White Paper on Gender Policies in Science and Academia

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WHITE PAPER ON GENDER POLICIES IN SCIENCE AND ACADEMIA

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FOREWORD

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There is a long tradition of studying the status of women in science and technology. Despite some partial attempts to compile statistics, especially in the United States of America, no serious, widespread efforts to address this issue were made until the 1970s. It was the United Nation's *Convention on the Elimination of All Forms of Discrimination Against Women* (CEDAW) in 1979 that set out the goals and the measures needed to achieve full equality between women and men in both public and private life. Article 1 of the Convention[1] defines discrimination against women as "any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field".

A series of actions to promote equality between women and men and human rights and freedoms took place during the UN's "Decade for Women" (1975-1985). In 1979 the United Nations Conference on Science and Technology for Development included a single article specifically dealing with women's issues. In 1983 the panel of the UN Advisory Committee on Science and Technology for Development advanced a programme of action on gender-related matters designated "*Science and Technology and Women*". The UN's Third World Conference on Women (Nairobi, Kenya, 1985) called for "full and

[1] United Nations. Convention on the Elimination of All Forms of Discrimination Against Women. https://www.ohchr.org/en/instruments-mechanisms/instruments/convention-elimination-all-forms-discrimination-against-women (last visited August 2024).

effective participation of women in the decision-making and implementation process related to science and technology, including planning and setting priorities for research and development, and the choice, acquisition, adaptation, innovation, and application of science and technology for development". In contrast, the UN's Fourth World Conference on Women held in Beijing in 1995 did not consider gender mainstreaming in science and technology to be one of its priorities, though its report did contain cross-references throughout.

Starting with these and numerous other reports and proposals, statistics on the status of women in R&D systems and higher education began to be gathered, statistics that were more or less global and more or less complete. The starting shot in the European Union was what is known as the "ETAN Report": the European Technology Assessment Network's Expert Working Group on Women and Science was commissioned by the Research Directorate-General to draw up a report subtitled "*Promoting excellence through mainstreaming gender equality*". The report looked at the status of women in science and technology in the different European countries and concluded that the "under-representation of women threatens the goals of science in achieving excellence, as well as being wasteful and unjust". Another of its conclusions was the difficulty in obtaining reliable data, and it recommended that all the EU Member States collect gender-disaggregated data. Many countries ignored that recommendation at first, but little by little more or less overall, more or less comparable statistics and studies started to become available.

These and many other studies have made governments, research institutes, and higher education institutions become aware of existing inequalities and begin to promote equality policies in different areas. Progress has been made since those initial studies, and the data are encouraging, but there are still gender inequalities in science: for instance, data show that there are fewer women in all STEM (Science, Technology, Engineering and Mathematics) areas, that there are fewer women in high positions and that this is a worldwide problem, though regional differences do exist. That is why policies and initiatives to solve gender issues are still needed.

This White Paper reviews the situation of women in science and technology, and in the policies pertaining to science, equality (providing all individuals with the same resources and opportunities) and gender equity (the same as for equality, but taking account of social injustices, in this case as they affect women) in 14 countries, nine in Europe, two in the Americas, two in Asia, and one in

Oceania (Australia). In each of these countries there is an association of Spanish researchers, and each of those associations also belongs to the Network of Associations of Spanish Researchers and Scientists Abroad (in Spanish: *Red de Asociaciones de Investigadores y Científicos Españoles en el Exterior [RAICEX]*), whose gender research group has produced this White Paper. As noted in the Introduction, each chapter has been written by scientists, women and men, who have engaged in research in the countries concerned and thus have first-hand knowledge and experience in the matter. Each chapter sets out data on research and higher education in those countries, their overarching gender policies, and decisions that have been taken and implemented as public policies to alleviate gender inequalities and inequities. Accordingly, this paper presents, through a gender lens, a practical picture and situational knowledge taking into account the views of women researchers.

There is reason for optimism in many of the countries covered in this paper, especially because of increased participation by women in the R&D field, though the inequalities and issues described continue to exist. Particularly, parity in positions of responsibility is still to be achieved. Nevertheless, the key point is that research and academic institutions in all the countries considered in this paper have put gender equality mainstreaming plans in place. One of this paper's novel and original aspects is its comparison of the different countries from a gender perspective and its focus on institutional evaluation and processes for promotion. All the above will need to be supplemented with an analysis of productivity gaps and access to leadership positions. Furthermore, there is a need for further study on the impact and effects of the equality policies that have been implemented.

The problem that arises is making these equality and equity policies impactful and ensuring that they are not merely symbolic. If policies and instruments are not employed effectively and efficiently, it can leave the impression that something is being done and that nothing more is needed, that the mechanisms to solve all issues are already in place. However, when legislation and regulatory instruments are not implemented effectively to bring about structural changes, those policies will be fruitless, sometimes even counterproductive. They can be turned into a wholly rhetorical –even metaphorical– device that conceals and perpetuates existing power dynamics in our R&D systems and in higher education. These power dynamics will inevitably diminish equality and equity.

INTRODUCTION

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Women have historically had a presence in the field of science, though they have often had to face constraints and have been relegated to a secondary role. This has been reflected both in access to education and in opportunities for academic careers.

Despite major strides made in recent years, there are still gender inequalities all over the world, known as the gender gap. The gender gap is both a theoretical and a practical concept referring to the disparity among different categories of variables used to compare rates for men and women. This disparity between men and women extends to aspects such as their level of participation, access to opportunities, rights, power and influence, remuneration and benefits (International Labour Organization [ILO], 2008; Instituto Andaluz de la Mujer, n.d.). The case considered in this paper is the difference in the number of women vs men working in different capacities in academia and in science, both in education and in research.

Women have faced discrimination and sexism, embodied by inequities that still exist, as demonstrated by statistics from all over the world. Currently, women make up fewer than 30% of scientists and researchers worldwide, and just 1 in 3 students in STEM (Science, Technology, Engineering and Mathematics) fields is a woman (UN, n.d.). The disparity in education starts right from the outset and intensifies over the course of education and work. Still, the data are overall statistics that do not take possible contrasting situations in different countries into account.

In many countries women start university on an equal footing, but numbers start to slip as the educational level increases, and the proportion of women in postgraduate studies decreases, particularly in STEM disciplines. Based on the

shapes of the data distribution plots for men and women, this process has been referred to metaphorically as the "leaky pipeline" (Figure 1.1), with women pulling out of educational, and especially research, careers "drop by drop".

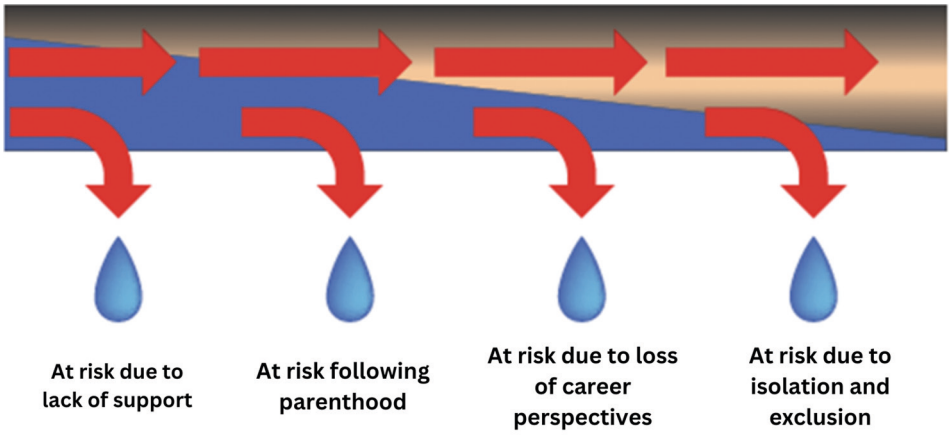

Figure 1.1. Depiction of the leaky pipeline. Women are at risk due to lack of support, due to parenthood, due to loss of expectations, due to isolation and exclusion. Compiled by the author based on data from EC-DGRTD (formerly DG Research), 2009.

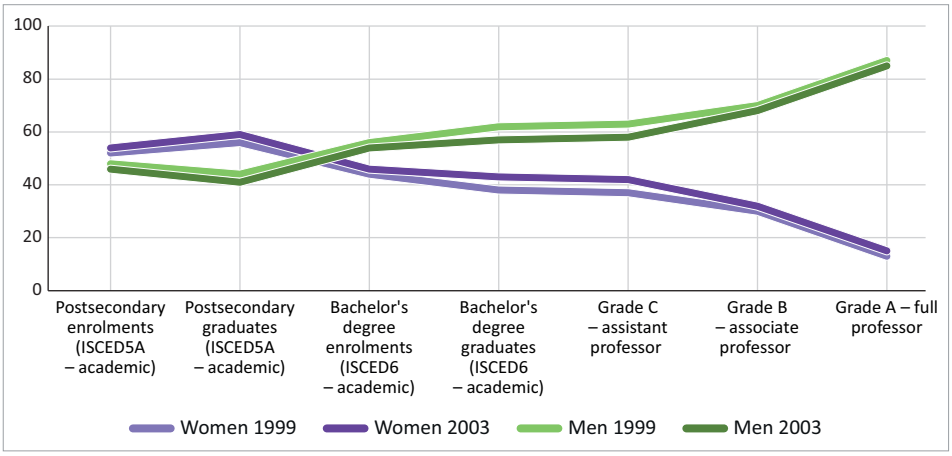

Figure 1.2a. Scissors diagram. Percentage of men and women in a typical academic career from undergraduate student to academic staff over their careers; EU-25, 1999-2003. Compiled by the author based on data from EC-DGRTD, 2009.

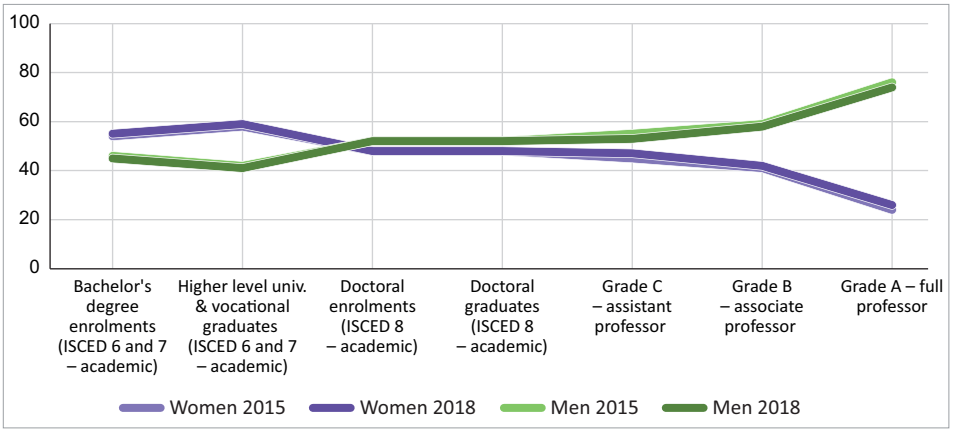

Figure 1.2b. Scissors diagram. Percentage of men and women in a typical academic career from undergraduate student to academic staff over their careers; EU-28, 2015-2018. Compiled by the author based on data from EC-DGRTD, 2021.

A second phenomenon observed in gender studies is the scissors effect, which shows how a trend in which women are the majority in the early stages of university education becomes inverted, with a majority of men as we progress up the professional career ladder, and with leadership at the highest levels being held chiefly by men (European Commission – Directorate-General for Research and Innovation [EC-DGRTD], 2009 and 2021). This can be seen in Figures 1.2a and 1.2b, presenting data for academia in the European Union. The data show a slight improvement in the situation of women in top positions between 2009 (Figure 1.2a) and 2018 (Figure 1.2b), with the percentage doubling from 13% to 26%, although still far below the figures for men, who currently hold 74% of those high-level jobs.

That is, women are under-represented, particularly in leadership and decision-making posts but also in the pursuit of basic and applied science. These differences vary by discipline; they are more evident in STEM fields than in HASS (Humanities, Arts and Social Sciences) fields.

This under-representation in leadership and decision-making positions and in specific research areas limits women's ability to influence decisions and policies in science and technology and hence the present and future of our society. Mixed, diverse teams have been shown to be beneficial and to yield better research and innovation performance (Nielsen et al., 2018). The continued absence of women in decision-making is a missed opportunity to bring to bear

the perspectives and experience that women can contribute, losing out on their unique, valuable insights.

The dearth of female representation in science also has a negative impact on research. Androcentrism and neurosexism-based scientific theories arose in the nineteenth century (García Dauder & Pérez Sedeño, 2018) and are still present in today's discourse. Historically, clinical studies have been performed on males, failing to consider the physiological and hormonal differences between males and females and the different symptoms and conditions that affect women, taking the masculine as normative in medicine, known as the "Yentl effect". This causes the differential morbidity and certain specific disease symptoms in women to be overlooked (García Dauder & Pérez Sedeño, 2018); for example, women too are subject to cardiovascular diseases, and they present with different symptoms from men, something most people are unaware of. Automobile crash test dummies are built to the size of the average man, increasing the likelihood that women will suffer a serious accident by 47% (Criado, 2020). These are some examples of science carried out by and for men, overlooking the other half of the population.

We women face barriers during our professional careers, in staff recruitment processes, in promotion procedures and in terms of salary. We also have fewer opportunities to develop professionally than our male peers.

Some governments and international institutions have proposed implementing policies, plans and programmes to address and mitigate the gender gap, both generally and in science. They have promoted initiatives in mentoring to give young women scientists female role models, in gender equality at work, and in greater representation for women in the workplace and on scientific decision-making bodies.

Yet there are both general and specific social and cultural challenges that need to be addressed to raise women's participation in the field of science. Therefore, as we see it, comparing countries when studying the gender gap helps us to identify specific inequalities in different political, economic and cultural contexts and to put forward targeted solutions tailored to each situation.

Furthermore, it is important to emphasise that deep-rooted gender stereotypes have to be set aside and that the lack of female role models limits expectations regarding the accomplishments girls and women can make in science.

Though the data are encouraging, statistics show that there are still gender inequities in science. The figures indicate that gender inequities remain, resulting

in fewer women in senior positions, especially in the STEM disciplines. This is an issue that is global in scale, though there are substantial differences between regions. That is why policies and initiatives aimed at resolving these gender issues are necessary.

Internationally, there are initiatives like International Women's Day on the 8th of March, and more particularly the International Day of Women and Girls in Science, held since 2015 on the 11th of February at the prompting of the General Assembly of the United Nations to recognise the critical role that women play in the science and technology communities. Further, gender equality and the empowerment of women and girls would also help make progress towards all the objectives and goals of the 2030 Agenda for Sustainable Development (UN, n.d.).

This paper reviews the status of women in science and science policies in 14 countries on four continents (Europe, North America, Asia and Oceania) in which there is an association of Spanish researchers all linked together through the Network of Associations of Spanish Researchers and Scientists Abroad (RAICEX) (see Figure 16.1 in the Final Conclusions chapter). Each chapter has been written by female and male scientists who have experienced living and working in research in the countries considered and who are able to portray for us the reality of the situation surrounding gender in science and academia in each country. In each chapter we will be looking at gender policies in general, statistics on the situation in science and academia in the respective country, and the efforts being made to alleviate inequality in these areas.

The pages of this collective volume bring to light a repeating pattern in each of the 14 countries, special conditions affecting each of those countries aside: the proportion of women shrinks as we climb the academic ladder, despite institutional efforts to close the gender gap, with greater or lesser success depending on the country or region, such as in the countries of the European Union. Here is a summary of the countries that have been evaluated, by continent and in accordance with the alphabetical order of the original Spanish text. The data were compiled and the initial drafts of the chapters were written in 2022.

EUROPE: BELGIUM, SPAIN, FRANCE, IRELAND, ITALY, NETHERLANDS, UNITED KINGDOM, SWEDEN AND SWITZERLAND

Belgium is one of the world's most densely populated countries, with a population heavily skewed toward the young. Its gross domestic product is above the European average, and it is the country with the sixth highest expenditure on science and technology in the OECD (Organisation for Economic Co-operation and Development). The European gender equality index ranks Belgium in the top 10, with a score of 76, which is 5.8 points above the average (EIGE, 2023). Even so, there are still inequalities in time allocation (housework and caring for others), access to the healthcare system and access to leadership positions. Despite a slight increase in the share of women in high academic positions in recent years, that share is still considerably below the European average. Gender equality plans (GEPs) have been implemented, and this has improved the trend recently, although without substantial changes and facing challenges posed by major difficulties stemming from the complexity of the country's political system.

The European gender equality index ranks **Spain** in fourth place, with a score of 76.4, 6.2 points higher than the average in Europe (EIGE, 2023). The past few decades have seen a series of legislative advances and active policies aimed at achieving equality. The creation of the Institute for Women's Affairs (*Instituto de la Mujer*) in the 1980s and various Observatories to consider the status of women compared to men, including the recent Women, Science and Innovation Observatory (*Observatorio de Mujeres, Ciencia e Innovación* [*OMCI*]) established by the 2021 Spanish Sciences Act (*Ley de Ciencia del 17 de junio de 2022*), have played a fundamental role. Equity with respect to women's access to university studies has been achieved, but there is still a considerable difference and a gap in women's career development moving up into positions of responsibility, and there is a scissors dynamic in which men hold most of the leadership positions both at university and at research centres.

The chapter on **France**, which has an overall gender equality score of 75.7, in sixth place and at 5.5 points above the EU average (EIGE, 2023), reveals an intergovernmental initiative to implement a national plan for job equality between women and men overseen by the Ministry of National Education and Youth Affairs, the Ministry of Higher Education, Research and Innovation and

the Ministry of the Olympic and Paralympic Games. In 2020 women made up more than half (55%) of students of higher education. However, the share of women in science, research, and teaching in France is below parity. Equality in academic posts has not yet been achieved, but some progress has been made.

In **Ireland**, the current gender equality legislation dates back to the 1970s when it joined the then European Economic Community. Ireland is ranked ninth among EU Member States on the global gender equality index (EIGE, 2023), with a score of 73, above the average. Irish institutions of higher education display a recent tendency to hire more women than men, but men still predominate in the highest positions of responsibility both in research and in teaching.

Since 2006 **Italy** has taken a series of steps to reach equality between men and women. The hiring of women is below the European average, with appreciable differences between northern and southern Italy. Its global gender equality index score is 68.2, lower than the four countries mentioned above, putting it in thirteenth place in the ranking, below the EU average (EIGE, 2023). For women, the academic workplace in Italy is marked by vertical segregation within academic careers, with the share of women falling as academics move up professionally and the differences being more pronounced in STEM fields than in HASS fields.

The **Netherlands** has a high population density, a powerful economy both within Europe and worldwide, and a strong academic tradition, with seven universities among the world's top 100. There are no significant gender differences in the unemployment rate, one of the lowest in the EU, though women make up the lion's share of part-time workers, especially after they have children. The global gender equality index stands at 77.9, second in the EU behind Sweden (EIGE, 2023). A series of multi-year plans to coordinate gender mainstreaming policies at the national level have been implemented since the year 2000. A review of the share of women in academic careers reveals a striking effect, more like two divergent lines than a scissors effect, with the number of men rising sharply over the number of women from the level of master's degree studies.

The chapter on the **United Kingdom** shows that notwithstanding the historical presence of women in different positions of power, the position of Minister for Women, later named the Minister for Women and Equalities, was not established until 1997. Though the country is home to some of the world's top universities, women are still under-represented in high ranking academic and administrative posts. In addition, more women than men work in part-time

jobs. The Athena, and subsequently the Athena Swan, initiatives have been put in place to drive the advancement and promotion of women working in teaching and research in the fields of science, engineering and technology at university, and are a requisite for access to certain sources of funding. Trends suggest that equity is close to being achieved in the coming years.

The chapter on **Sweden** indicates that despite its having one of the highest standards of living in the world, having spearheaded promoting gender balance, and boosting the presence of women in academic leadership positions in STEM fields, the country still has not reached full parity in this area. Nonetheless, his is the EU country with the highest global gender equality index score, 82.2, which is 10 points higher than the average (EIGE, 2023). The Swedish model is based on policies aimed at fighting gender inequality inside organisations, and it makes distinctions among measures directed at individuals, culture and organisational structures.

Switzerland, one of the smallest countries and one of the world's leading economic powerhouses, remains a conservative country. Gender equity has slowly been making headway and has now turned into a topical concern for its inhabitants. Unemployment in the country is quite low, slightly higher for women, with most working women holding part time jobs. Notwithstanding the country's high degree of development in the fields of research and innovation, Switzerland has one of the lowest rates of women with a postgraduate education in Europe and low numbers of women university professors, especially in STEM fields. In recent decades, equality mainstreaming programmes have been developed based on proposals by the EU, along with specific domestic subsidies for women and mentorship schemes to make up for the lack of female role models in science.

AMERICA: UNITED STATES OF AMERICA AND MEXICO

The **United States of America (USA)** is the world's largest economy. The situation in the country is complex because of its size and other features, e.g., its population, the high number of migrants, large differences among its 50 states, and its dual levels of government, federal and state. Women's integration initiatives lag behind many other countries, hindering progress for women in highly qualified positions, and there are few specific laws aimed at gender equity in general and in academia in particular. The percentage of leadership positions

filled by women at the top US universities is low. The main challenges faced are the pay gap, violence against women, and less female leadership.

The chapter on **Mexico** looks at the situation in this rather large country, which has an average economy in global terms, a large indigenous population and marked inequalities in wealth distribution. Women have less access to the job market than men and suffer from considerable under-representation in academia, even though they have made inroads in recent decades, particularly in STEM fields. Despite a sizeable bump in entry into the National Research System by women scholars in 2015, numbers have stagnated, and as a rule fewer women than men gain recognition for their research efforts. By the same token, there is an under-representation of women in leadership roles.

ASIA: UNITED ARAB EMIRATES AND JAPAN

The chapter on the **United Arab Emirates** (**UAE**) paints a picture of this Middle Eastern country which, thanks to its oil, has undergone unprecedented modernisation, gender equity policies included. One of the notable aspects of the UAE is its extremely large percentage immigrant population, the world's highest, and the high proportion of men to women in the population. Since 2015 the country has had a Gender Balance Council, a federal entity responsible for improving and growing the role of women in leadership positions and diminishing the gender gap. The chief issues are the pay gap and women dropping out of the workforce. The high proportion of women at university is significant, including in STEM fields, though the labour situation is a completely different matter, where they face hostility, causing them to leave the workforce, and there is a lack of low-skilled employment so most women are over-qualified for their jobs because there are few openings at their level. Access to leadership and decision-making positions is still more complicated. Data on women's share of academic employment generally tend to be hard to come by.

Japan is a highly advanced society and the world's third largest economy. However, on gender issues the country ranks 116th out of 146 because of the small percentage of women in the workforce, limited participation in politics and the pay gap. Many jobs have clear gender roles, and there are more women than men in less qualified jobs and part-time work. There are still very few women researchers in academia (indeed, the smallest ratio among all the OECD countries) despite an upward trend of late, including at the highest levels, with

a rise in the number of professorships held by women. This is because the Japanese government has enacted a series of gender equality mainstreaming laws and plans.

OCEANIA: AUSTRALIA

Australia is one of the world's least densely populated countries. Unemployment is low, but women have higher rates of part-time employment. A large segment of the population finishes university, with a majority of university graduates being women. Australian universities are consistently among the best in academic gender equality rankings. However, this has not had a significant impact on gender discrimination. There is a higher percentage of women exclusively working as teachers and of men working as researchers. Over the course of research careers, the highest positions tend to be filled by men, especially in STEM fields. In the past 10 years a workplace gender equality act has been enacted and a Science in Australia Gender Equity initiative implemented, but gender representation by discipline is still highly skewed and women are under-represented in high-ranking academic posts.

There are numerous reports and large volumes of statistics for the group of countries examined here that furnish data and charts for analysing equity policies in science and academia in the various countries.

Patterns in each society can be elucidated in light of each country's circumstances and particularities, and the responses to inclusion policies which are achieving greater or lesser success can be examined. Only by understanding local patterns can we address a complex global situation. We must not overlook the fact that gender equality is a fundamental human right and a guarantee of excellence (United Nations, n.d.; Observatorio Mujeres, Ciencia e Innovación, 2022). Furthermore, gender diversity is an essential component in advancing science, technology and innovation in today's society. Inclusion and gender equity policies and initiatives are basic to promoting progress and well-being for women and men alike. It is important to keep working to create fair and equitable conditions for women in science.

REFERENCES

Criado Pérez, C. (2020). *La mujer Invisible. Descubre cómo los datos configuran un mundo hecho por y para los hombres* [*Invisible Women. Exposing Data Bias in a World Designed for Men*]. Ed. Seix Barral. Barcelona.

European Comission (2022), *She Figures*.

European Commission, Directorate-General for Research (now the Directorate-General for Research and Innovation [EC-DG RTD]), *Women in science and technology – Creating sustainable careers*, Publications Office, 2009, https://data.europa.eu/doi/10.2777/57428 (last accessed 21 June 2023).

European Commission, Directorate-General for Research and Innovation (EC-DG-RTD), *Women in science and technology – Statistics and indicators.* Publications Office, 2021, https://op.europa.eu/es/publication-detail/-/publication/67d5a207-4da1-11ec-91ac-01aa75ed71a1 (last accessed 10 September 2023).

European Institute for Gender Equality (EIGE, 2023). https://eige.europa.eu/gender-equality-index/2023/EU (last accessed 10 February 2024).

García Dauder, S. & Pérez Sedeño, E. (2018). *Las "mentiras" científicas sobre las mujeres* [Scientific "lies" about women]. Ed. Los Libros de la Catarata. 2nd edition. Madrid.

ILO (2008). "Manual para Facilitadores de uditoria de género" ["Manual for Gender Audit Facilitators"]. Last accessed 20 May 2023.

Instituto Andaluz de la Mujer [Andalusian Institute for Women's Affairs]. No date. "Indicadores de género" [Gender Indicators]. Last accessed 20 May 2023.

Nielsen, M.W., Bloch, C.W. & Schiebinger, L. «Making gender diversity work for scientific discovery and innovation». Nat Hum Behav 2, 726-734 (2018). https://doi.org/10.1038/s41562-018-0433-1

Observatorio Mujeres, Ciencia e Innovación (OMCI) [Women, Science and Innovation Observatory], 2022. M + I Mujeres e Innovación [W + I Women and Innovation] 2022.

United Nations, n.d. International Day of Women and Girls in Science, 11 February. Last accessed 30 May 2023.https://www.un.org/es/observances/women-and-girls-in-science-day.

EUROPE

BELGIUM

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Belgium, officially the Kingdom of Belgium, has a land area of 30,528 km^2 and a population of 11,584,008 inhabitants (49.3% men, 50.7% women). It is one of the most densely populated countries, not just in Europe but in the world, with an average of 379 inhabitants per square kilometre (The Belgian Statistical Office [STATBEL], 2022). Unlike other European nations, Belgium's population pyramid is shaped like a pagoda, with a high proportion of young people in the job market (STATBEL, 2022). Real per capita gross domestic product (GDP) was €35,950 in 2021, above the European average (€27,880) (EUROSTAT, 2023), ranking 12th according to the International Monetary Fund (Federal Public Service FINANCE, n.d.; International Monetary Fund [IMF], n.d.), and 22nd in the world competitiveness ranking (Trading Economics, n.d.). According to the Organisation for Economic Co-operation and Development (OECD), Belgium ranks sixth in expenditures on research and development (3.4% of GDP), substantially higher than average (2.67%) (OECD, n.d.). This attests to its commitment to a research and knowledge-based economy, demonstrated by its large pharmaceutical and biotechnology industry (Flanders Investment and Trade, 2020).

Despite its small size, Belgium's political structure is complex, with a federal level, three communities (French-speaking, Flemish-speaking and German-speaking), and three regions (Wallonia, Flanders and Brussels-Capital). In Flanders, both community (Flemish-speaking) and regional competencies are overseen jointly by the Flemish Parliament (*Vlaamse Overheid*), while in the rest of the country community and regional communities are kept separate (Schulze et al., 2015).

The European gender equality index drawn up by the European Institute for Gender Equality (EIGE) in 2023 ranked Belgium among the top 10 European countries, with a score of 76, 5.8 points above the European average (70.2) (European Institute for Gender Equality, 2023). While Belgium is one of the best European countries in terms of workplace equality and access to financial resources, it still has inequalities, namely, such aspects as time allocation (housework and caring for others), access to healthcare, and access to top management positions at companies and various foundations (European Institute for Gender Equality, 2022).

At the federal level, though there were some measures here and there promoting gender equality dating as far back as the 1980s, equality between men and women was not expressly enshrined in the Belgian Constitution until 2002 (section 10, amended in 2002) (Schulze et al., 2015). To attain this, an independent, public, federal institute was set up that same year with the mission to assure and promote gender equality and fight gender discrimination (Institute for the Equality of Women and Men, n.d.). Later, the 2007 Gender Act (part of the Anti-Discrimination Act) implemented EU gender equality directives and addressed topics like pregnancy, maternity leave and transsexuality. The Act was updated in 2014 to include gender identity and gender expression and to make sexist behaviour a potentially criminal offence (Schulze et al., 2015). Nevertheless, these legislative efforts have proved to be inadequate, and today equality has still to be attained, one example being maternity and paternity leave, which differ in duration and remuneration (Portail belgium.be, n.d.; European Commission, Directorate-General for Employment, Social Affairs and Inclusion, n.d.).

At the regional level, the basic equality legislation in Flanders is the Framework Decree on equal opportunities and equal treatment policy dated 10 July 2008. For the French-speaking community it is the Framework Decree dated 12 December 2008, and in Wallonia it is the Decree dated 6 November 2008, both addressing certain types of discrimination and aimed at adapting the Federal legislation from 2007 (Schulze et al., 2015). The equality of opportunity policies of both the Flemish and Wallonian governments in the period from 2014 to 2024 have been aimed at curbing gender stereotypes and pay differences between men and women and at boosting women's participation at senior position level (Homans, 2014; Somers, 2019; Lannoy, 2019).

STATISTICS ON ACADEMIC STAFFING IN BELGIUM[1*]

Despite a slight rise in previous years, women still only held under 40% of the academic positions in Belgium in 2018 (Figure 2.1). Indeed, in addition to failing to reach the desired goal of parity, Belgium is substantially below the average for Europe (46.87% in 2018).

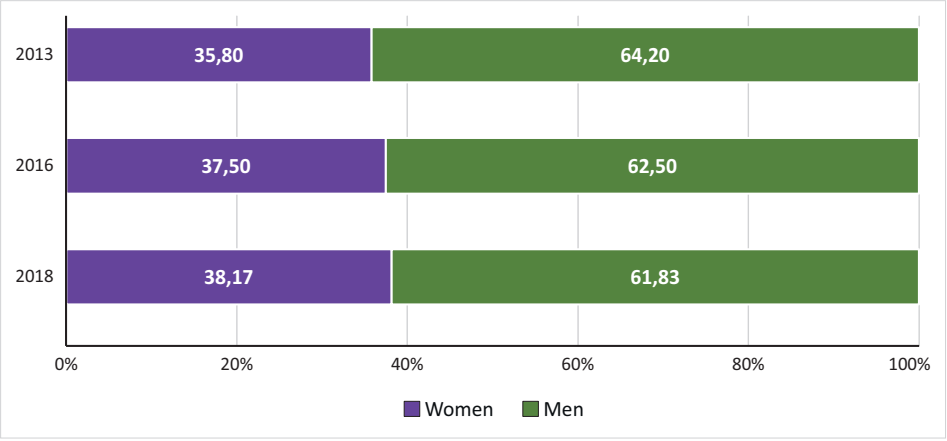

Figure 2.1. Percentage women in stable academic employment (grade C) at Belgian universities, 2013-2018. Compiled by the author from data for 2013-2018 in the EU She Figures 2015, 2018, and 2021 reports (European Commission. Directorate-General for Research and Innovation [DG RTD],2015; DG RTD, 2018; DG RTD, 2021).

