Zugänge, Barrieren und Potentiale für die internationale Mobilität von Wissenschaftlerinnen

Länderbericht Mexiko

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Country dossier Mexico

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1 The Context of Mexican Higher Education

1.1 Structure and Basic Characteristics

Mexico is a diverse country, geographically vast and wide, with a linguistic and ethnical diversity that is also reflected in the diversity of its higher education system and the multiplicity of its institutions. Much like other Latin American countries, Mexico's education system was historically influenced by the Catholic Church. The Royal and Pontifical University of Mexico, the first higher education institution in the country, was established in 1551 (Monroy and Trines, 2020). As of today, the administration of the Mexican educational system is in the hands of the National Ministry of Education, the Public Education Secretariat (SEP), and the 32 state-level jurisdictions. As shown in Appendix 1 – Table 01, the higher education institutions in the country comprise private (73,4%) and public (23,5%) institutions. In the public sector, we find state universities, state universities with solidarity support, intercultural universities, polytechnic universities, technological universities, decentralized technological institutes, federal technological institutes, and federal universities.[1] Mexico's public higher education system also includes teacher training colleges, dedicated research centers, and a large number of public open distance education institutions, such as the Open and Distance University (*Universidad Abierta y a Distancia de México*).

The largest number of institutions are private; among them are the normal private educational institutions for undergraduate and postgraduate students. These private universities represent 69.7% of all universities in the tertiary system in the country.

[1] **State Universities.** They offer innovative degrees, with one year of social service for careers in the health area and six months for other areas of knowledge. They train competent professionals with a broad ethical, humanistic and nationalistic sense, with a scientific and creative attitude, with an entrepreneurial and innovative spirit, oriented to obtain their achievements and personal improvement, with wide possibilities of inserting themselves in an unsaturated labor market.
Intercultural Universities. These institutions prepare men and women as intellectuals and professionals proud of their culture and committed to their peoples. They also seek participation in the sustainable development of their regions and a deep social interaction within the framework of cultural diversity.
Polytechnic Universities. They impart higher education in four-month school periods for two years, training professionals mainly in technological areas, with a solid training based on professional competencies, which responds to the needs of the national context.
Digital University. It has 41 Academic Units and eight Study Centers, through which, with the use of new technologies, education is offered to a greater number of people, regardless of their geographical location; undergraduate and graduate educational programs are offered online.
Technological Universities. Provide higher education at the Higher University Technician levels (with a duration of 2 years) and its continuity of studies at Bachelor level (a further 1 year and 8 months). The training is 70% practical and 30% theoretical. Its purpose is to promote technological education and strengthen its link with the productive sector.
Normal Schools. Train teachers in education in different specialties through current study plans and programs according to the needs and demands of the state population, as well as providing pedagogical updating for the personnel working at the different educational levels.

Government expenditure on education as a percentage of gross domestic product (GDP) decreased from 5.3% to 4.5% between 2014 and 2017 (CEWS Template/UIS, Table 1.1.3). Mexico's tertiary education sector experienced a minor decrease from 1.1 % in 2014 to 0.9 % in 2017. Government expenditure on tertiary education as a percentage of total government expenditure on education was 21.09 in 2016 (CEWS Template/UIS, Table 1.1.4).

1.2 Enrollment and Gender Participation in Higher Education

Between 2000 and 2017, enrollment in higher education in Mexico more than doubled, from 1.9 million to 4.4 million (Appendix 2 – Graphic 01; CEWS Template/UIS, Table 1.2.3). During the last decades, the government's public policy has allowed the development and proliferation of private higher education, without an existing regulatory framework that adequately controls its growth and quality. At the same time, the federal government has implemented policies aimed at increasing its capacity for coordination and intervention in public higher education institutions, expanding its coverage through technical education (Garay, 2013). Nonetheless, there are disparities between more industrialized northern parts of the country and less economically developed southern states (Monroy and Trines, 2019). In 2014, Mexico reported a gross enrollment ratio for tertiary education of 29.9% (Knoema, 2020). Despite these lower rates, Mexico is expected to become one of the top 20 countries in higher education enrollments by 2035 in the Latin American region (Calderon, 2012).

According to an OECD report (2018), the two most frequent fields of study in Mexico are law and business administration, which account for 35.1% of new entrants, followed by engineering, manufacturing and construction (24.4% of new entrants). These percentages are well above the OECD averages (23.3% and 16.5%, respectively). Health and welfare programs are also relatively common areas of enrollment (10.1% of new entrants compared to the OECD average of 13%). Natural science, mathematics, and statistics together with information and communication technologies (ICT) (3.1% and 1.9%, respectively), account for low proportions of first-time entrants in Mexico, much lower than the OECD averages (6.5% and 4.6%, respectively) (OECD, 2018).

In relation to the expansion of enrollment, one of the main problematic aspects has been the segmentation in the access to the system. According to a study by the Centro Interuniversitario de Desarrollo (CINDA, 2016), only 3.4% of higher education students in Mexico in 2014 belonged to the first income quintile (those with the lowest income), while 42.1% of students came from the highest income quintile. This means that for each student belonging to the lowest quintile there were 12.4 students from the highest quintile. This inequality in access to higher education is less marked in the enrollment in public institutions, representing a Gini coefficient of 0.376 in 2014, while the Gini coefficient for enrollment at private institutions was 0.690 in that year.

In the case of graduate studies, there has been an overall increase in postgraduate student enrollment in the last ten years (Appendix 2 – Graphic 02). However, the inequality in the enrollment of students from the highest and lowest quintiles is much greater than in undergraduate studies. According to the CINDA study (2016), there is very high concentration: 70% of postgraduate-level students belong to the fifth income quintile (that is, those with the

highest income), and the Gini coefficient is 0.801. The study proposes that these results are due to the great advance of private education in postgraduate studies, mainly in master's programs, and that the postgraduate scholarships granted by the Consejo Nacional de Ciencia y Tecnología (CONACyT) tend to privilege some indicators of family cultural capital to which members with fewer resources do not have access.

Women have benefited equally from the overall increase in students enrolled in tertiary education at bachelor's, master's, and doctoral levels in the last five years (Appendix 1 – Table 02). As of 2018, over half of the bachelor's graduates were women (54%); the share of women among master's graduates was even higher (56.7%), while women accounted for 52% of doctoral graduates. (Appendix 1 – Table 03).

