

WOMEN MATHEMATICIANS IN PORTUGAL: A PORTRAIT

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Abstract: In this article we describe the gender balance in the portuguese mathematical scientific community (with 2016 data).

keywords: data concerning Portuguese women mathematicians; gender equality.

1 Foreword

The present article is a translation of an article to appear in Boletim da Sociedade Matemática Portuguesa. The complete reference for the original article is:

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2 Introduction

In recent times special attention has been paid to the relative distribution between men and women in research and university teaching in several fields of science.

Several european organizations looked at this and many scientific societies have departments or committees dedicated to this theme. In what concerns mathematics see for instance the webpages of the London Mathematical Society ([1], [2]), of the Unione Matematica Italiana ([3]) and of the

European Mathematical Society ([4]). Recently the International Council for Science created a page dedicated to gender equality in science including in particular mathematics ([5]).

Looking at international statistics (e.g. [6]) one sees that in Portugal the percentage of women in research and development is higher than in many other developed countries and that in the “global gender report” the ranking of Portugal is also much higher. In the case of mathematics the same is true.

Maybe because of that in Portugal the issue of gender in mathematics has been generally ignored. It was revived in one thematic session of the National Meeting of the Portuguese Mathematical Society 2016 (<http://enspm16.spm.pt/pt/tematicas>), titled “Situação das Mulheres Matemáticas (e não só) em Portugal” organized by Catarina Lucas and Luísa Castro Guedes.

In the present text we aim to describe the gender balance in the portuguese mathematical community. We focus on the public universities and scientific activity, and we look at indicators like the presence of women in the several levels of university careers, in scientific and organizing committees of conferences, as plenary speakers of conferences, in directing boards of scientific bodies and as editors of journals.

Our access to data was limited and the information we gathered is not complete or exhaustive. Our aim is not closing the discussion about women in mathematics in Portugal. On the contrary, we hope that this text will arise sufficient interest so that others with more access to information or more able can characterize better the reality. If the reality reported here falls short of what might be desired, we hope it can be changed with effective measures in the near future.

3 European context

According to Hobbs and Koomen [7], the evolution of the number of women mathematicians in Europe between 1993 and 2005 has been very positive. In this respect, Portugal stands out presenting not only the highest percentage of women mathematicians between 1993 and 2005 but also the highest percentage of women mathematicians at the top career level in 2005.

Table 1 presents the numbers for Portugal (in first place in Europe in 1993 and 2005). The information for 1993 and 2005 was obtained in [7] and for 2016 was gathered by us using the correspondence Professor=Professor Catedrático, Senior Lecturer=Professor Associado e Lecturer=Professor Auxiliar. Let us point out that in 2005 the second place in Table 2 of

[7] belongs to Estonia with 35,2% women mathematicians, 10,5% of Professors, 35,3% of Senior Lecturers and 38,1% of Lecturers. These numbers are well below the portuguese ones. In 2005 the second european country in terms of women mathematicians at the top career level is Italy with 15,1% of Professors. Only Spain and France present percentages of women Professors above 10%.The gap below Portugal and Europe decreases in lower levels of the university careers. In Italy the percentages 40,3% of Senior Lecturers and 50,4% of Lecturers are similar to the percentages in Portugal in 2005.

Ano	% Women Mathematician	% Full Professor	% Senior Lecturer	% Lecturer
2016	47,2	32,7	36,1	51,7
2005	47,6	32,1	45,9	50,4
1993	40-45	5		

Table 1: Percentage of women mathematicians in Portugal in 1993, 2005 e 2016. The 1993 data are incomplete relative to the other data. 1993 e 2005 data are taken from Hobbs e Koomen [7], whilst 2016 data was gathered by us using on-line information from : Universidade do Porto (Faculdades de Ciências, de Economia e de Engenharia), Universidade de Lisboa (Instituto Superior de Economia e Gestão, Instituto Superior Técnico, Faculdade de Ciências) and Faculdades de Ciências e Tecnologia das Universidades de Aveiro, da Beira Interior, de Coimbra, do Minho, Nova de Lisboa e de Trás-os-Montes e Alto Douro.

The positioning of Portugal relatively to Europe is remarkable both in 1993 and 2005. However we point out a stagnation in the numbers between 2005 and 2016. These invert the previous trend particularly concerning the presence of women in the top career level.