Like many other countries, Belgium is mired in the scissors effect, with women predominating at the undergraduate and master's degree levels and then being overtaken in number by men starting with doctoral studies, with the difference growing more pronounced from the postdoctoral level (Figure 2.2). The trend had improved somewhat in the five years from 2013 to 2018 (Figure 2.2), probably as a result of implementation of gender equality plans (GEPs) by many Belgian universities during that period (European Institute for Gender Equality, n.d.). The difference in what the Flemish and Wallonian

[1] The Figures reported in this chapter have been taken from the EU documents She Figures 2015, She Figures 2018 and She Figures 2021, which attempted to equate the statistics from the French-speaking and Flemish-speaking regions, where the same data items are classified in different categories. For instance, in Flanders a postdoctoral researcher is classified in category C, and in Wallonia in category D.

regions classify as grade D (lumping both doctoral students and postdoctoral researchers together in Wallonia, while including just doctoral candidates in Flanders) has an effect when evaluating the "parity" that has theoretically been achieved according to the figure.

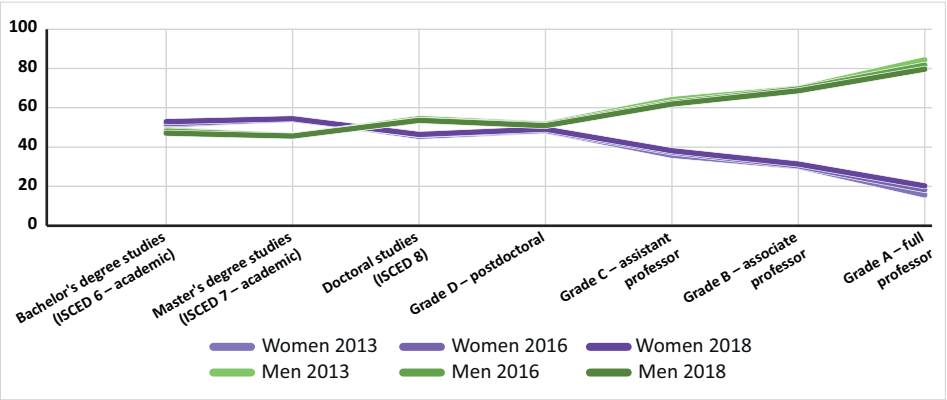

Figure 2.2. Percentage men and women in academic studies and careers in Belgium, 2013-2018. Compiled by the author using EUROSTAT statistics (ISCED 6-8) and She Figures 2015, 2018 and 2021 (grades A-D) (EUROSTAT, 2023; DG RTD, 2015; DG RTD, 2018; DG RTD, 2021).

GENDER EQUALITY POLICIES IN SCIENCE IN BELGIUM

As mentioned in the introduction, gender policies in Belgium are drawn up and implemented both at the federal level and at the regional level (governments of Flanders and Wallonia). Most of these policies address issues that affect women in academic circles, like work-life balance and the dearth of women in top-level positions, but even so, initiatives aimed at this sector are few and far between. Initiatives in the academic sphere are taken at the regional level and are mainly centralised by each region's interuniversity council.

The main initiatives in Flanders are taken by the Flemish Interuniversity Council (*Vlaamse Interuniversitaire Raad*, VLIR), formed by the Flemish-speaking universities (*KU Leuven*, *Universiteit Gent*, *Universiteit Hasselt*, *Universiteit Antwerpen and Vrije Universiteit Brussel*). In the last 20 years the VLIR has focused in particular on gender equality at its member universities.

As a response to gender inequality in the different academic posts, the VLIR created an equal opportunities working group, whose efforts culminated in the

2005 publication, "Equality Guide: HR instruments for Equal Opportunities at Universities" (Van Wesemael et al., 2008). The guide consisted of a series of modules setting out practical examples aimed at career development, mentoring, promotion, and dissemination. In response to debate ensuing as a result of quotas imposed on the universities by government decrees, in 2013 a VLIR task force drew up a higher education GEP that was intended to set in motion specific initiatives that would be more effective than quotas in the medium and long term (Vlaamse Interuniversitaire Raad (VLIR) High Level Task Force Gender, 2013), and that plan was expanded by another GEP in 2015 (VLIR, Bureau UOS, 2015). The latest GEP drawn up for 2020-2024 took into account Londa Schiebinger and Martina Schraudner's "three fixes" model (Schiebinger & Schraudner, 2011) that uses three strategic approaches to alleviate gender inequality in science: fix the numbers, fix the knowledge, and fix the institutions (VLIR, Bureau UOS, 2020). The plan also addresses inequalities faced by women who are members of minorities in Belgium. This plan's "fix the numbers" measures includes conducting detailed annual statistical analyses of the impact of gender on the submission and approval of applications for grants, projects, programmes and jobs. To "fix the knowledge", the plan advocates bringing a gender perspective to bear in all matters by supporting research projects that encompass a gender lens and by arranging workshops, courses and materials for academic staff to encourage them to include that lens in their research. Lastly, to "fix the institution", the VLIR sets a target whereby the personnel of bodies and projects should be no more than 60% one sex. With that in mind, it has changed its policy from equality to inclusion and made knowledge of the policy a requirement for all VLIR and related personnel. It has also created a permanent working party of experts on gender, diversity and development to help the board of governors put the policy into effect. At the same time, the various member institutions are to implement an annual gender action plan with tangible, assessable objectives and earmark a budget allocation for implementation. The working party is also tasked with evaluating compliance.

In 2011 the council of chancellors (CRef) in the French-speaking region (Wallonia-Brussels Federation [FWB]) also adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers to improve the gender balance in academia (Vincke, 2010). This took the form of six specific actions, including renewing the Committee for Women and Science, established as a government advisory committee by decree in 2016 (Parlement

de la Communauté française, 2016). That decree tasked the Committee with putting forward proposals to promote equality in academia, to ensure that the region's institutions use the available information and have instruments to achieve it, and to encourage adherence to the Charter for Researchers and the Code of Conduct for the Recruitment of Researchers referred to above. This decree provided funding for the universities belonging to the FWB (*Université de Liége, Université Libre de Bruxelles, Université de Mons, Université Catholique de Louvain*, Ilya Prigogine Business School, *Université de Saint Louis Bruxelles* and EPHEC) to hire a "Gender Contact Person". That person would be tasked with compiling annual gender diversity statistics at their universities, calling attention to gender equality matters, and drawing up an action plan to advance gender equality. The contact person would liaise with the FWB government, the Wallonian Scientific Research Fund (*Fonds de la Recherche Scientifique* [F.R.S-FNRS]), and the Academy for Research and Tertiary Education (*Académie de Recherche et d'Enseignement Supérieur* [ARES]).

A series of public entities have not only developed a regulatory framework for funding and equal opportunities but have actually contributed financially to promoting women in the academic environment. For instance, in 2013 Flanders launched a special funding package (*Bijzonder Onderzoeksfondsen*) to promote basic research that prioritised recruiting women in academia (Vlaamse Overheid, n.d.). Each of Belgium's public science funding institutions –Scientific Research Fund (*Fonds Wetenschappelijk Onderzoek* [FWO]) in Flanders; Scientific Research Fund – National Fund for Scientific Research (F.R.S-FNRS) in Wallonia; and Innoviris in the Brussels-Capital region – has its own GEP in place to avoid gender imbalances when handing out grants for projects and personnel and selecting the members of the committees of experts that evaluate the applications (*Fonds Wetenschappelijk Onderzoek* [FWO], 2021; *Fonds de la Recherche Scientifique* [F.R.S-FNRS], 2022; Innoviris, 2022). They also have special programmes in place to increase the visibility of women in under-represented science fields. For example, Innoviris awards the "*Women Award in Technology and Science*" prize (issued every two years and carrying a monetary value of €10,000), in an endeavour to draw attention to women scientists in tech fields and promote careers in science (Innoviris). In addition, in association with UNESCO, each year F.R.S-FNRS and FWO offer three "L'Oréal – UNESCO" doctoral fellowships of €30,000

to women researchers in the fields of biomedicine and technology (FWO and F.R.S-FNRS).

As already noted, one of the main difficulties contributing to the low percentage of women in top-level positions in academia in Belgium is the issue of work-life balance. Initiatives to promote work-life balance have been brought in at the regional academic level in an effort to supplement federal and regional measures. The duration of funding (not the total amount) for women researchers who are funded by the FWO while expecting a child is extended by one year (FWO, 2017). In addition, while on maternity leave female researchers are paid their full salaries plus a bonus by the F.R.S-FNRS (F.R.S-FNRS, 2017).

Apart from government and public institutions, there have also been a number of other initiatives and associations focusing on gender action in the framework of science and academia. "Sophia", a bilingual non-profit organisation in Belgium promoting gender studies, dates all the way back to 1989 (Broze et al., 2009). That association is still active today, one example being an article written by Dr. Dounia Bourabain on everyday sexism and racism faced by young women academics in Belgium (Bourabain, 2020). This particular study focused on young women researchers (doctoral students and postdoctoral researchers) that were members of both majority and minority ethnic groups at Flemish universities. One of her conclusions was that, despite the intention underpinning all the measures proposed by governments and institutions in their GEPs and internal plans, the discourse (termed "equality discourse") acts as a smokescreen that covers over and legitimises everyday racist and/or sexist practices. Furthermore, women are subjected to various forms of condescending practices that undervalue them as persons and/or scientists, in which paternalism pressures them into conforming to norms while at the same time they are penalised by the disconnect between their gender identity and their work identity. It is to be noted that her conclusions apply to all young women researchers, irrespective of ethnic origin.

Another initiative outside the scope of public and/or political institutions is Belgian Women in Science (BeWiSe), set up in 2003, a non-profit organisation committed to supporting women researchers in academia and in industry (Belgian Women in Science [BeWiSe], n.d.) and to improving communication between women scientists working in Belgium and the European scientific

community. It runs a scheme in which senior members mentor junior members, and it organises events to heighten members' visibility and to provide networking opportunities, workshops and seminars according to members' needs.

In addition, a series of private initiatives to draw attention to gender inequalities in science have emerged in recent years. On International Women's Day in 2014 a group of women researchers at KU Leuven launched the SASSY (*Sharing Academic Sexism Stories with You*) platform to share their experiences with sexism in academia in a safe environment (KU Leuven, 2017). In three years, the website hosted hundreds of stories in different languages exposing what everyone knows but no-one dares stand up against. Unfortunately, the website closed down because of time constraints and a lack of resources.

Recognising that "implicit bias" is one of the main contributors to gender imbalances in the academic setting, The Young Academy (*Jonge Academie*, bringing together young researchers at different Belgian universities) launched the campaign "Excellence in Science = M(en) + W(omen) + X(non-binary)" ("*Excellente Wetenschap = M+V+X*") on 11 February 2019 (Jonge Academie, 2019). The initiative took the form of posters, media interviews, events and a website that posted data, examples and tools for tackling situations involving overt gender inequity. This campaign ended with a letter, "Gender in Academia", signed by the chancellors of five VLIR member universities (at the time it was signed, only one of the five chancellors was a woman; today, the chancellors of all five universities are men) (VLIR & Jonge Academie, 2019). In that letter the five chancellors committed not only to raising gender awareness at university but also to a series of measures that included promoting balanced representation on the various bodies and at the different levels at university, work-life balance, and ongoing monitoring of gender data.

CONCLUSIONS

- Despite Belgium's high equality score, Belgian academia is a long way from achieving the parity it has been seeking.
- Today, all universities and funding institutions have implemented GEPs, but even so implicit bias, the pay gap and work-life balance issues still hold sway within Belgian academia, especially in high-level positions (grades C-A).

- The highly complex nature of Belgium's political system (federal and regional levels) works to impede, rather than facilitate, gender equality and gives rise to new imbalances at the regional level.

	Flemish-speaking	French-speaking
Grade A	ZAP1 (Gewoon/ buitengewoon hoogleraar) and ZAP2 (Hoogleraar)	F.R.S.-FNRS ordinary and extraordinary professors, research directors
Grade B	ZAP3 (Hoofddocent), ZAP4 (Docent), and ZAP5 ("Other")	F.R.S.-FNRS other professors, senior research assistants
Grade C	AAP2 (doctor-assistants), WP3 (postdoctoral researchers of unlimited duration), WP4 (temporary postdoctoral researchers and unpaid postdoctoral researchers)	F.R.S.-FNRS assistant professors or equivalent [includes lecturers (Chargés de cours), senior lecturers (Maîtres de conférence), and junior research assistants]
Grade D	AAP1 (assistants) + AAP3 ("Other") + WP1 (predoctoral researchers of unlimited duration), WP2 (temporary predoctoral researchers and unpaid predoctoral researchers)	Research personnel: postdoctoral researchers, workers in science, teaching assistants, research interns (and the like)

Table 2.1. Academic equivalencies.

REFERENCES

Belgian Women In Science (BeWiSe). (n.d.). *Belgian Women in Science, official website*. Last retrieved 19 February 2023 from www.bewise.be

Bourabain, D. (2020). «Everyday sexism and racism in the ivory tower. The experiences of female early career researchers on the intersection of gender and ethnicity in the academic workplace». *Gender, Work and Organization*, doi: 10.1111/gwao.12549.

Broze, L., García, A., Plateau, N., Pernot, A., Scheys, M. & Van Nuland, M. (2009). *20 jaar Sophia: tussen dromen en verwezenlijkingen*. [*20 years of Sophia: between dreams and achievements*]. https://www.sophia.be/wp-content/uploads/2009/04/sophia-20-jaar-4.pdf

European Commission, Directorate-General for Employment, Social Affairs & Inclusion (n.d.). *Belgium – Maternity and paternity benefits*. Last retrieved 19 February 2023 from https://ec.europa.eu/social/main.jsp?catId=1102&langId=en&intPageId=4415

European Commission. Directorate-General for Research and Innovation (DG RTD) (2015). *She Figures 2015,* Publications Office. https://data.europa.eu/doi/10.2777/744106

European Commission. Directorate-General for Research and Innovation (DG RTD) (2019). *She Figures 2018,* Publications Office. https://data.europa.eu/doi/10.2777/936

European Commission. Directorate-General for Research and Innovation (DG RTD) (2021). *She figures 2021: gender in research and innovation: statistics and indicators*, Publications Office. https://data.europa.eu/doi/10.2777/06090

European Institute for Gender Equality (EIGE). (2022). *Gender Equality Index – Belgium in 2022*. Last retrieved 19 February 2023 from: https://eige.europa.eu/gender-equality-index/2022/BE

European Institute for Gender Equality (EIGE). (2023). *Gender Equality Index – Belgium in 2023*. Last retrieved 20 January 2024 from: https://eige.europa.eu/gender-equality-index/2023/BE

European Institute for Gender Equality (EIGE). (n.d.). *Gender Equality in Academia and Research – Belgium*. Last retrieved 19 February 2023 from:

https://eige.europa.eu/gender-mainstreaming/toolkits/gear/legislative-policy-backgrounds/belgium

EUROSTAT. (2023). *Real GDP per capita – table*. Accessed at https://ec.europa.eu/eurostat/databrowser/view/sdg_08_10/default/table?lang=en

EUROSTAT. (2023). *Students enrolled in tertiary education by education level, programme orientation, sex and field of education (EDUC_UOE_ENRT03_custom_6008895)*. Accessed at https://ec.europa.eu/eurostat/databrowser/view/EDUC_UOE_ENRT03__custom_6008895/default/table?lang=en

Federal Public Service FINANCE (n.d.). *Belgium and the IMF*. Last retrieved 19 February 2023 from https://finance.belgium.be/en/iefa/topics/europe_monetary/imf#:~:text=Belgium%20was%20one%20of%20the,188%20members%20of%20the%20IMF.

Flanders Investment and Trade. (2020). *Belgium is "European biotech leader" for 3rd year in a row.*
https://www.flandersinvestmentandtrade.com/invest/en/news/belgium-%E2%80%98european-biotech-leader%E2%80%99-3rd-year-in-row

Fonds de la Recherche Scientifique (F.R.S-FNRS) [Wallonian Scientific Research Fund]. (2017). *Rules and Regulations – Financial and Social provisions for the research fellow fellowship*. https://www.frs-fnrs.be/docs/Reglement-et-documents/FRS-FNRS_REGL_ASP_2_EN.pdf

Fonds de la Recherche Scientifique (F.R.S-FNRS). (2022). *Plan d'égalité de genre du FNRS 2022-2025* [*FNRS Gender Equality Plan, 2022-2025*]. https://www.frs-fnrs.be/docs/Plan-egalite-genre-FNRS-2022.pdf

Fonds de la Recherche Scientifique (F.R.S-FNRS). (n.d.). *Les Bourses belges L'Oréal-UNESCO For Women in Science* [*L'Oréal-UNESCO For Women in Science Awards, Belgium*]. Last retrieved 19 February 2023 from:
https://www.frs-fnrs.be/fr/prix-mecenats/grants/l-oreal-unesco-for-women-in-science

Fonds Wetenschappelijk Onderzoek (FWO) (25 October 2017). *Reglement van het Fonds Wetenschappelijk Onderzoek – Vlaanderen tot regeling van het mandaat postdoctoraal onderzoeker*.
https://www.fwo.be/nl/onderzoeksfinanciering/postdoctorale-mandaten/junior-postdoctoraal-onderzoeker/reglement-postdoc-2019/

Fonds Wetenschappelijk Onderzoek (FWO) [Scientific Research Fund] (2021). *Gender Equality Plan.* https://www.fwo.be/en/the-fwo/research-policy/hr-strategy/gender-equality-plan/

Fonds Wetenschappelijk Onderzoek (FWO). (n.d.). *FWO L'Oréal-UNESCO PhD Fellowship.* Last retrieved 19 February 2023 from: https://www.fwo.be/en/fellowships-funding/scientific-prizes/phd-fellowships-l-or%C3%A9al-unesco/

Homans, L. (2014). *Beleidsnota 2014-2019, Gelijke Kansen* [*Policy Document 2014-2019, Equal Opportunities*]. https://publicaties.vlaanderen.be/view-file/15676.

Innoviris. (2022). *Gender Equality Plan 2022-2027.* https://innoviris.brussels/sites/default/files/documents/gep_innoviris_en_0.pdf.

Innoviris. (n.d.). *Women Award in Science and Technology*. Last retrieved 19 February 2023 from: https://innoviris.brussels/brussels-science-ambassadress.

International Monetary Fund (IMF). (n.d.). *International Monetary Fund – Belgium Indicators.* Last retrieved 19 February 2023 from: https://www.imf.org/external/datamapper/profile/BEL

Jonge Academie. (2019). *Excellente Wetenschap = M + V + X* [*Excellence in Science = M(en) + W(omen) + X(non-binary)*]. https://wetenschapismvx.be/implicit-gender/home/

KU Leuven. (2017). *Academic Sexism – SASSY – Share Your Story, Listen to the Stories of Others*. https://www.kuleuven.be/samenwerking/vapl/VenU/archives-v-en-u/gender-archive/AcademicSexism

Lannoy, F. (2019). *Plan Genre 2020-2024* [*2020-2024 Gender Plan*]. https://ediwall.wallonie.be/plan-genre-2020-2024-numerique-083464

Organisation for Economic Co-operation and Development (OECD). (n.d.). *Gross domestic spending on R&D – Table*. Last retrieved 19 February 2023 from https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm

Parlement de la Communauté Française [*Parliament of the French Community*]. (2016). Décret instituant le Comité Femmes et Sciences [*Enabling Decree for the Committee for Women and Science*]. https://www.gallilex.cfwb.be/document/pdf/42601_001.pdf

Portail belgium.be [*Belgium.be portal*] (n.d.). *Moederschapsverlof en borstvoedingspauzes* [*Maternity leave and breastfeeding breaks*]. Last retrieved 19 February 2023 from https://www.belgium.be/nl/werk/loopbaanbeheer/verlof_en_loopbaanonderbrekingen/moederschapsverlof

Schiebinger, L. & Schraudner, M. (2011). Interdisciplinary Approaches to Achieving Gendered Innovations in Science, Medicine, and Engineering. Interdisciplinary Science Reviews, Vol. 36 No. 2, June 2011, 154-67.

Schulze, E., De Jong, W., Hadjihristova, Y., Scott, I., Linares, J. & Ghailani, D. (2015). *The policy on gender equality in Belgium, update 2015.* European Parliament, Directorate-General for Internal Policies, Policy Department C: Citizens' rights and constitutional affairs.

Shanghai Ranking. (2022). *2022* Academic Ranking of World Universities. http://www.shanghairanking.com/rankings/arwu/2022

Somers, B. (2019). Beleidsnota 2019-2024: Gelijke Kansen, Integratie en Inburgering. [*Policy Document 2019-2024: Equal Opportunities, Integration and Civil Integration*]. https://publicaties.vlaanderen.be/view-file/32225

The Belgian Statistical Office (STATBEL) (2022). *Bevolking per geslacht en leeftijdsgroep voor België, 2012-2022* [*Population by gender and age group for Belgium, 2012-2022*]. Last retrieved 19 February 2023 from https://bestat.statbel.fgov.be/bestat/crosstable.xhtml?view=5fee32f5-29b0-40df-9fb9-af43d1ac9032

The Belgian Statistical Office (STATBEL) (2022). *Op 1 januari 2022 telde de wettelijke Belgischebevolking 11.584.008 inwoners* [*On 1 January 2022, the legal population of Belgium was 11,584,008 inhabitants*]. https://statbel.fgov.be/nl/themas/bevolking/structuur-van-de-bevolking

The Institute for the Equality of Women and Men. (n.d.). Last retrieved 19 February 2023 from https://igvm-iefh.belgium.be/en

Times Higher Education. (2023). World University Rankings 2023. https://www.timeshighereducation.com/world-university-rankings/2023/world-ranking#!/page/0/length/25/locations/BEL/sort_by/rank/sort_order/asc/cols/stats

Trading Economics. (n.d.). Belgium Competitiveness Rank. Last retrieved 19 February 2023 from: https://tradingeconomics.com/belgium/competitiveness-rank

Van Wesemael, Y., De Metsenaere, M., Lievens, S., Pyck, H., Vandenbussche, L., Hiel, E., Van der Auweraert, A. & Nielandt, B. (2008). *Equality Guide: HR Instruments for Equal Opportunities at Universities*. https://www.kuleuven.be/diversiteit/publicaties/Equality_Guide_Basisboek_EN.pdf

Vincke, P. (2010). Letter to Mrs. Dagmar Meyer, Directorate-General for Research, Universities and Researchers; European Commission. https://www.recherchescientifique.be/index.php?eID=tx_nawsecuredl&u=0&g=0&hash=be749ea48b1dec0ce2f725d047f7bd212e61a339&file=fileadmin/sites/sirs/upload/sirs_super_editor/sirs_editor/documents/be_cref2010.pdf

Vlaamse Interuniversitaire Raad (VLIR) [*Flemish Interuniversity Council*] & Jonge Academie. (2019). *Gender in academia – Charter.* https://vlir.be/publicaties/gender-in-academia/

Vlaamse Interuniversitaire Raad (VLIR) High Level Task Force Gender. (2013). *VLIR Actieplan Gender - Vrouwen in de academische loopbaan en het universitair beleid* [*VLIR Gender Action Plan - Women in academic careers and university policy*]. https://docplayer.nl/20495756-Vlir-actieplan-gender.html

Vlaamse Interuniversitaire Raad (VLIR), Bureau UOS. (2015). *Gender policy.* https://cdn.webdoos.io/vliruos/bf49de26b165fd3d5f73fc3e4140e327.pdf

Vlaamse Interuniversitaire Raad (VLIR), Bureau UOS. (2020). *Leaving No One Behind – Equality & Inclusion Policy of VLIR-UOS.* https://cdn.vliruos.be/vliruos/VLIR-UOS%20Gender%20policy%202020-2024%20final.pdf

Vlaamse Overheid [*Flemish Parliament*]. (n.d.). *Bijzondere Onderzoeksfondsen – BOF* [*Flemish Government. Special Research Funds*]. Last retrieved 19 February 2023 from: https://www.ewi-vlaanderen.be/wat-doet-ewi/excellerend-onderzoek/financiering-van-onderzoek/bijzondere-onderzoeksfondsen

SPAIN

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Spain is located in the western part of the continent of Europe and covers a land area of 505,944 km^2, the 52nd largest country worldwide and the fourth largest in Europe. Its total population is 47.43 million at a population density of 94 inhabitants/km^2 according to data published by Spain's National Statistics Institute (*Instituto Nacional de Estadística*). Women make up slightly more than half of the population, 24.20 million, and men 23.24 million (Instituto Nacional Estadística [INE], 2017).

Its gross domestic product (GDP) in 2022 was US$2.2 trillion, 16th on the list released by the International Monetary Fund (IMF) (IMF, 2022). According to its Social Security rolls, at the end of July 2022 Spain's workforce was composed of 9,480,585 women and 10,860,380 men, a gender gap of 6.78% (Observatorio de Igualdad y Empleo, 2022).

Administratively, Spain is organised into 17 Autonomous Communities (or regional governments), divided into 50 provinces, and two Autonomous Cities, making it quite similar to a federal state because of the high degree of decentralisation in which each autonomous area is vested with extensive regional autonomy.

Spain approved its current Constitution in 1978, and section 14 of the Constitution reads "*All Spaniards are equal before the law and are not to be subject to discrimination of any sort by reason of birth, race, sex, religion, beliefs, or any other personal or social condition or circumstance*" (Las Cortes Generales, 1978). Since that time, a series of legislative advances have been made and active policies implemented in an endeavour to achieve the equality posited in the Constitution. Two of the main ones were the establishment of the Institute of

Women's Affairs (*Instituto de la Mujer*) by the Spanish Institute of Women's Affairs Enabling Act (*Ley 16/1983, de 24 de octubre*), published in the Official Gazette of Spain (*Boletín Oficial del Estado*) of 26 October 1983, at first as a subsidiary agency of Spain's Ministry of Culture, and Spain's True Equality between Women and Men Act (*Ley Orgánica 3/2007, de 22 de marzo, para la igualdad efectiva de mujeres y hombres*), which marked a turning point for equality policies in Spain.

The Institute of Women's Affairs did not just provide a proactive framework for women's education and for implementing specific policies within government; it was also a change of paradigm, a women-centric way of thinking about and experiencing the country's political, cultural, and social issues. The Institute designed four plans for equal opportunities for women, later followed by two strategic plans for equal opportunities between women and men.

From the inception of the Institute of Women's Affairs to the present, Spain has undergone spectacular growth in civil, social and political rights as they relate to gender issues, and this has given rise to the creation of a series of observatories on equality, the National Gender Violence Observatory (*Observatorio Estatal de Violencia de Género*), the Observatory on Gender Balance in Cultural Matters (*Observatorio de Igualdad de Género en el Ámbito de la Cultura*), the Women's Image Observatory (*Observatorio de la Imagen de las Mujeres*), and the Women, Science and Innovation Observatory (*Observatorio de Mujeres Ciencia e Innovación*), to examine the status of women in different areas (*law, education, culture, society, science, etc.*) and the situation of women compared to men (Instituto de la Mujer. Ministerio de Igualdad, 2022).

These steps aimed at boosting equality have not been restricted to the national level. Through the Institute of Women's Affairs, at the end of August 2022 Spain, as a member of the European Institute for Gender Equality, took up and launched the #3StepsForward campaign to encourage i) **understanding the challenges**, ii) **identifying the three steps you can take**, and iii) **committing to action** (European Commission Report, 2012). The campaign was aimed at ensuring the changes in equality policies deliver real change to achieve equality moving forwards –and not a regression under which (as we saw during the Covid-19 pandemic) the most vulnerable sectors, primarily women, would be affected – by promoting truly balanced participation in working, social, and political life.

STATISTICS ON ACADEMIC AND SCIENTIFIC STAFFING IN SPAIN

At the present time a large volume of statistical data on the gender situation in respect of academic and scientific staff in Spain is available. The Equality Unit (*Unidad de Igualdad*), the Women and Science Unit (*Unidad de Mujeres y Ciencia*), and the Women, Science and Innovation Observatory have made great efforts and have produced a series of reports describing the status of women in real time. Spain is home to 88 universities, 50 of which are public (including two distance learning universities, such as the UNED (National Distance Learning University)) and 38 private. At the end of 2021, the total number of students amounted to nearly 1.7 million undergraduate, master's degree and doctoral students, with women accounting for 56%, 55.4% and 50%, respectively, in the 2020-2021 academic year (Observatorio de Igualdad y Empleo, 2022).

It is interesting to note that according to Spanish Ministry of Universities data (2022), female university students' preferred courses of study are firstly health sciences, followed by arts and humanities, social sciences and sciences generally, with engineering and architecture trailing by a clear margin (Figure 3.1).

Though it seems that access to university by women has attained equality, as Figure 3.1, shows, the fact is that there are large differences and a gap affecting women's career development and their attaining positions of responsibility, as will be discussed below.

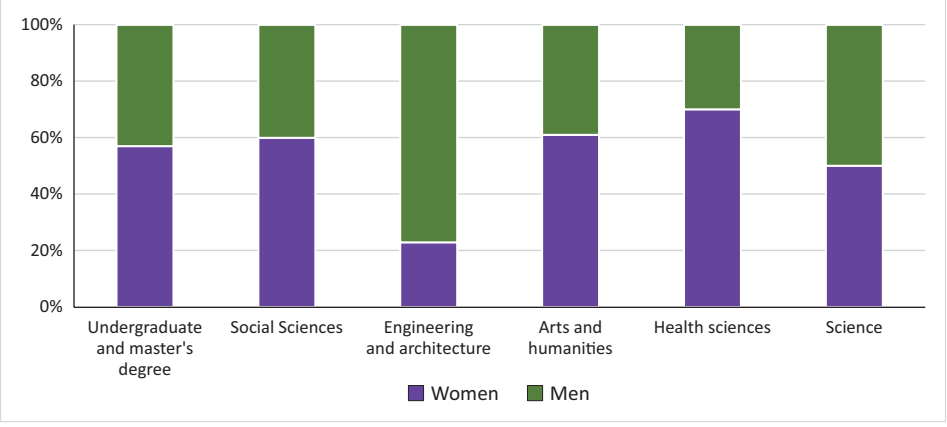

Figure 3.1. Students enrolled in undergraduate studies in Spain's university system in the 2020-2021 academic year by subject area and sex.
Data sourced from the Ministry of Universities (2021).

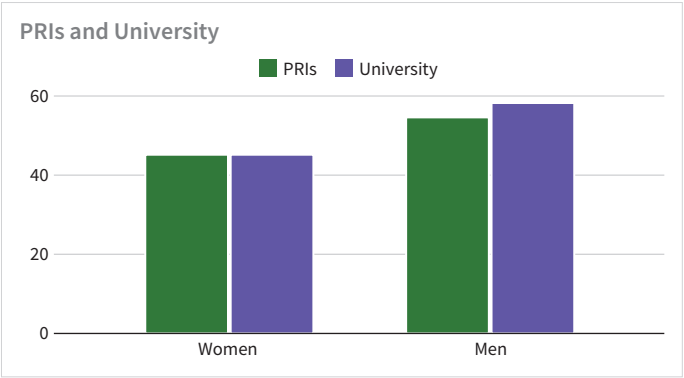

Figure 3.2. Percentage research and teaching staff at PRIs and universities. 2019. Share of Women on University Staffs and at R&D institutions report by the Ministry of Science, Innovation, and Universities (Ministerio de Ciencia, Innovación y Universidades) (Unidad de Igualdad, Gabinete Técnico de la Subsecretaría de Ciencia, I. y U, n.d.), compiled by the author.

