Update on the 2002–2003 U.S. Doctoral Recipients

Introduction

The Annual Survey of the Mathematical Sciences collects information each year about departments, faculties, and students in the mathematical sciences at four-year colleges and universities in the United States. Definitions of the various groups surveyed in the Annual Survey can be found on page 800 of this report.

This Second Report includes data from two parts of the 2003 Annual Survey. First, we update information about new doctoral recipients reported earlier in the February 2004 issue. Second, we present the starting salaries of the new doctoral recipients who responded to a follow-up survey.

The names of the 2002–2003 doctoral recipients and their thesis titles were published in "Doctoral Degrees Conferred" (*Notices of the AMS*, February 2004, pages 246–63). This list has been supplemented by twenty additional new doctorates. The supplemental listing appears at the end of this report on page 801.

Information about recipients of doctoral degrees awarded between July 1, 2002, and June 30, 2003, was collected from doctorate-granting departments beginning in late spring 2003 and from a follow-up census of individual degree recipients beginning in October. The "2003 Annual Survey First Report" (*Notices of the AMS*, February 2004, pages 218–33) presented survey results obtained about new doctoral recipients from the departments. Here we update information for new doctoral recipients using data gathered with a questionnaire, Employment Experiences of New Doctoral Recipients (EENDR). The EENDR was sent in early October 2003 to all new doctoral recipients whose address was known. When a new doctoral recipient did not respond or no address was known, information supplied by the department was used.

Updated Employment Status of 2002–2003 U.S. Doctoral Recipients

Table 1A shows the fall and final counts of doctoral recipients in the mathematical sciences awarded by U.S. institutions in each year from 1993 through 2003. Final counts include those new doctoral recipients reported from departments who missed the deadline for inclusion in the First Report. Numbers in this table have been revised from reports prior to 1998–1999 to exclude new doctorates data from Group Vb departments, which are no longer surveyed. Reversing the downward trend of the past four years, this year the total number of new doctoral recipients is 1,037, up from the previous year by 77; last year's number was the lowest since 1989–1990.

Table 1A: Annual U.S. Doctoral Recipients, Fall and Final Counts, 1993 to 2003

Year	Fall	Final
1993–1994	1025	1034
1994–1995	1148	1157
1995–1996	1098	1099
1996–1997	1123	1130
1997–1998	1163	1176
1998–1999	1133	1135
1999–2000	1119	1127
2000–2001	1008	1065
2001–2002	948	960
2002–2003	1017	1037

Table 1B shows trends in the number of new doctoral recipients for the past five years broken down by U.S. citizens and non-U.S. citizens. There was a drop of 98 new doctoral recipients from 1998–1999 to 2002–2003, mostly explained by a drop of 61 U.S. citizen new doctoral recipients. This year the number of new doctoral recipients who are U.S. citizens is 499, an increase of 71 over last year; last year's number of U.S. citizens was the lowest figure reported since 1989–1990. The all-time high number of non-U.S. citizen new doctoral recipients was 679 in 1992–1993.

Table 1B: Citizenship of Annual U.S. Doctoral Recipients, 1998 to 2003 Fall and Final Counts, 1992 to 2001

Year	U.S.	Non-U.S.	TOTAL
1998–1999	560	575	**1135**
1999–2000	566	561	**1127**
2000–2001	532	533	**1065**
2001–2002	428	532	**960**
2002–2003	499	538	**1037**

Table 1C gives a breakdown of the 1,037 doctoral degrees awarded in the mathematical sciences between July 1, 2002, and June 30, 2003, by type of degree-granting department.