More than one third (35%) of female graduates studied business, administration, or law, compared with 32% percent of male graduates. By contrast, only 10% of female graduates studied engineering, manufacturing and construction, compared with 28% of male graduates (Appendix 1 – Table 04).

According to the CEWS Template/UIS (Table 2.1.3, Gender Parity Index, GPI), the gross graduation ratio from tertiary education (ISCED 6 or higher) increased by 0.03 percent between 2014 and 2017, to 1.18% of the Mexican population age 25+ years (Appendix 1 – Table 05).

Enrollment in doctoral programs has increased for both women and men, and women have caught up with and even overtaken men. Women received 51.9% of the doctoral or equivalent degrees conferred in 2018 (Appendix 1 – Table 03).

This is a very interesting situation because if this tendency continues, Mexican women will increase their participation within the scientific fields in the future. Education, followed by business, administration and law, natural sciences, mathematics, and statistics, and engineering, manufacturing and construction are the fields with the highest numbers of doctoral enrollments (Appendix 1 – Table 06).

2 Higher Education and Research System

In 1970, the National Council of Science and Technology (CONACyT) was created. This administrative organization has the mission of decentralizing and strengthening scientific development and creating advanced human capital while promoting and sustaining research projects. In its official document, CONACyT states that it will contribute to adequately facing the main challenges of society and to improving the quality of life of the population. Since 2012, the mission of CONACyT for the year 2025 has been to strengthen the quality of scientific and technological research activities. Also, it aims to contribute to increasing scientific and technological potential and quality, competitiveness and innovation (Flores, 2018). However, the indicators show that only one state in Mexico (Nueva León) has a significant relationship with the industrial sector. Not even the National University of Mexico (UNAM), which is number one in almost all productivity, scientific, and technological areas, reports concrete relationships with private or industrial business.

According to the Global Innovation Index (2019), Mexico's gross expenditure on R&D (GERD) as a percentage of GDP was 0.5. It is important to mention that no country in Latin America, with the exception of Brazil, spends more than 1% of their GDP on R&D (Appendix 2 – Graphic 05). This low investment in research and technology impacts the number of researchers in the system and policies of promotion in science and technology. In Mexico, there are 0.84 researchers for every 100,000 economically active people, which is low compared to other Latin American countries (CEWS Template/UIS, Table 1.3.1). In 2014, Argentina reported 4.76 researchers for every 100,000 people, Brazil 2.3 (2010 figure), and Chile, 1.16 (RICYT, 2018). In terms of promoting research policies in Mexico, several studies have mentioned that there is an over-bureaucratization of the evaluation processes (coming from the government), which hinders scientific production and encourages "simulation" by the academics (García Salord, 2001; Didou and Gérard, 2010); the lack of gender equality policies; and the high concentration of researchers in some states and institutions. For example, in 2016, 70% of the members of the National System of Researchers (SNI) were concentrated in 60 universities and research centers, and 33% worked in five of these institutions located in Mexico City and Jalisco (Lloyd, 2018).

2.1 Funding and Research

Gross domestic expenditure on R&D (GERD) in 2018 by sector of performance was lowest in the private non-profit sector (1.15%) and highest in higher education (50.56%; see Appendix 1 – Table 07) (UNESCO, 2020a). According to the National Council of Science and Technology (CONACyT, 2020b), there are different budget programs intended to support the growth, strengthening, and linking of science, technology and innovation. These programs are classified into the following categories: (1) Sectoral Funding, (2) Mixed Funding, (3) Institutional Funding, (4) Institutional Support, (5) CONACyT Funds, (6) Innovation Incentive Program, and (7) State Incentive on Research and Technology Development. They allow the Council to interact between the secretariats of state, state governments, and the federal institutions, as well as with the academic and scientific institutions and civil society organizations and private companies that constitute the technological and scientific system of Mexico. The aforementioned funding programs were created with the purpose of giving support and financing to activities directly linked to the development of scientific and technological research, grants and training of advanced human capital. These funds are available for all public and private higher education institutions, centers, laboratories, public and private companies and people who are registered in the National Register of Scientific and Technological Institutions and Companies (CONACyT, 2020b).

CONACyT has the most important scholarship and grant program for post-graduate students in Mexico; it has been in existence for 45 years. These scholarships and grants include: (1) National Scholarships, (2) Scholarships Abroad, (3) National Program for Post-Graduate Quality, (4) Young Talents, (5) Support for Women Breadwinners ("Jefas de Familia"), (6) Academic Strengthening for Indigenous People, (7) High-Level Training for Public Administration, (8) National Post-Doctoral Stays, and (9) Post-Doctoral and Sabbatical Stays Abroad (CONACyT, 2020a). The main objective of the Scholarships Abroad program is to offer financial support to increase the humanistic, scientific, and technological capacity of the country,

thereby contributing to its development and social well-being. Applications for these scholarships are open to Mexican professionals who wish to undertake or are already undertaking postgraduate studies (at master's or doctorate level) at foreign institutions of high international quality. Despite the fact that women constitute almost 50% of doctoral students, the percentage of women among recipients of scholarships is lower. In 2017, women accounted for only 47% percent of new recipients of national scholarships (Appendix 1 – Table 11; see also Table 10) and for only 42% of new recipients of scholarships abroad (Appendix 1 – Table 09; see also Table 08).

2.2 Science, Gender, and Academic Career

Mexico has signed international agreements such as the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), which impacted changes in the Law on Science and Technology and in the National Development Plan (PND) in the period 2013 to 2018. The PND integrated a gender perspective to highlight the importance of the presence of women in higher education, not just as a personal achievement for women but as a way of developing the country by fostering policies to increase the amount of advanced human capital. Between 2010 and 2017, the number of women researchers in Mexico increased from 5,627 to 9,982 (Appendix 2 – Graphic 06). Yet, the share of women among researchers only rose from 33.9% to 36.7% during the same period. Thus, although the gender gap has narrowed, thus allowing women to access higher education in a broader way, there is still a lot of work to be done when it comes to research.

