa	0, 1, and 2
Foreign student (on temporary visa)	3
Missing	None specified

<sup>24</sup>A number of these may be "false positives." The NRC Validation Study (NRC 1994) showed that 39 percent of doctorate recipients listing NSF fellowship were not listed in the NSF files as having received one.

**Race/ethnicity** was determined from items 9 and 10, using the following crosswalk:

<u>Race/ethnicity</u>	<u>Code on questionnaire:</u>
American Indian or Alaskan Native (I)	Item 9, code 0; item 10, response "no"
Asian or Pacific Islander (A)	Item 9, code 1; item 10, response "no"
Black, non-Hispanic (B)	Item 9, code 2; item 10, response "no"
White, non-Hispanic (W)	Item 9, code 3; item 10, response "no"
Hispanic (H)	Item 9, any; Item 10, response "yes," codes 0, 1, or 2
Other (O)	None specified or multiple responses

**Sex** was determined from item 5:

<u>Sex</u>	<u>Code on questionnaire:</u>
Male	1
Female	2
Missing	None specified

**Carnegie codes** were assigned to the doctorate-granting institutions reported in item 13 based on the Carnegie classification system. (The Carnegie Foundation 1994)

- **Research I institutions** offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research. A Research I institution annually receives at least \$40 million in Federal support and awards at least 50 doctoral degrees.
- **All other institutions** comprise the Carnegie classifications of Research II, and doctorate-granting I & II institutions.

The doctorate-granting institutions reported in item 13 were categorized as **public or private institutions** based on their reporting on the institutional control item in the National Center for Education Statistics IPEDS surveys.

- **Private institution** – an educational institution controlled by a private individual(s) or by a nongovernmental agency, usually supported primarily by other than public funds, and operated by other than publicly elected or appointed officials.
- **Public institution** – an educational institution whose programs and activities are operated by publicly elected or appointed school officials and which is supported primarily by public funds.

**Table A1. Number of 1995 S&E Ph.D. recipients by primary source of support and selected characteristics**

Characteristic	Primary source of support								Total
	Fellowship	Traineeship	Research assistantship	Teaching assistantship	Own Funds	Loans	Other	Missing	
<b>Total</b> .....	667	1,797	8,069	3,748	4,582	430	1,951	6,621	27,865
<b>Sex</b>									
Female.....	251	768	2,112	1,130	1,965	246	529	2,130	9,131
Male.....	416	1,029	5,955	2,618	2,615	184	1,422	4,353	18,592
Unknown.....	0	0	2	0	2	0	0	138	142
<b>Race/ethnicity</b>									
White.....	449	1,234	4,417	2,289	3,571	347	1,265	3,050	16,622
Asian/Pacific Islander.....	86	362	3,231	1,260	732	21	417	2,237	8,346
Underrepresented minority <sup>1</sup> .....	123	178	324	167	251	60	224	569	1,896
Other (missing).....	9	23	97	32	28	2	45	765	1,001
<b>Citizenship</b>									
Foreign students on temporary visas.....	71	256	2,464	1,082	602	13	770	1,981	7,239
U.S. citizens and permanent residents.....	596	1,540	5,598	2,666	3,978	417	1,179	4,067	20,041
Unknown.....	0	1	7	0	2	0	2	573	585
<b>Institutional control</b> <sup>2</sup>									
Private.....	327	894	2,286	881	1,358	226	677	2,110	8,759
Public.....	340	903	5,783	2,867	3,224	204	1,274	4,511	19,106
<b>Carnegie classification</b> <sup>2</sup>									
Not research I.....	607	1,436	6,505	2,708	2,756	181	1,398	4,488	20,079
Research I.....	60	361	1,564	1,040	1,826	249	553	2,133	7,786
<b>Field of study</b>									
Agricultural sciences.....	28	23	407	33	131	8	148	258	1,036
Biological sciences.....	172	829	1,676	567	586	27	310	1,209	5,376
Health sciences.....	14	97	167	92	473	24	104	359	1,330
Engineering.....	141	141	2,567	449	704	23	579	1,404	6,008
Computer & information sciences.....	26	28	318	152	193	3	80	197	997
Mathematics.....	27	39	132	566	101	2	70	253	1,190
Physical sciences.....	91	112	1,679	661	236	10	175	877	3,841
Earth, atmospheric, & oceanographic sciences.....	15	24	314	78	107	2	68	172	780
Psychology.....	42	178	396	368	1,114	263	159	909	3,429
Social sciences.....	111	326	413	782	937	68	258	983	3,878

<sup>1</sup> Underrepresented minority includes blacks, Hispanics, and American Indians/Alaskan Natives.

<sup>2</sup> of doctorate institution

**SOURCE:** National Science Foundation/Division of Science Resources Studies, Survey of Earned Doctorates.

**Table A2. Number and percentage of 1995 S&E Ph.D. recipients by primary mode of support missing, and selected characteristics**