Table 1C: 2002–2003 U.S. Doctoral Recipients by Type of Degree-Granting Department

	I (Pu)	I (Pr)	II	III	IV	Va
Number	258	154	171	122	241	91
Percent	25	15	16	12	23	9

Table 2A: 2002–2003 U.S. Doctoral Recipients: Field of Thesis by

TYPE OF EMPLOYER		FIELD OF THESIS												TOTAL
		Algebra Number Theory	Real, Comp., Funct., & Harmonic Analysis	Geometry/ Topology	Discr. Math./ Combin./ Logic/ Comp. Sci.	Probability	Statistics/ Biostat.	Applied Math.	Numerical Analysis/ Approxi-mations	Linear Nonlinear Optim./ Control	Differential, Integral, & Difference Equations	Math. Educ.	Other/ Unknown	
Group I (Public)		29	8	13	4	5	0	5	6	1	12	0	1	**84**
Group I (Private)		14	5	9	4	1	2	3	0	1	14	0	0	**53**
Group II		7	3	9	3	2	2	9	3	4	10	2	0	**54**
Group III		0	4	1	3	0	10	1	1	1	3	1	0	**25**
Group IV		0	0	1	0	2	36	0	0	0	0	0	0	**39**
Group Va		0	0	0	2	1	0	4	2	0	0	0	0	**9**
Master's		8	9	8	3	3	6	4	2	0	2	3	2	**50**
Bachelor's		30	11	16	8	1	7	6	7	4	13	5	0	**108**
Two-Year College		0	0	0	0	0	0	1	1	0	1	0	0	**3**
Other Academic Dept.		7	3	2	5	3	56	15	3	1	6	6	0	**107**
Research Institute/ Other Nonprofit		3	0	0	3	0	11	0	2	0	0	0	0	**19**
Government		6	0	1	2	2	11	3	4	0	3	0	0	**32**
Business and Industry		9	6	2	8	4	50	11	5	3	1	0	0	**99**
Non-U.S. Academic		22	5	10	8	0	14	6	14	2	15	1	0	**97**
Non-U.S. Nonacademic		2	1	1	0	0	4	1	2	0	2	0	0	**13**
Not Seeking Employment		1	1	0	0	0	5	0	2	0	1	0	0	**10**
Still Seeking Employment		8	1	3	2	0	8	7	4	3	6	0	0	**42**
Unknown (U.S.)		11	10	9	8	0	34	17	8	1	6	1	4	**109**
Unknown (non-U.S.)[1]		12	8	9	6	5	19	14	6	0	4	1	0	**84**
TOTAL		**169**	**75**	**94**	**69**	**29**	**275**	**107**	**72**	**21**	**99**	**20**	**7**	**1037**
Column Subtotals	Male	133	61	69	52	21	161	75	55	18	73	6	5	**729**
	Female	36	14	25	17	8	114	32	17	3	26	14	2	**308**

[1] Includes those whose status is reported as "unknown" or "still seeking employment".

Table 2B: 2002–2003 U.S. Doctoral Recipients: Type of Degree-Granting Department by Fall 2003 Employment Status, Updated April 2004

TYPE OF EMPLOYER		TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT						TOTAL	Row Subtotals	
		Group I (Public) Math.	Group I (Private) Math.	Group II Math.	Group III Math.	Group IV Statistics	Group Va Applied Math.		Male	Female
Group I (Public)		44	25	9	2	0	4	**84**	64	20
Group I (Private)		18	29	1	0	2	3	**53**	43	10
Group II		17	5	24	3	2	3	**54**	40	14
Group III		2	1	5	10	4	3	**25**	19	6
Group IV		1	2	1	0	35	0	**39**	20	19
Group Va		1	0	0	0	1	7	**9**	6	3
Master's		8	2	19	15	6	0	**50**	27	23
Bachelor's		20	11	45	19	7	6	**108**	73	35
Two-Year College		0	0	3	0	0	0	**3**	1	2
Other Academic Dept.		10	8	11	12	52	14	**107**	66	41
Research Institute/ Other Nonprofit		2	7	0	0	10	0	**19**	9	10
Government		5	2	8	2	8	7	**32**	19	13
Business and Industry		19	14	5	8	46	7	**99**	75	24
Non-U.S. Academic		33	21	11	14	13	5	**97**	76	21
Non-U.S. Nonacademic		2	2	3	2	2	2	**13**	12	1
Not Seeking Employment		2	0	2	2	4	0	**10**	7	3
Still Seeking Employment		7	8	8	11	4	4	**42**	27	15
Unknown (U.S.)		34	8	9	13	31	14	**109**	81	28
Unknown (non-U.S.)[1]		33	9	7	9	14	12	**84**	64	20
TOTAL		**258**	**154**	**171**	**122**	**241**	**91**	**1037**	**729**	**308**
Column Subtotals	Male	201	126	121	68	141	72	**729**		
	Female	57	28	50	54	100	19	**308**		

[1] Includes those whose status is reported as "unknown" or "still seeking employment".