In Latin America, the average proportion of female researchers in relation to men reached 44% in 2015 (Arredondo Trapero et al., 2019). In other words, out of 100 researchers, 44 were women. Although this number is not extremely low, there is inequality in the Latin American region. There are countries that are leaders in gender parity in research, such as Paraguay (55%) and Argentina (53%). However, countries such as Chile (32%), Mexico (32%), and Colombia (38%) have larger gender gaps (Arredondo Trapero et al., 2019; Albornoz et al., 2018). A highly relevant observation is that the gender gap is not necessarily related to the level of development of science and technology systems. Mexico is one of the countries with the greatest scientific and technological development in the region; however, it is also one of the countries with significant gender gaps.

In Mexico, women scientists also face horizontal segregation within academia, and disparities based on rank or categories of researchers: In 2017, at least 50.9% of total human resources in science and technology were women (CONACyT, 2017). However, women were overrepresented in the lower research category (83%) while they accounted for only 37% of positions in the top research category, with little change since 2015.

In 2013 – based on the headcounts (HC) framework – the representation of female researchers was highest in the private non-profit sector (40.3%) and lowest the business enterprise sector (27.7%; Appendix 1 – Table 12). Between 2014 and 2016, there was an increase in the number of researchers among total R&D personnel from 54.6% to 60.6% (Appendix 1 – Table 13). This increase was due to the increase in full-time equivalents (FTEs), which rose from 50.7% in 2013 to 59.1% in 2016 (CEWS Template/UIS, Table 1.3.2).

As can be seen from Table 14 in Appendix 1 (Total R&D personnel by sector of employment), higher education was the sector with the highest percentages of R&D personnel both in terms of HC (46.4% in 2016) and FTE (38.2% in 2016).

In the academic year 2018–2019, a total of 414,408 academics were employed in the Mexican higher education system, of whom only 43% were women (Secretary of Public Education, 2020). Also, in the last decade, there has been an overall growth rate of 46% in the system. Unfortunately, no further information is available about academic hierarchy and job distribution. However, qualitative studies indicate that women in Latin America continue to be influenced by structural variables that determine culture in higher education institutions, which affect their possibilities of development and the role they play in society. Variables linked to family structure, as well as issues such as schooling or the gendered division of labor at home and in academia, contribute to the gender gap (Arredondo Trapero et al., 2019).

Previous studies in Mexico (Didou Aupetit and Gérard, 2010, 2011), have emphasized gender differences that hinder the work trajectories of women researchers. These differences, which are related to the fact that women have to combine family and academic responsibilities to a greater degree than men, are reflected in the low presence of women within the National System of Researchers and, above all, at the highest levels of the research hierarchies. For example, in the analysis of a survey of 1,775 academics conducted between 2007 and 2008, 13.5% of women reported having interrupted their work to care for children or elderly family members, and 20% believed that such a situation had a negative effect on their academic work. Among men, 3.5% interrupted their work, and 8% reported that they suffered a negative impact as a result (Lloyd, 2018).

According to Didou Aupetit and Gérard (2011), women and men compete and participate in scientific production under conditions of inequality. While 77% of men were located in the first two levels of the National System of Researchers (Candidate and Level 1), 84% of women were at those levels. In contrast, the proportion of men who reached Level III was more than double that of women: 6.2% versus 2.7%. The authors concluded that being a woman in Mexico still functioned as a discriminating factor both in terms of plans and temporalities for career paths in the education research system and in terms of the opportunities for career advancement that women have.

2.3 Scholarly Publications

From 2008 to 2017, Mexico experienced an annual growth rate of 5.93% in scholarly publications. Between 2013 and 2017, Mexico occupied 19th place among the 35 member countries of the Organisation for Economic Co-operation and Development (OECD) in terms of output of scholarly articles (CONACyT, 2017, p. 69). In the global scenario, the trend of Mexico's participation in the production of scholarly knowledge was positive, increasing from 0.61% of the global total in 2013 to 0.66% in 2017 (Appendix 2 – Graphic 09; CONACyT, 2017). Also, during the same time period, Mexico was behind Brazil (1.99%) but ahead of Latin American nations with similar characteristics in terms of knowledge production, such as Argentina, Chile and Colombia.

In regard to citation impact, on an international level Mexico's rate varies depending on the discipline or the Normalized Citation Impact (NCI), calculated by dividing the number of citations by the expected amount for publications in the same type of document, year of publication and area of interest (Appendix 2 – Graphic 10). Comparing the NCI of Mexico with that of other strategic nations in terms of international cooperation, Mexico is only ahead of Brazil and India. The first places on that list are occupied by the United Kingdom, the USA, and Canada (CONACyT, 2017, p. 78).

Appendix 1: Tables

Table 1 Types of higher education institutions in Mexico

Type of institution	Percentage	Frequency
State public universities	6.1	36
State public universities with solidarity support	3.9	23
Intercultural universities	1.9	11
Polytechnic universities	10.3	61
Technological universities	20	118
Decentralized technological institutes	20.7	122
Federal technological institutes	21.7	128
Federal public universities	15.4	91
Sub-total	**100**	**590**
Normal public education	81.6	239
Normal public education - postgraduate	18.4	54
Sub-total	**100**	**293**
Public research centers	18.7	36
Other public institutions	81.3	156
Sub-total	**100**	**192**
Normal private education	4.6	135
Normal private education – postgraduate	0.3	10
Private universities	95.1	2,821
Total (public institutions)	**26.6**	**1,075**
Total (private institutions)	**73.4**	**2,967**
Total	**100**	**4,042**

Source: Educational System of United States of Mexico, Main Figures 2018–2019.