The latest data set out in the "Women Researchers" ("Mujeres Investigadoras") report published by the Women and Science Committee (Comisión de Mujeres y Ciencia) of the CSIC (Spain's National Research Council) again takes the form of the now familiar scissors diagram, depicting the large gender gap affecting science careers. In point of fact, over the years there has been a clear evolution in the presence of women towards that scissors distribution, from parity at the predoctoral level to a substantial drop-off in the later stages of careers in science (Figure 3.3). Starting, in 2004, from 54% women at the predoctoral level and 85% men at the level of full professor and research professor, those shares have evolved up to 26.9% women in research professor positions in 2020, the peak value reached to date.

Still, Spain's figures are not entirely discouraging when examined in the framework, for instance, of the figures for membership on scientific and administrative committees broken down by sex. According to the She Figures for 2018 report (European Commission. Directorate-General for Research and Innovation, 2019), women made up 39% compared to 27% in the EU. One of the objectives of Horizon 2020, and therefore of the True Equality between Women and Men Act, aims at 40-60% membership of women in these groups (Horizon, 2020).

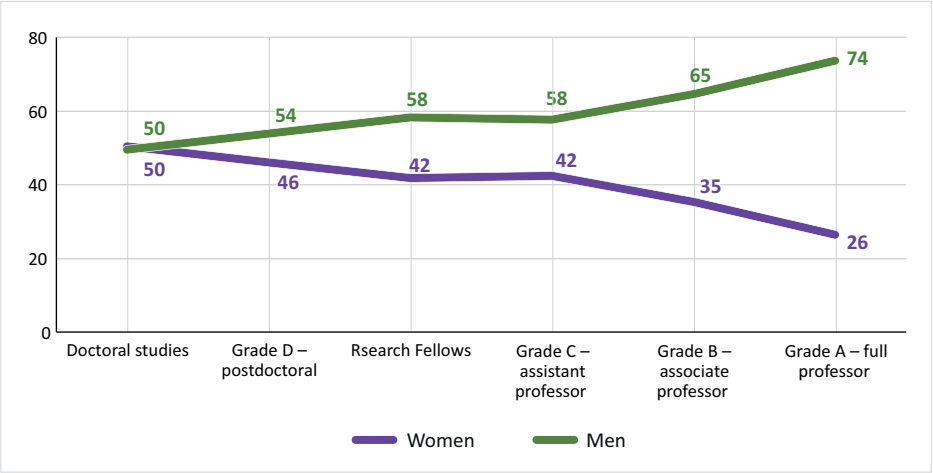

Figure 3.3. Percentage research staff at the National Research Council and research centres by sex (%) in 2021. Data extracted from the Women Researchers Report by the Women and Science Presidential Advisory Committee (CSIC, 2021).

GENDER EQUALITY POLICIES IN SCIENCE IN SPAIN

There is no question of the institutional intent to bridge the gender gap existing today at both the national and European levels. As we have seen in the introduction, many steps have been taken, ranging from the Horizon 2020 Strategy (*Horizon, 2020*) in Europe to changes in domestic legislation like the recently approved amendments to the Spanish Science, Technology and Innovation Act (*Ley 14/2011, de 1 de junio, de la Ciencia, la Tecnología y la Innovación*) Official Gazette of Spain (BOE) (Ley 17/2022, de 5 de septiembre [*Spanish Science, Technology and Innovation Act Amending Act*], 2022), providing, for the first time, legal certainty in matters pertaining to gender equality. SDG 5 in the 2030 Agenda, aimed at achieving gender equality and empowering women and girls at all levels in all areas, should also not be overlooked.

The European Commission has set three main objectives: 1) fostering equality in careers in science, 2) ensuring gender balance on decision-making bodies and in decision-making processes, and 3) integrating the gender dimension in research and innovation content (Gender Action, 2018).

Within Spain, as prescribed in the current wording of the amended Science, Technology and Innovation Act, public agencies must include

gender balance policies in their action plans and implement protocols against workplace harassment by reason of gender and/or sexual orientation (Nota de prensa aprobación de la Ley de la Ciencia [Press release on enactment of the Science Act]. La Moncloa, 2022). Needless to say, the creation of an observatory has been key in "*assessing, monitoring, and measuring impacts on the status of women in the field of research, development, and innovation; fostering, proposing, advising, and driving public policies and measures in those areas to do away with visible and invisible barriers to real and effective gender equality; and enhancing the status of women in Spain's Science, Technology and Innovation System*" (Observatorio de Mujeres, Ciencia e Innovación. Ministerio de Ciencia e Innovación, 2022).

The above Act also provides for the creation of gender equality certification schemes like those that already exist in other countries, such as Ireland. The Athena Swan accreditation was designed in Ireland in 2015 (Athena Swan, 2015) but dates back to the Gender Equality Unit in the United Kingdom in 2005 as a means of certifying gender policy excellence by implementing equality plans under special departments set up for that purpose.

The amended Science, Technology and Innovation Act also places emphasis on attracting female talent to STEM (Science, Technology, Engineering and Mathematics) careers and on retention and career development for women in science careers to try to reduce attrition. It further stresses the right to safe, diverse, inclusive and equal workplaces.

The importance of taking work-life balance into account and ensuring equality in selection processes and of fostering and advancing shared parenting to achieve real social change in Spain is emphasised in this White Paper and should not be overlooked.

Apart from the Science, Technology and Innovation Act Amending Act, there have been multiple gender initiatives and plans both nationally and at research centres and institutions. Examples include the Equality Plan published by the National Cancer Research Centre (*Centro Nacional de Investigaciones Oncológicas* [CNIO]) in October 2019 (CNIO, 2019) and more recent measures ranging from the "2022 Women and Innovation" ("*Mujeres e Innovación 2022*") report to the First Gender Equality Plan for 2021-2025 ("*I Plan de Igualdad de Género 2021-2025*") by the Spanish Science and Technology Foundation (Fundación Española para la Ciencia y la Tecnología,

FECYT) (FECYT, 2022). All these plans are based on a series of principles like multi-dimensional gender policies, social dialogue and prohibitions against sexual harassment or harassment directly or indirectly on account of sex.

Clearly, what is needed is not just the political will and a suitable legal framework but also positive measures for shrinking existing pay gaps and for access by women to positions of responsibility, breaking all the glass ceilings, sticky floors and other barriers women face in their professional careers.

CONCLUSIONS

- Since 1978, when the Spanish Constitution enshrined the equality of all Spanish citizens before the law irrespective of sex, race, religion, etc., Spain has made great strides in gender policies, not just in science and technology, as we have seen, but also in working, social and political life.
- These issues have been addressed by a series of legislative measures, yet even so this does not seem to have been enough, and stronger efforts are needed to make equality between the sexes a reality.
- To achieve sustainable development goal SDG 5 under the 2030 Agenda and secure gender equality and the empowerment of women and girls at all levels in all areas, we need to keep striving after gender equality, since women make up half the world's population.
- It is important to join together and encourage society as a whole, without regard to gender, to engage with real change so that "the subordinating of women because of its ignorance of the history of their struggles and accomplishments can be stemmed" [*retranslated from the Spanish*] (Gerda Lerner) in the shortest possible time, enabling actual gender equality to make this White Paper a historical footnote of one stage in the fight against inequality.

REFERENCES

Athena Swan (2015). https://hea.ie/policy/gender/athena-swan/

BOE [Official Gazette of Spain]. Ley 17/2022, de 5 de septiembre, por la que se modifica la Ley 14/2011, de 1 de junio, de la Ciencia, la Tecnología y la Innovación [*Science, Technology, and Innovation Act Amending Act*]. https://www.boe.es/buscar/pdf/2022/BOE-A-2022-14581-consolidado.pdf

Centro Nacional de Investigaciones Oncológicas (CNIO) [*National Cancer Research Centre*]. (2019). Plan de igualdad en la fundación del sector público estatal. Centro Nacional De Investigaciones Oncológicas Carlos III [*Charles III National Cancer Research Centre National Public Sector Foundation Equality Plan*]. https://www.cnio.es/downloads/mujeres-y-ciencia/Plan-de-Igualdad-CNIO-2019.pdf

Cortes Generales [*Spanish Parliament*] (1978). La Constitución española de 1978 [*The Spanish Constitution of 1978*]. https://www.boe.es/eli/es/c/1978/12/27/(1)/con

CSIC [*Spain's National Research Council*] (2021). Informe mujeres investigadoras [*Women Researchers Report*]. Comisión de mujeres y ciencia del Consejo Superior de Investigaciones Científicas [*Women and Science Committee of the National Research Council*]. https://icp.csic.es/wp-content/uploads/2021/06/informe_mujeres_investigadores_cmyc-2021_0.pdf

European Commission Report (2012). *Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation*. European Commission Report. doi 10.2777/32045

European Commission. Directorate-General for Research and Innovation (2019). *She Figures 2018*, Publications Office. https://data.europa.eu/doi/10.2777/936

Fundación Española para la Ciencia y la Tecnología (FECYT) [*Spanish Science and Technology Foundation*]. (2022). La Fundación Española para la Ciencia y la Tecnología publica su Plan de Igualdad de Género [The Spanish Science and Technology Foundation publishes its Gender Equality Plan]. Ministerio de Ciencia, Innovación y Universidades [Ministry of Science, Innovation and Universities]. https://www.fecyt.es/es/noticia/la-fundacion-espanola-para-la-ciencia-y-la[1]tecnologia-publica-su-plan-de-igualdad-de-genero

Gender action. (2018). *La perspectiva de género en Horizonte Europa* [*Gender Perspective in Horizon Europe*]. https://h2020.genderaction.eu/wp-content/uploads/2020/11/GENDERACTION-Policy-Brief_1_Gender-in-Horizon-Europe_ES.pdf

Horizon 2020. *Promoting Gender Equality in Research and Innovation*. https://ec.europa.eu/programmes/horizon2020/en/h2020-section/promoting-gender-equality-research-and-innovation#Article

Instituto de la Mujer [*Institute of Women's Affairs*]. Ministerio de Igualdad [*Ministry of Equality*] (2022). https://www.inmujeres.gob.es/elInstituto/historia/home.htm

Instituto Nacional de Estadística de España [*National Statistics Institute of Spain*] (2017). España en Cifras [*Spain in Figures*]. https://ine.es/prodyser/espa_cifras/2017/files/assets/common/downloads/publication.pdf

International Monetary Fund (2022). *World Economic Outlook Database*. https://www.imf.org/en/Publications/WEO/weo-database/2022/April/

Ministerio de Universidades [*Ministry of Universities*] (2021). *Datos y cifras del Sistema Universitario Español Publicación 2020-2021* [Data and figures on Spain's University System, 2020-2021]. https://www.universidades.gob.es/wp-content/uploads/2023/01/Datos_y_Cifras_2020_21.pdf

Ministerio de Universidades [*Ministry of Universities*] (2022). *Estadística de Estudiantes* [*Statistics on Students*]. https://www.universidades.gob.es/estadistica-de-estudiantes/

Mujeres e Innovación [*Women and Innovation*] (2022). https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/ciencia-e-innovacion/Documents/2022/080322_Informe_Mujeres_Innovacion_2022.pdf

Mujeres Investigadoras de la Comisión Asesora de Presidencia "Mujeres y Ciencia" ["*Women Researchers" Report by the Women and Science Presidential Advisory Committee*]. https://www.ciencia.gob.es/InfoGeneralPortal/documento/f97aa94d-9c13-4c5e-b47a-a8ae1e8280f2

Nota de prensa aprobación de la Ley de la Ciencia [Pr*ess release on enactment of the Science Act*]. La Moncloa [*Moncloa Presidential Offices*] (2022). https://www.lamoncloa.gob.es/serviciosdeprensa/notasprensa/ciencia-e-innovacion/Paginas/2022/250822-aprobacion-ley-ciencia.aspx

Observatorio de Igualdad y Empleo [*Employment and Equality Observatory*] (2022). https://www.observatorioigualdadyempleo.es/estadisticas-2/

Observatorio de Mujeres, Ciencia e Innovación [*Women, Science and Innovation Observatory*]. Ministerio de Ciencia e Innovación [*Ministry of Science and Innovation*] (2022). https://www.ciencia.gob.es/en/Secc-Servicios/Igualdad/OMCI.html

Unidad de Igualdad, Gabinete Técnico de la Subsecretaría de Ciencia, I. y U. [*Equality Unit, Technical Department, Office of the Undersecretary for Science, Innovation and Universities*]. (n.d.). *Presencia de mujeres en el personal de la universidad y en la I+d+i* [*Participation by Women on University Staffs and at R&D Institutions*]. Ministerio de Ciencia, Innovación y Universidades [*Ministry of Science, Innovation and Universities*]. https://www.ciencia.gob.es/InfoGeneralPortal/documento/f97aa94d-9c13-4c5e-b47a-a8ae1e8280f2

FRANCE

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

France, in western Europe, has a land area of 549,087 km^2 and a population of 67,842,582 people (51.7% women), an appreciable number of inhabitants compared with other countries in western Europe, and a population density of 124 inhabitants per km^2.

In 2022 France's gross domestic product (GDP) was €2.6 trillion and €36,660 per capita (Institut National de la Statistique et des Études Économiques [INSEE], 2022). In 2020 the employment rate for women from 15 to 64 years of age was 67.6% compared with 74.5% for men. According to the International Labour Organization (ILO), women make up 48.5% of the workforce (France Travail, 2022).

The gap between women and men in part-time employment has been shrinking since 2014, dropping for women and rising moderately for men. In fact, in 2020, among the working population more women still worked part time compared to men, 27.4% vs 8.4%. In both cases, personal and family reasons were the main reasons for working part time.

The European gender equality index drawn up by the European Institute for Gender Equality (EIGE) in 2023 ranked France among the top six European countries, with a score of 75.7, at 5.5 points above the European average (70.2) (European Institute for Gender Equality, 2023).

The Ministry of National Education and Youth (*Éducation nationale et de la Jeunesse* [MENJ]), the Ministry of Higher Education, Research, and Innovation

(*Enseignement supérieur, de la Recherche et de l'Innovation* [MESRI]), and the Ministry of the Olympic and Paralympic Games (*Jeux olympiques et paralympiques* [MSJOP]) have designed a national action plan for job equality between women and men for 2021-2023, to be updated and renewed every three years. The national action plan applies to the entire country, while initial pilot French Standardisation Association (*Association française de normalisation* [AFNOR]) audits have focussed on the central ministerial administration. The ministries participate in the equality action plan, along with the universities of Versailles, Rennes and Strasbourg, leading to the potential receipt of certain certifications for job equality between women and men (valid for four years), with audits every two years in the interest of continuous improvement.

Five areas have been chosen to transform behaviour and human resource management in research (Ministère de l'Enseignement supérieur et de la Recherche, 2021):

- Strengthening policies to achieve equality between men and women.
- Enabling equal access to jobs and professional responsibilities.
- Preventing and addressing differences in remuneration and career development.
- Providing more support for childbearing, paternity and work-life balance.
- Preventing and tackling discrimination, violence, mobbing and sexual harassment, and sexism.

STATISTICS ON ACADEMIC STAFFING IN FRANCE

The statistics shed light on the parity situation in academic and scientific pursuits in France. At the beginning of the 2020 academic year, women made up more than half (55%) of students of higher education. The presence of women in university education is particularly strong in life sciences (63% of students) and medicine-dentistry (64%). Women's share in other scientific fields is progressively growing (41% of students, a 3.2% increase since 2010), and their participation in the pure sciences (physics, chemistry, astronomy, geology, and biology) is also climbing (31% in 2021 vs 28% in 2016).

Parity in academic posts has not yet been achieved, although some progress has been made. Women accounted for 45% of associate professors (in French, *maîtresse de conference* [MCF]) in 2020, but parity is still very far off for full

professors (*professeurs d'université* [PR]), with women accounting for just 29% in 2020 vs 21% in 2012. Furthermore, whether as researchers or as support staff, women hold temporary positions more often than men (18% women, 15% men).

French research policy is set by the Ministry of Higher Education, Research, and Innovation (Ministère de l'Enseignement Supérieur de la Recherche et de l'Innovation, 2015), and the Ministry reviews the National Research Strategy (*Stratégie Nationale de Recherche* [SNR]) every five years.

MESRI and the Strategic Research Council set the research policy road map and overall budget. Funding providers like the National Research Agency (*Agence Nationale de la Recherche*, 2022) decide on the most pressing objectives for the sector and how resources are to be allocated.

One-third of research is carried out by higher education establishments and national research institutions (public research), the remaining two-thirds by businesses (private research). The National Scientific Research Centre (*Centre National de la Recherche Scientifique* [CNRS]), France's equivalent to Spain's National Research Council (CSIC), and the Alternative Energies and Atomic Energy Commission (*Commissariat à l'énergie atomique et aux énergies alternatives* [CEA]) carry out 33% of public research.

The share of women scientists in science, research, and teaching in France is below parity. Women made up 45% of associate professors in 2020, a mere 10% rise since 1992. The proportion of women full professors is considerably lower, 29% in 2020 (Figure 4.1).

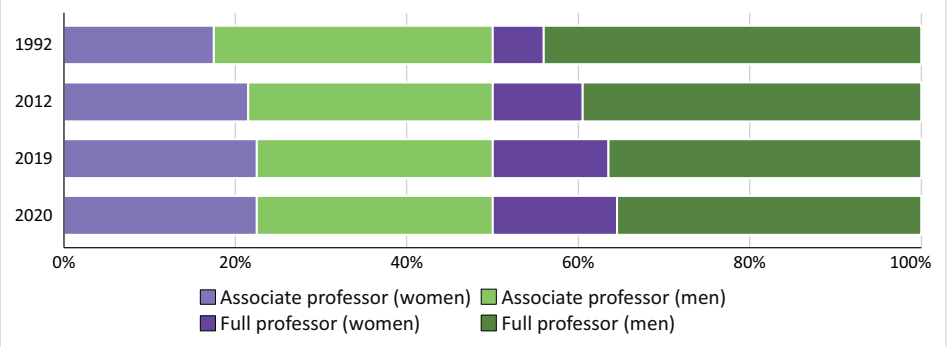

Figure 4.1. Associate professors and full professors (women and men) in France. Compiled by the author from Eurostat-DG Research and Innovation – Women in Science data – She Figures 2018 and She Figures 2021; processed by MESRI-SIES (Information Systems and Statistical Studies).

The percentage of women displays a pronounced scissors effect over the course of academic careers as a whole (Figure 4.2). Women make up the majority at the level of undergraduate and master's degree studies but then drop out of academia at the doctoral level. The share of women in higher level academic positions (grade A) in France was slightly above the EU average in 2015 and 2018. In 2018 27.7% of grade A positions were held by women, compared with the EU average of 26.2% (*She Figures*, 2021). Some progress in raising the proportion of women at that level has been made since 2013, and the share of women in grade A positions rose by 7.2 points in 2013-2018.

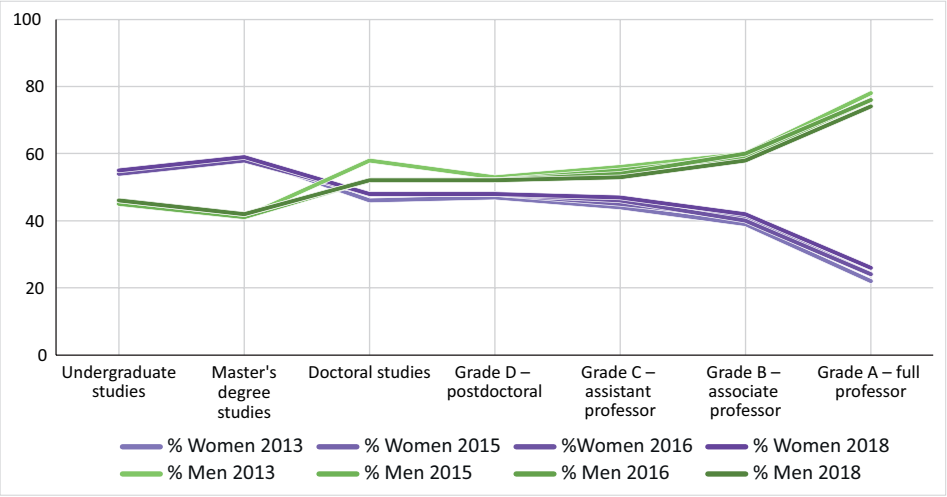

Figure 4.2. Percentage men and women in academic studies and careers at French universities, 2013-2018. (Source: Eurostat-DG Research and Innovation – Women in Science database – She Figures 2018 and She Figures 2021; processed by MESRI-SIES).

Turning to positions in the STEM fields, women make up a very small percentage over the entire span of academic careers (Figure 4.3).

Women accounted for 40% of research and teaching staff at university in 2020. They make up 63% of teaching and research staff in the field of language and literature, but that figure drops by 20% in the engineering fields. Figure 4.4 depicts the under-representation of women in engineering, physics, mathematics and IT.

Over the past 10 years, the number of female university professors has risen by 24% while the number of male university professors has fallen by 7%. This trend can be observed in all the main subject areas: 1) Law-Economics-Business:

up by 52% (women) /down by 6% (men); 2) Science and Technology: up by 25% /down by 2%, and 3) Arts and Humanities: up by 17% /down by 14%.

Figure 4.3. Percentage women and men in science and engineering careers in France, 2013-2020. (Compiled by the author from Eurostat-DG Research and Innovation – Women in Science data – She Figures 2018 and She Figures 2021; processed by MESRI-SIES).

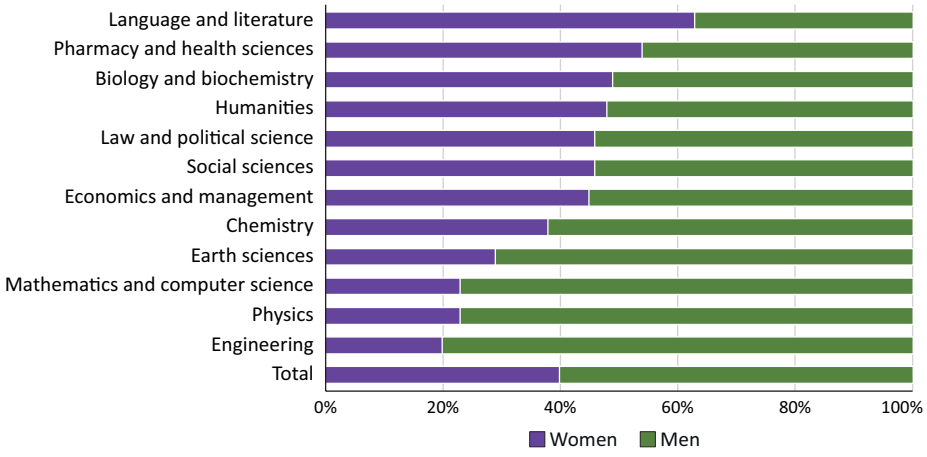

Figure 4.4. Percentage men and women researchers in France by subject area, 2020. Compiled by the author from MEN/MESRI-DGRH [HR Office] staff databases and yearbooks.

In that same period from 2010 to 2020, numbers of female associate professors were up 4% while those of male associate professors were down 6%. Women were up 12% in Law-Economics-Business, 5% in the Arts and Humanities, and 1% in Science-Technology, while at the same time men were down 9% in Law-Economics-Business and in the Arts and Humanities and 4% in Science-Technology.

GENDER EQUALITY POLICIES IN SCIENCE IN FRANCE

The 2012 Equality in the Civil Service Act (Act dated 12 March 2012) forms the legislative framework for equality policies at French universities. Based on that legislation the Ministry of Higher Education, Research and Innovation set in motion an action plan for equality between women and men (Ministère de l'Enseignement supérieur et de la Recherche, 2021, 2023) which began in 2012 and ended in 2020. That plan included eight mainstreaming actions:

1. Coordinating gender equality policies among university institutions.
2. Implementing the provisions aimed at equality as regards access to and enhancement of the conditions of the civil service laid down in the Act of 12 March 2012.
3. Integrating job equality into academic and research career development.
4. Promoting parity on representative bodies.
5. Fostering diversity and combating stereotypes in university education.
6. Fighting against sexual violence.
7. Supporting and disseminating gender studies research.
8. Promoting these actions in the European area.

In 2013 another law was enacted, the Higher Education and Research Act, known as the *Fioraso* Act (Légifrance, 2013), in its turn buttressed by the Equality and Citizenship Act in January 2017 (Légifrance, 2017).

Measures set forth in these two acts to be highlighted include parity at decision-making levels, fostering the presence of women in traditionally male fields and fighting sexual harassment. However, the most significant measure contained in the *Fioraso* Act was the requirement for universities to appoint a men's and women's equality officer (*Chargé de mission égalité hommes-femmes*) to be in charge of adopting and implementing specific equality initiatives. Universities may appoint one of their administrative or academic staff members to serve as the officer tasked to perform those special duties.

Besides these measures are calls to adapt an academic action plan to take into account contextual circumstances and specific territorial issues, as part of the local social dialogue.

In addition, a series of actions relating to personnel recruitment have been taken in recent years.

- Since 2012 (the Sauvadet Act), management has been required to appoint at least 40% from each gender on all assessment and examining panels and search committees.
- Since 2017 the panel and selection committee chair is to alternate between women and men at the end of each chair's term.
- Professional assessment and selection procedures are required to avoid all discriminatory practices, especially against expectant mothers, who are entitled to take oral examinations by video conference, if they wish.
- To prevent all forms of discrimination in the broadest sense, in 2021 the HR Office (*Direction Générale des Ressources Humaines* [DGRH]) circulated a framework document on procedures and improvements to avoid discrimination in recruitment, onboarding and integration.

The need to be able to relocate geographically can often put a brake on equality between women and men in their professional careers. The following steps have been taken with that in mind:

- Promoting or enabling functional relocation instead of geographical relocation.
- Anticipating and restructuring relocation cycles or extending job duration before having to change jobs.
- Providing better support for relocation from a social and family perspective.

CONCLUSIONS

- In France, more women than men complete undergraduate and master's degrees. However, the situation for top-level positions is the converse.
- There are clear differences in the research fields chosen by men and women.
- STEM fields are still chosen mostly by men.
- Despite recent gender equality laws, the government has not yet achieved parity in the civil service.

SUPPLEMENT

The categories in France's academic system do not correspond exactly with the categories that exist in other countries, complicating classifications when comparing other countries' university and academic systems.

Description of the categories in France's research system (Kammerer, 2020):

- PhD candidate (*Doctorant [bac+8]*), with a three-year contract. France also has industrial research training contracts (*Conventions industrielles de formation par la recherche [CIFRE]*), which enable young researchers to do work towards their doctoral theses at a company under the supervision of an outside research team (the university) while being paid by the company.
- Postdoctoral researcher (*Post-doctorant*).
- Temporary postdoctoral teaching and research assistant (*Attachés temporaries d'enseignement et de recherche [ATER]*), combining both teaching and laboratory research.
- Teaching and research positions: Research professor (*Enseignant-Chercheur*): Associate professor (*Maître de conférences [MCF]*) and full professor (*Professeur des universités [PR]*). Both these posts have the dual mission of conducting and supervising basic and applied research combined with knowledge transfer through teaching.
- Dedicated research positions (non-teaching): Researcher (*Charge de Recherche, [CR]*) and Director of Research (*Directeur de Recherche [DR]*).
- Senior researcher (*Ingénieurs de recherche [IR]*). No such category exists in Spain. Duties involve research, training and management activities and disseminating scientific and technical information and knowledge. Also, tasks connected with coordinating technical areas. A doctorate is a requirement for this position.
- Junior researcher (*Ingénieur d'études [IE]*). Duties mainly concern designing and developing methods and techniques aimed at improving results. The position is open to certified engineers, holders of an undergraduate degree and master's degree students.
- Research assistant (*Assistant ingénieur [AI]*). This job is focused on devising and executing specialised or technical processes. Duties may also entail being in charge of specific assignments. These jobs are open only to students who have an undergraduate degree with teaching qualifications.

- Research and training technician (*Technicien de recherche et de formation*). Duties involve entry-level implementation of methods and techniques.

REFERENCES

Agence Nationale de la Recherche [*National Research Agency*] (2022). *Évaluation des Initiatives d'excellence (IDEX) et Initiatives Science-Innovation-Territoire-Economie (I-SITE) du programme d'investissements d'avenir (PIA)* [*Initiative of Excellence Evaluation and Initiatives for Science, Innovation, Territories, and Economy under the Investments for the Future Programme*]. https://anr.fr

Centre National de la Recherche Scientifique [*National Centre for Scientific Research*]. (n.d.) https://www.cnrs.fr

Commissariat à l'énergie atomique et aux énergies alternatives [*Alternative Energies and Atomic Energy Commission*] (n.d.). *Découvrez les principaux domaines d'activité sur lesquels le CEA travaille [Check out the main areas of the CEA's work].* https://www.cea.fr/Pages/domaines-de-recherche.aspx

European Commission. Directorate-General for Research and Innovation (2019). *She Figures 2018,* Publications Office. https://op.europa.eu/en/publication-detail/-/publication/9540ffa1-4478-11e9-a8ed-01aa75ed71a1/language-en

European Commission, Directorate-General for Research and Innovation, (2021). *She figures 2021: gender in research and innovation: statistics and indicators*, Publications Office. https://data.europa.eu/doi/10.2777/06090

European Institute for Gender Equality, (2023). *Gender Equality Index*. https://eige.europa.eu/gender-equality-index/2023/FR

France Travail [*French Employment Service*] (2022). Pôle emploi [*Job Centre*]. https://www.pole-emploi.fr.

Institut national de la statistique et des études économiques [*National Institute of Statistics and Economic Studies*] (2022). *Évolution du produit intérieur brut et de ses composantes* [*Changes in Gross Domestic Product and GDP Components*]. https://www.insee.fr/fr/statistiques/2830613

Kammerer, C. (2020). *Les personnels de la recherche* [*Research personnel*]. Ministère de l'enseignement Supérieur et de la Recherche [*Ministry of Higher*

Education and Research]. https://www.enseignementsup-recherche.gouv.fr/fr/les-personnels-de-la-recherche-46556

Légifrance [*Legislation Publications Office*] (2013). *LOI n° 2013-660 du 22 juillet 2013 relative à l'enseignement supérieur et à la recherche (1)* [*Higher Education and Research Act 2013-660 of 22 July 2013*]. https://www.legifrance.gouv.fr/loda/id/JORFTEXT000027735009

Légifrance. (2017). *LOI n° 2017-86 du 27 janvier 2017 relative à l'égalité et à la citoyenneté (1)* [*Equality and Citizenship Act 2017-86 of 27 January 2017*]. Gouvernement. Fr. https://www.legifrance.gouv.fr/loda/id/JORFTEXT000033934948

Ministère de l'Enseignement Supérieur de la Recherche et de l'Innovation. (2015). *Stratégie nationale de recherche [National Research Strategy] France Europe 2020.* https://www.enseignementsup-recherche.gouv.fr/sites/default/files/imported_files/documents/strategie_nationale_recherche_397269.pdf

Ministère de l'Enseignement Supérieur et de la Recherche. (2021). *Plan national d'action 2021-2023 pour l'égalité professionnelle* [*2021-2023 National job equality action plan*]. https://www.enseignementsup-recherche.gouv.fr/fr/plan-national-action-2021-2023-egalite-professionnelle

Ministère de l'Enseignement Supérieur et de la Recherche. (2023). *Égalité professionnelle entre les femmes et les hommes* [*Career equality between women and men*]. https://www.enseignementsup-recherche.gouv.fr/fr/egalite-professionnelle-entre-les-femmes-et-les-hommes-51877

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

The Republic of Ireland is located at the northwestern edge of the continent of Europe and has a land area of 70,282 km^2 out of the island of Ireland's 84,421 km^2 (Encyclopedia Britannica, 2023). It officially became a republic after its independence from Great Britain in 1921 following a brief Civil War caused by differences between the sides concerning the terms of separation. Its per capita GDP in 2021 was €84,940 (World Bank Group, 2023), one of the world's highest.