Table 2C: 2002–2003 U.S. Doctoral Recipients: Field of Thesis by Type of Degree-Granting Department, Updated April 2004

TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT	FIELD OF THESIS												TOTAL
	Algebra Number Theory	Real, Comp., Funct., & Harmonic Analysis	Geometry/ Topology	Discr. Math./ Combin./ Logic/ Comp. Sci.	Probability	Statistics/ Biostat.	Applied Math.	Numerical Analysis/ Approxi-mations	Linear Nonlinear Optim./ Control	Differential, Integral, & Difference Equations	Math. Educ.	Other/ Unknown	
Group I (Public)	72	33	41	21	11	4	16	15	5	38	1	1	**258**
Group I (Private)	43	12	25	15	5	7	19	8	1	17	0	2	**154**
Group II	39	17	23	10	5	6	21	18	7	22	2	1	**171**
Group III	13	13	4	11	2	17	11	19	1	14	17	0	**122**
Group IV	0	0	0	0	4	232	2	0	0	0	0	3	**241**
Group Va	2	0	1	12	2	9	38	12	7	8	0	0	**91**
TOTAL	**169**	**75**	**94**	**69**	**29**	**275**	**107**	**72**	**21**	**99**	**20**	**7**	**1037**

Tables 2A, 2B, and 2C display updates of employment data, found in these same tables in the First Report, for the fall count of 2002–2003 doctoral recipients plus twenty additional doctoral recipients reported late. These tables are partitioned by field of thesis research, by the survey group of their degree department, and by type of employer. At the time of this Second Report, the fall 2003 employment status of 844 of the 1,037 doctoral recipients was known.

The fall 2003 unemployment rate for new doctoral recipients, based on information gathered by the time of the Second Report, was 5.0%. This is the highest unemployment rate since 1996, when it was 8.1%. Figure 1 presents the fall 1979 through fall 2003 trend in the final unemployment rate of new doctoral recipients. The counts on which these rates are determined do not include those new doctoral recipients whose fall employment status was unknown at the time of the Second Report. Although the number of recipients whose employment status was reported as unknown had been declining, from 150 in 1997 to a low of 94 in 2002, this year it spiked to a high of 193. For future reports, measures are being taken which should reduce the number of recipients whose employment status gets reported as unknown. Note that prior to 1999 the new doctoral recipients from Group Vb are included in the total unemployment rate for each year.

Of the 844 new doctoral recipients whose employment is known, 682 were employed in the U.S., 110 were employed outside the U.S., 42 were still seeking employment, and 10 were not seeking employment.

Figure 1: Percentage of New Doctoral Recipients Unemployed, As Reported in the Respective Annual Survey Second Reports, 1979 to 2003

Year	Percentage
1979	1.5
1980	0.9
1981	0.0
1982	1.8
1983	2.2
1984	2.1
1985	0.8
1986	2.3
1987	3.0
1988	1.4
1989	3.0
1990	2.2
1991	5.0
1992	6.7
1993	8.9
1994	10.7
1995	10.7
1996	8.1
1997	3.8
1998	4.9
1999	4.7
2000	3.3
2001	3.7
2002	2.9
2003	5.0