Table 2 Enrollment in tertiary education in ISCED programs, both sexes

Enrollment in tertiary education, both sexes	2014	2015	2016	2017	2018
ISCED 6: Bachelor's or equivalent	3,042,546	3,118,608	3,740,744	3,916,844	4,035,251
ISCED 7: Master's or equivalent	199,846	205,729	28,9660	294,661	308,188
ISCED 8: Doctoral or equivalent	29,355	31,364	38,770	39,448	43,744

Source: CEWS Template/UIS

Table 3 Percentage of women among graduates by sex

	Sex	2013	2014	2015	2016	2017	2018
Bachelor's or equivalent level (ISCED 2011 level 6)	Women	53.8	53.4	53.8	54.1	53.9	54.0
	Men	46.2	46.6	46.2	45.9	46.1	46.0
Master's or equivalent level (ISCED 2011 level 7)	Women	55.0	55.1	54.6	56.4	56.3	56.7
	Men	45.0	44.9	45.4	43.6	43.7	43.3
Doctoral or equivalent level (ISCED 2011 level 8)	Women	48.1	47.7	48.4	50.4	51.0	52.0
	Men	51.9	52.3	51.6	49.6	49.0	48.0

Source: CEWS Template/UIS, Table 2.1.1.

Table 4 Tertiary graduates by field of study and sex

Field of knowledge	Total by area (%)	Women (%)	Men (%)
Education	11	15	7
Arts and humanities	3	4	3
Social sciences, journalism and information	9	12	6

Business, administration and law	**34**	**35**	**32**
Natural sciences, mathematics, and statistics	3	2	3
Information and communication technologies	5	3	8
Engineering, manufacturing and construction	18	10	28
Agriculture, forestry, fisheries and veterinary	**2**	**1**	**3**
Health and welfare	11	15	8
Services	3	3	3

Source: OECD, 2020.

Table 5 Gross graduation ratio from tertiary education

	2014	**2015**	**2016**	**2017**	**2018**
Gross graduation ratio from first degree programs (ISCED 6 and 7) in tertiary education, gender parity index (GPI)	1.15	1.17	1.19	1.18	-

Source: OECD, 2020

Table 6 Enrollment in doctoral programs by field of knowledge in Mexico

	2013			2014			2015			2016			2017			2018		
Field of knowledge	**W**	**M**	**Total**	**W**	**M**	**Total**	**W**	**M**	**Total**	**W**	**M**	**Total**	**W**	**M**	**Total**	W	**M**	**Total**
Education	3213	2448	**5661**	3563	2634	**6197**	3676	2511	**6187**	5652	4039	**9691**	5387	3646	**9033**	6364	4450	**10814**
Business, administration and law	1459	2297	**3756**	1541	2291	**3832**	1670	2364	**4034**	2907	4023	**6930**	3340	4502	**7842**	4068	5074	**9142**
Natural sciences, mathematics and statistics	2578	3036	**5614**	2724	3276	**6000**	3226	3718	**6944**	3438	3867	**7305**	3593	4073	**7666**	3494	4177	**7671**
Social sciences, journalism and information	1860	1665	**3525**	1925	1771	**3696**	2231	1931	**4162**	2477	2011	**4488**	2337	1987	**4324**	2631	2291	**4922**
Engineering, manufacturing and construction	1595	2687	**4282**	1780	2918	**4698**	1745	3131	**4876**	1830	3284	**5114**	1864	3470	**5334**	1441	2831	**4272**
Arts and humanities	1061	1141	**2202**	1167	1269	**2436**	1233	1339	**2572**	1231	1307	**2538**	1216	1240	**2456**	1291	1376	**2667**
Health and welfare	500	415	**915**	49	433	**482**	577	459	**1036**	617	454	**1071**	656	467	**1123**	1317	979	**2296**
Agriculture, forestry, fisheries and veterinary	371	488	**859**	387	586	**973**	486	656	**1142**	505	695	**1200**	541	709	**1250**	516	619	**1135**
Information and communication technologies	74	237	**311**	92	285	**377**	68	244	**312**	63	256	**319**	66	234	**300**	167	527	**694**
Services	30	36	**66**	597	67	**664**	52	47	**99**	46	68	**114**	41	79	**120**	39	92	**131**

Source: OECD, 2020.

Table 7 Gross domestic expenditure on R&D (GERD) by sector of performance (%)

Mexico	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Business enterprise	36.67	35.04	34.9	26.77	25.45	17.85	18.6	22.22	22.49	22.11
Government	29.8	34.33	32.76	38.47	41.8	32.33	30.12	26.38	26.18	26.19
Higher education	29.89	29.35	30.9	33.75	31.77	48.82	50.34	50.41	50.26	50.56
Private non-profit	3.63	1.28	1.44	1.01	0.97	1	0.93	0.99	1.07	1.15
Not specified	0	0	0	0	0	0	0	0	0	0

Source: Cews Template/UIS, Table 1.1.2

Table 8 New recipients of scholarships abroad 2015 and 2017, by sex and type of postgraduate course

Postgraduate	2015			2017		
	Women	Men	Total	Women	Men	Total
Doctoral	39,6%	60,4%	100,0%	39,6%	60,4%	100,0%
Master plus specialization	45,4%	54,6%	100,0%	42,9%	57,1%	100,0%

Source: Own elaboration. Information obtained from database of new scholarships abroad by gender and country of destination 2015 and 2017 (CONACyT, 2020c).

Table 9 New recipients of scholarships abroad 2015 and 2017, by sex

Sex	2015	2017
Women	44%	42%
Men	56%	58%
Total	**100%**	**100%**

Source: Own elaboration. Information obtained from database of new scholarships abroad by sex and country of destination 2015 and 2017 (CONACyT, 2020c).

Table 10 New recipients of national scholarships 2015 and 2017, by sex and postgraduate type

Postgraduate	2015			2017		
	Women	Men	Total	Women	Men	Total

Doctoral	44,2%	55,7%	100,0%	45,5%	54,4%	100,0%
Master plus specialization	47,0%	52,9%	100,0%	47,2%	52,7%	100,0%

Source: Own elaboration. Information obtained from a database of new national mixed scholarships by gender and area of knowledge 2015 and 2017 (CONACyT, 2020c).

Table 11 New recipients of national scholarships 2015 and 2017, by sex

Sex	2015	2017
Women	46%	47%
Men	54%	53%
Total	**100%**	**100%**

Source: Own elaboration. Information obtained from a database of new national mixed scholarships by sex and area of knowledge 2015 and 2017 (CONACyT, 2020c).

Table 12 Female researchers by sector of employment

	2013
Female researchers as a percentage of total researchers (HC) – Business enterprise	27.7
Female researchers as a percentage of total researchers (HC) – Government	33.0
Female researchers as a percentage of total researchers (HC) – Higher education	34.6
Female researchers as a percentage of total researchers (HC) - Private non-profit	40.3

Source: CEWS Template/UIS, Table 1.3.4.