Characteristic	Number			Percentage		
	Primary source of support missing			Primary source of support missing		
	No	Yes	Total	No	Yes	Total
<b>Total</b> .....	21,244	6,621	27,865	76.2	23.8	100.0
<b>Sex</b>						
Female.....	7,001	2,130	9,131	76.7	23.3	100.0
Male.....	14,239	4,353	18,592	76.6	23.4	100.0
Unknown.....	4	138	142	2.8	97.2	100.0
<b>Race/ethnicity</b>						
White.....	13,572	3,050	16,622	81.7	18.3	100.0
Asian/Pacific Islander.....	6,109	2,237	8,346	73.2	26.8	100.0
Underrepresented minority <sup>1</sup> .....	1,327	569	1,896	70.0	30.0	100.0
Other (missing).....	236	765	1,001	23.6	76.4	100.0
<b>Citizenship</b>						
Foreign students on temporary visas.....	5,258	1,981	7,239	72.6	27.4	100.0
U.S. citizens and permanent residents.....	15,974	4,067	20,041	79.7	20.3	100.0
Unknown.....	12	573	585	2.1	97.9	100.0
<b>Institutional control</b> <sup>2</sup>						
Private.....	6,649	2,110	8,759	75.9	24.1	100.0
Public.....	14,595	4,511	19,106	76.4	23.6	100.0
<b>Carnegie classification</b> <sup>2</sup>						
Not research I.....	5,653	2,133	7,786	72.6	27.4	100.0
Research I.....	15,591	4,488	20,079	77.6	22.4	100.0
<b>Field of study</b>						
Agricultural sciences.....	778	258	1,036	75.1	24.9	100.0
Biological sciences.....	4,167	1,209	5,376	77.5	22.5	100.0
Health sciences.....	971	359	1,330	73.0	27.0	100.0
Engineering.....	4,604	1,404	6,008	76.6	23.4	100.0
Computer & information sciences.....	800	197	997	80.2	19.8	100.0
Mathematics.....	937	253	1,190	78.7	21.3	100.0
Physical sciences.....	2,964	877	3,841	77.2	22.8	100.0
Earth, atmospheric, & oceanographic sciences.....	608	172	780	77.9	22.1	100.0
Psychology.....	2,520	909	3,429	73.5	26.5	100.0
Social sciences.....	2,895	983	3,878	74.7	25.3	100.0

<sup>1</sup> Underrepresented minority includes blacks, Hispanics, and American Indians/Alaskan Natives.

<sup>2</sup> of doctorate institution

**SOURCE:** National Science Foundation/Division of Science Resources Studies, Survey of Earned Doctorates.

**Table A3. Number and percentage of 1995 S&E Ph.D. recipients by any mode of support missing, and selected characteristics**

Characteristic	Number			Percentage		
	Any source of support missing			Any source of support missing		
	No	Yes	Total	No	Yes	Total
<b>Total</b> .....	26,086	1,779	27,865	93.6	6.4	100.0
<b>Sex</b>						
Female.....	8,577	554	9,131	93.9	6.1	100.0
Male.....	17,504	1,088	18,592	94.1	5.9	100.0
Unknown.....	5	137	142	3.5	96.5	100.0
<b>Race/ethnicity</b>						
White.....	15,981	641	16,622	96.1	3.9	100.0
Asian/Pacific Islander.....	8,028	318	8,346	96.2	3.8	100.0
Underrepresented minority <sup>1</sup> .....	1,784	112	1,896	94.1	5.9	100.0
Other (missing).....	293	708	1,001	29.3	70.7	100.0
<b>Citizenship</b>						
Foreign students on temporary visas.....	6,849	390	7,239	94.6	5.4	100.0
U.S. citizens and permanent residents.....	19,217	824	20,041	95.9	4.1	100.0
Unknown.....	20	565	585	3.4	96.6	100.0
<b>Institutional control</b> <sup>2</sup>						
Private.....	7,981	778	8,759	91.1	8.9	100.0
Public.....	18,105	1,001	19,106	94.8	5.2	100.0
<b>Carnegie classification</b> <sup>2</sup>						
Not research I.....	7,177	609	7,786	92.2	7.8	100.0
Research I.....	18,909	1,170	20,079	94.2	5.8	100.0
<b>Field of study</b>						
Agricultural sciences.....	969	67	1,036	93.5	6.5	100.0
Biological sciences.....	5,098	278	5,376	94.8	5.2	100.0
Health sciences.....	1,212	118	1,330	91.1	8.9	100.0
Engineering.....	5,615	393	6,008	93.5	6.5	100.0
Computer & information sciences.....	936	61	997	93.9	6.1	100.0
Mathematics.....	1,121	69	1,190	94.2	5.8	100.0
Physical sciences.....	3,625	216	3,841	94.4	5.6	100.0
Earth, atmospheric, & oceanographic sciences.....	742	38	780	95.1	4.9	100.0
Psychology.....	3,103	326	3,429	90.5	9.5	100.0
Social sciences.....	3,665	213	3,878	94.5	5.5	100.0

<sup>1</sup> Underrepresented minority includes blacks, Hispanics, and American Indians/Alaskan Natives.

<sup>2</sup> of doctorate institution

**SOURCE:** National Science Foundation/Division of Science Resources Studies, Survey of Earned Doctorates.

**Table A4. Percentage distribution by field, race/ethnicity and citizenship of 1995 S&E Ph.D. recipients**

Field	Asian/Pacific Islander <sup>1</sup>	Underrepresented minority <sup>1,2</sup>	White <sup>1</sup>	Foreign on temporary visa <sup>3</sup>
<b>Total S&amp;E</b> .....	100	100	100	100
Agricultural sciences.....	2	3	3	6
Biological sciences.....	25	19	21	13
Health sciences.....	2	8	6	3
Engineering.....	27	12	14	35
Computer & information sciences.....	4	1	3	5
Mathematics.....	6	2	4	5
Physical sciences.....	20	10	13	13
Earth, atmospheric, & ocean sciences...	3	1	3	2
Psychology.....	3	24	19	2
Social sciences.....	8	20	14	15

<sup>1</sup> U.S. citizens and permanent residents only.

<sup>2</sup> Underrepresented minorities include blacks, Hispanics, and American Indians/Alaskan Natives.

<sup>3</sup> Foreign students who were on temporary visas at the time of Ph.D. conferral.

**SOURCE:** National Science Foundation/Division of Science Resources Studies, Survey of Earned Doctorates.