According to preliminary 2022 census data, Ireland's population was 5.1 million, the highest number since 1841. Women made up 50.34%, men 49.66%. The country's population density has grown in recent years, to 72 per km2 (2021) compared with 67 in 2011 and 62 in 2006. The average for urban areas is 2,008 people per km2, in contrast to 27 per km2 in rural areas. The most densely populated regions are chiefly within the Greater Dublin area, namely, the country's capital city and its outlying districts (Central Statistics Office [CSO], 2022).

The roots of the current Irish gender equality laws trace back to the 1970s, when the republic joined the then European Economic Community. One of the first measures that were taken was to repeal the marriage bar for women who

worked in the public sector. The immediate result was to increase the number of women in the job market.

The country adopted the principle of mainstreaming the gender perspective at the end of the 1990s/beginning of the 2000s. The European Commission requires EU-funded projects to foster equal opportunity, but the Irish government has broadened this requirement to all government projects irrespective of the source of their funding.

Ireland ranks ninth among EU Member States on the Overall Gender Equality Index (2023), with a score of 73 (where 1 is complete gender inequality and 100 full gender equality) (EIGE, 2023), one point less and one place lower than in previous years. The distribution of seats in Parliament (2020) was 22.2% women and 77.8% men (CSO, n.d.).

Ireland's present unemployment rate is relatively low, thanks to an economic upswing. The rate dropped from 5.1% for the population as a whole in December 2021 to 4.1% for men and 4.5% for women in December 2022 (CSO, n.d.).

The gender gap currently stands at 80.4%. This percentage places Ireland among the top 10 in the ranking of countries with the greatest equality between men and women, specifically, in ninth place. Despite these advances, workplace inequalities still exist, and pay for women is 16% lower than the average salary for men (Global Gender Gap Report [GGGR], 2022).

STATISTICS ON ACADEMIC STAFFING IN IRELAND

Total enrolment in higher education grew by 17.3% from the 2014/15 academic year to the 2020/21 academic year, rising from nearly 209,000 to more than 246,000. In 2020 59.9% of women and 52.2% of men between 25 and 34 years of age were enrolled in higher education studies (Higher Education Authority [HEA], 2021).

The choices of students entering institutions of higher learning still appear to be coloured by traditional thinking, with a sizeable proportion of women choosing the fields of healthcare, education and the humanities and a larger proportion of men choosing STEM (Science, Technology, Engineering, and Mathematics) fields, business and construction (Figure 5.1).

The available data suggest that in staff hirings by institutions of higher education in Ireland in recent years, there has been a tendency to hire more

women than men (Figure 5.2). This trend is still more marked on the staffs of Institutes of Technology (higher education institutions concentrating on STEM studies), where the proportion has risen to around 50-50, and at colleges (higher education technical training institutions), where women hold nearly two-thirds of staff positions.

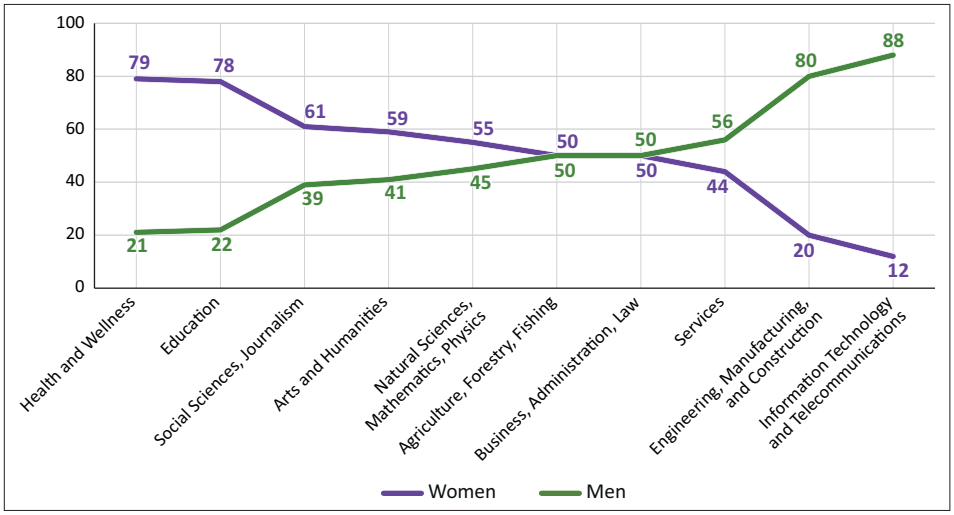

Figure 5.1. Percentage women and men by knowledge area. Compiled by the authors. Source: HEA. Student data: https://hea.ie/statistics/data-for-download-and-visualisations/

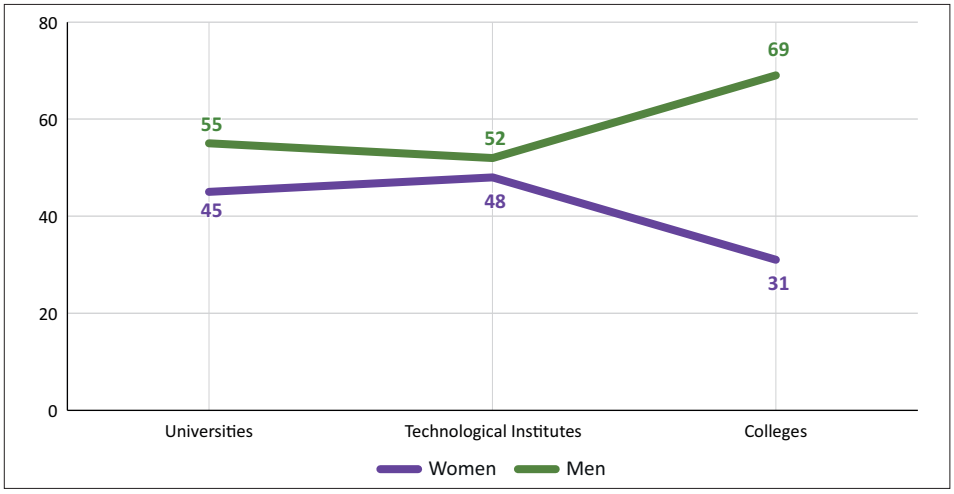

Figure 5.2. Percentage staff at institutions of higher education in Ireland by sex. Compiled by the authors. Source: https://www.maynoothuniversity.ie/gender-equality-dashboard

Yet a look at the make-up of staff in academia (excluding administrative personnel) makes clear that women are over-represented in less permanent, lower-level positions, while men continue to predominate in technical fields and in the most high-ranking positions with the greatest responsibility both in research and in teaching (Figure 5.3).

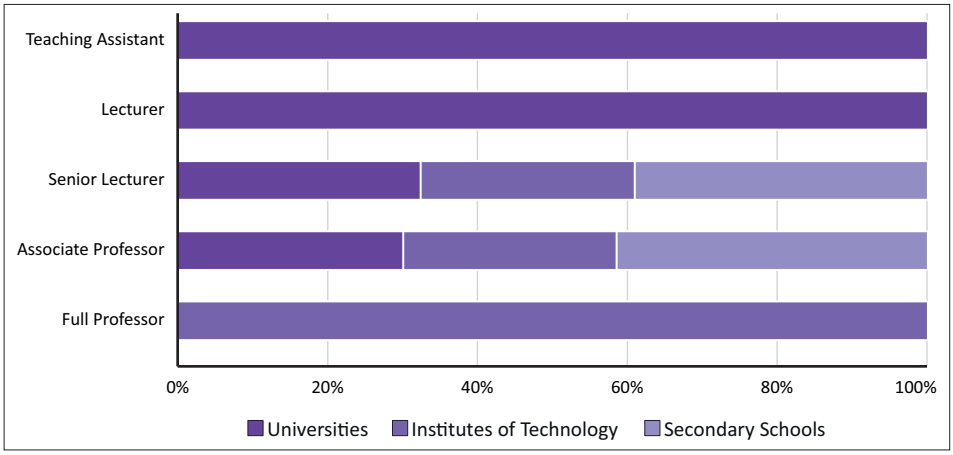

Figure 5.3. Women in academic posts at institutions of higher education in Ireland (Academic core-funded staff by grade). Compiled by the authors. Source: https://www.maynoothuniversity.ie/gender-equality-dashboard.

Though the academic job designations used and hiring criteria vary considerably by type of institution, some core categories can be clearly distinguished for purposes of this paper. These core positions are named and described below:

- Full Professor: A track record of distinguished academic and career achievement that has earned a national or international reputation in the holder's field of study. Duties include both research and teaching.
- Associate Professor: Solid academic and professional standing nationally and excellent teaching skills and strong commitment to the holder's field. Duties include both research and teaching.
- Senior Lecturer: Broad teaching experience and experience in the field of education. Duties do not necessarily include research.
- Lecturer: Normally a junior-level position with teaching duties in a specified area.
- Teaching Assistant: Ordinarily a temporary appointment to support higher-ranking academics with certain teaching or teaching-related tasks.

Turning now to the highest university degree level, in April 2016 (the last date for which data are available), there were 28,759 doctoral degree holders, up 30.9% over 2011, when there were 21,970, and up 99.5% over 2006, when there were 14,412. In 2016 16,016 men (56% of the total) and 12,743 women (43%) held PhDs (CSO, 2017). The Figures show that substantial strides were made in the first part of the period considered (2006-2011) but that progress slowed in the next five years (2011-2016).

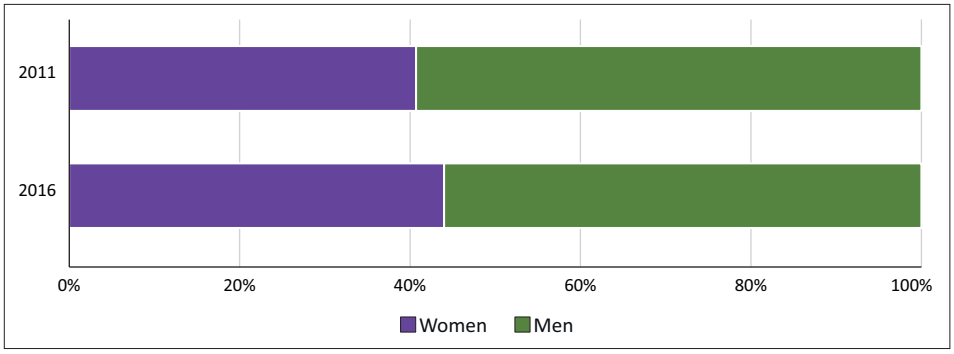

Figure 5.4. Percentage doctoral degree holders by sex. Source: Compiled by the authors from Maynooth University data. (2023). Gender Pay Gap Report 2022.

The 2021 Gender Pay Gap Information Act addresses the gender pay gap at institutions of higher learning and requires all public and private employers with 250 or more employees in Ireland to report any differences in remuneration and benefits between male and female employees.

The reports published under that Act by three of the country's leading universities (Trinity College, University College Dublin, and Maynooth University) reveal a pay gap of around 7% to 14% for teaching staff and administrative personnel combined, depending on whether the value used in each case is the average or median salary.

In any case, the three institutions have all reported that the gap has tended to shrink in recent years, and they have all announced measures to continue to diminish the pay gap, ranging from committing to the Athena Swan Ireland initiative, through high-level gender equality task forces and gender equality action plans and policies, up to participating in EU and HEA gender equality research projects.

GENDER POLICIES AND MEASURES IN SCIENCE AND ACADEMIA IN IRELAND

As already pointed out, policies and initiatives to promote gender equality both in society as a whole and in science and academia in Ireland go back more than half a century. Some of the most salient of these policies and initiatives aimed at addressing gender balance in these areas are described below.

Timeline:

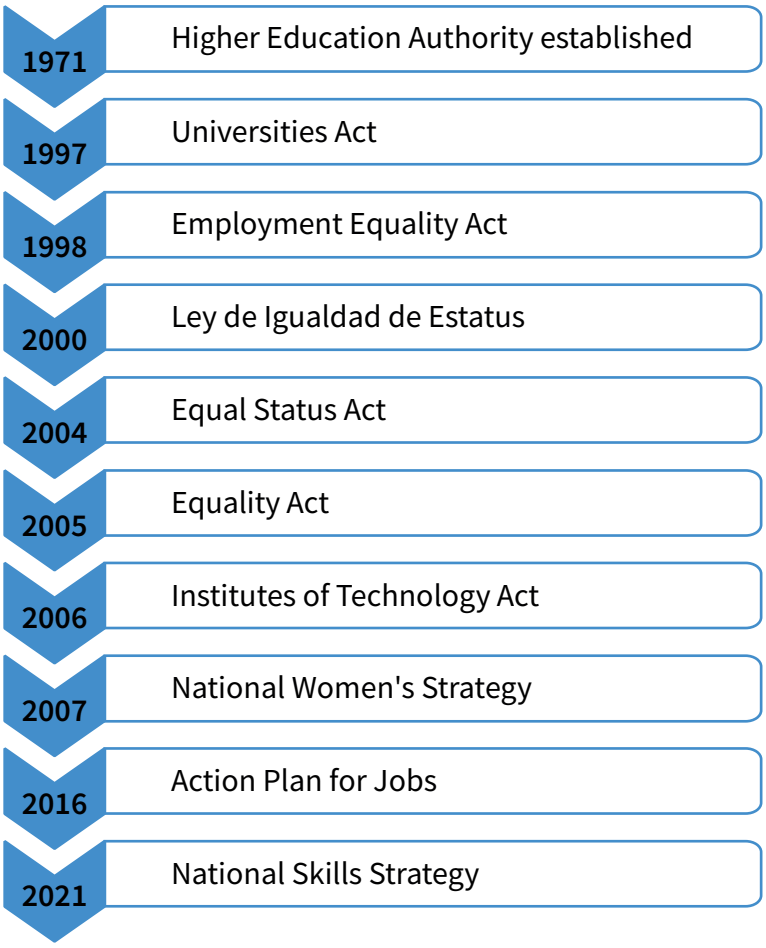

Table 5.1. Compiled by the authors. Source: HEA, 2021.

The Irish Universities Act of 1908 brought in one of the first policies aimed at promoting gender equality in academia in Ireland by allowing women to attend university in the same conditions as men. However, no material efforts were actually made to bring that about until the 1970s and 1980s.

Table 5.1 shows that the Higher Education Authority Act enacted in 1971 set up the Higher Education Authority (HEA) as a statutory agency and tasked it with the "general function" of "[promoting] the attainment of equality of opportunity in higher education" (Gender Equality in Ireland, 2021). Consequently, the HEA's duties to promote the attainment of equality of opportunity in higher education extend to all aspects: as they correspond both to staff and to students and to the nine named grounds for unlawful discrimination in Ireland – sex, civil status, family status, age, race, religion, disabilities, sexual orientation and membership of the traveller community.

The Commission on the Status of Women was created in 1970 and drew up a report on the status of women in Ireland. The report called attention to the under-representation of women in the academic realm and in science and recommended implementing positive discrimination policies to address that issue.

One of the most important initiatives that ensued from that report was the creation of the Equality for Women Measure in 1990, which provided funding for projects to promote gender equality in education and training. The Women in Science and Engineering (WISE) initiative was set up in 2000 to advance women's participation in science, engineering, and technology. The Universities Act of 1997 required universities to draw up a statement outlining their equity policies, gender equality included, and authorised the HEA to review those policies and their implementation. In 2006 that Act was extended to include Institutes of Technology.

That initiative earmarked funding for research projects, tutoring programmes and networking opportunities. The Gender Action Plan for Higher Education Institutions was introduced in 2015 to address gender imbalances at Irish universities and colleges. The plan established gender equity units at higher education institutions, training for staff tackling unconscious bias and prejudice, and gender quotas for top academic posts.

Since 2012 the HEA has included data on core funding for academic staff broken down by gender in the annual multidimensional institutional dashboards. This data compilation is to be expanded further through a new staff database that the HEA is currently building.

More recently, gender equity has been a key feature of national strategy and policy, including the Action Plan for Jobs 2016, which stated, "Greater female participation in the work force has the potential to deliver significant social and gender equality benefits, while also helping to address the growing need for skills and talent" (Action Plan for Jobs, 2016).

Ireland's National Skills Strategy 2025 emphasises the under-representation of women in STEM fields and the need to address this if Ireland intends, as it does, to continue to develop as a successful knowledge society and economy.

On the whole, the policies and initiatives implemented in Ireland over the past 50 years have played a key role in promoting gender equality in science and academia. Much remains to be done, but these policies have helped increase the presence of women in these fields and produce a more diverse and inclusive scientific and academic community.

Statistical data and the body of laws, regulations and policies appear to show that Ireland has indeed made some progress towards gender equality at institutions of higher learning. However, those same data suggest that stereotypes and biases persist when choosing areas of study and that traditional discriminatory practices that limit access to decision-making and leadership positions by women both in academia and in the workplace also remain in place.

Effective implementation of the entire package of legislation and policies, supplemented by an open, broad-based discussion actively involving all parties working on these challenges, would doubtless help improve this situation and close the various gender gaps that continue to exist in Irish academia.

CONCLUSIONS

- Even though Irish gender equality legislation was first enacted in the 1970s, gaps and biases that hinder women's access to decision-making and leadership positions subsist.
- The laws and measures approved over the last 50 years are evidence of the successive governments' interest in achieving gender equity in higher education, but in practice the results still fall some distance short of reaching that objective.
- Biases, stereotypes and structures are still present at institutions of higher education in Ireland, and, notwithstanding national policies and those

institutions' own regulations, continue to generate obstacles, bottlenecks and glass ceilings that hinder women's access to positions of greater responsibility in academia.

- A free and public conversation among all the parties involved would help more clearly identify the persisting challenges and contribute to designing effective policies and measures to address them.
- Though what is involved here is the most highly educated segment of the population, there is little doubt that there continues to be a need for campaigns and other initiatives to do away with ingrained biases and traditional gender roles in academia still held over from those in society as a whole.

REFERENCES

Central Statistics Office. (2016). *Census of Population 2016 – Profile 2 Population Distribution and Movements.* https://www.cso.ie/en/releasesandpublications/ep/p-cp2tc/cp2pdm/pd/

Central Statistics Office. (2019). *Women and Men in Ireland 2019.* https://www.cso.ie/en/releasesandpublications/ep/p-wamii/womenandmeninireland2019/genderequality/

Central Statistics Office. (2022). *Census of Population 2022 – Preliminary Results*, https://www.cso.ie/en/csolatestnews/pressreleases/2022pressreleases/pressstatementcensusofpopulation2022-preliminaryresults/

Central Statistics Office. (n.d.). *Women and Men in Ireland*. https://www.cso.ie/en/statistics/generalstatisticalpublications/womenandmeninireland/

Centre of Excellence for Equality, Diversity and Inclusion. (2022). *Gender Equality in Irish Higher Education 2016-2021*. https://hea.ie/assets/uploads/2022/03/Gender-Equality-in-Irish-Higher-Education-2016_2021.pdf

Department of Education. (2020). Statistical Bulletin. https://www.gov.ie/en/organisation/department-of-education/?referrer=http://www.education.ie/en/Publications/Statistics/Data-on-Individual-Schools/Data-on-Individual-Schools.html

Department of Enterprise, Trade and Employment. (2016). *Action Plan for Jobs* 2016. https://enterprise.gov.ie/en/publications/publication-files/action-plan-for-jobs-2016.pdf

Eire Dialogue. (2021, March). *Women in academia: Underrepresentation and Discrimination*. https://eiredialogue.ie/women-in-academia-underrepresentation-and-discrimination/

Encyclopedia Britannica. (2023). *Ireland*. https://www.britannica.com/place/Ireland#ref23009

European Commission. (2020). *Irish women's rights and equality in the EU*. https://ireland.representation.ec.europa.eu/strategy-and-priorities/key-eu-policies-ireland/eu-and-irish-women_en

European Institute for Gender Equality. (2023). Gender Equality Index. https://eige.europa.eu/gender-equality-index/2023/IE

Gender Equality Taskforce. (2020). *Gender Action Plan 2018-2020*. https://assets.gov.ie/24481/8ab03e5efb59451696caf1dbebe6fddc.pdf

Government of Ireland (2021). *Gender Equality in Ireland*. https://www.gov.ie/en/campaigns/d7752-gender-equality/?referrer=/

Higher Education Authority. (2016). *HEA National Review of Gender Equality in Irish Higher Education Institutions*. https://hea.ie/assets/uploads/2017/06/HEA-National-Review-of-Gender-Equality-in-Irish-Higher-Education-Institutions.pdf

Higher Education Authority. (2021). *Higher Education Institutional Staff by Gender*. https://hea.ie/assets/uploads/2019/07/Higher-Education-Institutional-Staff-Profiles-by-Gender-2021.pdf

Higher Education Authority. (2021). Statistics. https://hea.ie/statistics/data-for-download-and-visualisations/

International Monetary Fund. (2021). *Ireland: Financial Position in the Fund as of November 30, 2022*. https://www.imf.org/external/np/fin/tad/exfin2.aspx?memberKey1=470&date1key=2099-12-31

Maynooth University. (2021). *National Gender Equality Dashboard for Higher Education Institutions (HEIs)*. https://www.maynoothuniversity.ie/gender-equality-dashboard

Maynooth University. (2023). *Gender Pay Gap Report 2022*. https://www.maynoothuniversity.ie/sites/default/files/filefield_paths/GPG%20Report %20MU%202022.pdf

Nolan, W. (2009). *Geography of Ireland*. https://web.archive.org/web/20091124012641/http://www.gov.ie/en/essays/geography.html

O'Shea, M. (2022, September). *Higher Education Key Facts and Figures 2021-2022.* https://hea.ie/2022/09/12/higher-education-key-facts-and-figures-2021-2022/

Trinity College Dublin. (2023). *Gender Pay Gap Report 2022*. https://www.tcd.ie/hr/gender-pay-gap/

University College Dublin. (2023). *Gender Pay Gap Report 2022*. https://www.ucd.ie/equality/information/genderpaygapreportinginucd/

Woods, R. (2022, March). *Gender inequality remains a serious barrier to female progression in academia. The Irish Times.* https://www.irishtimes.com/news/education/gender-inequality-remains-a-serious-barrier-to-female-progression-in-academia-1.4818559

World Bank Group (2023). *GDP per capita Current US$ – Ireland*. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations

World Economic Forum. (2022). *Global Gender Gap Report 2022. Global Gender Gap Report 2022 INSIGHT REPORT.* https://www.weforum.org/reports/global-gender-gap-report-2022

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Italy has a land area of 301,340 km^2 and a population of 58,983,122 inhabitants (51.3% women) with a density of 200.42 people/km^2. Though it is the world's eighth-largest economy by gross domestic product (GDP) (2021 GDP: €1.8 trillion) (Datos macro, 2021), based on workplace gender equality data it is quite some distance from the top of the worldwide rankings.

From a public employment perspective, gender equality become a political priority until well into the twenty-first century. In this context there were three three principal measures were introduced to promote equal job opportunities for men and women in public service.

First, in 2006 Legislative Decree No. 198 established the National Code for Equal Opportunities for Women and Men, which required public entities (including universities and research organisations) to put a three-year Positive Action Plan (PAP) into effect. That plan was to dismantle the barriers standing in the way of equal opportunity in the workplace. (Gazzetta Ufficiale (G.U.) [Official Journal of the Italian Republic], 2006).

Second, the Directive of the Prime Minister of 23 May 2007 (G.U., 2007) set forth measures to achieve equality between men and women in public service and for the first time recommended use of a gender-parity scale by all public entities.

And third, Act No. 183/2010 set up the Unitary Committees to Guarantee Equal Opportunities and Non-Discrimination in Public Service for the Wellbeing of Workers (abbreviated to CUG in Italian) (Governo Italiano, 2010). These Committees replaced the earlier Equal Opportunity Committees (abbreviated to CPO in Italian) (Gazzetta Ufficiale, 2010).

The World Economic Forum's Global Gender Gap Report ranked Italy 63rd (2022) out of a total of 146 countries considered (World Economic Forum [WEF], 2022). According to data published by the National Institute of Statistics (*Istituto Nazionale di Statistica* [ISTAT]), the employment rate for women aged 15-64 in Italy in 2021 was 49.4%, while for the European Union (EU) it was 63.4% (Istituto Nazionale di Statistica, n.d.). Additionally, a marked regional disparity was also evident between the northern and southern parts of the country. The employment rate for women in the North was 59.3% (highest in the Autonomous Province of Bolzano, at 63.7%), in central Italy it was 55.1%, and in the South it was 33% (lowest in Sicily and Campania, at 29.1%). The unemployment rate for women was 10.8%: 7.2% in the North, 9.9% in central Italy and 19% in the South. The difference in the unemployment rate for men and for women was also higher in the South (15.3% for men/19% for women), than in central Italy (7.9% for men/9.9% for women) and in the North (5.2% for men/7.2% for women).

Notwithstanding the differences between the North and the South, according to data released by the European Institute for Gender Equality (EIGE), the Gender Equality Index score was 68.2 in 2023, 4.4 points lower than the EU average (European Institute for Gender Equality, 2023). The index scores the EU and the Member States according to a scale running from 1 to 100 (100 being full equality between women and men).

From a cultural perspective, the conclusions of a survey on "Gender role stereotypes and the social image of violence" carried out by ISTAT in association with the Department of the Prime Minister for Equal Opportunity (*Dipartimento per le Pari Opportunità presso la Presidenza del Consiglio*) in 2018 (ISTAT, 2019) hold out interest. According to the findings of that survey, 32.5% of 18 to 74-year-olds, both men and women alike in substantially the same proportion, mostly or strongly agreed that success at work is more important for men than for women. Further, 31.4% of respondents agreed that men were less suited to housework than women. Finally, 27.9% of respondents believed

that providing for the family's financial needs was the man's responsibility. This was also borne out by the European Values Study, a European-wide survey that takes into account aspects contributing to a culture of gender inequality (European Values Study, 2022). A high percentage of Italians still agree with the statements, "children suffer when their mothers work" and "when jobs are scarce, men should have preference over women". These attitudes reflect a persisting traditional view role of women, who, even when they work outside the home, need to shoulder the household responsibilities, childcare and housework. An important factor to bear in mind as regards work-life balance is part-time work, which is not distributed evenly between men and women. In 2021 31.5% of women worked part time compared to only 8.4% of men (ISTAT, 2021).

STATISTICS ON ACADEMIC STAFFING IN ITALY

Since 2012 the Statistical Service of Italy's Ministry of University and Research (*Ministero Università e Ricerca* [MUR]) has published data on women during their studies and careers at university.

In 2020 women made up around 41% of teaching and research staff at Italian universities, less than parity (Ministero Università e Ricerca, Servizio Statistico, 2022). That figure was still lower in STEM (Science, Technology, Engineering and Mathematics) spheres, at 36.3%, evidencing the horizontal segregation of women between STEM and HASS (Humanities, Arts and Social Sciences) fields at university. In point of fact, women are quite unevenly distributed among the various disciplines from the very outset of their academic lives.

Women's academic careers in Italy are subject to vertical segregation (perfectly represented by a scissors diagram). In 2020 women made up 56.3% of undergraduate students and 56.9% of graduates. However, the figure dropped to 48% of doctoral study enrolments and 49.4% of doctoral degree holders (Figure 6.1). The presence of women continued to fall in the move from university studies to an academic career.

The picture for STEM areas was similar, although here women made up under 50% at all levels of academic life.

Looking at the data over the period 2005-2020, it shows that there has been a slight improvement in grades B and A, namely, associate professors and full professors (Figure 6.2). On the other hand, a slight decrease can be observed

in the proportion of women doctoral students, doctoral degree holders and holders of postdoctoral positions.

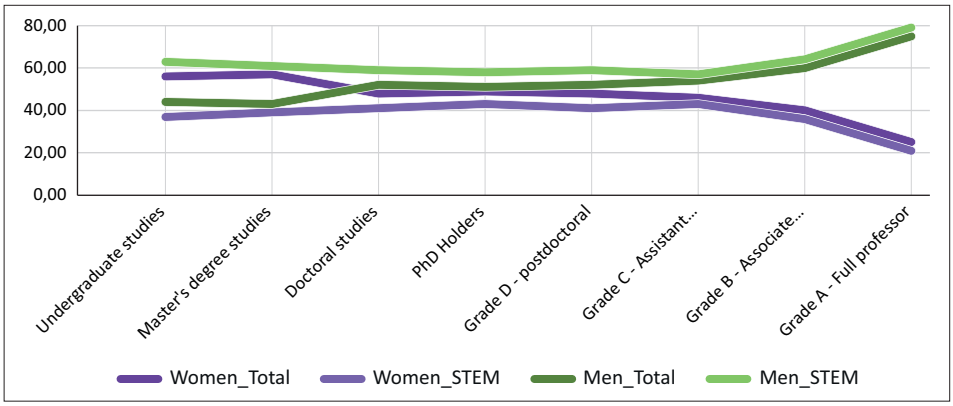

Figure 6.1. Percentage men and women in university studies and academic careers (overall and in STEM fields) in Italy by level (2020). Compiled by the authors, MUR data (MUR Servizio Statistico, 2020).

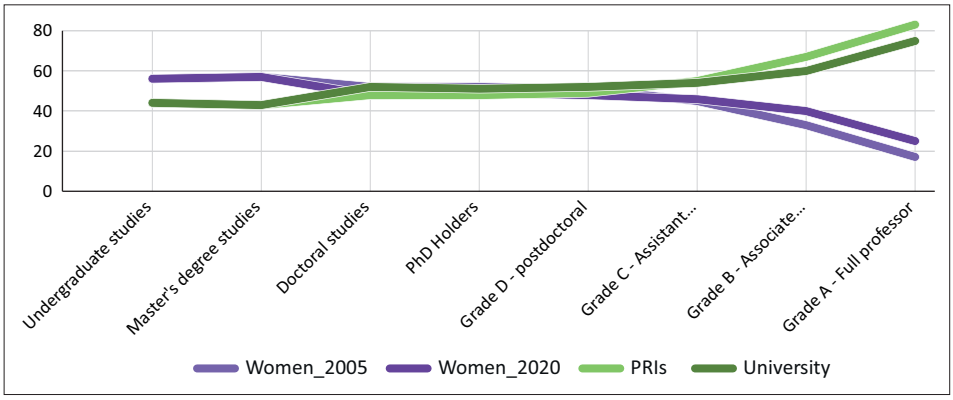

Figure 6.2. Percentage men and women in university studies and academic careers in Italy by level in 2005 and 2020. Compiled by the authors, MUR data (MUR, Servizio Statistico).

One odd finding is that the number of doctoral degree holders has declined overall, from 11,576 in 2012 to 7,617 in 2020 (MUR, Servizio Statistico, n.d.). Job insecurity and difficulties in gaining access to academic careers in Italy have doubtless contributed to that decline. Those same obstacles have also caused Italy to suffer from the well-known "brain drain" effect.

The main causes of the brain drain at the postdoctoral level are largely linked to job opportunities. A 2018 ISTAT study looked at people who had been living in Italy before starting university and who had earned doctorates between 2012 and 2014. It found that 12.5% of those persons were living outside Italy and that men were more likely to move abroad (15.1%) than women (10.2%) (ISTAT, 2018).

For students who had earned their doctorates in 2012, that same study concluded that six years after completing their doctorates (i.e., in 2018), 10.2% of PhD holders were working as university teaching or research staff and that the percentage was lower for women (7.2%) than for men (13.4%).

The "glass ceiling index" (GCI) compares the share of women in research job category grades B, C, and D with the share in the top-most category (grade A). When the highest level positions are held by men and women equally, the index value approaches 1. The index value is less than 1 when women outnumber men in the top spots and greater than 1 when men outnumber women. In 2020 the GCI value for academic careers in Italy was 1.52. The value has come down from 2005, when it was 1.84. In STEM fields the GCI value dropped from 2.10 in 2005 to 1.60 in 2020.