*Data available only for the year 2013

Table 13 Total R&D personnel per million inhabitants, per thousand labor force and per thousand total employment (FTE and HC)

	2013	2014	2015	2016
Total R&D personnel per million inhabitants (FTE)	497,1	433,3	467,9	533,7
Total R&D personnel per million inhabitants (HC)	650,2	592,4	636,7	727,1
Total R&D personnel per thousand labor force (FTE)	1,1	1,0	1,1	1,2

Total R&D personnel per thousand labor force (HC)	1,5	1,4	1,4	1,6
Total R&D personnel per thousand total employment (FTE)	1,2	1,0	1,1	1,3
Total R&D personnel per thousand total employment (HC)	1,6	1,4	1,5	1,7

Source: CEWS Template/UIS, Table 1.3.1

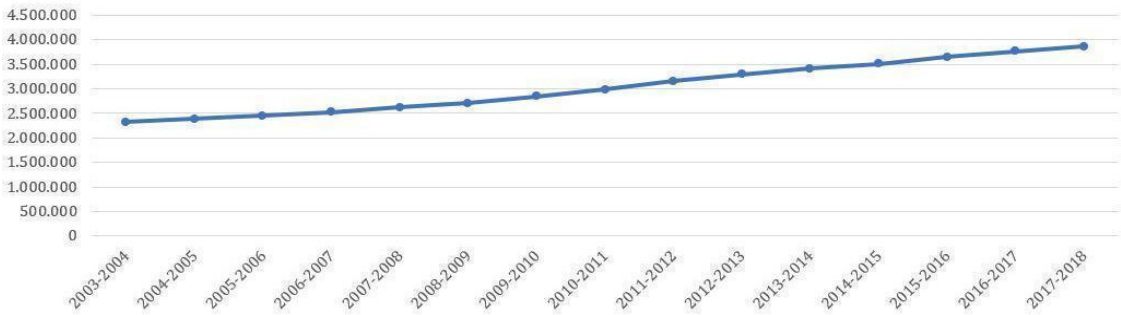
Table 14 Total R&D personnel by sector of employment (%)

		2013	2014	2015	2016
Total R&D personnel – Business enterprise	**FTE**	32.5	30.9	33.1	40.0
	HC	30.2	27,3	29.5	36.6
Total R&D personnel – Government	**FTE**	28.7	25.2	22.7	20.0
	HC	24.3	19.2	17.4	15.3
Total R&D personnel – Higher education	**FTE**	35.7	41.7	42.1	38.2
	HC	42.6	51.6	51.2	46.4
Total R&D personnel – Private non-profit	**FTE**	3.1	2,2	2,0	1,8
	HC	2.9	1.9	1.9	1.7

Source: CEWS Template/UIS, Table 1.3.3.

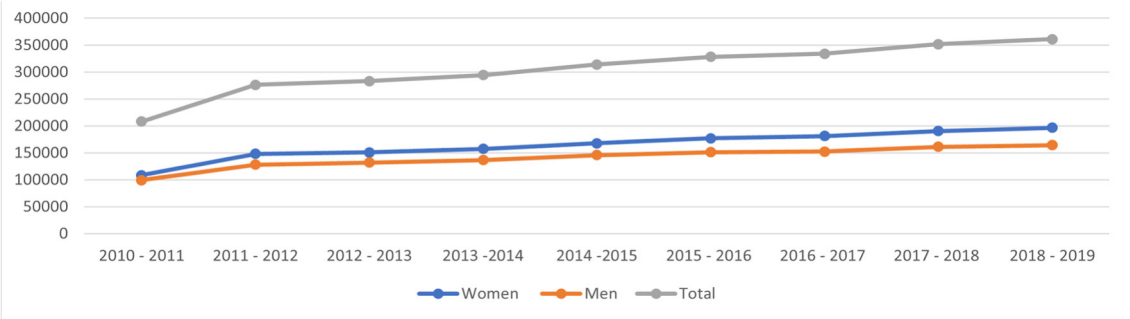
Appendix 2: Graphics

Graphic 1 Enrollments in Mexican higher education 2003–2018



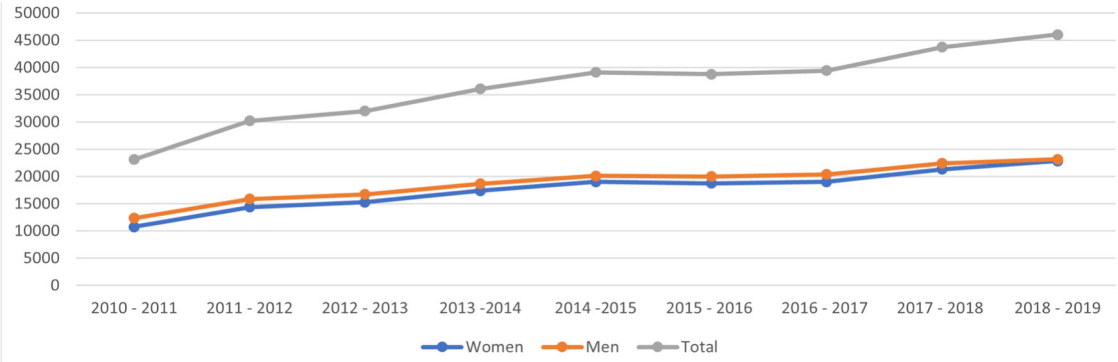
Source: Own elaboration. Information obtained from the Ministry of Public Education (SEP). Historical Statistics 1893–2015.

