



Debt Burden of Science and Engineering Doctorates— Differences by Race/Ethnicity



Eleanor L. Babco
Executive Director
Commission on Professionals in Science and Technology

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Commission on Professionals in Science and Technology
1200 New York Avenue, NW, Suite 390
Washington, DC 20005
Tel: (202) 326-7080
Fax: (202) 842-1603
info@cpst.org
<http://www.cpst.org>

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Not only is it informative to examine trends in support mechanisms for science and engineering doctorate recipients by field and race/ethnicity¹, but it is also important to look at the debt burden that these science and engineering (S&E) graduates incur in obtaining their degree. Does it differ by race/ethnicity? By level of indebtedness?

To answer that question, Alan Rapoport in 1998 examined the debt burden of new science and engineering PhDs between 1993 and 1996.² Just under 40 percent of those who received their science and engineering PhDs from 1993-96 reported having no debt at the time their degrees were conferred. Forty-two percent reported total debt burden of \$20,000 or less (26 percent had debt up to \$10,000, and 16 percent had debt between \$10,000 and \$20,000). Another 8 percent reported debt levels of \$20,000 to \$30,000, and 8 percent had debts exceeding \$30,000.

Overall, there was little difference between men and women in the amount of debt burden in the 1993-96 period. Thirty-nine percent of each group reported having no debt. The debt burden for women appears to be slightly higher than that for men, with 17 percent of women reporting debt greater than \$20,000 compared to 14 percent of men. Among the men, 43 percent reported debt less than \$20,000 compared to 39 percent of the women. However, when examined by field, there were substantial differences in the debt burden between male and female S&E PhDs. The primary reason for that was because 30 percent of women's S&E doctorates conferred between 1993-96 were in psychology compared to only 11 percent of the men's, and psychology as a field has the highest percent and levels for educational debt of all the S&E fields.

There were also differences among the racial/ethnic groups in the 1993-96 period, although data are not available on the debt burden by individual racial/ethnic group because of the small numbers. However, we can obtain some information when all the underrepresented minority groups are lumped together. For example, for the 1993-96 period, a smaller percentage of underrepresented minorities were debt free compared to whites or Asians. Only 27 percent of underrepresented S&E PhD recipients reported not having any debt, compared to 40 percent of whites and 45 percent of Asians. But, underrepresented minorities reported higher levels of debt than their white and Asian counterparts.

¹ See *Trends in Primary Financial Support for Science and Engineering Graduate Students by Race/Ethnicity, 1996-2002*, by Eleanor L. Babco, available on CPST's website, <http://www.cpst.org>.

² Alan I. Rapoport, *Does the Educational Debt Burden of Science and Engineering Doctorates Differ by Race/Ethnicity and Sex?*, National Science Foundation, NSF 99-341, April 16, 1999.

Have Rapoport's findings changed since that time? Unfortunately, we are only able to make a comparison for the period 1997-2000 since the question on debt was changed in 2001 to separate out undergraduate and graduate debt and therefore the data are not comparable. However, we can look at the debt related to the education of all doctorate recipients by race/ethnicity in 2001 and 2002, but not broken out by specific field.

For the 1997-2000 period, women appeared to incur more debt than men. For example, 37 percent of women reported no debt (compared to 39 percent in the 1993-96 period), while 41 percent of men reported no debt (compared to 39 percent in the earlier period). This again is primarily due to the concentration of women in psychology (there were over twice as many women earning doctorates in psychology as there were men) which has the highest percent and levels for educational debt of all the S&E fields.

As shown in the following table, there was virtually no difference in the proportion of men and women reporting no debt in mathematics and statistics, computer science, engineering, physical sciences, earth and atmospheric sciences, and social sciences total. However, in the biological sciences, women were much more likely to be debt free than were men earning doctorates.