The National Research Council (*Consiglio Nazionale delle Ricerche* [CNR]) is Italy's largest public research organisation, covering a wide range of subject areas divided among seven departments (Engineering, ICT and technologies for energy and transportation; Biology, agriculture and food sciences; Biomedical science; Chemical sciences and material technology; Earth system science and environmental technologies; Physical sciences and technologies of matter; Social sciences, humanities and cultural heritage science). For that reason, the organisation's gender balance (Consiglio Nazionale delle Ricerche, 2021) can be taken as suitably representative of the status and presence of women in research careers in Italy.

In 2019, women made up 47% of administrative, technical and research staff. Notably, in the ten years up to 2019 the percentage of women had risen from 43% to 47%. By category the share of women engaged in research-related work is technical operator: 36.6%; technologists (research support activities, IT-related, etc.): 50.2%; researchers: 46.7%; executive level (management): 22%. Technologists and researchers are classified in grades A, B, and C. The presence of women can be observed to decrease progressively as research careers advance up to the higher levels. It is also interesting to note that for CNR employees

as a whole, men outnumber women in all age groups except the age 46 to 50 group (in which there are 104 women to every 100 men). Only 2.7% of research staff have requested part-time employment. Among research staff, 1.64 women take up part-time contracts for every man that does. This shows that part-time contracts are mainly used by women.

The National Institute of Health (Istituto Superiore di Sanità [ISS]) is another example of the current situation, and an important one, because it is the primary public health research organisation in Italy and sets health policy. The average age of Institute employees is high, the modal value being 51-60 years of age for both men and women. The staff is predominantly female (1,162 women to 543 men), a ratio of 2 to 1. This contrasts with the ratio of men to women in management positions, namely, 4 men to 2 women (out of 6 department heads), 8 men to 10 women (directors of centres), and 5 men to 2 women (ISS leadership). Men also outnumber women in the top posts (Level I: Research Director/Technology Director), a reflection of gender stereotypes rooted in the past (the over-60 age bracket) that are ageing out, since at the next level down (Level II: Chief Researcher/Chief Technologist) the ratio of men to women is almost balanced (in the under-60 age bracket). It is striking that for Technical Operators (Levels VI-VIII), the percentage ratio is 3 to 1 slanted towards men, indicating that manual work is still assigned preferentially to men. Lastly, it can be noted that flexible schedules and flexible work arrangements are mostly used by women. This factor does not, however, impact the time-in-grade needed for promotion to the next level, which tends to be quite similar for both men and women (Istituto Superiore di Sanità, 2022).

GENDER POLICIES AND MEASURES IN SCIENCE AND ACADEMIA

University Education Reform Act No. 240/2010 set two major equal opportunity goals: i) achieving gender parity on research institute management councils and ii) expanding maternity leave for postdoctoral researchers to five months (G.U., 2011).

Gender equality at university began to garner attention starting in 2017. Three specific events marked this shift in focus towards reaching the goal of gender balance:

- A decree by the Ministry of Education, University and Research (*Ministero Istruzione Università e Ricerca* [MIUR]) (Ministerial Decree

of 29 December 2017) on actions in the interest of university students (Ministero dell'Istruzione, dell'Università e della Ricerca, 2017).

- Publication of a document on reasons for MIUR to take positive action in gender matters at university and in research (MIUR, 2018).
- Release by the Conference of Italian University Rectors (Conferenza dei Rettori delle Università Italiane [CRUI]) of guidelines on gender balance at academic institutions (Conferenza dei Rettori delle Università Italiane, 2019).

The ministerial decree of 29 December 2017 on actions in the interests of university students set up a university orientation fund. One of the purposes of these resources was to encourage enrolment in scientific subject areas (mathematics, chemistry, physics, engineering, computing, statistics) at university. Special attention was given to boosting the entrance by women into those fields.

In 2018 MIUR also issued guidance and proposals aimed at implementing a suitable gender policy in Italy for universities and research. The recommendations that were put forward included promoting gender parity in research programmes funded directly by MIUR, both at research team level and at the uppermost levels. With that in mind, research proposals that included at least 40% of each gender would score extra points. Gender parity on review boards was also promoted.

In September 2019 CRUI released guidance on how to achieve gender balance at Italian universities. Prior to that release, a document promoting gender balance at Italian universities had been approved in January 2017. This "Gender Balance Sheet" was intended to provide a snapshot of the gender distribution at university and the level of participation by women and men on their management bodies. It was also intended to be a means for measuring, monitoring and assessing actions aimed at achieving gender equality at university.

After these guidelines were released, universities began to draw up annual gender balance sheets, something that had in fact been put in place earlier by certain universities, i.e., the University of Bologna (Università di Bologna, 2015), the Mediterranean University of Reggio Calabria (Università Mediterranea di Reggio Calabria, 2015), the University of Ferrara (Università di Ferrara, 2016), the University of Padua (Università di Padova, 2016) and the Sapienza University of Romae (Sapienza, Università di Roma, 2016).

At the same time, in 2019 the Ministry of the Civil Service issued Directive No. 2/19 (Ministero della Funzione Pubblica, 2021) strengthening public entities' CUGs and promoting gender equality in the public sector. That same year the Ministry of Health released its "Gender-based Medicine Dissemination and Implementation Plan" (Ministero della Salute, 2019) to support the practice of gender-based medicine in research, preventive care, diagnosis and treatment and to take into account sex-based and gender differences in the healthcare sector.

By way of example, Italy took part in a series of European gender equality and training projects. The UniSAFE project, funded by Horizon 2020, looked at gender-based violence, including sexual harassment, in higher education and academia. Based on national reports published by 33 countries, partners in the UniSAFE project have created a European baseline of policies to combat gender-based violence at the legal and policy levels.

Today MUR is coordinating the National Research Programme (abbreviated to PNR in Italian) for research and development (R&D) planning for 2021-2027 (MUR, 2020). The PNR recommends guaranteeing gender balance and encourages research organisations to promote equal opportunities and to ensure that research includes a gender dimension.

In addition, Italian universities and research centres are beginning to implement their own "equality plans", a requirement for gaining access to funding under the new Horizon Europe Framework Programme for Research and Innovation (2021-2027) (European Commission, 2020).

The National Recovery and Resilience Plan (in Italian, PNNR) (Governo Italiano, 2021) puts emphasis on gender equality and in line with the UN's Agenda includes specific objectives aimed at reducing the gender gap. One of its innovative features is the youth and women's employment conditionality clause as a requirement to be able to take part in public procurement procedures for PNNR projects; others are gender procurement that favours enterprises that do not discriminate against women, gender balance certification and implementation of Gender Impact Assessments. As part of mission 4, "Education and Research", a plan has been designed to diminish the gender gap in STEM training ranging all the way from preschool to doctoral studies. In addition, €4.3 billion have been earmarked to establish five national research centres, 11 regional innovation ecosystems, and 49 research and technology

infrastructure systems. Some of this expenditure will be spent on hiring researchers, at least 30% of whom will have to be women.

The Department of the Prime Minister for Equal Opportunity has released its "National Gender Equality Strategy" for 2021-2026, impacting the research and innovation sector (Governo Italiano, 2022). The guidelines centre on five strategic priorities and have altered funding mechanisms to take gender equality at university into account. Special funds have been earmarked to achieve minimum levels of gender participation in appointments of professors, researchers, and administrative staff and in STEM enrolment.

One of the objectives for the education sector is to increase female student enrolment in undergraduate STEM fields from its current level of 27% to approximately 35%.

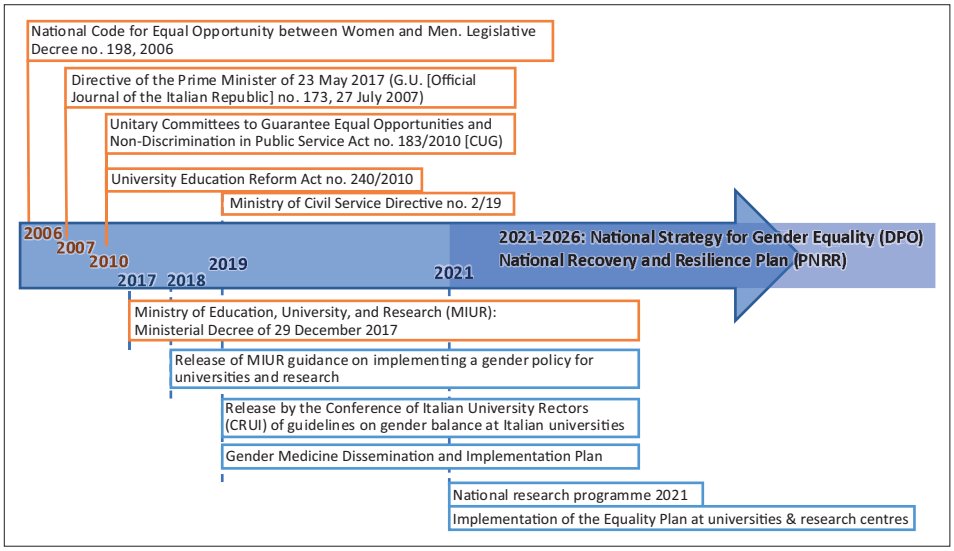

Figure 6.3. Timeline for national and academic gender policies in Italy from 2016 to the present. At top, in brown: laws and directives. At bottom, in blue: the documents listed and discussed in this section. Source: Compiled by the authors.

CONCLUSIONS

- An underlying culture continues to impede gender equality, particularly in the job market. The overall proportion of women in academia has changed little, though some progress is visible at the most senior career levels.
- The presence of women drops off progressively as we move up the academic career ladder from university, indicative of vertical segregation.
- Horizontal segregation between STEM and HASS fields is present from the outset of university study, and available data suggest that women face greater attrition at successive academic grades.
- Despite a relative lack of dedicated legislation to boost the presence of women in academia, in recent years positive action has been taken to promote women's role in academia (MIUR), and each university has issued guidelines aimed at achieving gender balance.
- Each university and institution takes whatever measures it considers appropriate and includes them in its gender balance action plans.
- At the present time special measures aimed at increasing the numbers of women in academic careers are being implemented under the National Recovery and Resilience Plan and the National Gender Equality Strategy 2021-2026.

REFERENCES

Conferenza dei Rettori delle Università Italiane [*Conference of Italian University Rectors*]. (2019) *Linee guida Bilancio di Genere negli Atenei Italiani* [*Gender Balance guidelines for Italian universities*].

Consiglio Nazionale delle Ricerche [*Italian National Research Council*]. (2021). *Bilancio di genere* [*Gender Balance*]. CNR Edizioni. https://doi.org/10.14600/978-88-8080-423-9

Datos macro (2021). https://datosmacro.expansion.com/pib?anio=2021

European Commission (2020). A Union of Equality: Gender Equality Strategy 2020-2025. Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. 152 final. Brussels, 2020. Europa.eu

European Institute for Gender Equality (2023). *Gender Equality Index 2023*. https://eige.europa.eu/gender-equality-index/2023/IT

European Values Studies (2022). *European Values Study 2017: Integrated Dataset (EVS 2017)*. GESIS, Cologne. ZA7500 Data file Version 5.0.0. https://doi.org/10.4232/1.13897.

Fort Worth Business (2021). *A year into the COVID-19 pandemic, we have begrudgingly accepted social distancing.* https://fortworthbusiness.com/opinion/a-year-into-the-covid-19-pandemic-we-have-begrudgingly-accepted-social-distancing/

Gazzetta Ufficiale [*Official Journal of the Italian Republic*], Serie Generale [*General Series*] no. 125 (2006) Suppl. Ordinario [*Ordinary Supplement*] no. 133. Decreto Legislativo 11 aprile 2006, n. 198 Codice delle pari opportunita' tra uomo e donna, a norma dell'articolo 6 della legge 28 novembre 2005, n. 24 [*Legislative Decree No. 198 of 11 April 2006 Code for Equal Opportunities for Men and Women under section 6 Act No. 23 of 28 November 2005*]. Entered into force on: 15 June 2006. Ministero della Giustizia [*Ministry of Justice*], 2006 Italy. https://www.gazzettaufficiale.it/dettaglio/codici/pariOpportunita

Gazzetta Ufficiale, Serie Generale no. 173 (2007) p. 17. Directiva de la Presidencia del Consejo de Ministros [*Directive of the Prime Minister*]. Ministero Della Giustizia 2007, Italy. https://www.gazzettaufficiale.it/eli/gu/2007/07/27/173/sg/pdf

Gazzetta Ufficiale, Serie Generale no. 10 (2010). Ministero Della Giustizia 2010, Italy. https://www.gazzettaufficiale.it/eli/gu/2010/11/09/262/so/243/sg/pdf

Gazzetta Ufficiale, Serie Generale no. 10 (2011) Suppl. Ordinario no. 11. Ministero Della Giustizia 2011, Italy. Última actualización de la ley publicada el 27/02/2023 [*Latest revised wording of the Act enacted on 27 February 2023*]. https://www.gazzettaufficiale.it/eli/id/2011/04/18/011G0087/sg

Governo Italiano [*Government of Italy*] (2010). Last retrieved 13 February 2023 from https://www.agid.gov.it/it/agenzia/comitato-unico-garanzia

Governo Italiano (2021). *Piano nazionale di ripresa e resilienza [National Recovery and Resilience Plan]. Next generation Italy*. Last retrieved 13 February 2023 from https://www.governo.it/sites/governo.it/files/PNRR_0.pdf

Governo Italiano (2022). Condizioni Abilitanti Programmazione 2021 [*Enabling conditions – Planning for 2021*]. Governo.it. Last retrieved 21 April 2023 from https://politichecoesione.governo.it/media/2890/relazione-autovalutazione_42_parita-di-genere_versdef_aprile_2022.pdf

Istituto Nazionale di Statistica [*National Institute of Statistics*] (2018). *Report: L'inserimento professionale dei dottori di ricerca* [*Report: the professional integration of PhDs*]. https://www.istat.it/it/files/2018/11/Report-Dottori-di-ricerca-26nov2018.pd

Istituto Nazionale di Statistica. (2019). *Report suglistereotipi di genere* [*Report on gender stereotypes*]. https://www.istat.it/it/files//2019/11/Report-stereotipi-di-genere.pdf

Istituto Nazionale di Statistica (2021). Last retrieved 13 February 2023 from http://dati.istat.it/Index.aspx?DataSetCode=DCCV_TAXOCCU1

Istituto Superiore di Sanità (2022). Relazione CUG - *Istituto Superiore di Sanità* [*Joint Committee for Equal Opportunity report National Institute of Health*]. Last retrieved 14 February 2023 from http://portalecug.gov.it/format-2/relazione-cug-istituto-superiore-di-sanita-iss-2022

Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR) [*Ministry of Education, University, and Research*] (2017). *DM 1047* [*Ministerial Decree No. 1047*]. https://www.miur.gov.it/documents/20182/226551/DM+1047+del+29+dic+2017.pdf/6d585918-e820-4966-9c13-d6790f30fb3a?version=1.1

Ministero dell'Istruzione, dell'Università e della Ricerca. (2018). *Indicazioni per azioni positive del MIUR sui temi di generenell'Università e nella Ricerca* [*Guidelines for positive action by the MIUR in gender matters at university and in research*]. Last retrieved 13 February 2023 from https://www.miur.gov.it/documents/20182/991467/Documento_+Indicazioni_azioni_positive_MIUR_su_temi_genere.pdf/23e81cb6-f15a-4249-9bd6-cf4fdcd113a8?version=1.0

Ministero dell'Università e della Ricerca [*Ministry of University and Research*]. (2020). Programma nazionale per la ricerca [*National Research Programme*] 2021-2027. Last retrieved 13 February 2023 from: https://www.mur.gov.it/sites/default/files/2021-01/Pnr2021-27.pdf

Ministero dell'Università e della Ricerca, Servizio Statistico [*Ministry of University and Research, Statistical Service*]. (n.d.). *Dati per Bilancio di Genere* [*Gender Balance Data*]. http://dati.ustat.miur.it/dataset/dati-per-bilancio-di-genere

Ministero dell'Università e della Ricerca, Servizio Statistico. (2022). *Focus "Le carriere femminili in ambito accademico"* [*Focus on women's academic careers*]. http://ustat.miur.it/media/1218/focus_carrierefemminili_universit%C3%A0_2022.pdf

Ministero della Funzione Pubblica [*Ministry of the Civil Service*]. (2019). *Direttiva 2/19 "Misure per promuovere le pari opportunità e rafforzare il ruolo dei Comitati Unici di Garanzia nelle amministrazioni pubbliche"* [*Directive No. 2/19 on Measures to promote equal opportunity and strengthen the role of the Joint Committee for Equal Opportunity in Public Service*]. https://www.funzionepubblica.gov.it/sites/funzionepubblica.gov.it/files/Direttiva_n_2.pdf

Ministero della Salute [*Ministry of Health*]. (2019). *Piano per l'applicazione e la diffusione della Medicina di Genere* [*Gender-based medicine dissemination and implementation plan*]. https://www.pnrr.salute.gov.it/imgs/C_17_pubblicazioni_2860_allegato.pdf

Sapienza, Università di Roma [*Sapienza University of Rome*]. (2016). *Bilancio sociale [Social Balance Sheet]. Università degli Studi di Roma "La Sapienza".* Last retrieved 13 February 2023 from https://www.uniroma1.it/sites/default/files/allegati/BilancioSociale2016.pdf

Università di Bologna [*University of Bologna*]. (2015). *Bilancio di genere* [*Gender Balance Sheet*]. Last retrieved 13 February 2023 from https://dati.unibo.it/dataset/gender-equality-report/resource/bilancio-di-genere_2015_it/download/bilancio-di-genere_2015_it.pdf

Università di Ferrara [*University of Ferrara*]. (2016). *Bilancio di genere (BDG) 2016* [*Gender Balance Sheet 2016*]. Last retrieved 13 February 2023 from https://www.unife.it/it/ed/strategie/bilancio-di-genere/bdg_2016_unife_ita.pdf

Università di Padova [*University of Padua*]. (2016). *Bilancio di genere 2016* [*Gender Balance Sheet 2016*]. Last retrieved 13 February 2023 from: https://www.unipd.it/sites/unipd.it/files/2017/Bilancio%20di%20genere%202016_0.pdf

Università Mediterranea di Reggio Calabria [*Mediterranean University of Reggio Calabria*]. (2015). *Bilancio di genere* [*Gender Balance Sheet*]. Last retrieved 13 February 2023 from:
http://www.geecco.unirc.it/images/pdf/BDG_2015.pdf

World Economic Forum. (2022). *The Global Gender Gap Report 2022*. Geneva: The World Economic Forum Publishing.

THE NETHERLANDS

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

The Netherlands is located in northwestern Europe, part of the Kingdom of the Netherlands, which also includes some island territories in the Caribbean. Its government is a parliamentary monarchy. Relatively small in size (41,543 km^2), its population density is one of the highest in the world as, with 17,781,667 million inhabitants, its density is 428 people/km^2 (Centraal Bureau voor Statistiek [CBS], 2022). The population is comprised of 49.7% men and 50.3% women (CBS, 2022). The Netherlands' GDP is US$990 billion (International Monetary Fund [IMF], 2022), making its economy one of the strongest in the Eurozone and in the world; moreover, it ranks 4th on the Global Competitiveness Index (World Economic Forum [WEF], 2019). The country is also competitive academically, with seven universities in the top 100 on the world university rankings (Times Higher Education, 2022).

In terms of gender equity, the Netherlands was the third country to approve women's suffrage (in 1917) and it has a good international reputation, in that it was one of the first countries to bring in broad-ranging legal safeguards against discrimination (European Institute of Gender Equality [EIGE], 2019). It currently ranks second on the EU's Gender Equality Index, with a score of 77.9 (EIGE, 2023). The principles of non-discrimination and equality have been enshrined in the Dutch Constitution since 1983, and special laws against sex-based discrimination were enacted in 1975 (Equal Pay Act [*Wet gelijk loon voor vrouwen en mannen*]) and in 1980 (Equal Treatment for Men and Women Act [*Wet gelijke behandeling van mannen en vrouwen*]) (Goldschmidt, 2012).

Nevertheless, gender equality in the workplace is still a long way off. The World Economic Forum's Global Gender Gap Report ranks the Netherlands in 38th place (WEF, 2020), and the country's gender pay gap stands at 12.7% (Organisation for Economic Co-operation and Development [OECD], 2021). There are no appreciable gender differences in the unemployment rate, which is one of the lowest in the EU (3.9% for men and 4.3% for women), but women make up the lion's share of part-time workers, especially after they have children. Thus, according to the Dutch model of the family, the man is generally employed full time and the woman part time (Garcia Working Papers 5 – Netherlands, 2015). In this respect, according to a 2006 survey, approximately 30% of respondents (both men and women) thought that women with preschool-aged children should not work outside the home (Portegijs et al., 2006). Traditionally, gender equality has not been regarded as an urgent matter either socially or politically (EIGE, 2021).

From 2000 the Ministry of Education, Culture, and Science [OCW]'s Office of Emancipation began designing Multi-Year Plans to coordinate gender-based policies nationally. The first five-year plan (for 2000-2005) laid the groundwork at ministerial level for emancipating women and the LGBTQ+ community economically and in the workplace, though no legal requirements were laid down (EIGE, 2019).

When that plan's objectives were not reached, the government switched to a different strategy. The Multi-Year Emancipation Policy Plan 2006-2010 focused on gender mainstreaming policies, especially from 2007 (EIGE, 2019). That plan's goals included raising the number of hours worked by women and making better use of their talents and qualities. The annual budget for those policies was €15 million in 2008 (van den Brink, 2009). Subsequently, further multi-year plans were successively implemented for 2011-2015 and 2016-2020. As a rule, the government provides subsidies for non-governmental organisations (NGOs) and civil associations and cooperates with them in monitoring implementation of the plans (EIGE, 2019).

STATISTICS ON ACADEMIC STAFFING IN THE NETHERLANDS

The share of women scientists in the Netherlands is below parity (41% in 2020). Weak improvement since 2015 aside, that share has barely budged in the past six years (Figure 7.1).

Over the course of academic careers as a whole, the share of women exhibits a pronounced scissors effect (Figure 7.2). Women are the majority only in undergraduate and master's degree studies. They start to abandon academia as a career path option even before their doctoral studies. Therefore, when academic careers are viewed from the predoctoral stage, as depicted in the preceding figure, the status of women researchers in the Netherlands can be seen to take the shape of an extremely wide open scissors plot, evidencing pronounced gender differences in the university workplace. The data reveal that slight improvements were achieved in grades A, B, and C in the period from 2010 to 2020 (Figure 7.2). However, the Dutch Network of Women Professors (*Landelijk Netwerk Vrouwelijke Hoogleraren* [LNVH]) has calculated that at the current rate, actual parity will not be reached until 2040 (Dutch Network of Women Professors, 2022).

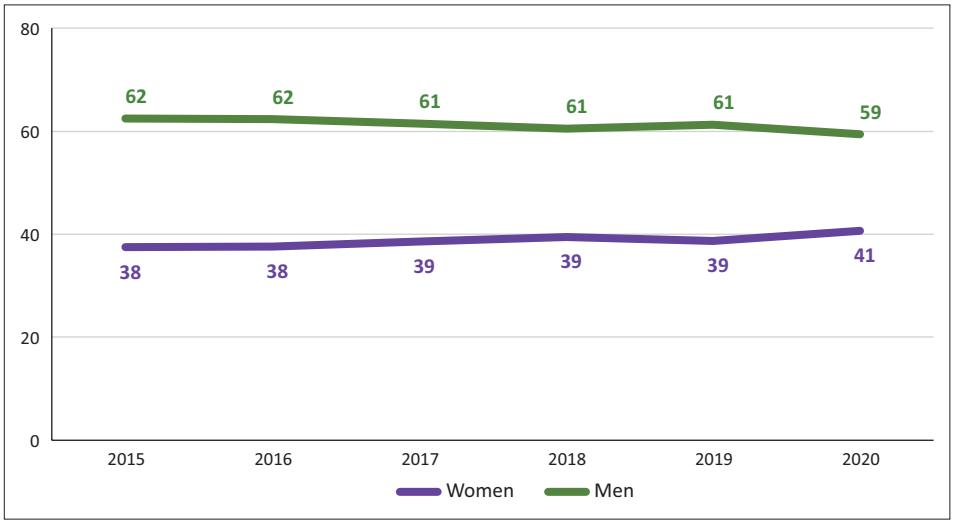

Figure 7.1. Percentage women and men at university and in academic positions in the Netherlands, including from the doctoral studies stage up to full professor, 2015-2020. Compiled by the author from the personnel database of the Association of Universities in the Netherlands (Universiteiten van Nederland) (https://www.universiteitenvannederland.nl/feiten-en-cijfers-personeel.html).

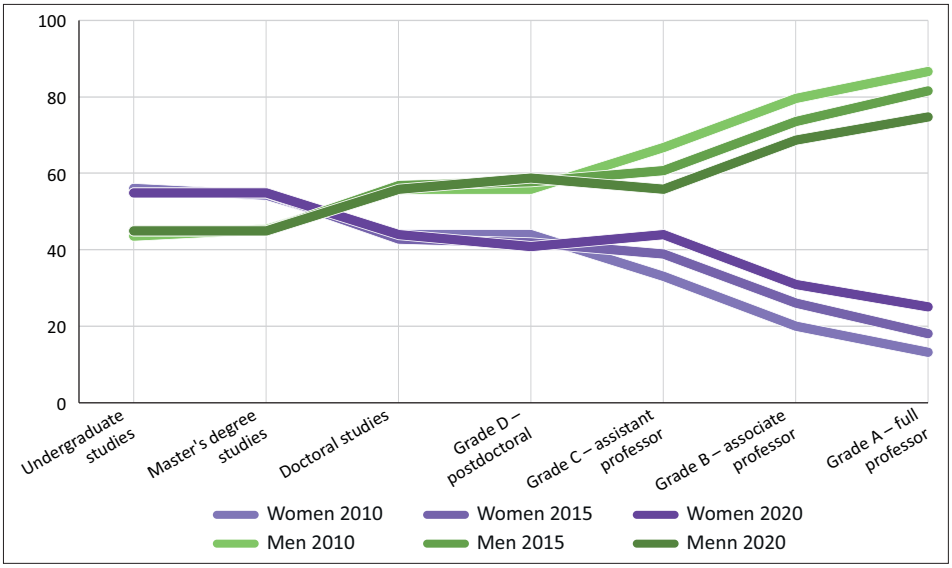

Figure 7.2. Percentage men and women in academic studies and academic careers at Dutch universities, 2010-2020. Compiled by the author. For undergraduate and master's degree students, sourced from statistical data released by StatLine, the public database of Statistics Netherlands (Centraal Bureau voor de Statistiek [CBS]); and for academic university staff, sourced from the personnel database of the Association of Universities in the Netherlands (Universiteiten van Nederland, 2022).

GENDER EQUALITY POLICIES IN SCIENCE IN THE NETHERLANDS

Legislative background and structure

Gender inequality is indeed an issue in academia in the Netherlands. Women hold 41% of university academic positions in the Netherlands, and the percentage of women full professors is among the lowest in the EU (a scant 25%) (Universiteiten van Nederland, 2022). A 2015 study disclosed gender bias in funding for scientific research: the language of calls for grant proposals was biased in favour of male applicants, and male applicants' merits were valued more highly than those of female applicants. This worked to appreciably boost success rates for men and in that way contributed to the gender gap (van der Lee & Ellemers, 2015).

The Dutch Higher Education and Research Act (Wet op het hoger onderwijs en wetenschappelijk onderzoek, 1992) was enacted in 1992. It contained

a number of sections that made reference to sex-based discrimination at institutions of higher education. For example, the Act provided that institutions "must pay attention to their students' personal development" and that as part of their social responsibility the institutions must "eschew all discriminatory conduct and statements". It specified that they were to exercise their responsibility in this area by creating university councils to fight discrimination of all kinds and to promote the inclusion of minorities.

Gender equality policies in science, 1997-2006

The 1997 Proportional Representation Act (*Wet Evenredige Vertegenwoordiging*) required educational institutions to set numerical targets and policy goals to increase the presence of women in leadership positions and to publish their results every four years (Staatsblad van het Koninkrijk der Nederlanden, 1997). These policies, though set by the government, were to be designed and implemented by each institution. A 2001 report on the effects of that decision noted that most institutions had not set ratios as a goal and had not implemented policies in this regard. Additionally, the institutions themselves had delegated responsibility for implementation to university departments that were not themselves capable of developing measures effective at that level, and this hampered successful implementation (Gemmeke & de Weerd, 2001).

The Aspasia and FOm/f programmes are two noteworthy policies from that period. The Aspasia programme was launched in 1999 as an initiative of the Dutch Research Council (NWO), the Association of Universities in the Netherlands (then the VSNU), and the Ministry of Education, Culture and Science. The programme's main objective was to advance the careers of junior women university professors. Academic institutions that were awarded fellowships under the programme had to promote the lead female researcher to Associate Professor. The programme was well received by the women beneficiaries, and figures for women researchers climbed from 9% in 1999 to 14% in 2003, though it also elicited controversy. This facet of the Aspasia programme remained in effect until 2002, when it was integrated into other national grant programmes (van den Brink, 2009).

Another programme from 1999 came from the FOM Foundation (Foundation for Fundamental Research on Matter), with the FOm/f programme for advancing the careers of postdoctoral women researchers in

physics by promoting them to professor (Stobbe et al., 2004). The programme was approved for five years and was given a budget of €4.5 million. As a result of these measures, the number of female professors with permanent appointments rose from just one in 1999 to 10 in 2003, of which four were full time, and subsequent editions of the programme have helped continue this upward trend (Hoogh et al., 2019). Even so, on evaluating the programmes, the beneficiaries reported that cultural stereotypes that subsequently affected their careers continued to linger within their departments and that their male colleagues viewed them merely as applicants to special women's programmes rather than as equal competitors in regular funding (van den Brink, 2009).

Gender equality plans in science, 2006-2020

In 2017 the NWO presented another programme, the *Westerdijk Talent Scheme*, named after Professor Johanna Westerdijk, marking the 100th anniversary of her appointment as the first female university professor in the Netherlands. The programme lasted just one year, and its goal was for universities to hire 100 new permanent female professors. The total investment allocated was €5 million (NWO, 2017).

Around that same time more universities began to endorse the creation of committees and draw up reports on this issue. The various universities put their policies into effect in highly disparate manners, and the results achieved were disparate as well. For instance, Timmers et al. (2007, 2010) conducted two in-depth studies on the policies implemented by 14 Dutch universities. Some universities focused more on personalised actions like coaching and mentoring for women researchers; others elected to focus on structural policies, like establishing specific tenure tracks or modifying recruitment procedures to avoid bias and improve transparency. According to the study, the mentoring initiatives proved effective, because they met a need the participants had already expressed (namely, for someone to provide them with guidance) and because the mentors had a positive experience acting as role models. The measures that were easiest for universities to implement appeared to relate to hiring and advancement, especially promotions from the doctoral and postdoctoral positions and international talent hires. What researchers thought was still missing was follow-up and monitoring to be able to quantify the effectiveness of the measures and to identify the causes when they failed (Timmers, 2007; Timmers et al., 2010).

Equity policies in science in effect today

Centralised measures include equality plans by government ministries and fellowship programmes for women scientists.

The Ministry of Education, Culture and Science approved a "National action plan for greater diversity and inclusion in higher education and research" for 2020-2025 (Ministry of Education, Culture and Science, 2020). The primary aim of this action plan is to create an inclusive, diverse and safe learning and working environment in higher education. This is to be achieved through five goals: embedding diversity and inclusion more effectively; monitoring diversity in higher education and research; setting up an award system to promote diversity and inclusion; expanding cooperation by consolidating and supporting institutional diversity plans; and establishing a national centre of excellence regarding diversity. Fulfilment is monitored by a committee set up for that purpose. The goal for 2025 is for one of every three university professors nationally (31.2%) to be female, setting a minimum ratio of 25% for each individual educational institution (Ministry of Education, Culture and Science, 2020). It should, however, be pointed out that once again promoting gender equality in research has been left to the discretion of each university, through the appointment of a diversity officer (European Institute for Gender Equality, 2020). Interviews with some of these officers have revealed that most do not have any actual power to make real change and that they lack both the material resources and the time to do so (Bonjour et al., 2020).