Graphic 2 Postgraduate program enrollment by sex 2009–2019



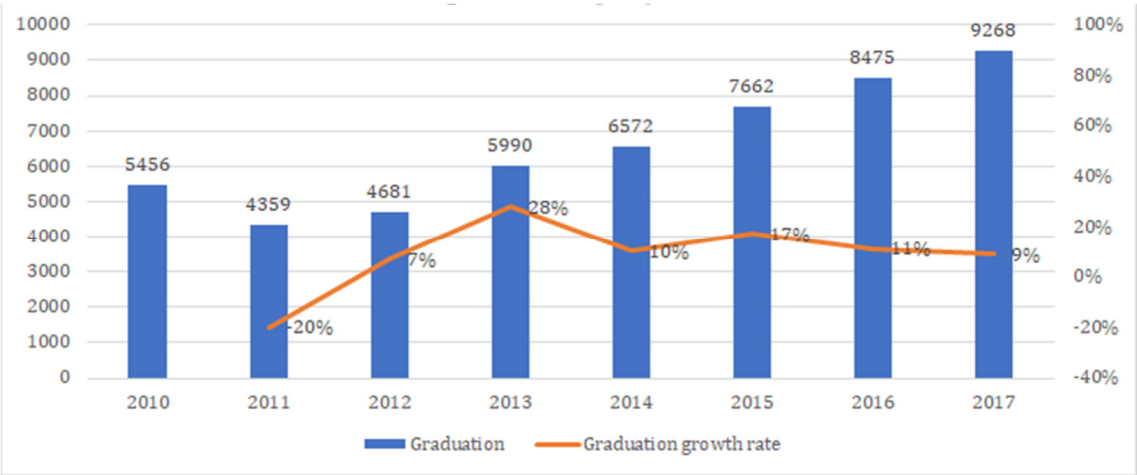
Source: Own elaboration. ANUIES Statistical Yearbooks from 2010–2011 to 2018–2019.

Graphic 3 Doctoral student enrollment by sex 2010–2019



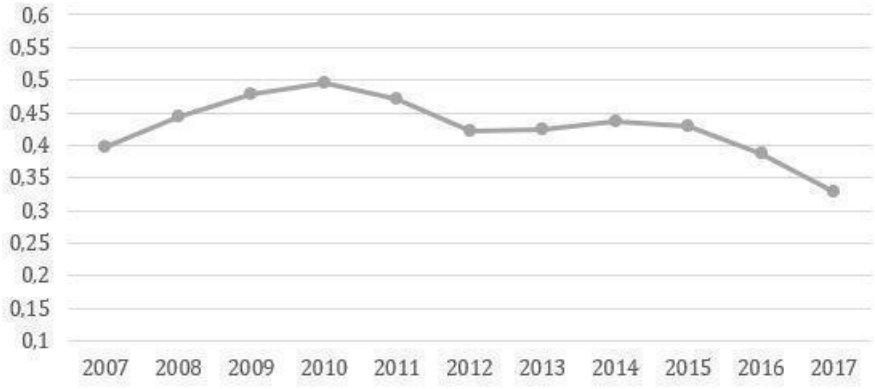
Source: Own elaboration. ANUIES Statistical Yearbooks from 2010–2011 to 2018–2019.

Graphic 4 Doctoral graduation per year (2010–2017)



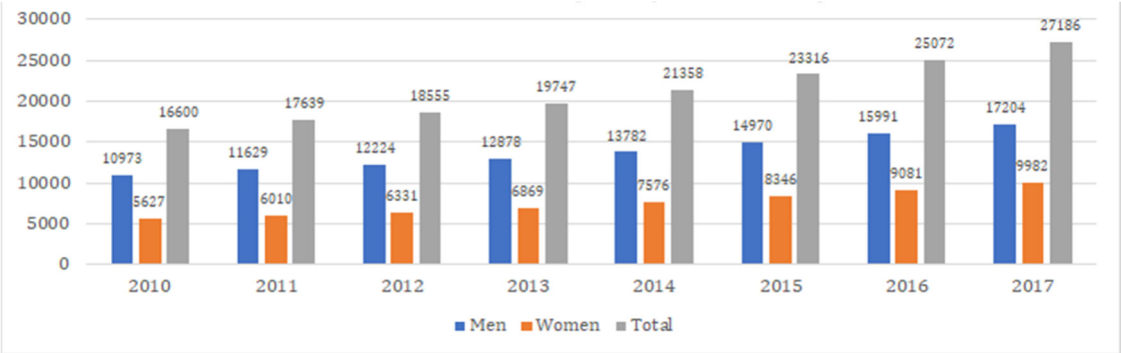
Source: General report on the state of science, technology, and innovation (CONACyT, 2017)

Graphic 5 Expenditure on R&D as a percentage of GDP (GERD) in Mexico 2007–2017



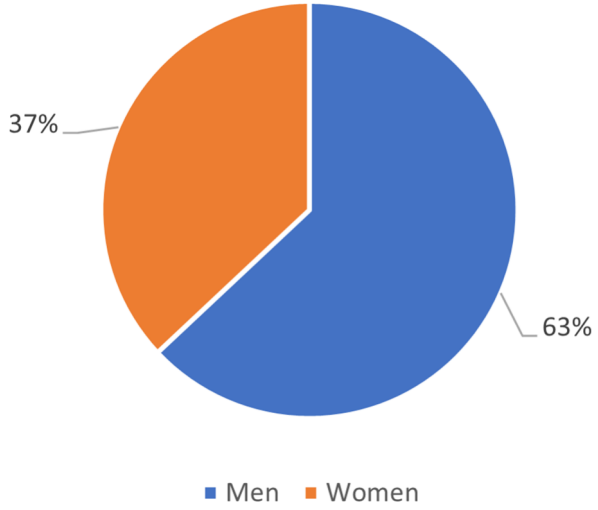
Source: World Bank, 2020.