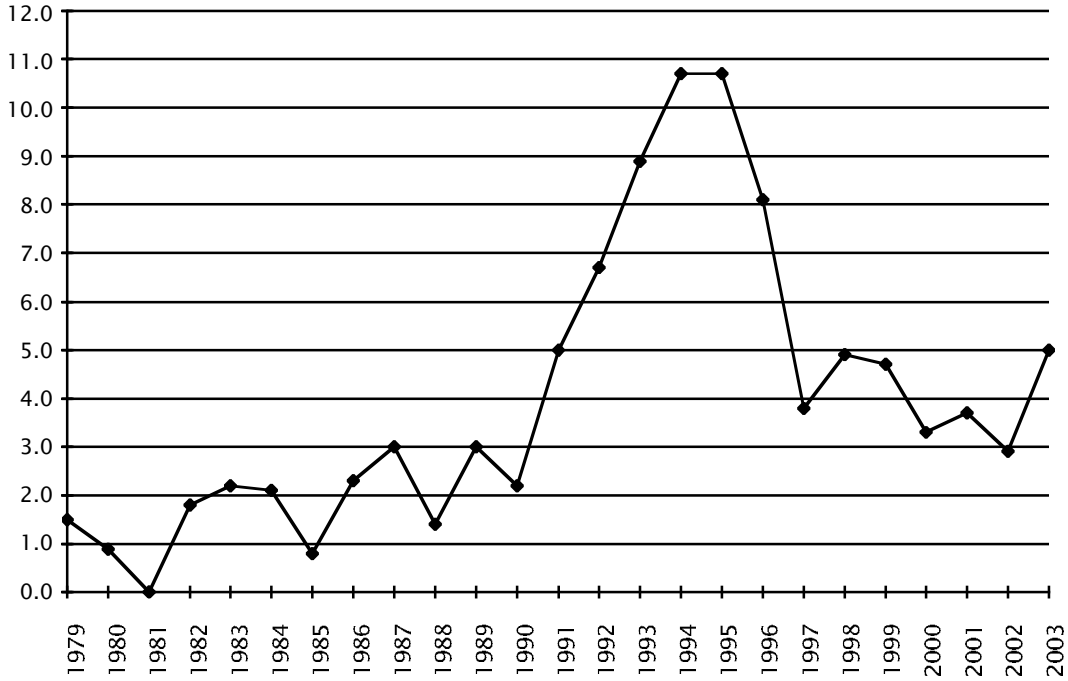

Table 2D: Percentage of Total Employed New Doctoral Recipients by Type of Employer, Fall 1999 to Fall 2003

%	U.S. Employed		Non-U.S. Employed		TOTAL NUMBER EMPLOYED
	Academic	Nonacademic	Academic	Nonacademic	
Fall 1999	64	23	11	2	**955**
Fall 2000	62	28	10	1	**957**
Fall 2001	63	27	9	2	**914**
Fall 2002	67	22	10	1	**829**
Fall 2003	70	17	12	2	**792**

Table 2D presents the trend in the percentage of employed new doctoral recipients by type of employer for the last five years. Academic employment includes those employed by research institutes and other nonprofits. The percentage of the total employed new doctoral recipients that are in U.S. academic positions is at a five-year high, while the percentage of the total employed in U.S. nonacademic positions is at a five-year low.

Among new doctoral recipients who are employed, the percentage taking nonacademic employment (U.S. government, U.S. business and industry, and non-U.S. nonacademic) varied significantly by field of thesis. For those whose field of thesis is in the first three columns in Table 2A, this percentage is the lowest, at 11% (up from 9%), while the percentage for those with theses in probability or statistics is the highest, at 30% (down from 39%).

Tables 3A through 3D first appeared in the First Report for 2000–2001, although they do not have the same table numbers in that report. They have all been updated with information obtained from the individual new doctoral recipients who responded to the follow-up questionnaire. The next few paragraphs discuss some of the information presented in these tables.

Table 3A: Number of New Doctoral Recipients Taking Positions in Business and Industry in the U.S. by Type of Degree-Granting Department, Fall 1999 to Fall 2003

Group	I (Pu)	I (Pr)	II	III	IV	Va	TOTAL
Fall 1999	32	24	28	21	66	14	**185**
Fall 2000	33	28	37	24	83	18	**223**
Fall 2001	28	15	27	26	75	23	**194**
Fall 2002	18	12	19	7	65	15	**136**
Fall 2003	19	14	5	8	46	7	**99**

Table 3A shows that the fall 2003 total number of doctoral recipients taking positions in business or industry is 99; this number reflects a continued decline, and a 56% decrease since fall 2000's high of 223. While some groups have shown a slight increase, Groups II and IV show the largest decreases over last year.