The NWO Talent Programme's national research grant scheme includes some initiatives to improve the success rate of female applicants. For example, where two or more grant proposals earn the same score, proposals put forward by women are to be given preference (NWO, 2022). Mothers can request an 18-month extension of the deadline for submitting grant proposals per child (NWO, 2022; Rathenau Instituut, 2022). In addition, the Aspasia programme has been integrated into the overall NWO Talent Programme of research grants. The programme has three levels of grants for independent research: *Veni* (for postdoctoral researchers who have recently obtained their degrees), *Vidi* (for researchers with fewer than eight years of postdoctoral experience), and *Vici* (for senior researchers with at least 15 years of postdoctoral experience and a demonstrated ability to lead projects and supervise students) (Talent Programme, 2022). Women who are awarded a *Vidi* or a *Vici* grant are also

awarded an Aspasia grant in the amount of a further €40,000. Universities receive a premium for advancing these female researchers in their careers from assistant professor to associate professor (Aspasia Programme, 2020). The NWO also grants the Athena Award, a €50,000 prize for women researchers in the fields of the Natural and Exact Sciences. This nomination-based prize has been in operation since 2015 (NWO, 2021).

There is a broad range of initiatives at the institutional level. As mentioned above, some universities have focused on hiring policies while others have preferred to implement mentoring programmes.

Because of its media impact, an important example of a gender equity policy at a major institution was the major shift in hiring policy at the Eindhoven University of Technology, known as the Irène Curie Fellowship Programme. In 2019, when only 14% of professors were women, that university announced that only applications by women candidates would be taken during the first six months of any selection procedure to hire a professor. If no female candidate was suitable for the position, the process would then be opened to applications by men. In addition, the women recruited were awarded funding of €100,000 to start up their laboratory, in addition to mentoring. That initiative received both support and criticism from a number of sectors, including academia, on grounds of "discrimination against men" (Dance, 2019). Indeed, in 2020 the programme was brought before the Netherlands Institute for Human Rights (*Het College voor de Rechten van de Mens* [CRM]); it was forced to change its rules so that it would not conflict with Dutch legislation on equal treatment, and its scope also had to be restricted (College voor de Rechten van de Mens, 2020). Despite the controversy, after the first 18 months of operation, women's presence at the university had doubled. That success caused the university to extend the programme until 2024, with the rules changed as required by the CRM, in an effort to raise the proportion of women professors at the university to 30% (Technische Universiteit Eindhoven, 2021). Other programmes were also aimed at boosting the hiring of women, like the programme at the Delft University of Technology (Oordeelnummer 2012-195, 2012).

In addition, the University of Groningen has been operating its Rosalind Franklin Fellowship since 2003. This fellowship is intended to promote women scientists through a five-year tenure track to full professor. As an added feature, it has an international scope, and it includes a package for support and job guidance

for the partners of fellows who have to move to Groningen (Rijksuniversiteit Groningen, 2021). In its turn, since 2015 the Free University of Amsterdam (*VU Amsterdam*) has had a chair for women researchers, the Fenna Diemer-Lindeboom chair, to advance the careers of female scientific talent. Candidates are associate professors who are nominated by their schools and are appointed for a term of up to five years. After that term and after successfully passing a performance review, holders are offered a full professorship (Fenna Diemer-Lindeboom chair, 2020).

Lastly, attention can be drawn to the role of civil associations and foundations in gender equality in science. The Dutch Network of Women Professors (LNVH, n.d.) has been an extremely active social agent for the past 20 years. As part of its activities it runs a mentoring programme for women scientists, issues comprehensive publications and reports on harassment and inequality and on the implementation and execution of equity initiatives at different levels, and also acts as a consultant body (Women Professors Monitor, 2021). Furthermore, the Netherlands Organisation for Health Research and Development (*ZonMw*) has a gender and health programme and runs workshops to promote knowledge and training in the field of health along with research that includes a gender perspective (ZonMw, 2024).

CONCLUSIONS

- The march of equality has been slow, especially up to 2010. Since that time, a clear improvement in the proportion of women scientists over the course of their careers in science has become discernible, and the gap between women and men in professorships has decreased by 10% over the past 10 years.
- The Netherlands has focused on a gender perspective mainstreaming strategy that has been more effective than the equality and emancipation strategies that came before.
- Solutions to this issue that are perceived as being drastic still encounter social and political resistance.
- Allocating sufficient funding to enable institutions to implement hiring, promotion and diversity initiatives is critical to the success of those measures. For that reason, national plans backed by a budget to attain this goal are needed.

- Meeting the need of women researchers to have access to mentors has proved to be a key measure. Today's programmes of grants, fellowships and tenure tracks often include a mentoring scheme for their beneficiaries.
- Scientific and civil organisations have played a role as allies by acting as consultants and monitors for gender equality policies.

REFERENCES

Bonjour, S., van der Brink, M. & Taartmans, G. (2020). Een diversity officer is nietgenoeg: Het diversiteitsbeleid op Nederlandse universiteiten [*A diversity officer is not enough: diversity policy at universities in the Netherlands*]. *TH&MA, 27*(5), 83-89. https://hdl.handle.net/2066/227131

Centraal Bureau voor Statistiek [*Statistics Netherlands*]. (January 2022). *Mannen en vrouwen* [*Men and women*]. https://www.cbs.nl/nl-nl/visualisaties/dashboard-bevolking/verdeling/

Centraal Bureau voor Statistiek. (October 2022). *Population Dashboard*. https://www.cbs.nl/nl-nl/visualisaties/dashboard-bevolking

College voor de Rechten van de Mens [*Netherlands Institute for Human Rights*]. (3 July 2020). *College oordeelt over voorkeursbeleid TU Eindhoven* [*Institute rules on TU Eindhoven's preferential policy*]. https://www.mensenrechten.nl/actueel/nieuws/2020/07/03/college-oordeelt-over-voorkeursbeleid-tu-eindhoven

Dance, A. (2019). How a Dutch university aims to boost gender parity. *Nature Career News*.

Dubois-Shaik, F. & Fusulier, B. (Eds.) (2015). Garcia (Gendering the Academy and Research: combating Career Instability and Asymmetries) Working Papers 5 – Netherlands. In C. Herschberg & L. Berger, Garcia Working Papers 5 Academic Careers and Gender Inequality (p. 74).

Dutch Network of Women Professors [LNVH] (2022). Women Professors Monitor 2021. https://www.lnvh.nl/a-3720/lnvh-presents-the-2021-women-professors-monitor

Dutch Network of Women Professors [LNVH]. (n.d.). About the LNVH. https://www.lnvh.nl/about-the-lnvh

European Institute of Gender Equality. (2019). *Gender Mainstreaming (Netherlands)*. https://eige.europa.eu/gender-mainstreaming/countries/netherlands

European Institute for Gender Equality. (2020). *Legislative policy background Netherlands, Key actors*. https://eige.europa.eu/gender-mainstreaming/toolkits/gear/legislative-policy-backgrounds/netherlands

European Institute for Gender Equality. (2021). *Gender Equality Index – Netherlands*. https://eige.europa.eu/gender-equality-index/2021/NL

European Institute for Gender Equality. (2023). *Gender Equality Index – Netherlands*. https://eige.europa.eu/gender-equality-index/2023/NL

Gemmeke, M. & de Weerd, M. (2001). Evaluatie van de wet evenredige vertegenwoording vrouwen in leidinggevende functies [*Review of the law on proportional representation of women in management positions*]. Amsterdam: Regioplan.

Goldschmidt, J. (2012). Protecting Equality as a Human Right in the Netherlands: From Specialised Equality Body to Human Rights Institute. In The Equal Rights Review, Vol. Eight (pp. 32-49).

Hoogh, A. d., Hesping, S., Rudolf, P. & Wolf, E. d. (2019). The Dutch FOm/f Approach to Gender Balance in Physics. *AIP Conference Proceedings.*

International Monetary Fund. (2022). *World Economic Outlook databases.* October 2022. https://www.imf.org/en/Publications/SPROLLs/world-economic-outlook-databases#sort=%40imfdate%20descending

Ministry of Education, Culture, and Science. (2020). *National action plan for greater diversity and inclusion in higher education and research.* https://www.government.nl/documents/reports/2020/09/01/national-action-plan-for-greater-diversity-and-inclusion-in-higher-education-and-research

NWO. (2017). *Westerdijk Talent Scheme*. https://www.nwo.nl/en/researchprogrammes/westerdijk-talent-scheme

NWO. (2020). *Aspasia Programme*. https://www.nwo.nl/en/researchprogrammes/aspasia

NWO. (2021). *Athena Award*. Sourced from: https://www.nwo.nl/en/athena-award

NWO. (2022). *Talent Programme*. https://www.nwo.nl/en/calls/nwo-talent-programme

NWO. (2022). *Talent Programme Call for Proposals.* https://www.nwo.nl/sites/nwo/files/media-files/Call%20for%20proposals%20Veni%202021%20-%20ENG%20%281%29.pdf

NWO. (2022). *Talent Programme FAQ.* https://www.nwo.nl/sites/nwo/files/media-files/faq_jan_2022_-_en_0.pdf

Oordeelnummer [*Ruling number*] 2012-195, 2012-195 (College voor de Rechten van de Mens [*Netherlands Institute for Human Rights*] 18 December 2012). https://oordelen.mensenrechten.nl/oordeel/2012-195

Organisation for Economic Co-operation and Development. (2021). *Gender equality data*. https://www.oecd.org/gender/data/employment/

Portegijs, W., Hermans, B. & Lalta, V. (2006). *Emancipatiemonitor [Emancipation monitor] 2006.* The Hague: Sociaal en Cultureel Planbureau & Centraal Bureau voor de Statistiek [*Social and Cultural Planning Office & Statistics Netherlands*].

Rathenau Instituut (2022). *Research grants: a stepping stone for women in their scientific career?* Sourced from: https://www.rathenau.nl/en/science-figures/personnel/women-science/research-grants-stepping-stone-women-their-scientific

Rijksuniversiteit Groningen [*University of Groningen*] (2021). *Rosalind Franklin Fellowship*. https://www.rug.nl/about-ug/work-with-us/rff/rosalind-franklin/

Staatsblad van het Koninkrijk der Nederlanden [*Official Gazette of the Kingdom of the Netherlands*] 1997, 105. (3 June 1997).

Stobbe, L., van den Brink, M. & van Duijnhoven, S. (2004). *Images of Science, Scientific Practice and Femininity Amongst Physicists*. Utrecht: FOM.

Technische Universiteit Eindhoven [*Eindhoven University of Technology*]. (2021). *TU/e resumes preferential policy for hiring female scientists*. https://www.tue.nl/en/news/news-overview/tue-resumes-preferential-policy-for-hiring-female-scientists/

Times Higher Education. (2022). *World University Rankings*. Sourced from: https://www.timeshighereducation.com/world-university-rankings/2022/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats

Timmers, T. (2007). *Op zoeknaar best practices. Een onderzoeknaar de effectiviteit van emancipatiebeleid in de periode 2000-2007 aan 14 Nederlandse universiteiten* [*In search of best practices. A study into the effectiveness of emancipation policy at 14 Dutch Universities between 2000 and 2007*]. Rotterdam: Asociación Neerlandesa de Mujeres Profesoras & Fundación SoFoKleS [*Dutch Network of Women Professors & SoFoKleS Foundation*].

Timmers, T. M., Willemsen, T. M. & Tijdens, K. G. (2010). Gender diversity policies in universities: a multi-perspective framework of policy measures. *Higher Education*, 59(6):719-735.

Universiteiten van Nederland [*Association of Universities in the Netherlands*]. (2022). *Feiten en cijfers personeel* [*Personnel facts and figures*]. Retrieved 1 May 2022. https://www.universiteitenvannederland.nl/feiten-en-cijfers-personeel.html

Universiteiten van Nederland. (2022). *Feiten en Cijfers – Personeel* [Facts and Figures –Staff]. Retrieved 1 May 2022. https://www.universiteitenvannederland.nl/feiten-en-cijfers-personeel.html

van den Brink, M. C. (2009). Behind the Scenes of Science: Gender Practices in the Recruitment and Selection of Professors in the Netherlands. *Amsterdam University Press*.

van der Lee, R. & Ellemers, N. (2015). Gender contributes to personal research funding success in The Netherlands. *Proceedings of the National Academy of Sciences, 112*(40), 12349-12353. https://doi.org/10.1073

VU Amsterdam [*Free University of Amsterdam*]. (2020). *Fenna Diemer-Lindeboom chair*. Sourced from: VU Prizes and distinctions: https://vu.nl/en/research/prizes-and-distinctions

Wet op het hoger onder wijs en wetenschappelijk onderzoek [*Higher Education and Research Act*]. (1992). Sourced from: https://wetten.overheid.nl/BWBR0005682

World Economic Forum. (2019). *Global Competitiveness Report 2019*. Sourced from: http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

World Economic Forum. (2020). *Global Gender Gap*. Sourced from: http://reports.weforum.org/global-gender-gap-report-2020/the-global-gender-gap-index-2020-rankings/

ZonMw [*Netherlands Organisation for Health Research and Development*] (2024). *Gender in Research Fellowship*. https://www.zonmw.nl/nl/subsidie/gender-research-fellowships-2024

UNITED KINGDOM

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INTRODUCTION AND SOCIOCULTURAL CONTEXT[1]

With a land area of more than 240,000 km^2 and a population of some 65 million people, of which 34 million are women, the United Kingdom[2] is one of Europe's economic powerhouses. According to the Global Competitiveness Report 2019, its economy in that year ranked ninth among the G20 countries (Schwab, n.d.). Globally, a study published by the IMD World Competitiveness Center crossing political, social, and cultural factors with data on the Gross Domestic Product (GDP) placed the United Kingdom 23rd in 2022, five spots lower than in 2021 (World Competitiveness Ranking, n.d). Formal education reaches 99% of the population, and women have had the same voting rights as men since 1928.

A woman has been Head of State and Head of the Church at different times in the United Kingdom's history, namely, Queen Elizabeth I, Queen Anne, Queen Victoria and Queen Elizabeth II. The United Kingdom has also democratically elected two women to be the country's prime minister (a third, Liz Truss, was chosen to succeed Boris Johnson in September 2022), but it was under a man, Tony Blair, that the position of Minister for Women, later the Minister for Women and Equalities, was first established, in 1997.

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[1] *This chapter on the United Kingdom was written in October 2022. This is noted because the United Kingdom has embarked on large-scale social change, primarily due to the impact that Brexit, i.e., leaving the European Union, is having on the country in the aftermath of the 2016 referendum.*

[2] *The United Kingdom of Great Britain and Northern Ireland consists of four countries, England, Scotland, Wales and Northern Ireland. For purposes of the assessment presented in this chapter, all four countries have been grouped together into one whole.*

Data on women in the labour market published in 2019 indicated that 72.1% of working-age women held jobs compared to 80.1% of men. However, according to the Office for National Statistics, 41% of women were employed part time compared to 13% of men (Census 2019, 2021).

University education in the United Kingdom is one of the main pillars underpinning the British economy. In 2021 the United Kingdom proudly boasted four universities among the top 10 in the world in the QS ranking (Oxford University, Cambridge University, Imperial College London and University College London) (QS Top Universities 2021) (G, n.d.). These and other British universities are a magnet for large numbers of foreign students, who come to the country chiefly to study for master's degrees or to complete doctoral programmes (41% and 36%, respectively, in 2020). They are charged fees that tend to be double or treble the fees paid by domestic students. Indeed, in 2012 the sector generated a total of €90 billion for the country's coffers, 2.8% of that year's GDP (Department for Business, Innovation & Skills, 2014).

According to calculations, in 2017 the country's universities employed nearly a million people (Bothwell, 2017), 54.2% of whom were women, based on data published by Advance Higher Education (Advance HE) in 2020 (The Higher Education, 2020).

Nevertheless, "despite comprising the majority of staff working in UK institutions of higher education, women remained under-represented among academic staff, staff in SET subject areas and in senior management roles". This same sentence has been republished word for word in all the annual reports released by Advance HE from 2011 to 2021. The data are broken down and considered in greater detail in the following sections.

STATISTICS ON ACADEMIC STAFFING IN THE UNITED KINGDOM

The data relating to academic staffing in the United Kingdom considered here have been drawn from the annual reports released by Advance HE. Advance HE notes that its statistics, discussed in this chapter, classify academic staff by their chosen gender identities.

Advance HE is a non-profit organisation that works with institutions and universities around the world for the betterment of higher education, not just

for students but also for staff (Advance HE, n.d.). Its reports address subjects like age, gender, racial, religious and disability-related inequality along with many other facets of student and academic life. The first reports were published in 2010 using data collected since 2002.

In 2020 most university staff members were women (54.2%). However, for academic staff the figure dropped to 46.7% women and 53.3% men. Figure 8.1 shows that the ratio of women academic staff members has been rising since 2002 at the expense of the ratio of men.

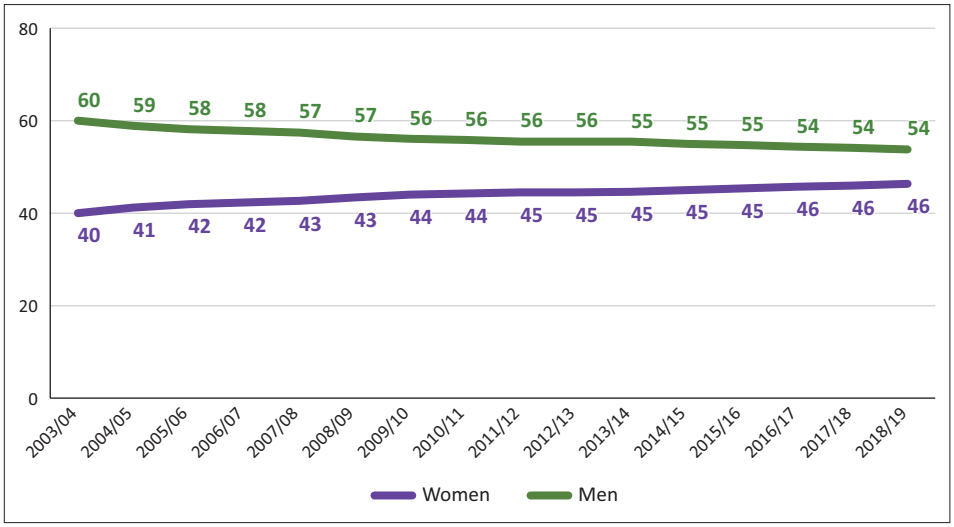

Figure 8.1. Percentage women vs men in academia. (Compiled by the author from data gathered by Advanced HE).

The preceding Figure shows that the percentage of female academic staff members rose by 6 percentage points from 2003 to 2020. However, in 2019 the percentage of women academics working part time was 55.4% vs 44.6% for men (data not shown). That value may be linked to the types of contracts men and women enter into in academia. In that same year, 2019, under 41% of women had permanent contracts compared with 59.2% of men. Another interesting point is that in 2021 47.8% of male academic staff were engaged in teaching and research compared with 39.4% of women, i.e., a difference of 8.4%. Furthermore, 36.6% of female academics held exclusively teaching jobs compared with 28.8% of men, though the share of academic staff engaged solely in research was practically the same for both sexes (Figure 8.2).

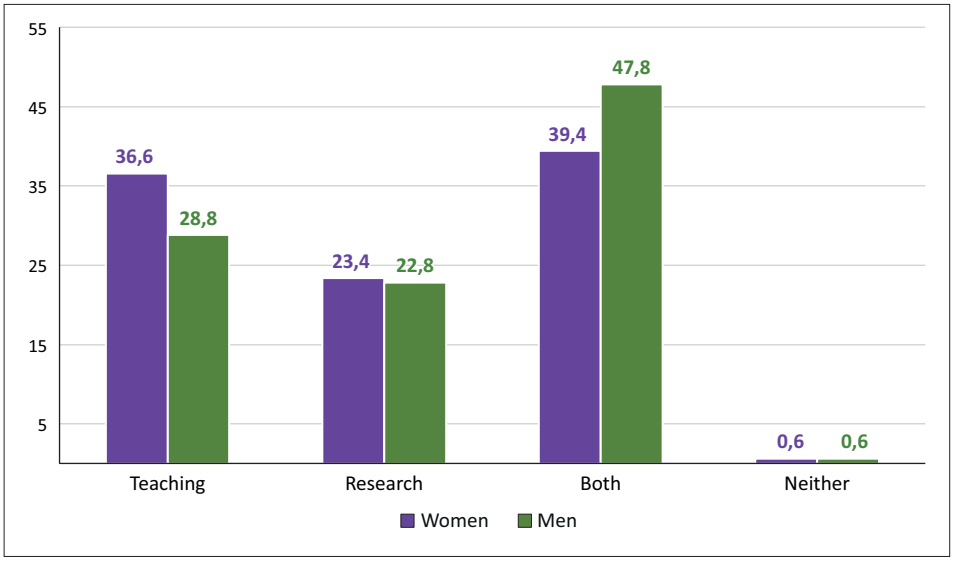

Figure 8.2. Percentage women and men in British academia by their main job duties in 2021 (Compiled by the author from data gathered by the Higher Education Academy).

For STEM (science, technology, engineering and maths fields, the data are a bit different, as depicted in Figure 8.3.

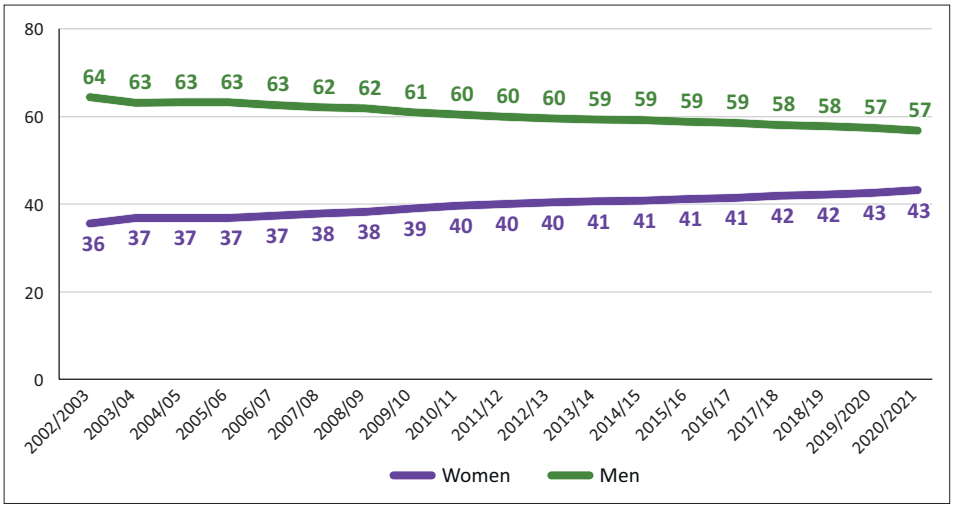

Figure 8.3. Percentage men and women in science, technology, engineering and maths (STEM) in academia.
(Compiled by the author from data gathered by the Higher Education Academy).

Plotting the percentage for women and men at the different academic levels in 2010, 2015 and 2021 shows that there is parity between women and men in the initial stages of a career in science and academia and that the percentage of men rises steeply in upper echelon positions. However, the trend can be seen to have been inverted in the case of grade B positions in 2021 (Figure 8.4a).

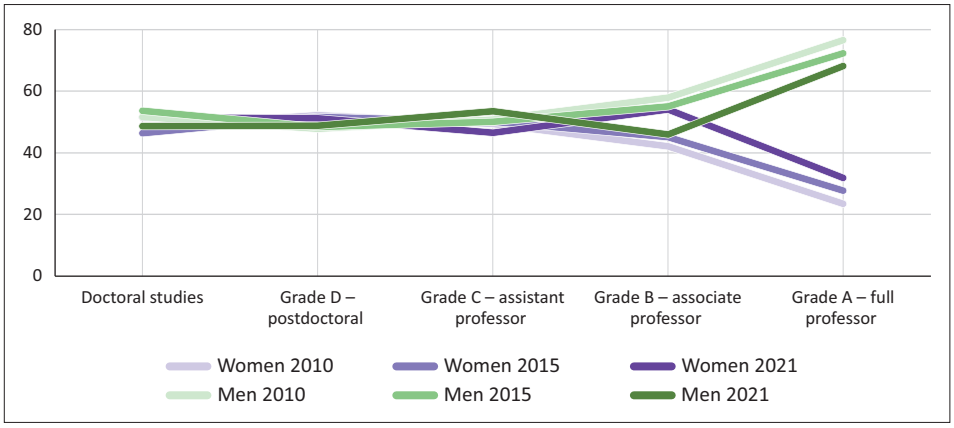

Figure 8.4a. Percentage women and men over the course of academic careers in the United Kingdom, 2010-2020.
(Compiled by the author from data gathered by the Higher Education Academy).
Figure 8.4b plots the data for 2021 in more detail.

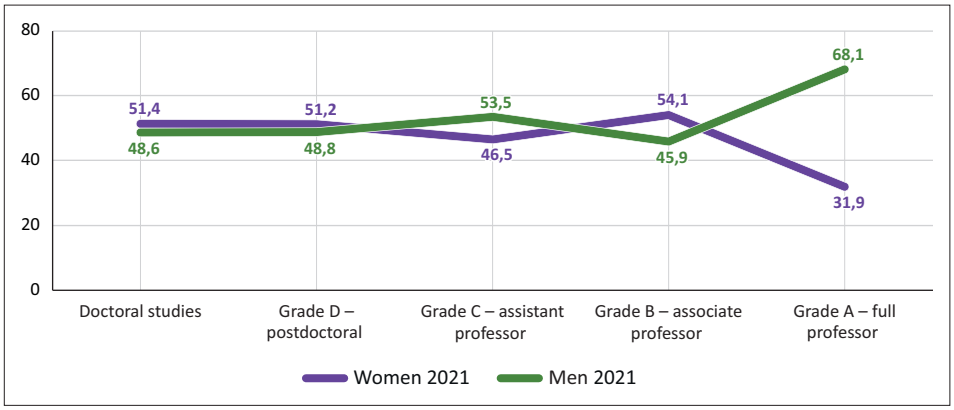

Figure 8.4b. Distribution of the different academic ranks by sex in 2021 (Compiled by the author from data gathered by the Higher Education Academy).

Based on the Figure the gender policies carried out in the United Kingdom could appear to have had a positive impact on male-female parity over the years, but restricting the plot to just the data for the most senior positions in academia shows that for the most part those posts are held by men (Figure 8.5).

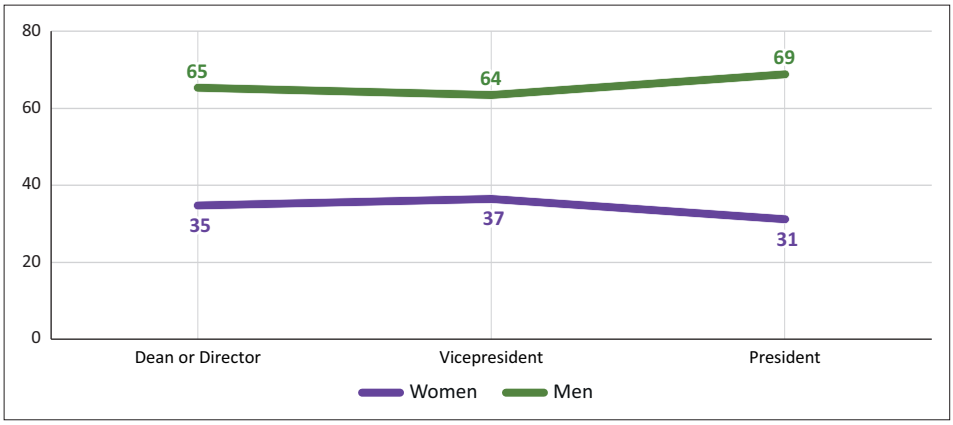

Figure 8.5. Distribution of the most senior academic positions in the United Kingdom by sex in 2021 (Compiled by the author from data gathered by the Higher Education Academy).

GENDER EQUALITY POLICIES IN SCIENCE IN THE UNITED KINGDOM

In 1998 the United Kingdom adhered to the European Convention by passing the Human Rights Act (Human Rights Act, n.d.) including its safeguards for women's rights in the workplace. The Athena Project followed the year after, in 1999. The aim of that initiative was to advance and promote women working in teaching and research in the fields of science, engineering and technology at university. Its initial goal was to raise the number of women hired by universities, especially in positions of high responsibility.

The Athena Project ran until 2007; however, the Athena Swan accreditation began in 2005. Its seal is awarded to recognise institutions that are committed to employing women in science, technology, engineering, medicine and mathematics as institutions of excellence (Athena Swan Charter, n.d.). Advance HE awards three categories of accreditation, bronze, silver and gold. Each category certifies that the institution concerned meets certain minimum gender equality requirements.

To meet the minimum requirements for bronze accreditation, institutions must have performed an internal qualitative and quantitative gender assessment. They must also have been able to identify gender issues specific to their institutions and must have taken suitable measures to address them. The silver award requires having demonstrated the impact those measures have had at the institution, and the gold award requires the institution to have become an example and a beacon for other universities.

To promote those policies, certain organisations, e.g., the National Institute for Health and Care Research (NIHR), provide funding for research only where the applicant university holds silver or gold Athena accreditation. A similar strategy has been implemented by the non-profit Wellcome Trust (Else, 2017), which plans to earmark over £16 billion for research funding up to 2032 (Wellcome Trust, n.d.).

Still, though positive for the university community as a whole, accreditation of this kind holds back women›s career growth. In an interview in March 2021, Cathy McIlwaine, Vice Dean (Research), Faculty of Social Sciences and Public Policy, at King›s College London, said that «male academics are more likely to develop high-profile, research-oriented activities within an individualised system. Women, especially mid-career, [get] ‹stuck› and are unable to move up into professorial positions, because of the pressures they end-up facing in the more ‹routine jobs› that make departments work» (King›s College London, 2021). This is highlighted by the fact that if we look at the 142 applications submitted to Advance HE for Athena Award Charter accreditation the year before, we can see that on the 140 applications that listed the names of the people responsible for submitting the application, the lead person was a woman in 85% of cases, a man in 15% (Athena Swan Charter, n.d.). These applications are usually sent in by the members of the DEI (Diversity, Equity and Inclusion) Committee, on which there tends to be over-representation of women and members of ethnic minorities and the LGBTQ + community. This can be taken as an indication that even though Athena Award Charter accreditation helps public university research institutions gain funding and that as shown in Figure 8.2 male academics are the majority in that sector, this burden is shouldered by members of the most vulnerable groups.

At the national level, in 2010 Parliament issued its Declaration of Equality (Equality Act, n.d.) making a series of sex-based discriminatory practices in the

workplace unlawful, e.g., different pay for men and women who do the same jobs and sex-based hiring discrimination.

All these measures and policies, whether centralised through the government or handled by the universities› and institutions› own internal bodies, do seem to have helped advance women›s careers and to have consolidated women›s presence at the highest echelons of British universities. However, the paucity of women chancellors signifies that there is still room for improvement, though the trend seems to be that parity is drawing near and could be attained in the next few years.

Thus, creating an award for gender equity at universities and research organisations may be helpful as a means of boosting these practices. The fact that powerful funding partners like the NIHR, Wellcome Trust and others that provided more than €5.2 million for research in the United Kingdom in 2018 (UK Health Research Analysis, n.d.) require the universities they fund to hold equity accreditation is definitely an incentive for universities to recognise and value the role of women within their organisations.

Even so, society as a whole and more particularly men as a group are still a long way away from understanding that this struggle also concerns them and that they should therefore be more involved in DEI and other committees of that kind, on which participation by white heterosexual males remains at extremely low levels.