Graphic 6 National System of Researchers (SNI) researchers by sex (2010–2017



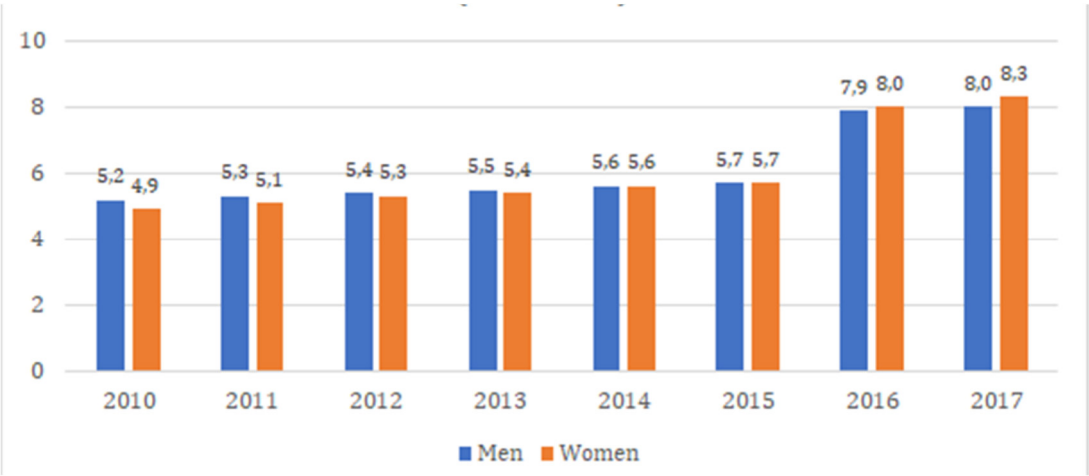
Source: General report on the state of science, technology, and innovation (CONACyT, 2017).

Graphic 7 National System of Researchers (SNI) researchers by sex, 2017



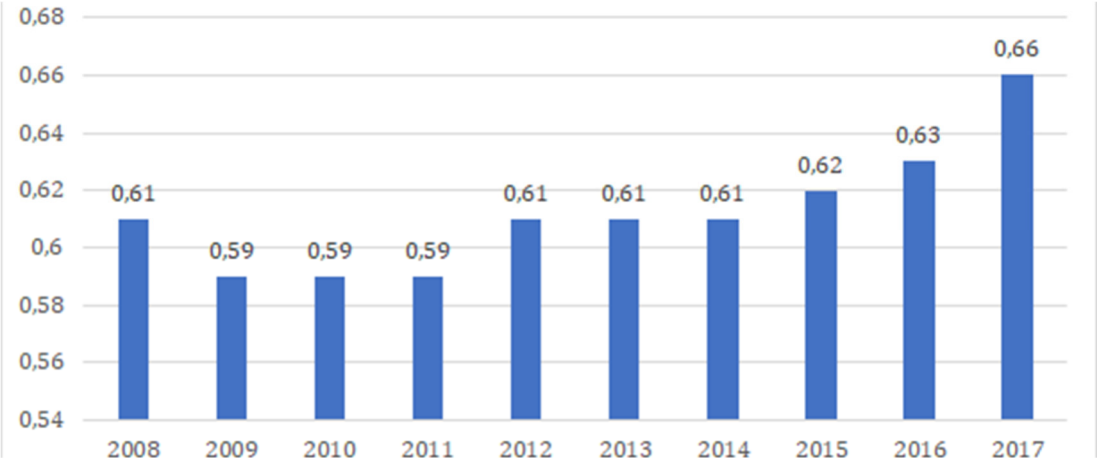
Source: General report on the state of science, technology, and innovation (CONACyT, 2017).

Graphic 8 Researchers in science and technology by sex (2010–2017)



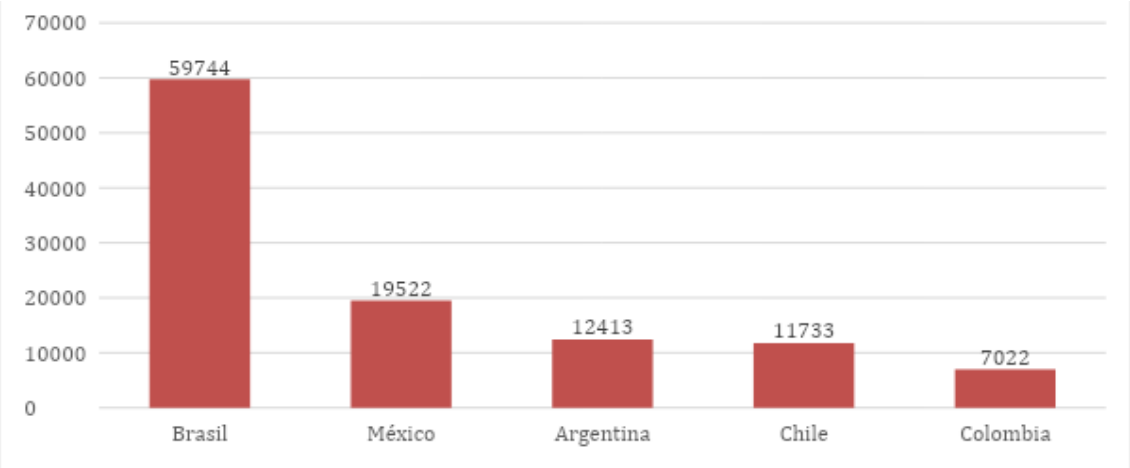
Source: General report on the state of science, technology and innovation (CONACyT, 2017).

Graphic 9 Mexican scholarly article production as a percentage of the global total (2008–2017)



Source: General state report of science, technology and innovation (CONACyT, 2017).

Graphic 10 Number of articles per country – SCI 2018



Source: Network for Science and Technology Indicators – Ibero-American and Inter-American - (RICYT), 2018.

References

Arredondo Trapero, F., Vázquez Parra, J., & Velázquez Sánchez, L. (2019). STEM y Brecha de Género en Latinoamérica. *Revista De El Colegio De San Luis*, *9*(18), 137-158. https://doi.org/10.21696/rcsl9182019947

Albornoz, M., Barrere, R., Matas, L., Osorio, L. y Sokil, J. (Eds.). (2018). *Las brechas de género en la producción científica Iberoamericana*. (Papeles del Observatorio, No. 09). Observatorio Iberoamericano de la Ciencia, la Tecnología y la Sociedad de la Organización de Estados Iberoamericanos (OCTS-OEI).