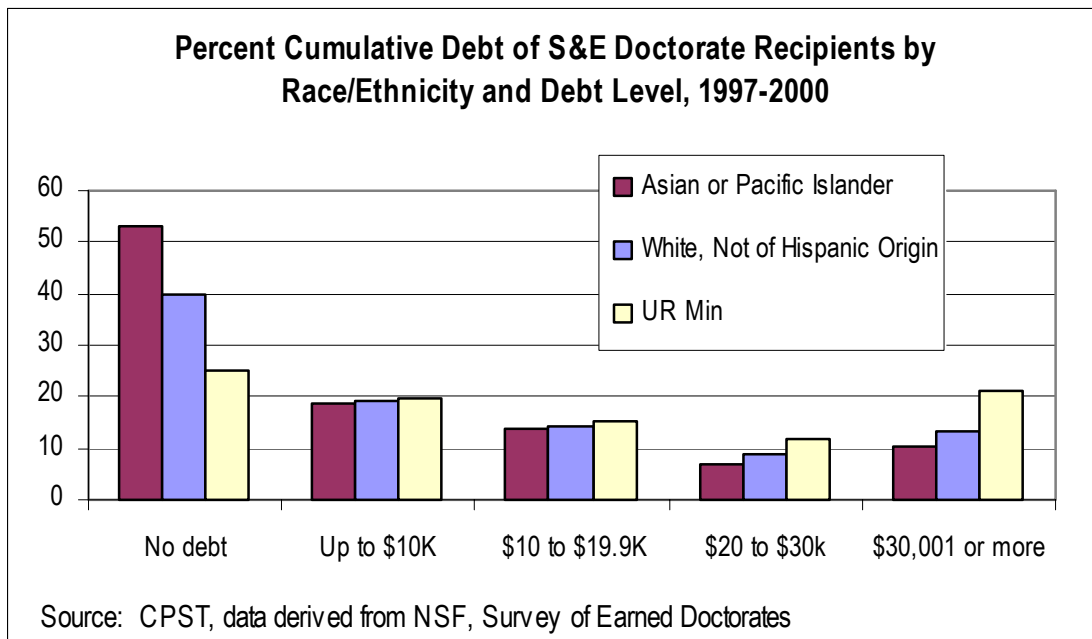
**Cumulative Debt Related to the Education of S&E Doctorate Recipients
(US Citizens) by Sex and Field: 1997-2000**

PhD Field	Sex	Number of PhDs	Percents		
			No debt	Up to \$20K	> \$20K
S&E Total	Men	38,145	40.5	34.2	20.5
	Women	25,801	36.7	32.7	25.4
Agricultural Sciences	Men	1,240	38.7	36.9	19.2
	Women	580	41.9	37.4	13.6
Mathematics and Statistics	Men	1,539	48.0	33.9	13.8
	Women	624	48.4	36.1	10.7
Computer Science	Men	1,365	57.5	26.0	10.5
	Women	348	59.2	25.0	9.5
Biological Sciences	Men	8,214	37.7	38.4	19.9
	Women	6,774	42.6	38.4	15.9
Engineering	Men	6,259	41.5	38.8	14.9
	Women	1,937	41.2	40.7	14.5
Physical sciences	Men	1,399	45.1	37.3	14.2
	Women	586	46.4	35.2	14.3
Earth, atmospheric total	Men	8,373	50.7	30.9	13.8
	Women	1,636	50.7	34.4	11.5
Psychology	Men	4,079	23.8	25.7	43.3
	Women	8,507	26.1	25.3	40.3
Social science total	Men	5,677	33.5	34.6	27.4
	Women	4,809	35.5	33.2	27.3

NOTES: Percentages do not total to 100 due to rounding and omission of non-respondents from table. Debt is for undergraduate and/or graduate education expenses for tuition and fees, living expenses and supplies, and transportation to and from school.

SOURCE: CPST, data derived from National Science Foundation, Survey of Earned Doctorates.

There were changes in cumulative debt by race/ethnicity in the 1997-2000 period as well. The proportion of underrepresented minorities who earned a science and engineering doctorate and reported no debt decreased from 27 percent to 25 percent, while the number of Asians increased substantially – from 45 percent to 53 percent. The proportion of whites earning S&E doctorates in the 1997-2000 period who reported no debt remained the same at 40 percent. Additionally, as was true in the earlier 1993-1996 period, underrepresented minorities reported the same or higher levels of debt than their white and Asian counterparts in each of the four indebtedness ranges shown in the accompanying chart. For example, 12 percent of underrepresented minorities reported debt between \$20,000 and \$30,000, compared to 9 percent of whites and 7 percent of Asians; and 21 percent of underrepresented minorities reported debt greater than \$30,000, compared to 14 percent of whites and 10 percent of Asians.