CONCLUSIONS

- Gender equity in British academia is near at hand, despite room for improvement in the most senior positions.
- Creation of the bronze, silver, and gold Athena Swan accreditation has been well received in academia and seems to have played a key role.
- Silver accreditation is a core requirement for securing research grants from the main sources of funding.

REFERENCES

Advance HE (n.d.). Advance HE: Home. Last retrieved 6 February 2023 from https://www.advance-he.ac.uk/

Athena Swan Charter (n.d.). Athena Swan Charter Members. Advance HE. Last retrieved 6 February 2023 from: https://www.advance-he.ac.uk/equality-charters/athena-swan-charter/members

Athena Swan Charter (n.d.). *Athena Swan charter. Advance HE*. Last retrieved 6 February 2023 from: https://www.advance-he.ac.uk/equality-charters/athena-swan-charter

Bothwell, E. (2017). *Universities 'generate £95 billion for UK economy'. Times Higher Education (THE).* Last retrieved 6 February 2023 from: https://www.timeshighereducation.com/news/universities-generate-ps95-billion-uk-economy

Department for Business, Innovation and Skills (2014). *Contribution of UK universities to national and local economic growth. GOV.UK*. Last retrieved 6 February 2023 from: https://www.gov.uk/government/speeches/contribution-of-uk-universities-to-national-and-local-economic-growth

Else, H. (2017). *Wellcome Trust explores diversity rules for funding applications. Times Higher Education*. Last retrieved 6 February 2023 from: https://www.timeshighereducation.com/news/wellcome-trust-explores-diversity-rules-funding-applications

Equality Act (n.d.). *Equality Act 2010*. Last retrieved 6 February 2023 from the web page https://www.legislation.gov.uk/ukpga/2010/15/contents

G, J. (n.d.). *Top Universities* in the UK 2021. Top Universities. Last retrieved 6 February 2023 from: https://www.topuniversities.com/university-rankings-articles/world-university-rankings/top-universities-uk-2021

Human Rights Act (n.d.). *Human Rights Act 1998*. Last retrieved 6 February 2023 from: https://www.legislation.gov.uk/ukpga/1998/42/schedule/1

King's College London (2021). IWD2021: *Women's leadership and gender equality in academia | Feature from King's College London*. Last retrieved 6 February 2023 from: https://www.kcl.ac.uk/iwd2021-womens-leadership-and-gender-equality-in-academia

Office for National Statistics. Census 2021 (2019). *Labour market economic commentary: August 2019. Labour market economic commentary – Office for National Statistics*. Last retrieved 6 February 2023 from:

https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/labourmarketeconomiccommentary/august2019#toc

Schwab, K. (n.d.). *The Global Competitiveness Report 2019*. weforum.org. Last retrieved 6 February 2023 from: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

The Higher Education (2020). *Equality in higher education: Staff statistical report 2020*. Advance HE. Last retrieved 6 February 2023 from: https://www.advance-he.ac.uk/knowledge-hub/equality-higher-education-statistical-report-2020

UK Health Research Analysis (n.d.). *UK Health Research Analysis 2018*. HRCS Online. Last retrieved 6 February 2023 from: https://hrcsonline.net/reports/analysis-reports/uk-health-research-analysis-2018/#participating-2018

Wellcome Trust (n.d.). *Grant funding schemes and guidance | Grant funding*. Wellcome. Last retrieved 6 February 2023 from: https://wellcome.org/grant-funding

World Competitiveness Ranking (n.d.). World Competitiveness Rankings – IMD. IMD Business School. Last retrieved 6 February 2023 from: https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/

SWEDEN

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Sweden is a northern European country with a land area of 528,861 km^2 (Expansion Magazine, n.d.). Stockholm is its capital city. Together with Norway and Denmark, it is part of the region known as Scandinavia.

Sweden's population is 10,452,326, and its population density is a moderate 20 people per km^2. Women make up 50.2% of Sweden's population (Expansion Magazine, n.d.; United Nations Department of Economic and Social Affairs: Population Division [UNDESA], n.d.). Its currency is the Swedish krona (SEK), and its economy ranks 24th in gross domestic product (GDP). Its public debt was €193 billion in 2021, 36.3% of GDP. In that year, GDP per capita was €51,560 (Expansion Magazine, n.d.).

Sweden's per capita GDP ranks 14th, i.e., its people have a high standard of living among the 196 countries in the ranking. In terms of gender equality and gender equity policies, Sweden acknowledges inequality in such areas as pay, housework and sexual abuse. In an endeavour to foster a more equal society, the Swedish Parliament, the *Riksdag*, has implemented gender equality policies aimed at giving women and men the same degree of influence in society and in their personal lives. The national government and the country's provincial, regional and local governments are in charge of advancing gender equality policy goals in Sweden. Gender equality policies have six partial objectives targeting areas of inequality, namely, equitable distribution of power and influence; economic equality; educational parity; fair split of unpaid housework and caregiving; health equality; and the eradication of male violence against women (Länsstyrelserna, 2023).

STATISTICS ON ACADEMIC STAFFING IN SWEDEN

Sweden has earned the highest score on the Overall Gender Equality Index, 82.2 in 2023, while the EU average is 70.2 (EIGE, 2023). Even though Sweden, together with Norway and Finland, is regarded as being at the forefront of gender balance in research (Commission et al., 2014), women still lag far below the level of gender parity in academic positions of leadership in science, technology, engineering and mathematics (STEM) fields (Länsstyrelserna [County Administrative Boards], 2023). At the same time, overall, there has been a discernible trend towards a decrease in enrolment in higher studies in Sweden, especially by women (Bengtsson et al., 2022; Kahlroth & Inkinen, 2016). There were 86,000 new enrolments in higher education in Sweden in the 2014/15 academic year. Of those, 57% were women and 43% were men (Kahlroth & Inkinen, 2016), and this trend continued until 2021 (Bengtsson et al., 2022).

In 2021 most women enrolled in the subject areas of medicine and nursing, while engineering, followed by natural sciences, still remained the overriding domain of men (Bengtsson et al., 2022) (Figure 9.1). Over the past 10 years the gender ratio among students of higher education has been more or less balanced, but financing does not show the same parity, and men are in a better position to finance their studies (Bengtsson et al., 2022), in that they tend not to need alternative means of financing to finish their education.

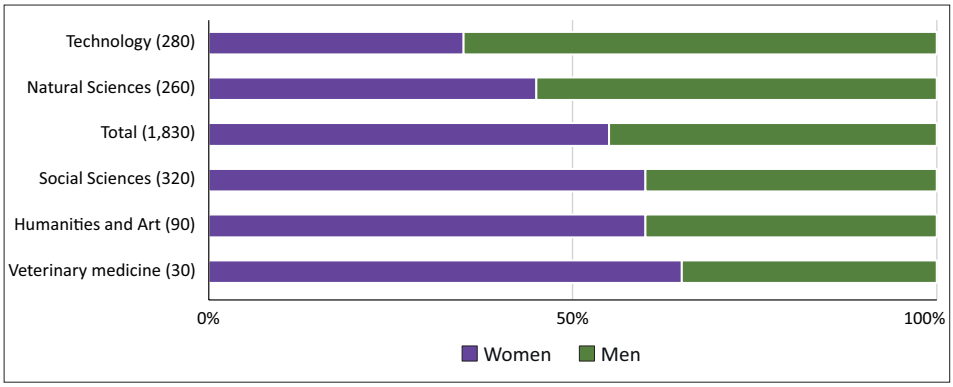

Figure 9.1. Share of Swedish women and men starting out in postgraduate education in 2021, overall and by research subject area. Total number of enrolments in brackets. Compiled by the authors after Bengtsson et al. (2022).

In general, the gender ratio for teaching and research staff has been rising rather uniformly in recent years (Figure 9.2). In 2011, 44% were women, and that percentage had increased to 48% in 2021 (full-time equivalents). There are differences in the ratio of women in the different job categories, but except for full professors, all fall within the range of from 30 to 60%. For full professors, the ratio of women rose from 23% in 2011 to 32%, a 12% increase (Bengtsson et al., 2022).

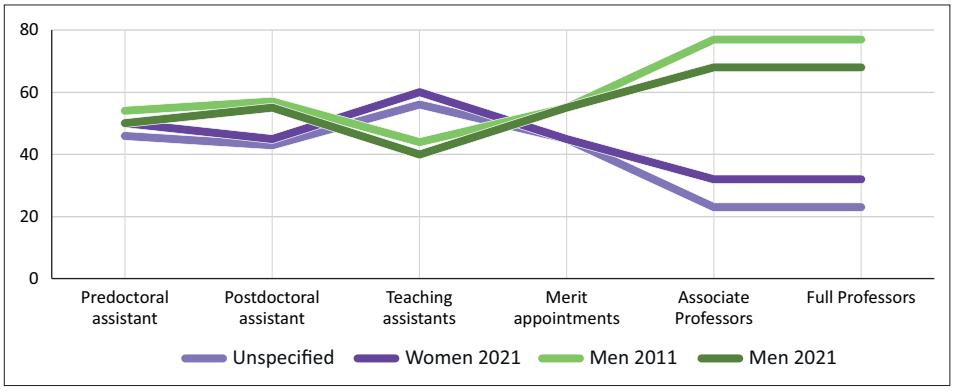

Figure 9.2. Teaching and research staff at universities and colleges in 2011 and 2021 showing the percentage ratio and percentage change for women and men by job category, full-time equivalents (compiled by the authors after Bengtsson et al., 2022).

The ratio of women directors of higher education institutions in Sweden in 2021 was 47%, one of the highest in Europe. Nonetheless, the ratio is still rather far below parity in the STEM fields, although the *She Figures* report published by the European Union in 2021 containing data for 2018 shows that Sweden, at a ratio of 28% women full professors in STEM subjects, is above the average of 26% for the 27 EU Member States (Directorate General for Research and Innovation, 2021).

GENDER EQUALITY POLICIES IN SCIENCE AND ACADEMIA

In Sweden, as in most developed countries, there are more female than male students of higher education. Despite this, there are still differences for women and men in terms of employment, career trajectories and access to research funding. Though Sweden has a reputation as a front-runner in promoting gender balance in research, the ratio of women in the top academic positions in STEM fields in Sweden is still below parity.

A series of measures and initiatives to promote gender parity advanced at the national level have been funded from public monies in the Nordic countries since as far back as the early 1980s. Indeed, the first high-level national reports on women in research were released in Sweden and Finland (Husu et al., 2019). Nevertheless, the political will of Nordic countries, including Sweden, to promote gender equity and the measures they proposed were constrained by EU regulations and could not be implemented at that time (Husu et al., 2019).

In the framework of gender policies for academia, the under-representation of women in STEM fields in Sweden has made necessary national and institutional measures to promote gender parity at university. Research organisations in Sweden operate under the laws and charters governing the sphere of higher education, chiefly the Swedish Higher Education Act (SFS [Swedish Code of Statutes] 1992:1434) and the Higher Education Ordinance (SFS 1993:100). The national government also provides incentives for universities to foster gender equality. The efficacy of these policies depends both on the types of measures and how they are implemented by the universities, since it is the universities that are responsible for drawing up their own gender policies, independently.

In 2016 the Swedish government directed all institutions of higher education under its authority to operate in a framework of gender mainstreaming. After a 2022 review, the government instructed higher education institutions to continue their efforts towards gender mainstreaming in their working procedures to help achieve the gender equity policy objectives with respect to equality of job opportunities, design of courses of study from a gender perspective and degree completion rates (Regeringens skrivelse [Government communication] 2016/17:10). Institutions of higher education have been tasked with identifying gender equality issues affecting their primary operating procedures that they are able to address, and they are required to report on how due consideration is given to gender mainstreaming when allocating funds for research (Stockholm University, 2023-2025). Stockholm University is an example of a Swedish university that has identified three lines of attack and has considered how to implement them (Stockholm University, 2023-2025). The first action plan was drawn up in 2017, and a third, based on the measures already put into practice under the first two plans implemented in the intervening years, was under way in 2022. The third action plan included both activities that continued other, earlier initiatives and new measures to address emerging issues that had been identified (Stockholm University, 2023-2025).

These policies are aimed at fighting gender inequality existing within the university and may encompass measures directed at individuals, at the culture and at organisational structures. The first measures were gender policies targeting members of the under-represented sex (in STEM subject areas, women) aimed at remedying "deficiencies" to help them advance within the prevailing career structures (Silander et al., 2022). Gender differences are addressed by targeting women through measures that aim to change individual behaviour and the choices made by women (although these can be influenced by societal norms and values). Those initiatives are often based on the assumption that women lack the required knowledge or networks, or behave in ways that make them less competitive (e.g., not engaging in enough risk-taking, not actively seeking promotions). With that in mind, women are offered targeted training, coaching, networking, mentoring and leadership programmes to help them meet the norms of the "ideal academic" (Silander et al., 2022).

Training measures also seek to change the culture of the organisation and prevent research and teaching staff and managers from holding implicit bias and stereotypes which may reproduce existing patterns of inequality. Although academia is often presented as gender neutral, many practices privilege men. Thus, training measures target the norms and values of staff in an organisation, especially department heads and members of recruitment and promotion committees (Silander et al., 2022). The transformative learning opportunities on which interactive training initiatives are based, rooted in continuous dialogue at both the individual and group levels and between managers and staff, have the potential to leave a lasting mark on an organisation. This takes advantage of the organisation's know-how and is perceived as relevant to daily activities, helping to problematise daily practices and to promote critical thinking (Larsson, 2023).

The next category of measures is structure-oriented policies and includes initiatives to support organisational responsibility in gender equality work. If organisations do not assign responsibility for diversity goals to a specified office or person, these goals risk being overlooked when line managers need to meet competing demands from academics. The recommendation in these policies is for them to assign responsibility for setting goals, allocating resources and evaluating progress, which can take the form of action plans, internal monitoring and the introduction of diversity committees (Silander et al., 2022). Successful implementation of gender equity policies must extend through all the organisational levels of an institution in order to be able to change organisational

conditions and challenge the hierarchies, norms and informal group values that can help perpetuate unequal conditions. This type of implementation requires an organisational approach and a willingness to change previously established practices and routines (Andersson & Sjöberg Forssberg, 2018).

Policies that seek to make structural changes in organisations aspire to change the way rules, structures, decision-making and processes are organised, for example, by increasing representation or transparency within the organisation. Previous studies on measures for improving gender balance and diversity in organisations indicate that transparency in hiring and promotion, policies that establish clear responsibility for increasing diversity within the organisation and affirmative action plans in combination with responsibility structures are most effective (Silander et al., 2022). This may involve including transparent procedures for workload allocation and promotion criteria or official publishing of positions for recruitment. A number of policies that represent organisational responsibility in promoting gender equality, e.g., the requirement to have a gender equality plan and salary reviews by sex, are part of the legislation in the Nordic countries, including Sweden (Silander et al., 2022).

Existing organisational structures and institutions are not gender neutral but favour one sex (usually men) in a variety of subtle and often invisible ways. So a second category of structure-oriented policy is focused on organisational structures capable of influencing individuals' entry and promotion in academic careers (Silander et al., 2022).

Though as a rule STEM-oriented universities in the Nordic countries vary considerably in their use of organisational gender and equality measures, active use of the gender and equality measures described above seems to be related to significant changes in the ratio of women in grade A positions, namely, full professorships. It is clear that Swedish universities that have implemented significant shifts in the ratio of women more often also used "preferential treatment" measures and measures specifically targeting women. In any case, it should be noted that use of targeted and "preferential treatment" measures in the policies used in the Nordic countries has been more temporary in nature. For example, the use of the strongest version of "preferential treatment", earmarking resources, was discontinued at many Swedish universities because it was considered discriminatory towards men after being ruled out by the European Court of Justice in 2002 and 2003 (Silander et al., 2022).

A study of gender equity in Swedish academia from 2023 reported that Swedish universities bring a variety of measures to bear in support of equality (Silander, 2023). The measures reported in that study that were used most often by those universities were organisational measures, followed by training initiatives. By contrast, preferential treatment measures and targeted measures were used less often. Even so, there was variation among the different universities (Silander, 2023). Increased use of organisational measures has followed on arguments by academics that there is a need to change organisational cultures and practices from the ground up (Silander, 2023).

In addition, the Swedish government issues public research institutes specific instructions concerning gender equity (European Institute for Gender Equality, 2024). Some examples include the model for equal distribution of research funds at Kristianstad University (*HKR*), the equality office led by the Vice-President at the Royal Institute of Technology (*KTH)*, and equal funding of innovations at the Swedish Innovation Agency (*VINNOVA)* (European Institute for Gender Equality, 2024).

The measures that have proved most effective for achieving progress in Sweden include challenging existing organisational cultures to change in order to counteract organisational inequalities and promoting the advancement of women to the top-level full professorship positions.

It is important to assess the gender equality policy implementation process at the organisational level. A recent study released by the Swedish Government's Gender Equality Agency (*Jämställdhetsmyndigheten*) has identified five steps to follow to successfully mainstream gender equality policies in higher education and research organisations from the standpoint of organisational change. These steps are: (1) identifying the issues, (2) allocating resources and support staff and creating structures to support the process, (3) tackling implementation, or changing over from words (or documents) to actual action, (4) accepting and embracing the programmes at the level of the organisation, and lastly (5) ensuring their sustainability over time (Jordansson & Peterson, 2024). This requires engagement on the part of both structural elements and management personnel at different levels within the organisation (top-down approach), together with generally motivating staff members through activities intended to improve training and "plant the seed" for the changes to be made (bottom-up approach). Some of the obstacles identified in that study included individual-based aspects,

i.e., implementation that depends on specific individuals rather than being spread through the community; a lack of localised implementation in the different departments or groups; policies that are not designed to turn plans and documents into real action; and organisational "forgetfulness", that is, when policy implementation does not take hold at the institution (Jordansson & Peterson, 2024).

CONCLUSIONS

- Sweden holds the top overall gender equality index score and a burnished image that has been promoted for years, and it is above the European average for the number of women in positions of leadership. Still, complete parity is yet to be reached, above all in STEM fields, and the country shares some problems with other countries where women are poorly represented in senior positions.
- The government enacts laws, but it is the universities that are tasked with deciding how to put them into effect.
- STEM-oriented universities have employed a range of measures to promote gender equality, and the number of leadership positions held by women has grown substantially.
- The universities that have experienced significant positive change in the number of women in positions of responsibility have used "preferential treatment" measures and targeted measures to change the organisational structure.
- The link between representation and "preferential treatment" measures reflects interventional strategies that are controversial, short-sighted and short-term.
- Training measures and measures aimed at strengthening organisational responsibility are what brings enduring changes in gender equality at university.
- Deep-rooted, sustainable gender equity policies at institutions require both top-down engagement by management structures and bottom-up engagement by staff.

REFERENCES

Andersson, S. & Sjöberg Forssberg, K. (2018). Lärande organisation med mottaglighet för innovation. Den lärande organisationen 2.0. [*Teaching organisation open for innovation. The teaching organisation*]. (red. Otto Granberg & Jon Ohlson). Lund: Studentlitteratur.

Bengtsson, A., Gribbe, J. & Wintgren, H. (Eds.). (2022). Universities and colleges. Swedish Higher Education Authority (UKÄ). [*Swedish Higher Education Authority publications*].

European Commission, Directorate-General for Research and Innovation, Lipinsky, A. (2014). *Gender equality policies in public research: based on a survey among Members of the Helsinki Group on Gender in Research and Innovation, 2013*, Publications Office. https://data.europa.eu/doi/10.2777/65956

European Commission, Directorate-General for Research and Innovation (2021). *She Figures 2021. Gender in research and innovation: statistics and indicators*, Publications Office. https://data.europa.eu/doi/10.2777/06090

European Institute for Gender Equality. (2024). *Gender Equality in Academia and Research - GEAR tool, Sweden*. https://eige.europa.eu/gender-mainstreaming/toolkits/gear/legislative-policy-backgrounds/sweden?language_content_entity=en

Expansion Magazine. (n.d.). *Suecia, Economía y demografía (2023)* [*Sweden, Economy and Demography (2023)*]. https://datosmacro.Expansion.Com/Paises/Suecia.

Husu, L., Heikkinen, M., & Vanhala, S. (Eds.). (2019). Gender equality in academia and research: International perspectives. Abingdon & New York: Routledge.

Jordansson, B. & Peterson, H. (2024). Jämställdhetsintegrering I akademin: framgångar och fallgropar I implementeringsprocessen. [*Equality integration in academia: successes and pitfalls*] Jämställdhetsmyndigheten, Underlagsrapport [*Swedish Gender Equality Agency, Background report*]: 2024:2.

Kahlroth, M. & Inkinen, M. (2016). *Universitet och högskolor: Årsrapport 2016* (Vol. 10). (Rapport 2016:10). Stockholm: Universitetskanslerämbetet. https://www.uka.se/download/18.75ddc5ef1846027d0e82172/1668082868215/arsrapport2016.pdf.

Länsstyrelserna [*County Administrative Boards*] (2023). *Derechos de la mujer e igualdad de género. Acerca de Suecia con material de educación cívico* [*Women's rights and gender equality. Sweden from a civics education perspective*]. https://www.Informationsverige.Se/Es/Om-Sverige/Individens-Rattigheter-Och-Skyldigheter/Kvinnors-Rattigheter-Och-Jamstalldhet.Html.

Larsson, H. (2023). Transformativtl ärande I idrott och hälsa – att motverka könsmönster [*Transformative learning in sports and health - to neutralize gender patterns*]. Jämställdhetsintegrering i högre utbildning [*Equality integration in higher education*] (red. Felicia Garcia & Kristin Ewins. Stockholm: Liber.

Regeringens skrivelse [*Government Communication*] 2016/17:10 Makt, mål och myndighet – feministiskpolitik för en jämställd framtid [*Power, goal and authority - feminist politics for an equal future]*. Stockholm: Government of Sweden.

Silander, C., Drange, I., Pietilä, M. & Reisel, L. (2022). *Gender inequalities in tech-driven research and innovation* (pp. 93-108). Bristol University Press. https://doi.org/10.51952/9781529219494.ch006

Silander, C. (2023). *Gender equality in Swedish academia: Unpacking the toolbox.* Journal of Praxis in Higher Education, 5(1): 45-68. https://doi.org/10.47989/kpdc372

Stockholm University, Directions for Gender Mainstreaming 2023-2025. https://www.su.se/staff/organisation-governance/governing-documents-rules-and-regulations/gender-equality-equal-terms-and-broader-recruitment/direction-for-gender-mainstreaming-2023-2025-1.694756

Swedish Code of Statutes (SFS 1992:1434). *Higher Education Act*. https://www.uhr.se/en/start/laws-and-regulations/Laws-and-regulations/The-Swedish-Higher-Education-Act/

Swedish Code of Statutes (SFS 1993:100). *Higher Education Ordinance*. https://www.uhr.se/En/Start/Laws-and-Regulations/Laws-and-Regulations/The-Higher-Education-Ordinance/

United Nations Department of Economic and Social Affairs: Population Division. (n.d.). Sweden Advance HE for Athena Award. https://countrymeters.info/en/Sweden

SWITZERLAND

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Switzerland, officially the Swiss Confederation, is a small country covering only 41,300 square kilometres, with a population of 8.7 million. It is a wealthy country with a gross domestic product of €767 billion in 2022. It is the world's 20th most competitive country (Datosmacro.com, 2022) and fifth among the G20 countries (Schwab, 2019; World Bank Group – International Development, Poverty & Sustainability, 2020).

Switzerland is a complex nation that has over the centuries evolved from a confederation, a loose alliance of autonomous entities, into a more centralised federal state. The country consists of 26 states, called cantons, and has four official languages, German, French, Italian and Romansh. Switzerland is thus a clearly plural country, and as a result data collection and the statistics available differ from region to region. It is also a major stumbling block when it comes to gaining appointment to positions at public universities, since speaking the language of the canton is an essential requirement. One of the most characteristic features of Switzerland's system of government is that the citizenry is regularly called to the polls to vote in referendums on laws or constitutional amendments (Sáenz Royo, 2016). Switzerland holds more national referendums than any other country.[1] This system has its advantages and its disadvantages, one of the

[1] *Of 2,703 national referendums held globally up to October 2015, 612 have taken place in Switzerland.*

latter being that it makes the process of approving national policies quite slow. For instance, same-sex marriage was not approved until the referendum held in September 2021, when it passed with 64% of the votes.

It is notable that this country, one of the world's leading powers, is still extremely conservative. Women did not get the right to vote until 1971, 123 years after men. Gender equality has been addressed very gradually and quite slowly; for example, the law permitting abortion was first approved in 2000, 21 years later than in Spain. Without delving too deeply into this, female genital mutilation was not added to the criminal code until 2012, and it took until 2019 for an amendment concerning pay discrimination to be included in the gender equality act ("Gender equality is respected in both professional and private life, and women are assured of full and effective participation in decision-making at all economic, political and public levels"). Today there are 23 federal, cantonal and local gender equality offices in Switzerland, an indication that gender equality is a topical issue and a growing concern among the people. Switzerland is actively working to close gender gaps, and passed a law in 2020 requiring equal pay for men and women by companies with more than 100 employees.

Equity policies in science are Switzerland's weak point. In the past 50 years, there have been just eight women presidents, significant given that the country's president is elected yearly. However, a clear pattern of change has been emerging, especially in the past 15 years, a period that offers a good reflection of how the country works at the present time. The European GARCIA Project has been set up in association with other European universities in an effort to provide an overview of the sociocultural context, elucidate the situation of women at university and ultimately be able to implement specific mainstreaming measures in future (Poggio Barbara, 2016). The population data and basic statistics reported in this chapter are for 2019 to 2021.

Women are slightly in the majority over men in the population, 50.4% to 49.6%. The unemployment rate is very low (2% in June 2022), 5% of working-age women (aged 20-64) and 4.9% of men. However, the percentage of women who work part time (50%) is high compared to men (23%), especially for families with small children (Federal Statistical Office [FSO], 2022). It is also striking that, despite being a country in which a high percentage of its people complete basic education, Switzerland has one of the lowest rates of women master's and doctoral degree holders (Table 10.1).

Degree	Women	Men
Undergraduate	59%	41%
Master's degree	49%	51%
Doctorate	44%	56%

Table **10.1.** Percentage of academic degree holders by sex. Data for 2021 (FSO, 2022).

In STEM (science, technology, engineering, and mathematics) fields, there are 3.3 times more men than women degree holders, up to 4.9 times more in engineering, manufacturing and construction, and 8.5 times more in information technology and communications. The reason for the greater success of men in these fields is not simple to explain, but this imbalance appears early on in the subjects chosen by school-age children in Switzerland (Figure 10.1). Boys are three times more likely to specialise in mathematics and physics in secondary school than girls, a ratio that has held steady since 2012 (FSO, 2022).

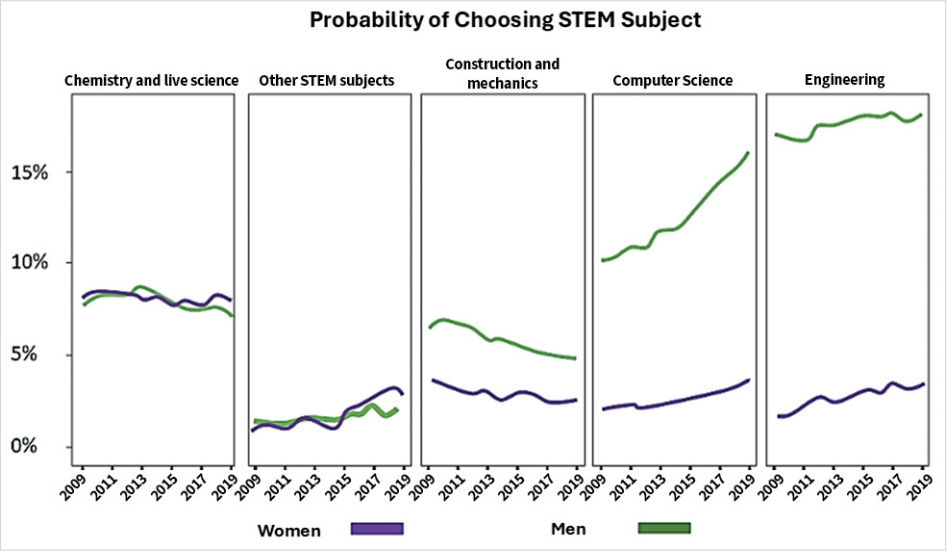

Figure 10.1. STEM study areas chosen, by sex. Compiled by the authors from FSO data for 2019.

STATISTICS ON ACADEMIC STAFFING IN SWITZERLAND

In 2021 the Swiss government released statistics on academic staffing for the five previous years. There are 12 public universities in Switzerland, but according to government data only 24% of women reach the upper echelons, 2% fewer than in the EU currently (Leybold-Johnson, 2021).

Looking at all academic personnel, both full-time and part-time, and both in teaching and in research, the percentage of men is higher than that of women (Figure 10.2). Only 23% of women become university professors, which falls to 20% in STEM fields (Figure 10.3) (FSO, 2020; Piccoli, 2021).

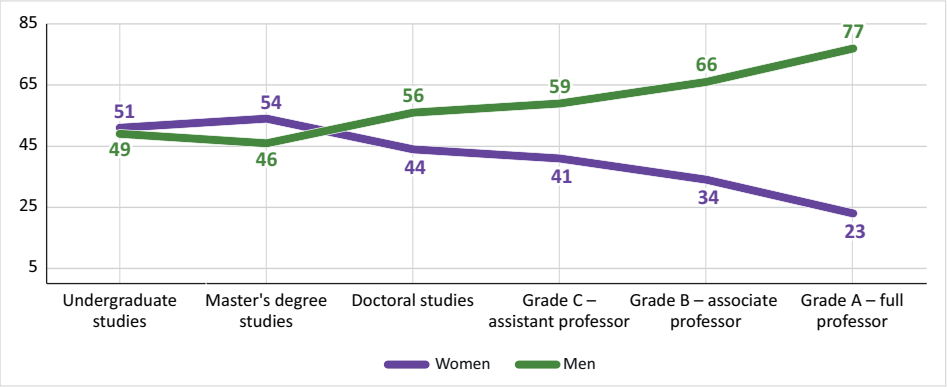

Figure 10.2. Scissors diagram showing how fewer women than men reach positions of leadership (grade B or full professor or grade A or director) in academia in Switzerland (modified after Piccoli, 2021).

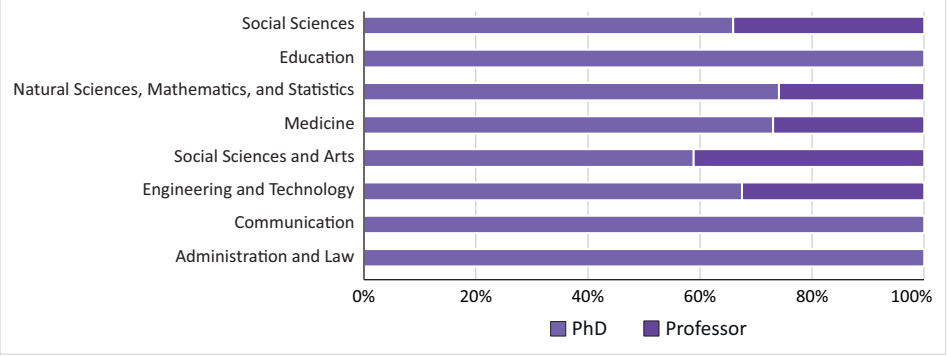

Figure 10.3. Percentage women in doctoral studies (light purple) and full professors (grade B, dark purple) in STEM disciplines (science, technology, engineering and mathematics) in Switzerland. Data taken from FSO (FSO, 2020).