Calderón, A. (2012). *High education in 2035 – The ongoing massification.* RMIT University. Retrieved from: https://www.academia.edu/2612867/High_Education_in_2035_The_Ongoing_Massification

CINDA (2016). Informe nacional México. In *Educación superior en Iberoamerica* (pp. 250–251). Retrieved from: https://cinda.cl/wp-content/uploads/2019/01/educacion-superior-en-iberoamerica-informe-2016-informe-nacional-mexico.pdf

CONACyT. (2017). *Informe general del estado de la ciencia, la tecnología y la innovación.* Retrieved from: https://www.siicyt.gob.mx/index.php/estadisticas/informe-general/informe-general-2017/4813-informe-general-2017/file

CONACyT (2020a). *Becas y posgrados.* Retrieved from: https://www.conacyt.gob.mx/Becas-y.posgrados.html

CONACyT (2020b). *Fondos y apoyos.* Retrieved from: https://www.conacyt.gob.mx/Fondos-y-apoyos.html

CONACyT (2020c). *Bases de datos abiertos S190.* Gobierno de México. Retrieved from: https://www.siicyt.gob.mx/index.php/s190-becas-de-posgrado-y-otras-modalidades-de-apoyo-a-la-calidad?id=219:bases-de-datos-abiertas-s190%3Bcatid=10

Didou Aupetit, S., and Gérard, E. (2011). El Sistema Nacional de Investigadores en 2009 ¿Un vector para la internacionalización de las élites científicas? *Perfiles Educativos 33*(132), 29–47.

Didou Aupetit, S. and Gérard, E. (2010). *El Sistema Nacional de Investigadores, veinticinco años después. La comunidad científica, entre distinción e interna- cionalización*. Mexico: ANUIES.

Foro Consultivo Científico y Tecnológico. (2020). *Forum 47. Creación del Conacyt y descentralización de la investigación, vitales en el avance de la ciencia*. Retrieved from: https://foroconsultivo.org.mx/FCCyT/revista-forum/forum-47-creación-del-conacyt-y-descentralización-de-la-investigación-vitales-en

Flores J. (2018). Retos y contradicciones de la formación de investigadores en México. *Revista Educarem 34*(71), 35–49

Garay, A. (2013). La expansión y diversificación de la educación superior privada en México en los primeros diez años del siglo XXI. *Espacio Abierto 22*(3), 413–436

García Salord, S. (2001). La simulación: El fantasma que recorre a la vida académica cotidiana. *Universidad y Sociedad 1*(1), 97–103

Global Innovation Index. (2019). *Global Innovation Index 2019: Mexico*. Retrieved from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2019/mx.pdf

Knoema (2020). *México – Tasa bruta de escolarización. Terciaria (CINE 5 y 6)*. Retrieved from: https://knoema.com/atlas/Mexico/topics/Education/Tertiary-Education/Gross-enrolment-ratio-in-tertiary-education

Lloyd, M. (2018). El sector de la investigación en México: entre privilegios, tensiones y jerarquías. *Revista de la Educación Superior 47*(185), 1–31

Monroy, C., and Trines, S. (June 23, 2020). *Education in Mexico.* Education System Profiles, World Education News + Reviews. Retrieved from: https://wenr.wes.org/2019/05/education-in-mexico-2

OECD. (2018). *Education at a glance 2018: OECD indicators*. Paris: OECD Publishing. https://doi.org/10.1787/eag-2018-en.

OECD. (2020). OECD.Stat. Retrieved from: https://stats.oecd.org/

RICYT (2018). *Indicadores de ciencia y tecnología*. Retrieved from: http://www.ricyt.org/

Secretary of Public Education (2020). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2018–2019.* Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from: https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_2018_2019.pdf

Secretary of Public Education (2018). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2016–2017*. Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from: https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_2016_2017.pdf

Secretary of Public Education (2015). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2014–2015.* Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from: https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_14_15.pdf

Secretary of Public Education (2013). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2012–2013.* Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from:

https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_2012_2013.pdf

Secretary of Public Education (2011). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2010–2011*. Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from: https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_2010_2011.pdf

Secretary of Public Education (2010). *Sistema educativo de los Estados Unidos Mexicanos: Principales cifras ciclo escolar 2008–2009.* Dirección General de Planeación, Programación y Estadística Educativa. México. Retrieved from: https://www.planeacion.sep.gob.mx/Doc/estadistica_e_indicadores/principales_cifras/principales_cifras_2008_2009.pdf

UNESCO (2020). *Database.* Retrieved from: http://data.uis.unesco.org/

UNESCO (2020a). *Mexico – Education and literacy*. Retrieved from: http://uis.unesco.org/en/country/mx?theme=education-and-literacy

UNESCO (2020b). *Mexico – Science, technology and innovation*. Retrieved from: http://uis.unesco.org/en/country/mx?theme=science-technology-and-innovation

World Bank. (2020). *Expenditure on tertiary education (% of government expenditure on education) – Mexico*. Retrieved from: https://data.worldbank.org/indicator/SE.XPD.TERT.ZS?locations=MX

Humboldt's template

	Indicator	*Chile*	*Colombia*	*Mexico*
1	Gross domestic expenditure on R&D (GERD) as a percentage of GDP	✓	✓	✓
2	GERD by sector of performance	✓	✓	✓
3	Government expenditure on education as a percentage of GDP	✓	✓	✓
4	Expenditure for tertiary education as a percentage of total government expenditure on education	✓	✓	✓
5	Population (25+ years) by at least bachelor or equivalent (ISCED 6 or higher)	✓	✓	✓
6	Doctoral degrees (ISCED 8) as percentage of all graduates from tertiary education	✓	✓	✓
7	Total R&D personnel per millions inhabitants, per thousand labor force and/or per thousand total employment	✓	*No data*	✓
8	Researchers as percentage of R&D personnel	✓	*No data*	✓
9	Total R&D personnel by sector of employment	✓	*No data*	✓
10	Tertiary graduates (ISCED 6+7) by sex and level of education	✓	✓	✓
11	Tertiary graduates by field of study and sex	✓	✓	✓
12	Gender Parity Index (GPI) at least bachelor's or equivalent (ISCED 6 or higher), population 25+ years, gender parity index (GPI)	✓	✓	✓
13	Doctoral degrees (ISCED 8) by sex	✓	✓	✓
14	Percentage of female teachers in higher education	✓	✓	*No data*
15	Percentage of female researchers by sector of employment	✓	✓	*No data*
16	Academic staff grade or postdoctoral researcher in academia (R2 or Grade C) by sex	✓	✓	*No data*
17	Senior academic staff (grade A/R4), by field of science and sex	*No data*	*No data*	*No data*