

# Statistics on Women in Mathematics

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## Introduction

Data on women in mathematical research in Europe was last collected in 1993 by the Women in Mathematics Committee of the European Mathematical Society. This illustrated a perhaps surprising distribution of the proportions of women in mathematical research across the EU, with considerable differences between different regions. In particular, 'southern' countries, such as Italy, Portugal and Spain, had a much higher proportion of women in mathematics than 'northern' countries such as Germany and Sweden.

In 2005, funding from the UK Royal Society Athena Awards enabled us to repeat this data collection exercise. We used a variety of sources for data collection, includ-

ing European Women in Mathematics regional co-ordinators, national statistics agencies and the internet. Our aim was to collect data to compare with the 1993 study, but we also collected further data from countries not included in the original study and tried to obtain more detailed information about career grading than had been possible in 1993. In fact it is hard to obtain truly comparative data since countries in Europe often have very different academic career grades and also the distinction between research mathematics, educational mathematics and research in related areas such as physics and statistics makes it hard to distinguish just the women in mathematics research. However, we have made as good an attempt as possible and present our data and analysis here.

Table 1: Comparative data, 1993 and 2005

Country	1993 data						2005 data					
	Mathematicians			Full Professors			Mathematicians			Full Professors		
	Total	F	% F	Total	F	% F	Total	F	% F	Total	F	% F
<b>North</b>												
Denmark	121	4	3.3%	19	1	5.3%	237	23	9.7%	53	2	3.8%
Finland	127	3	2.4%	34	1	2.9%	440	64	14.5%	71	2	2.8%
Iceland	10	0	0.0%	4	0	0.0%	13	0	0.0%	7	0	0.0%
Norway	103	9	8.7%	45	3	6.7%	134	16	11.9%	53	2	3.8%
Sweden	150	7	4.7%	21	0	0.0%	637	79	12.4%	166	7	4.2%
<b>West</b>												
Austria	762	54	7.1%	79	0	0.0%	228	21	9.2%	32	1	3.1%
Belgium	219	30	13.7%	134	8	6.0%	337	84	24.9%	38	3	7.9%
France			20-25%			8.0%	3740	860	23.0%	1168	120	10.3%
Germany[1]	1500	40	2.7%	490	4	0.8%	4116	600	14.6%	1388	95	6.8%
Ireland	135	7	5.2%	9	0	0.0%	173	18	10.4%	45	0	0.0%
Netherlands	437	19	4.3%	88	1	1.1%	458	45	9.8%	120	3	2.5%
Switzerland	141	3	2.1%	91	0	0.0%	119	8	6.7%	97	3	3.1%
UK[2]	1379	97	7.0%	267	3	1.1%	2909	519.7	17.9%	561.2	15.8	2.8%
<b>East</b>												
Czech Rep[3]	500	60	12.0%	65	2	3.1%	1013	267	26.4%	138	3	2.2%
Estonia	109	32	29.4%	8	0	0.0%	250	88	35.2%	19	2	10.5%
<b>South</b>												
Italy	1727	609	35.3%	646	84	13.0%	2476	867	35.0%	823	124	15.1%
Portugal			40-45%			5%	906	431	47.6%	84	27	32.1%
Spain	1075	168	15.6%	279	12	4.3%	1331	358	26.3%	139	18	12.9%

## Data

Table 1 shows the comparison between 1993 data and 2005 data, divided into four regions of Europe. The 1993 data included only the distinction between mathematicians (which we took to include researchers, lecturers and senior lecturers, but not PhD students) and full professors (which we took as the most senior career grade in any academic system – in some countries most academics are called professors and we counted only the most senior in this category). Note that UK data, which is collected by a government agency (the Higher Education Statistics Authority), counts part-time staff as fractional appointments, hence the UK data is sometimes not a whole number.

Table 2 shows the fuller data we were able to collect in 2005, which included more countries and a more complete breakdown of different categories of staff. Note that the total number of mathematicians does not include Ph.D. students. We included professors, senior research staff and Heads of Department in the category

'Professor', senior lecturers, principal lectures, senior researchers and associate professors in the category 'Senior Lecturer' and lecturers and research staff in the category 'Lecturer'. We used this particular breakdown as it closely reflects the categories used in the UK, where we are based. The data is sorted from largest percentage of women mathematicians to least.

Table 3 shows some additional data we were able to collect showing the numbers of women in mathematical research in some non-European countries. The career categories are as described above.