Field distribution of science and engineering doctorates varies by race/ethnicity and the level of indebtedness also varies by discipline. As was pointed out earlier in the sex differences of debt, although overall the levels were similar, field differences were very prominent which was explained by women's predominance in psychology. However, that is not true for underrepresented minorities compared to whites and Asians. In each of the fields noted in the table on the following page, including those in which underrepresented minorities were more likely to receive their doctorate – psychology and the social sciences – a smaller percentage of underrepresented minorities reported not having any debt than either whites or Asians. And in many of those fields, the differences were substantial. Additionally, in both the debt ranges reported in the table, with the exception of underrepresented minorities in the earth and atmospheric sciences reporting debt up to \$20,000, the percentage of underrepresented minorities reporting debt is always greater than the percentage of Asians or whites reporting debt.

**Cumulative Debt Related to the Education of S&E Doctorate Recipients
(US Citizens) by Race/Ethnicity and Field: 1997-2000**

PhD Field	Number of PhDs	Percents		
		No debt	Up to 20K	>\$20K
S&E total				
White	52,760	40.0	33.8	22.2
Asian	3,829	44.5	32.4	17.2
Underrepresented minority	5,313	24.9	35.2	32.6
Agricultural Sciences				
White	1,580	40.5	38.0	17.2
Asian	56	51.8	23.2	14.3
Underrepresented minority	131	26.7	38.2	24.4
Biological Sciences				
White	12,421	40.5	38.7	17.9
Asian	1,110	46.5	34.9	14.9
Underrepresented minority	1,067	28.1	41.6	25.5
Computer Science				
White	1,370	59.9	25.5	10.1
Asian	165	60.0	23.6	7.3
Underrepresented minority	103	35.9	37.9	19.4
Mathematics and Statistics				
White	1,851	49.2	35.3	12.3
Asian	131	49.6	26.7	15.3
Underrepresented minority	116	31.9	34.5	25.0
Engineering, total				
White	7,682	51.8	31.7	13.2
Asian	1,017	50.0	31.3	12.5
Underrepresented minority	683	34.6	39.2	21.8
Earth, atmospheric total				
White	1,755	46.4	37.5	13.6
Asian	47	44.7	40.4	8.5
Underrepresented minority	113	40.7	28.3	25.7
Physical sciences total				
White	6,990	42.3	39.6	14.9
Asian	493	47.9	36.3	9.7
Underrepresented minority	474	27.6	44.5	20.9
Psychology				
White	10,310	27.1	25.6	41.5
Asian	424	23.8	26.4	42.7
Underrepresented minority	1,518	16.8	26.9	44.0
Social sciences, total				
White	8,801	35.7	33.4	25.7
Asian	386	32.9	36.0	23.8
Underrepresented minority	1,108	22.0	34.0	39.1

NOTES: Percentages do not total to 100 due to rounding and omission of non-respondents from table. Underrepresented minorities include American Indians/Alaskan Natives, blacks, and Hispanics. Debt is for undergraduate and/or graduate education expenses for tuition and fees, living expenses and supplies, and transportation to and from school.

As noted earlier, we are unable to look at cumulative debt for 2001 and 2002 broken out by field, level of indebtedness and race/ethnicity. However, we can examine debt for all doctorate recipients by level and demographic group.

Looking at the debt related to the education of PhD recipients by racial/ethnic group for all doctorates in 2001 and 2002, we find that overall, more men than women had no debt in both 2001 and 2002 and that more Asians and whites reported no debt at the time of degree than did African Americans, Hispanics and Native Americans. Additionally, a higher proportion of women (17.7 percent) than men (14.8 percent) had cumulative debt of \$35,000 and up in 2002. A higher proportion of underrepresented minorities had cumulative debt of \$35,000 and up in 2002 than did Asians and whites. Nearly a third (33.5 percent) of African Americans, 24.5 percent of Hispanics and 29.3 percent of Native Americans had cumulative debt of \$35,000 and up in 2002. This compares with 10.2 percent of Asians and 17.2 percent of whites as shown in the following table.