We did not find european data on other indicators, like for instance participation of women in editorial boards of journals and direction boards of scientific organizations. However, Topaz and Sen [8] study the participation of women in editorial boards of mathematical scientific journals worldwide and in 13067 editors, remark that only 8,9% are women. In a text directed to american mathematicians, Martin [9] studies the presence of women mathematicians in conferences and remarks that in the International Congress

of Mathematicians 2014 there were 20 plenary talks with only one (5%) given by a woman and that out of 237 plenary and invited speakers only 35 were women (14,8%). According to this author both percentages are below the percentages of Ph.D awarded to women in the USA. In Europe, we gathered data, reproduced in Table 2, relative to the European Congress of Mathematics (ECM) of the European Mathematical Society (EMS).

Speakers	Plenary			Invited		
	YEAR	Men	Women	% W	Men	Women
2016	7	3	30,0	25	6	19,4
2012	9	1	10,0	30	3	9,1
2008	8	2	20,0	30	5	14,3
2004	6	1	14,3	26	4	13,3
2000	8	1	11,1			

Table 2: Men and women plenary and invited speakers of ECM from 2000 to 2016. We could not find data relative to invited speakers in 2000.

4 The portuguese case

In this section we describe the situation of women mathematicians in Portugal using the data we could gather without too much effort.

As one can see in Table 3, the number of Ph. D. awarded in Portugal each year was, at least till 2009, balanced in gender terms. This shows that the situation of women mathematicians in Portugal is very different from the situation in many other countries where the debate is still focused on how to attract women for graduate study in maths.

year	Men	Women	%Women
2009	26	31	54.4
2008	32	19	37.3
2007	26	28	51.9
2006	35	36	50.7
2005	15	32	68.1
2004	16	30	65.2
2003	22	20	47.6
2002	15	15	50.0
2001	11	11	50.0
2000	17	18	51.4
1999	4	10	71.4
1998	7	8	53.3
1997	7	6	46.2
1996	7	5	41.7
total	240	269	52.8

Table 3: Number of Ph.D. in Maths awarded in Portugal by gender. Source: GPEARI — MCTES 14/12/2011 in dados.gov.pt

What happens in Portugal after the Ph.D. can be partly understood in Table 4, where we present the data relative to the faculties that on an aggregate basis appear in Table 1. The data were taken from the institutions webpages in July 2016. This is not an exhaustive survey of all higher education portuguese institutions because it was not possible to find this type of data in some of them. We believe, however, that this sample reflects the reality.

We observe, with 3 exceptions¹, a decrease in the percentage of women from Professor Auxiliar to Professor Associado. In the transition between Professor Associado e Catedrático there is an increase in 6 institutions and a much higher decrease in the other 6 institutions. In fact, as it can be seen in Table 1, there is a decrease of percentage of women mathematicians in the transition to higher career levels.

¹The exceptions are the Universidade de Aveiro, the Universidade da Beira Interior and the Faculdade de Economia da Universidade do Porto.

Institution	Career level	Men	Women	% Women
UNIVERSIDADE DE AVEIRO				
	Prof. Auxiliar	19	22	53,7
	Prof. Associado	2	3	60,0
	Prof. Catedrático	6	0	0,0
UNIV. DA BEIRA INTERIOR				
	Prof. Auxiliar	22	12	35,3
	Prof. Associado	1	1	50,0
	Prof. Catedrático	0	1	100,0
UNIVERSIDADE DE COIMBRA				
	Prof. Auxiliar	23	19	45,2
	Prof. Associado	8	5	38,5
	Prof. Catedrático	4	6	60,0
UNIVERSIDADE DE LISBOA				
ISEG	Prof. Auxiliar	9	11	55,0
	Prof. Associado	4	0	0,0
	Prof. Catedrático	2	4	66,7
IST	Prof. Auxiliar	39	23	37,1
	Prof. Associado	17	5	22,7
	Prof. Catedrático	10	3	23,1
Fac.Ciências	Prof. Auxiliar	9	15	62,5
	Prof. Associado	7	4	36,4
	Prof. Catedrático	5	2	28,6
UNIVERSIDADE DO MINHO				
	Prof. Auxiliar	16	29	64,4
	Prof. Associado	7	6	46,2
	Prof. Catedrático	1	1	50,0
UNIV. NOVA DE LISBOA				
	Prof. Auxiliar	33	34	50,7
	Prof. Associado	7	2	22,2
	Prof. Catedrático	2	1	33,3
UNIVERSIDADE DO PORTO				
Fac. Ciências	Prof. Auxiliar	12	14	53,8
	Prof. Associado	6	4	40,0
	Prof. Catedrático	5	0	0,0
Fac. Economia	Prof. Auxiliar	10	7	41,2
	Prof. Associado	1	2	66,7
	Prof. Catedrático	0	1	100,0
Fac. Engenharia	Prof. Auxiliar	6	11	64,7
	Prof. Associado	1	1	50,0
	Prof. Catedrático	2	1	33,3
UNIV. DE TRÁS-OS-MONTES E ALTO DOURO				
	Prof. Auxiliar	9	22	71,0
	Prof. Associado	1	2	66,7
	Prof. Catedrático	0	0	0,0