Table 3B: Number of New Doctoral Recipients Taking U.S. Academic Positions by Type of Degree-Granting Department, Fall 1999 to Fall 2003

Group	I (Pu)	I (Pr)	II	III	IV	Va	TOTAL
Fall 1999	166	91	146	82	86	39	**610**
Fall 2000	144	82	126	79	131	28	**590**
Fall 2001	159	71	126	80	108	30	**574**
Fall 2002	133	86	107	91	102	34	**553**
Fall 2003	123	90	118	61	119	40	**551**

Table 3C shows that the number of new doctoral recipients taking U.S. academic positions has continued to decline over each of the past five years, from 610 in 1999 to 551 in 2003. The number hired by Groups M and B has dropped each of the years 1999–2002, but is slightly up this year; there has been a 18% decrease from fall 1999 to fall 2003. This decline may reflect more hiring at these institutions of individuals completing a postdoctoral appointment.

Table 3C: Number of New Doctoral Recipients Taking U.S. Academic Positions by Type of Hiring Department, Fall 1999 to Fall 2003

Group	I–III	IV	Va	M&B	Other	TOTAL
Fall 1999	233	47	19	193	118	**610**
Fall 2000	216	51	11	180	132	**590**
Fall 2001	214	49	11	178	122	**574**
Fall 2002	222	45	10	148	128	**553**
Fall 2003	216	39	9	158	129	**551**

Table 3D gives information about the production and hiring of female new doctoral recipients in the doctoral-granting departments of this survey. From Table 3D we see that the percentage of females hired ranges from a high of 49% in Group IV to a low of 19% in Group I (private).

Table 3D: Females as a Percentage of 2002–2003 U.S. Doctoral Recipients Produced by and Hired by Doctoral-Granting Groups, Fall 2003

%	I (Pu)	I (Pr)	II	III	IV	Va	TOTAL
Produced	22	18	29	44	41	21	**30**
Hired	24	19	26	24	49	33	**27**

Updated Information about 2002–2003 U.S. Doctoral Recipients by Sex and Citizenship

Tables 3E and 3F show the sex and citizenship of the 1,037 new doctoral recipients and the fact that 682 new doctoral recipients found jobs in the U.S. this year. This is 86% of the 792 new doctoral recipients known to have jobs in fall 2003. Last year this percentage was 88%.

Table 3E: 2002–2003 Male U.S. Doctoral Recipients: Type of Citizenship by Fall 2003 Employment Status

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL MALE DOCTORAL RECIPIENTS
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	255	16	173	18	**462**
U.S. Academic	205	14	137	12	**368**
Groups I, II, III, and Va	92	4	68	8	**172**
Group IV	12	1	7	0	**20**
Non-Ph.D. Department	99	9	55	4	**167**
Research Institute/Other Nonprofit	2	0	7	0	**9**
U.S. Nonacademic	50	2	36	6	**94**
Non-U.S. Employer	11	0	75	2	**88**
Non-U.S. Academic	9	0	66	1	**76**
Non-U.S. Nonacademic	2	0	9	1	**12**
Not Seeking Employment	6	0	1	0	**7**
Still Seeking Employment	13	2	12	0	**27**
Subtotal	285	18	261	20	**584**
Unknown (U.S.)	55	6	18	2	**81**
Unknown (non-U.S.)[1]	1	0	50	13	**64**
TOTAL	**341**	**24**	**329**	**35**	**729**

[1] Includes those whose status is reported as "unknown" or "still seeking employment".