## Analysis

It is clear from the comparative data that in almost all countries the proportion of women in mathematical research has increased in the 12 years between the surveys, in many cases dramatically. Some of this increase can be explained geographically: for example, the figures for Germany in 1993 only included former West Germany. With

Table 2: 2005 data, ordered by decreasing percentage of women mathematicians

Country	Mathematicians			Professors			Senior Lecturers			Lecturers		
	T	F	%F	T	F	%F	T	F	%F	T	F	%F
Portugal	906	431	47.6%	84	27	32.1%	231	106	45.9%	591	298	50.4%
Estonia	250	88	35.2%	19	2	10.5%	76	27	35.3%	155	59	38.1%
Malta	28	9	32.1%	3	0	0.0%	5	1	20.0%	20	8	40.0%
Italy	2476	867	35.0%	823	124	15.1%	895	361	40.3%	758	382	50.4%
Spain	1331	358	26.9%	139	18	12.9%	586	152	25.9%	606	188	31.0%
Czech Rep	1013	267	26.4%	138	3	2.2%	244	29	11.9%	631	235	37.2%
Belgium	337	84	24.9%	38	3	7.9%	108	21	19.4%	191	60	31.4%
France	3740	860	23.0%	1168	120	10.3%	2230	685	30.7%	342	55	16.1%
UK	2909	519.7	17.9%	561.2	15.8	2.8%	644.1	81.2	12.6%	1703.7	422.7	24.8%
Lithuania	321	56	17.4%	56	1	1.8%	135	26	19.3%	130	29	22.3%
Germany	4116	600	14.6%	1388	95	6.8%	434	57	13.1%	2294	448	19.5%
Finland	440	64	14.5%	71	2	2.8%	69	7	10.1%	300	55	18.3%
Azerbaijan	1449	194	13.4%	224	11	4.9%	0	0	0.0%	1225	183	14.9%
Sweden	637	79	12.4%	166	7	4.2%	311	40	12.9%	160	32	20.0%
Norway	134	16	11.9%	53	2	3.8%	49	6	12.2%	32	8	25.0%
Ireland	173	18	10.4%	45	0	0.0%	34	7	20.6%	94	11	11.7%
Netherlands	458	45	9.8%	120	3	2.5%	136	10	7.4%	202	32	15.8%
Denmark	237	23	9.7%	53	2	3.8%	128	10	7.7%	56	11	19.6%
Austria	228	21	9.2%	32	1	3.1%	104	3	2.9%	92	17	18.5%
Switzerland	119	8	6.7%	97	3	3.1%	7	1	14.3%	15	4	26.7%
Iceland	13	0	0.0%	7	0	0.0%	3	0	0.0%	3	0	0.0%

<sup>1</sup> Data was just for former West Germany in 1993 but for unified Germany in 2005.

<sup>2</sup> Figures obtained from the UK Higher Education Statistics Agency.

<sup>3</sup> Data was for Czechoslovakia in 1993.

Country	Mathematicians			Professors			Senior Lecturers			Lecturers		
	T	F	%F	T	F	%F	T	F	%F	T	F	%F
Canada	2077	290	14.0%	670	59	8.8%	447	53	11.9%	960	178	18.5%
New Zealand	179	27	15.1%	57	3	5.3%	61	9	14.8%	61	15	24.6%
Australia	1006	170	16.9%	418	15	3.6%	227	52	22.9%	361	103	28.5%
South Africa	264	56	21.2%	59	4	6.8%	87	12	13.8%	118	40	33.9%
Japan	494	13	2.6%	193	3	1.6%						

the unification of Germany, many more women mathematicians from former East Germany are now included in the data. Other increases can be explained by changes in the counting system. For example, in the UK the 1993 data did not include mathematicians working at the former polytechnics, which all became universities in 1992/93. There also appear to be some anomalous figures, such as the very large number of mathematicians recorded in Austria in 1993. Since we did not collect the 1993 data we cannot vouch for its accuracy or be sure that the same concept of a 'mathematician' was applied across all countries.

Even so, we observe that in many European countries the numbers of women in mathematics has doubled or even trebled, particularly where the percentage in 1993 was very low. In the countries where women were already well-represented the increase has been much less significant. This may suggest a drift towards a mean of around 40-50% representation of women in mathematics.

The data broken down by region shows that there are distinct profiles of the proportion of women in mathematics in different parts of Europe. There seems to be a clear difference between 'western/northern European' systems and 'southern/eastern' regions. The data for non-European countries is in some sense consistent with this as one could regard the academic systems and cultures of countries such as Canada, Australia and New Zealand to be more closely related to western European culture than to southern/eastern Europe.

## Conclusions

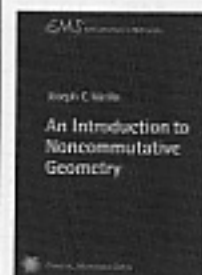
The data presents a positive trend – the proportion of women in mathematical research is increasing. However, the regional differences show that in many countries there is a long way to go, particularly those in northern and western Europe.



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