Table 4: Percentage of women mathematicians in 2016. The data was gathered by us using the information on the webpages of each institution. Professor Auxiliar is the starting level of the career (equivalent to Lecturer in Great Britain), Professor Associado is the second level (equivalent to Reader in Great Britain), whilst Professor Catedrático is Full Professor, the top of the career.

Between July 2016 and June 2017, we gathered other indicators for Portugal., which are presented in Tables 5 – 11.

Table 5 shows a complete absence of women mathematicians from the presidency of the Centro Internacional de Matemática (CIM) since 2000, as well as the complete absence of women mathematicians from the directive boards in 1996-2004 and 2011-15.

In Table 6 we present the data of the Scientific Council of CIM since 1996. We separate in the counting portuguese nationals working in institutions in Portugal from the portuguese nationals working in institutions abroad (these very often belong to the Scientific Council).

Direction	President		Treasurer		Other members	
	Men	Women	Men	Women	Men	Women
2016-19	1	0	0	1	3	0
2011-15	1	0	1	0	4	0
2008-11	1	0	0	1	2	1
2004-08	1	0	1	0	1	2
2000-04	1	0	1	0	3	0
1996-2000	1	0	1	0	2	0

Table 5: Men and women in the directive board of CIM desde 1996. We note the complete absence of women in 2011-15 and in the two older terms.

Scientific Council	Men (all)	Women (all)	% W (all)	Men (nat.)	Women (nat.)	% W (nat.)
2011-14	9	2	18,2	5	1	16,7
2009-11	10	2	16,7	6	1	14,3
2005-08	13	2	13,3	8	1	11,1
2000-04	16	1	5,9	10	1	9,1
1996-2000	13	3	18,8	7	3	30,0

Table 6: Women and men in CIM's scientific council from 1996 to 2014. We make a separate count of the members belonging to portuguese institutions (last three columns). With the exception of the 1996 scientific council, in each term only one woman belonging to portuguese institutions appears.

In Table 7 we present the scientific and organizing committees of the National Meetings of the Portuguese Mathematical Society (Sociedade Portuguesa de Matemática - SPM). The number of women in the scientific committee is scarce, contrasting with the big number of women in the organizing committee. Even if the number of plenary scientific sessions is very small, we remark that in none of the meeting women outnumbered men in plenary sessions and in two of the four meetings for which we have data no woman gave a plenary talk.

Year	Scientific Committee		Organizing Committee		Scientific Plenary talks	
	Men	Women	Men	Women	Men	Women
2016	5	1	0	8	2	1
2014	6	0	2	6	3	0
2012	6	1	2	6	2	1
2010	5	0	2	5	3	0

Table 7: Women and men in the organization of the National Meetings of SPM from 2010 to 2016. In 2012, the only woman in the Scientific Committee was explicitly dedicated to education.

In what concerns women mathematicians (we count only those based in Portugal) in the editorial board of *Portugaliae Mathematica*², their presence has been diminishing throughout the years (see Tables 8 e 9), and it is altogether missing from 2008 on. This absence is very striking among the executive editors³ whom traditionally are all based in Portugal.

²*Portugaliae Mathematica*, now published by EMS, is a peer-reviewed journal of the Portuguese Mathematical Society

³We note during the revision of this article (July 2018) the appearance women as two of the five Executive Editors.