Table 3F: 2002–2003 Female U.S. Doctoral Recipients: Type of Citizenship by Fall 2003 Employment Status

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL FEMALE DOCTORAL RECIPIENTS
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	130	16	66	8	**220**
U.S. Academic	107	12	57	7	**183**
Groups I, II, III, and Va	23	3	24	3	**53**
Group IV	10	1	7	1	**19**
Non-Ph.D. Department	68	7	24	2	**101**
Research Institute/Other Nonprofit	6	1	2	1	**10**
U.S. Nonacademic	23	4	9	1	**37**
Non-U.S. Employer	3	1	18	0	**22**
Non-U.S. Academic	3	1	17	0	**21**
Non-U.S. Nonacademic	0	0	1	0	**1**
Not Seeking Employment	2	0	1	0	**3**
Still Seeking Employment	9	4	2	0	**15**
Subtotal	144	21	87	8	**260**
Unknown (U.S.)	14	5	7	2	**28**
Unknown (non-U.S.)[1]	0	0	15	5	**20**
TOTAL	**158**	**26**	**109**	**15**	**308**

[1] Includes those whose status is reported as "unknown" or "still seeking employment".

Sex and citizenship is known for all of the 1,037 new doctoral recipients. The final count of new doctoral recipients who are U.S. citizens is 499 (48%). For the last five years this figure has remained very close to 50%, the largest percentage reported by the Annual Survey since the mid-1980s. Pages 224–6 of the First Report presents further information related to the citizenship of the 2002–2003 new doctoral recipients.

Of the 499 U.S. citizen new doctoral recipients reported for 2002–2003, 158 are female and 341 are male. While females accounted for 32% of the U.S. citizen total, both figures represent an increase over last year's counts of 130 and 298, respectively.

Table 3G shows that U.S. academic doctoral departments, Groups I through Va, hired 52% U.S. citizens, while groups M, B, and all other academic departments hired 61% U.S. citizens. U.S. citizens represented 56% of those hired into nonacademic positions. Among the 682 new 2002–2003 doctoral recipients employed in the U.S., 19% took nonacademic employment (government or business and industry.) This percentage is down from 24% in 2001–2002 and from 30% in 2000–2001.

New Information from the EENDR Survey

Of the 1,017 new doctoral recipients reported in the First Report, the 910 whose addresses were known were sent the Employment Experiences of New Doctoral Recipients (EENDR) survey in October 2003, and 551 (54%) responded. The response rates varied considerably among the various subgroups of new doctoral recipients defined by their employment status as reported by departments. Among those who were employed, the highest response rate, 74%, was from those in academia in the U.S., while the lowest, 57%, was from those in U.S. nonacademic.

The EENDR gathered details on employment experiences not available through departments. The rest of this section presents additional information available on this subset of the 2002–2003 doctoral recipients.

Table 4A: Number (and Percentage) of Annual EENDR Respondents Taking U.S. Positions by Job Status, Fall 1999 to Fall 2003

U.S. Employed	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
TOTAL	**512**	**536**	**473**	**510**	**469**
Permanent	273 (53)	317 (59)	266 (56)	264 (52)	253 (54)
Temporary	237 (46)	218 (41)	205 (43)	245 (48)	216 (46)
Perm not avail.	101 (43)	92 (42)	107 (52)	90 (37)	87 (40)
Postdoctorate	155 (65)	157 (72)	143 (70)	203 (83)	164 (76)
Perm not avail.	58 (37)	55 (35)	42 (29)	69 (34)	53 (32)
Unknown	2	1	2	1	0

Table 4B: Percentage of Annual EENDR Respondents Taking U.S. Positions by Employment Sector within Job Status, Fall 1999 to Fall 2003

U.S. Employed	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
Permanent					
Academia	59	59	62	70	76
Government	4	4	6	6	4
Business/Ind.	37	36	32	23	20
Temporary					
Academia	94	95	95	93	94
Government	5	2	4	6	3
Business/Ind.	0	2	0	1	3

Table 3G: Number of 2002–2003 New Doctoral Recipients Employed in the U.S. by Citizenship and Type of Employer

	CITIZENSHIP		
U.S. EMPLOYER	U.S.	Non-U.S.	TOTAL
Academic, Groups I–Va	137	127	**264**
Academic, Other	175	112	**287**
Nonacademic	73	58	**131**
TOTAL	**385**	**297**	**682**