Debt Related to the Education of Doctorate Recipients by Demographic Group														
Cumulative Debt	Sex		Race/Ethnicity (U.S. citizens and permanent residents)											
	Male		Female		Asian		Black		Hispanic		Native Am.		White	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
2002														
No debt	9,798	50.4	7,747	48.4	1,110	55.3	429	26.6	412	31.5	37	26.4	9,012	44.0
\$5000 or less	1,410	7.3	1,017	6.4	138	6.9	99	6.1	113	8.6	15	10.7	1,354	6.6
\$5,0001-\$10,000	1,321	6.8	1,012	6.3	137	6.8	92	5.7	96	7.3	14	10.0	1,479	7.2
\$10,001-\$15,000	1,104	5.7	879	5.5	115	5.7	92	5.7	99	7.6	7	5.0	1,341	6.5
\$15,001-\$20,000	863	4.4	815	5.1	102	5.1	111	6.9	80	6.1	4	2.9	1,164	5.7
\$20,001-\$25,000	817	4.2	611	3.8	78	3.9	74	4.6	68	5.2	8	5.7	997	4.9
\$25,001-\$30,000	658	3.4	574	3.6	57	2.8	100	6.2	53	4.1	9	6.4	843	4.1
\$30,001-\$35,000	599	3.1	524	3.3	53	2.6	76	4.7	66	5.0	5	3.6	787	3.8
\$35,000 and up	2,869	14.8	2,829	17.7	219	10.9	540	33.5	320	24.5	41	29.3	3,528	17.2
Total	19,439	100.0	16,008	100.0	2,009	100.0	1,613	100.0	1,307	100.0	140	100.0	20,505	100.0
Mean	\$11,595		\$12,805		\$9,658		\$21,601		\$17,890		\$19,607		\$13,432	
2001														
No debt	10,348	50.2	7,857	48.7	1,149	55.9	453	28.2	391	32.5	54	35.3	9,637	44.2
\$5000 or less	1,716	8.3	1,192	7.4	138	6.7	128	8.0	97	8.1	10	6.5	1,647	7.6
\$5,0001-\$10,000	1,476	7.2	1,061	6.6	125	6.1	114	7.1	109	9.1	16	10.5	1,635	7.5
\$10,001-\$15,000	1,203	5.8	845	5.2	122	5.9	89	5.5	79	6.6	9	5.9	1,407	6.5
\$15,001-\$20,000	1,047	5.1	780	4.8	110	5.3	86	5.3	80	6.7	6	3.9	1,316	6.0
\$20,001-\$25,000	757	3.7	646	4.0	76	3.7	89	5.5	59	4.9	5	3.3	999	4.6
\$25,001-\$30,000	707	3.4	572	3.5	54	2.6	81	5.0	56	4.7	7	4.6	912	4.2
\$30,000 and up	3,376	16.4	3,188	19.8	283	13.8	569	35.4	332	27.6	46	30.1	4,242	19.5
Total	20,630	100.0	16,141	100.0	2,057	100.0	1,609	100.0	1,203	100.0	153	100.0	21,795	100.0

Source: CPST, data derived from NSF/NIH/USED/NEH/USDA/NASA Survey of Earned Doctorates

As shown in the table, the average cumulative debt in 2002 was highest for African Americans – \$21,601 – and lowest for Asians at \$9,658.

In conclusion, it appears that underrepresented minorities who earned their doctorates in science and engineering from 1997 to 2000 graduated with more debt than did whites and Asians. Additionally, there was a higher percentage of whites and Asians who graduated with no debt than there was of underrepresented minorities. This was true regardless of field.

In 2001 and 2002, there continued to be a higher proportion of Asian and white doctorates who graduated with no debt and a higher proportion of underrepresented minority doctorates who graduated with more than \$30,000 debt.