	Executive editors		Associate editors	
Year	Men	Women	Men	Women
2017	5	0	2	0
2016	5	0	2	0
2015	5	0	4	0
2014	5	0	4	0
2013	5	0	4	0
2012	5	0	4	0
2011	4	0	3	0
2010	4	0	3	0
2009	4	0	3	0
2008	4	0	3	0

Table 8: Men and women in the editorial board of Portugaliae Mathematica since it started being published by EMS and till 2017. We consider only editors based in Portugal.

	Executive editors		Associate editors	
Year	Men	Women	Men	Women
2007	6	0	6	1
2006	6	0	7	1
2005	6	0	7	1
2004	6	0	8	1
2003	5	0	8	1
2002	6	0	9	2
2001	6	0	13	4
2000	6	0	13	4
1999	5	0	14	4
1998	5	0	13	4
1997	6	0	13	4
1996	6	0	13	4

Table 9: Women and men in the editorial board of Portugaliae Mathematica before it was published by EMS. We consider only editors based in Portugal.

The Portuguese Mathematical Society (SPM) had a woman as its pres-

ident between 2000 and 2004, and also a woman vice-president in 2010, as it can be seen in Table 10. More recently, the trend is similar to the one presented in Tables 8 e 9 relative to *Portugaliae Mathematica*, with a total absence of women as presidents and a decrease of women as members of the directing board. The treasurer post seems to be more frequently given to a woman mathematician.

Direction	President		Vice-President		Treasurer		Member	
	M	W	M	W	M	W	M	W
2016	1	0	2	0	0	1	3 (1)	4 (2)
2014	1	0	2	0	0	1	3 (2)	3 (1)
2012	1	0	2	0	0	1	2	3 (2)
2010	1	0	1	1	0	1	2	3
2008	1	0	2	0	1	0	1	4 (2)
2006	1	0	2	0	1	0	1	4 (2)
2004	1	0	1	0	0	1 (0)	0	2
2002	0	1	1	0	0	1	1	1
2000	0	1	1	0	0	1	1	0
1998	1	0	1	0	0	1	1	1

Table 10: Men and women in the directing board of SPM from 1998 to 2016. In this period, there were only women president/vice-president in the terms of office starting in 2000, 2002 and 2010. Before there was only a woman president in the term of office starting in 1994. In the last three columns in parenthesis we indicate the number of women in university or research. The other women are high-school teachers.

Table 11 shows the numbers and percentages relative to applications for funding of research projects of the *Fundação para a Ciência e a Tecnologia* (FCT). Here the percentages are nearer the ones in Table 1, being even more favourable towards women mathematicians in 2012 and 2013. We want to point out that according to recent statistics of a governmental body (*Direção - Geral de Estatísticas da Educação e Ciência* (DGEEC)), there was in the end of 2016 a very similar percentage of men and women belonging to Research and Development units of FCT: 77% of men university staff and 75% of women belonged to a Research and Development unit of FCT.

Year	Financed			Assessed		
	M	W	% W	M	W	% W
2014	8	2	20,0	62	37	37,4
2013	1	8	88,9	27	23	46,0
2012 (E)	1	1	50,0	-	-	-
2012	1	4	80,0	42	32	43,2
2010	11	4	26,7	48	33	40,7
2009	12	4	25,0	38	22	36,7
2008	16	10	38,5	62	41	39,8
2006	15	5	25,0	40	18	31,0

Table 11: Men and women as principal researcher (PR) of research projects financed and assessed by FCT. The designation (E) in 2012 refers to the excellency projects.

5 Conclusions

We remark that, with the exception of the numbers in Table 11, the percentual values (and that, as we said before, may be biased by the information we were able to gather) relatively to indicators beyond mere existence are well below the percentual values of women mathematicians. We wish to note that participation in scientific committees of conferences, presentations in plenary sessions and presence in editorial boards of scientific journals are very often taken into account for progression in an university career.

Table 3 shows clearly the difference between women mathematicians in Portugal and Europe: women in Portugal do not avoid higher degrees in maths or at least do not avoid them more than men. Comparing the data of Table 3 with the subsequent data it is clear that this higher education in maths does not mirror proportionally neither in the university career progression neither in the other indicators, with the exception of research projects funded by FCT.

This text does not aim to find the reasons behind this portrait; we leave that task to the future and possibly to other people. We believe that the debate this article may originate, independently of its outcome, can only benefit Mathematics and the whole community of portuguese mathematicians, men or women.

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