Table 4A provides the trend in EENDR respondents taking permanent and temporary positions in the U.S for fall 1999 through fall 2003. This year we see that among the 469 employed in the U.S., 253 reported obtaining a permanent position and 216 a temporary position. Of the 216 in temporary positions, 87 (40%) reported taking temporary employment because a suitable permanent position was not available and 164 (76%) classified their position as postdoctoral. Furthermore, among those in postdoctoral positions, 32% responded that they took the position because a suitable permanent position was not available. Of particular note in Table 4A is that after showing a 13% increase last year, this year there is a decline in the percentage of temporarily employed respondents who reported taking a postdoctoral position; last year the percentage of temporarily employed respondents who were hired in postdoctoral positions was 83%, and this year it was 76%. The figures reported in this table for fall 2001 and fall 2002 have been corrected, as they were incorrectly reported on page 807 of the "2002 Annual Survey of the Mathematical Sciences Second Report" (*Notices of the AMS*, August 2003).

Table 4B shows the employment trends of permanent and temporary positions broken down by sector for the last five years. There has been a continuing increase in the proportion of EENDR respondents taking permanent employment in academia and an offsetting decline in the proportion taking permanent positions in business and industry.

Among the 253 who reported obtaining a permanent position in the U.S. in fall 2003, 76% were employed in academia (including 3% in research institutes and other nonprofits), 4% in government, and 20% in business or industry. Women held 37% of the permanent positions.

Among the 216 individuals with temporary employment in the U.S. this year, 94% were employed in academia (including 5% in research institutes and other nonprofits), 3% in government, and 3% in business or industry.

Figure 2: Age Distribution of 2002–2003 EENDR Respondents

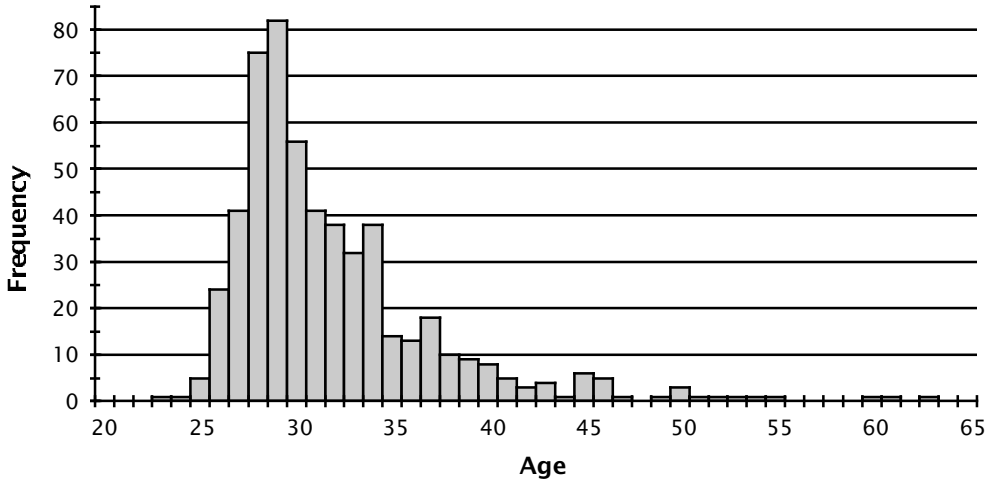

Figure 2 gives the age distribution of the 551 new doctoral recipients who responded to this question. The median age of new doctoral recipients was 30 years, while the mean age was 32 years. The first and third quartiles were 28 and 34 years, respectively. These figures are the same as those reported last year and very similar to those reported in previous years.

Previous Annual Survey Reports

The 2003 First Annual Survey Report was published in the *Notices of the AMS* in the February 2004 issue. For the last full year of reports, the 2002 First, Second, and Third Annual Survey Reports were published in the *Notices of the AMS* in the February, August, and September 2003 issues respectively. These reports and earlier reports, as well as a wealth of other information from these surveys, are available on the AMS website at `www.ams.org/employment/surveyreports.html`.