GENDER EQUALITY POLICIES IN SCIENCE IN SWITZERLAND

Research institutions and universities have, in association with the European Union (EU), taken a series of measures to increase the number of women associate and full professors and above all to retain women in academia. Those measures include designing Gender Equality Plans (GEP) as part of the framework of the EU's "Horizon Europe" programme. In reference to funding from Europe, though, it is to be noted that Switzerland did not renew the framework agreement with the EU in May 2021, and the Confederation has been relegated to the status of a third country not associated with the Horizon Europe programme (2021-2027). Accordingly, while it may take part in roughly two-thirds of calls for proposals, it will not receive EU funding. It has thus lost one of the main sources of funding for research projects until 2030. Other measures include national grants from the Swiss National Science Foundation (SNSF) targeting women (PRIMA programme, SNSF, running until 2023) (Swiss National Science Foundation, 2023). Further SNSF measures include grants aimed at enhancing work-life balance (Flexibility Grant, SNSF). These latter grants cover the outside costs borne by researchers with children, both for childcare and for hiring research assistants.

Several recent programmes have focused on promoting and supporting the professional careers of women researchers. The Federal Institute of Technology Zurich (*ETH Zürich*), the Federal Polytechnic School of Lausanne (*EPFL Lausanne*) and associated centres have since 2007 provided mentoring and coaching schemes and other workshops for women scientists as part of the "Fix the leaky pipeline" programme. Female researchers funded by the SNSF also have available SNSF gender equality grants like the Flexibility grant, which pays 1,000 Swiss francs (around €1,000) per project year for such career support measures as coaching, training, courses, meetings and seminars. Finally, the annual Connect programme (Connect Program, 2014) was established in 2018 and is open to all scientific and academic institutions. Its purpose is to have role models in industry and academia assist female scientists with their career planning.

For established women researchers (group A) in Switzerland, there is the Women Professors Forum (WPF, 2012), the first forum specifically targeting women in academia. Since its founding in 2012 at the ETH Zürich, its aim has been to break down gender barriers, address political issues and put forward role models in science for society, a key factor in motivating young female researchers.

The active participation of more than 80% of women professors at ETH Zürich and EPFL Lausanne today is proof of the forum's success.

Lastly, attention is also drawn to the High Potential University Leaders Identity & Skills Training (HIT) programme for female full professors (Swiss universities, 2020). Ten cantonal universities and two federal institutes of technology work together in this collaborative programme with the support of the Swiss government. Women professors receive a Welcome Package, individual guidance, professional networking opportunities and other forms of support to prepare women for leadership positions in academia and help them develop gender equality and diversity skills.

Switzerland is an economic power but is a very traditional country where changes need to go through a lengthier process than in other countries, and this accounts for the delay compared with other European partners. There is a paucity of female role models, especially in STEM fields, something that is partly attributable to the attrition rate for women in the job market (Figure 10.1). The attrition rate is much higher for women, particularly in the period around 30 to 40 years of age, a period which coincides with the start of parenthood. In Switzerland many families can manage on a single income, and this means that it is mainly women who take charge of child rearing, causing them to drop out or put their academic careers on hold relative to their male peers. Many universities promote programmes to boost the inclusion of women with children, but these are wholly local initiatives or proposals, not federal, and they have proved to be unable to stem this drain on female talent. Nevertheless, for some years now interest in removing gender barriers has been gaining strength in government circles and in society, and measures aimed at boosting entry and retention of women in scientific and technical fields are being viewed in a positive light. For the impact to be real, however, a further step is needed: not just engagement by the government but a change in mentality about women's role in society as a whole and in the field of science in particular.

CONCLUSIONS

- Switzerland is an extremely traditional country where change takes longer to come about than in other European countries.
- Salaries are high, enabling one parent to stop working to take charge of child rearing; generally, it is women who give up their professional careers.

- Women tend to drop out from the job market at a much higher rate, and this is especially true for women aged between 30 and 40, the peak childbearing and parenting years.
- There is a need for more effective government-led programmes to boost women's re-entry to the workplace after parenthood.
- There are few female role models in STEM fields.
- Exiting EU funding programmes like Horizon Europe could put a brake on measures intended to boost inclusion.

REFERENCES

Connect Program (2014). https://www.connectswitzerland.ch/

Datosmacro (2021). https://datosmacro.expansion.com/pib/?anio=2021

ETH [*Federal Institute of Technology Zurich*]/EPFL [*Federal Polytechnic School of Lausanne*]. (n.d.). *Women Professor Forum*. Last retrieved 22 March 2024 from: https://eth-wpf.ch/

European Commission, Directorate-General for Research and Innovation (2021). *She Figures 2021. Gender in research and innovation: statistics and indicators*, Publications Office. https://data.europa.eu/doi/10.2777/06090

Federal Statistical Office (2022). https://www.bfs.admin.ch/bfs/en/home/statistics/catalogues-databases/graphs.assetdetail.22784570.html

Leybold-Johnson, I. (2021). *Female professors in Switzerland? Still a way to go.* https://www.swissinfo.ch/eng/female-professors-in-switzerland-still-a-way-to-go/46444186

Piccoli, F. & Guidobaldi, G. (2021). A report on gender diversity and equality in the geosciences: an analysis of the Swiss Geoscience Meetings from 2003 to 2019. *Swiss J Geosci*, 114:1.

Poggio, B. (2016). Gendering the Academy and Research: combating Career Instability and Asymmetries. http://garciaproject.eu/

Sáenz Royo, E. (2016). La regulación y la práctica del referéndum en Suiza: un análisis desde las críticas a la institución del referéndum [*Referendums in Switzerland: legislation and practice – considering criticism of the referendum as an institution*]. *Revista de Estudios Políticos* [*Journal of Political Studies*], 171, 71-104.

Schwab, K. (2019). *The Global Competitiveness Report 2019*. Last retrieved 6 February 2023 from: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Swiss National Science Foundation (SNSF). https://www.snf.ch/en

Swiss universities. (2020). *H.I.T. – High Potential University Leaders Identity & Skills Training Program*. Gender Campus. https://www.gendercampus.ch/en/project/hit-high-potential-university-leaders-identity-skills-training-program

World Bank Group – International Development, Poverty & Sustainability (2020). https://data.worldbank.org/

AMERICA

UNITED STATES OF AMERICA

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

The United States of America (USA) is the third-largest country in the world, with a land area of 9,833,520 km^2, divided into 50 states, the federal district of the District of Columbia, five unincorporated territories (including Puerto Rico) and nine outlying islands. As of 2021, it had a population of over 333 million, with a population density of approximately 36 people per square kilometre. However, most of the population lives in urban areas with much higher population densities, which can vary significantly from one city to another. Between 2016 and 2020, 58.4% of the population were women of working age (aged 16 and over). The United States has a strong economy, with a GDP of US$ 23 trillion in 2021 (the highest in the world), and is also the largest shareholder in the International Monetary Fund (World Bank Group, 2022; U.S. Census Bureau, 2022a; U.S. Department of the Treasury, 2022; Wikipedia, 2022a).

The USA is a complex country in many respects, largely due to its vast demographic spread, the high number and diversity of immigrants and the dichotomies among its 50 states. Initiatives aimed at integrating women lag behind those of many other countries, making it harder for women to access highly skilled positions. Although gender inequality in academia is conspicuous, there are almost no laws specifically directed at academia. As such, general gender equality legislation is the only legal mechanism available to academic institutions. In addition to gender-related challenges, racial inequalities (Dizikes, 2020) also affect the labour market and compound the situation, therefore women of colour face additional barriers to professional advancement and success.

At the legislative level, efforts to improve civil rights, including women's rights, are hindered by the polarisation of the two legislative chambers (the Senate and the House of Representatives) (Wikipedia, 2022b), the obstructionist tactic used in the Senate known as the "filibuster" (Lau, 2021), as well as other idiosyncrasies of the USA political system. The United States has a bicameral legislature comprising the House of Representatives and the Senate. This structure is intended to ensure a system of checks and balances on legislative power. When the two chambers are held by opposing political majorities, the passing of laws may be blocked, regardless of the political leanings of the government in power at that time (Valdés, 2021; The White House, 2022).

One recent example of the country's political complexity and the rollback of human and women's rights is the Supreme Court's decision in June 2022 to revoke the federal constitutional protection of the right to abortion, leaving the matter to be decided by each individual state (SCOTUS blog, 2022). This ruling came after nearly 50 years of legal abortion and despite studies showing that access to abortion supports reproductive health, enables women to maintain a positive future outlook and helps them pursue their life goals (Upadhyay et al., 2015).

As a large country, the United States' legal system operates across multiple jurisdictions, including federal and state levels. Some legal areas are regulated at the federal level (such as human rights and immigration), while others fall under state jurisdiction (such as marriage, divorce and property). In addition, in certain areas where federal pre-emption applies, legislation is determined at the federal level and states have limited authority to intervene. One such example, which will be discussed in later sections, is the right to family leave (Library of Congress, n.d.).

STATISTICAL DATA ON ACADEMIC STAFF IN THE UNITED STATES

The percentage of women in STEM careers in the United States remains below parity, standing at 26.9% in 2019. Over the past nine years, this figure has hardly changed at all (U.S. Census Bureau, 2022b). It is important to note that these gender distribution statistics encompass all branches of science and technology (STEM), not only the academic sector. If we break down the percentage of women and men by career level, there is lower female representation in the earlier stages of an academic career (master's, doctorate and postdoctoral). However, parity is reached at the level of Assistant Professor (grade C), only to drop sharply again at the ranks of Associate Professor and Full Professor (grades B and A) (Figure 11.1). There has been a slight increase in the percentage of women in senior academic positions in recent years, with women representing 28.4% of Full Professors (grade A) in 2013 and 31.8% in 2018 (Figure 11.1).

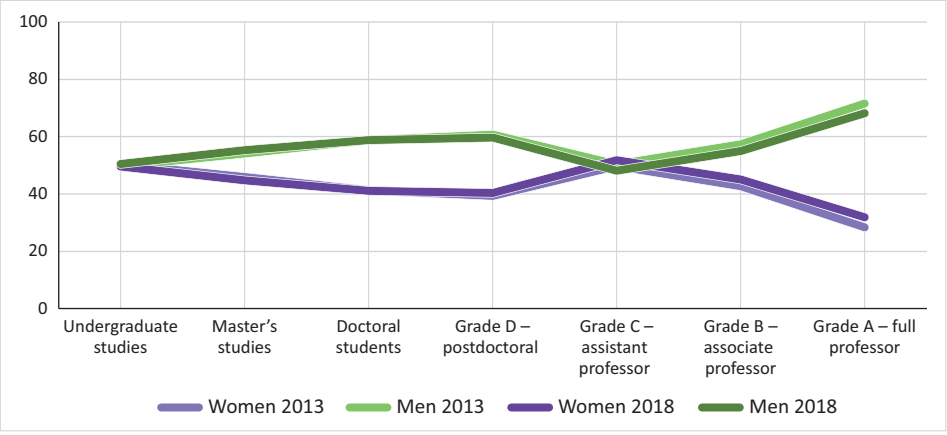

Figure 11.1. Proportion of men and women in scientific careers in the United States, 2013 vs 2018. Source: compiled by the authors based on data from undergraduate, master's and doctoral studies - U.S. Department of Education, National Center for Education Statistics, Completions Survey (U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, 2022a); grade D - postdoctoral data from the National Center for Science and Engineering Statistics, Survey of Graduate Students and Postdoctorates in Science and Engineering; grades C, B and A - U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Human Resources Component (U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, 2022b).

Only 22% of leadership positions at highly ranked US universities are held by women (Eos Foundation, 2022). The situation is even worse for women of colour, who occupy just 5% of these positions. These figures are particularly striking given the rising percentage of women obtaining university and doctoral degrees in recent decades. This disparity may be due to the lack of inclusive recruitment processes and to systemic biases within academic and administrative structures (Fleck, 2022).

GENDER EQUALITY POLICIES IN SCIENCE AND ACADEMIA

At the federal level, there are some general gender-related laws, but each state, university, or research centre has its own specific protocols and initiatives. The limited number of federal policies that actively promote gender equality in academic and scientific fields means that much of the progress in this area has occurred through institutional initiatives. These efforts have often been implemented following national media coverage of academic scandals.

However, some key legal protections for workers are worth highlighting. Notably, just one year after Martin Luther King Jr.'s iconic 1963 March on Washington for Jobs and Freedom in the United States where he delivered his famous "I Have a Dream" speech (Stanford University – King Encyclopedia, 2022), employees were granted the right to be free from discrimination on the basis of race, colour, religion, **sex** and nationality. This right was later enacted under Title VII of the Civil Rights Act of 1964, which represented a significant step towards equal rights for US citizens, including women. Of particular relevance to this chapter is the last-minute amendment introduced by Congresswoman Martha Griffiths, who advocated for the explicit inclusion of **sex** as a protected category. Before this legislation was passed, employers could lawfully exclude women from the workplace, pay them less, deny them employment or dismiss them on the basis of their sex. Marriage, age and motherhood were also considered valid grounds for dismissal.

The 50th anniversary report on Title VII of the Civil Rights Act of 1964 identified three major barriers to gender equality in the United States: 1) the gender pay gap, 2) sexual harassment and violence and 3) discrimination against pregnant workers and working mothers (WNY Women's Foundation, 2019). This section focuses on the federal laws enacted to remove these barriers, their positive impact on promoting gender equality in academia, and the factors contributing to their partial failure in the United States.

Equal pay

A recent study conducted by the University of Maryland (USA) and Hitotsubashi University (Japan) showed that the gender pay gap is more pronounced in academia than in industry (Ding et al., 2021). This gap widens with years of experience in academia, as women do not receive salary increases comparable to those of their male counterparts. This phenomenon is partly explained by the higher proportion of men who reach senior positions. However, even among tenure-track positions, there is still a gender pay gap between men and women who have held the same position for the same number of years. Therefore, equal pay legislation and its continued development are essential. Two key laws are particularly relevant in this context: the **Equal Pay Act of 1963** and the **Lilly Ledbetter Fair Pay Act of 2009**. Both prohibit wage disparities based on gender for jobs requiring similar skills, effort and responsibilities, and performed under comparable working conditions (U.S. Equal Employment Opportunity Commission, 2022; Slack, 2012).

Violence and sexual harassment against women

In academia, the main federal law protecting against sex-based discrimination is **Title IX of the Education Amendments of 1972**. This law prohibits sexual discrimination in educational programmes and activities that receive federal funding. It states that "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance" (California Department of Education, 2022). More recently, in August 2020, an amendment was passed requiring institutions and local education authorities to respond to allegations of sexual harassment, with the aim of clarifying whether the harassment constitutes a form of sex discrimination (California Department of Education, 2022). To ensure compliance with Title IX, universities have dedicated offices that handle gender-based discrimination cases enabling victims to report incidents anonymously and without fear of retaliation.

Academic leadership

In 2022, an article published in Forbes highlighted the significant gender gap in leadership positions at major US universities (Nietzel, 2022). One of

the causes cited is the existence of systemic biases, particularly affecting women of colour, that make it more difficult for them to attain presidency positions. The article noted that, despite decades of efforts to train women and people of colour in leadership, the gender gap has persisted. It concluded that universities must confront their institutional biases and revise their recruitment procedures to achieve more equitable outcomes. Among women from non-white backgrounds (Hispanic/Latina, Asian, Indigenous and African American) working in STEM, a major issue is the belief that racial privilege no longer exists. This misconception obscures the specific challenges faced by this group, which experiences both gender - and race-based discrimination (Miriti, 2020).

In recent years, legislation supporting women entrepreneurs has also been enacted. **The Promoting Women in Entrepreneurship Act of 2017** and the **Women's Entrepreneurship and Economic Empowerment Act of 2018** were introduced to authorise the National Science Foundation (NSF) to fund entrepreneurship programmes for women and to improve activities and policies relating to women's economic empowerment, respectively.

Pregnancy and working mothers

Parenthood often marks a turning point in the professional careers of many women, including those in STEM fields. The COVID-19 pandemic added to this burden, forcing many women to balance remote work and childcare responsibilities (Schaeffer, 2022). Although family leave policies have been introduced at universities, they are rarely used by female faculty members, who fear that taking leave will have a negative impact on their academic career advancement (Samble, 2008).

Given the lack of nationwide support for working mothers, several **programmes** have been created to help retain women in academia. One example is the Claflin Distinguished Scholar Awards at Massachusetts General Hospital, which awards $50,000 annually to support academic productivity during the child-rearing years. The Doris Duke Charitable Foundation offers a programme that enables early-career clinical researchers to use the funding to obtain additional support, and allows them to dedicate more time to other academic activities. In 2019, the National Institutes of Health (NIH) introduced supplements aimed to ensure continuity of research during a period in which the grantee experiences critical life events" by funding additional technical

assistance for researchers holding career development awards (such as F and K awards) or those in the early stages of R01 grants (the main federal funding mechanism for research projects). In addition, for each pregnancy, the NIH extends early-stage investigator (ESI) status by one year. This designation offers applicants certain advantages during grant review processes and is retained for up to ten years after the researcher's most recent academic degree (such as a doctorate). It is important to note that many of these programmes are not exclusive to women, as they are intended to support both mothers and fathers.

CONCLUSIONS

- The United States is a vast and complex country. Institution-specific data would be required in order to carry out a comprehensive analysis of gender inequality in academia nationwide.
- Although recent comparisons indicate some progress, and the percentage of women in the early stages of academic careers is now higher than in the past, there is a pronounced drop in the proportion of women holding established or leadership positions in academia.
- The idiosyncrasies of the political and legislative system slow down and obstruct the passage of new laws aimed at promoting gender equality in academia and other fields.
- While there are federal laws designed to guarantee equality and protect women and minority groups, most are not specific to the academic sector. As a result, it is largely up to individual institutions to adopt measures that promote gender equality.
- The United States is currently undergoing a period of significant social turmoil in which the fundamental rights of women have been undermined. The long-term professional consequences of these setbacks for women in academia remain unclear.

REFERENCES

Barroso, A. & Menasce Horowitz, J. (2021). *The pandemic has highlighted many challenges for mothers, but they aren't necessarily new.* https://www.pewresearch.org/fact-tank/2021/03/17/the-pandemic-has-highlighted-many-challenges-for-mothers-but-they-arent-necessarily-new/

California Department of Education. (2023). *Gender Equity/Title IX*. https://www.cde.ca.gov/re/di/eo/genequitytitleix.asp

Ding, W.W., Ohyama, A. & Agarwal, R. (2021). Trends in gender pay gaps of scientists and engineers in academia and industry. *Nature Biotechnology*, *39*(8), 1019-1024.

Dizikes, P. (2020). *Straight talk about race in academia*. https://news.mit.edu/2020/black-ivory- racism-academia-1208

Eos Foundation. (2022). Women's Power Gap. https://www.womenspowergap.org/

Fleck, A. (2022). *Gender gap persists at all levels of leadership in US universities, report finds*. https://www.weforum.org/agenda/2022/05/gender-gap-us-universities-leadership/

Lau, T. (2021). The Filibuster, Explained. https://www.brennancenter.org/our-work/research-reports/filibuster-explained

Library of Congress. (n.d.). Law Library. Accessed on 23 April 2023 at: https://guides.loc.gov/american-women-law/types-of-law#note3

Miriti, M.N. (2020). The Elephant in the Room: Race and STEM Diversity. *BioScience, 70*(3), 237-242.

Nietzel, M.T. (2022). *New Evidence Shows Large Gender Gap In Leadership Of Major U.S. Universities*. https://www.forbes.com/sites/michaeltnietzel/2022/03/01/new-evidence-shows-large-gender-gap-in-leadership-of-major-us-universities/

Pew Research Center. (2022). *Majority of Public Disapproves of Supreme Court's Decision To Overturn Roe v. Wade*. https://www.pewresearch.org/politics/2022/07/06/majority-of-public-disapproves-of-supreme-courts-decision-to-overturn-roe-v-wade/

Powell, K. (2019). Why scientist-mums in the United States need better parental-support policies. Nature, 569 (7754), 149-151.

Samble, J.N. (2008). Female faculty: Challenges and choices in the United States and beyond. *New Directions for Higher Education*, 2008: 55-62.

Schaeffer, K. (2022). *Working moms in the U.S. have faced challenges on multiple fronts during the pandemic*.

https://www.pewresearch.org/fact-tank/2022/05/06/working-moms-in-the-us-have-faced-challenges-on-multiple-fronts-during-the-pandemic/

SCOTUSblog. (2022). Dobbs v. Jackson Women's Health Organization. https://www.scotusblog.com/case-files/cases/dobbs-v-jackson-womens-health-organization/

Slack, M. (2012). *From the Archives: President Obama Signs the Lilly Ledbetter Fair Pay Act*. https://obamawhitehouse.archives.gov/blog/2012/01/30/archives-president-obama-signs-lilly- ledbetter-fair-pay-act

Stanford University – King Encyclopedia. (2022). *March on Washington for Jobs and Freedom, 1963*. https://kinginstitute.stanford.edu/encyclopedia/march-washington-jobs-and-freedom

The White House. (2022). The legislative branch. https://www.whitehouse.gov/government/legislative-branch/

U.S. Census Bureau. (2022a). Quick facts. https://www.census.gov/quickfacts/fact/table/US/LFE046220

U.S. Census Bureau. (2022b). *American Community Survey 1-Year Estimates Subject Tables, 2010-2019*. https://www.census.gov/en.html

U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. (2022a). *Completions Survey*. https://nces.ed.gov/ipeds/

U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System. (2022b). *Human Resources Component*. https://nces.ed.gov/ipeds/

U.S. Department of Labor. (2022). *Wages and the Fair Labor Standards Act*. https://www.dol.gov/agencies/whd/flsa

U.S. Department of the Treasury. (2022). *International Monetary Fund*. https://home.treasury.gov/policy-issues/international/international-monetary-fund

U.S. Equal Employment Opportunity Commission. (2022). *The Equal Pay Act of 1963*. https://www.eeoc.gov/statutes/equal-pay-act-1963

Upadhyay, U.D., Biggs, M.A. & Green Foster, D. (2015). The effect of abortion on having and achieving aspirational one-year plans. *BMC Women's Health*, 15, 102.

Valdés, R.S. (2021). *¿Cómo se aprueban las leyes en Estados Unidos?* [*Passage of laws in the United States*]. https://www.vozdeamerica.com/a/estadosunidos_como-se-aprueban-las-leyes-en-eeuu/6072463.html

Wikipedia. (2022a). *United States*. https://en.wikipedia.org/wiki/United_States

Wikipedia. (2022b). *Party divisions of United States Congresses*. https://en.wikipedia.org/wiki/Party_divisions_of_United_States_Congresses

WNY Women's Foundation. (2019). *Moving Women Forward*. https://wnywomensfoundation.org/app/uploads/2019/08/Moving-Women-Forward-On-the-50th-anniversary-of-title-vii-of-the-civil-rights-act-part-one.pdf

World Bank Group. (2022). Data – United States. https://data.worldbank.org/country/US

MEXICO

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

The United Mexican States, or Mexico, has a land area of 1,964,375 km^2 (13th largest in the world) and a population of 126,014,024 (51.2% women; Instituto Nacional de Estadística y Geografía [INEGI], 2020). With a population density of 64.3 inhabitants per square kilometre, it is the tenth most populous country in the world and the second largest in Latin America. Mexico has a significant indigenous population, with 19.4% of those aged over three self-identifying as indigenous, equivalent to 23.2 million people, of whom 51.4% are women (INEGI, 2022a). In economic terms, gross domestic product (GDP) amounted to US$1.29 trillion in 2021 (INEGI, 2022b), with annual growth of 4.8%. It is the 15th largest economy in the world (World Bank, 2021). Although the country has a high Human Development Index (HDI), this fell from 0.768 in 2015 to 0.758 in 2021, dropping from 78th to 86th place globally.

Women's participation in the labour market in Mexico is low. Between 2005 and 2021, the female economic activity rate ranged from 40% to 45%, below the global average of 48.5% and below similar economies such as Brazil (49.5%) and Colombia (50.3%) (Instituto Mexicano para la Competitividad [IMCO], 2022a). It is also considerably lower than the male participation rate. In 2021, 44.7% of women were active in the labour market, compared to 76.4% of men (Organization for Economic Co-Operation and Development [OECD], 2022), meaning women accounted for 39% of the country's employed population. The gender pay gap in the first quarter of 2022 stood at 12.5%, above the global average of 12% (OECD, 2022). Based on the average exchange

rate of the Mexican peso against the US dollar, the average monthly wage was US$329.2 for women and US$389.7 for men. In addition, 55% of employed women (and 50% of men) work in the informal economy, which encompasses economic activities carried out by workers and production units that are not, or are only partially, covered by formal systems under the law or in practice (International Labour Organization [ILO], 2015). This significantly affects access to employment benefits, making the situation for women even more precarious (Observatorio de Igualdad de Género de América Latina y el Caribe [OIG-CEPAL], 2022).

According to the 2019 National Survey on Time Use (*Encuesta Nacional Sobre Uso del Tiempo*, ENUT) (INEGI and National Institute for Women [*Instituto Nacional de la Mujeres*, INMUJERES], 2019), there is a marked gender disparity in the distribution of time spent on paid and unpaid work. For women, 30.9% of total time was spent on paid work, 66.6% on unpaid domestic and care work and 2.5% on the production of goods for household use. For men, 68.9% of time was spent on paid work, 27.9% on unpaid domestic work and 3.1% on the production of goods for household use.

Mexico has developed a range of gender-sensitive laws and programmes, with significant progress made at the start of this century. The creation of the National Institute for Women in 2001 marked a watershed moment in gender equality policy. Through this body, various programmes and laws have been established and promoted (Diario Oficial de la Federación [DOF], 2012; Normas Mexicanas [NMX], 2015) aimed at guaranteeing gender equality and establishing institutional guidelines and mechanisms to achieve substantive equality in public and private spheres, while promoting women's empowerment (PROIGUALDAD, 2021; INMUJERES, 2021).

STATISTICAL DATA ON ACADEMIC STAFFING IN MEXICO

The National Programme for Equality between Women and Men, PROIGUALDAD 2020-2024 (INMUJERES, 2020), identifies a "significant under-representation of women in highly profitable productive areas, such as those linked to information and communication technologies, engineering, mathematics, among others, as well as a significant educational gap among women over 30 years of age" (INMUJERES, 2020, p. 32). In this regard, the inequality of women's participation in the economy is also evident in their

choice of academic studies. Between 2012 and 2021, the number of women pursuing degrees in science, technology, engineering and mathematics (STEM) rose by 42%. However, substantial disparities remain: only 30% of students choosing STEM fields were women, and in 2021, only 13.5% of female professionals working in Mexico held STEM degrees (IMCO, 2022b). Among STEM graduates, just 12% of women were employers. Although the gender pay gap is smaller in this group, it still exists and constitutes a barrier to professional advancement. As in the broader population, motherhood also affects this group. The economic participation rate among STEM professionals without children was 78%, compared to 64% among those with children (IMCO, 2022c). Under the Federal Labour Law (DOF, 2022a), maternity leave lasts six weeks, but may be extended by up to 60 days with half pay, or up to one year without pay but with the employee retaining her position. As for paternity leave, the law "will grant five working days of paid paternity leave to male employees upon the birth of their children, and likewise in the case of the adoption of an infant", significantly less than the OECD average of eight weeks (OECD, 2016).

The data below refer to academic staff belonging to the National System of Researchers (*Sistema Nacional de Investigadores* [SNI]), a distinction and incentive system overseen by the National Council of Science and Technology (*Consejo Nacional de Ciencia y Tecnología* [CONACYT]), which is a system that assesses the quality and prestige of scientific contributions and the training of human resources among research staff. The SNI classifies members into four levels according to productivity and track record, from Candidate (the lowest), to Levels I, II and III. The SNI is the only available source of current, official data on researchers in Mexico. However, a large number of active women researchers are not part of the system and are therefore excluded from the following statistics.

Although the percentage of women in the SNI increased significantly between 2015 and 2016, from 7% to 34% of total membership, since then the proportion has remained relatively unchanged, staying below 40% (Figure 12.1). In STEM fields specifically, women make up only 31.8% of SNI researchers (Figure 12.2).

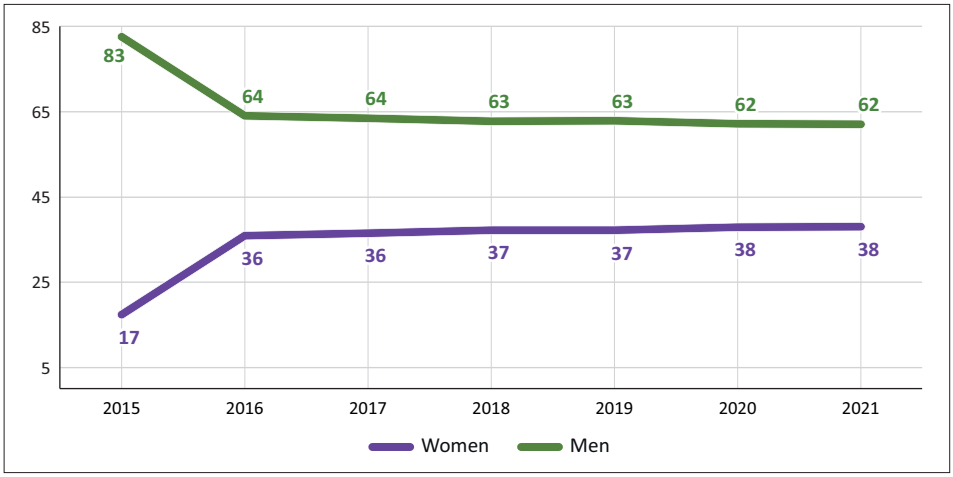

Figure 12.1. Evolution of the percentage of women in the SNI, 2015-2021. Source: compiled by the authors based on data from the National Council of Science and Technology (CONACYT, 2021).

Figure 12.2 illustrates the change in the percentage participation by women across different fields of knowledge between 2015 and 2021. In percentage terms, there was an increase for the agricultural sciences, biotechnology and social sciences but a decrease for exact and natural sciences. However, in absolute terms, the number of women in the exact and natural sciences rose from 445 to 3,497 in six years, making it the field with the highest number of female researchers.

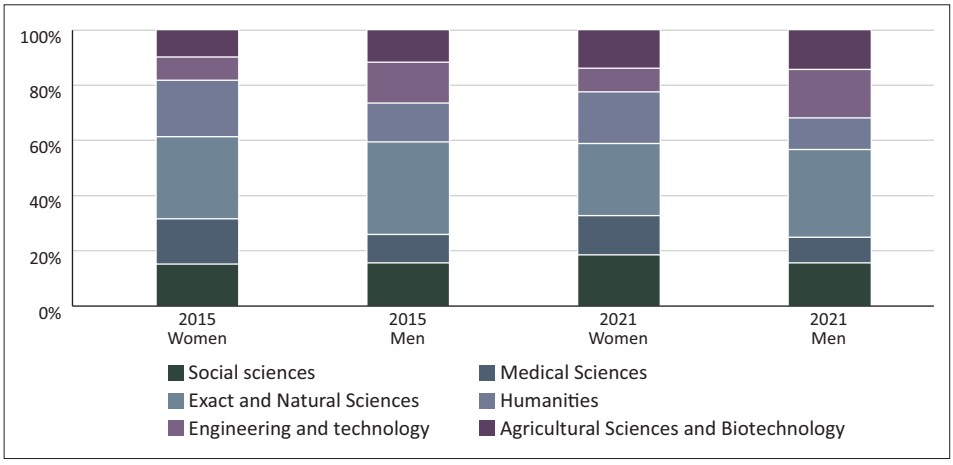

Figure 12.2. Evolution of participation by women and men in different knowledge areas within the SNI. Source: compiled by the authors based on data from CONACYT (2021).

According to CONACYT's categorisation system within the SNI, women accounted for a lower proportion than men in all categories in 2021, with the gender gap widening in the higher levels. These levels are determined by criteria related to scientific output and the training of human capital. The disparity is largely due to the historically limited participation of women in research, which continues to prevent equal representation in senior categories.

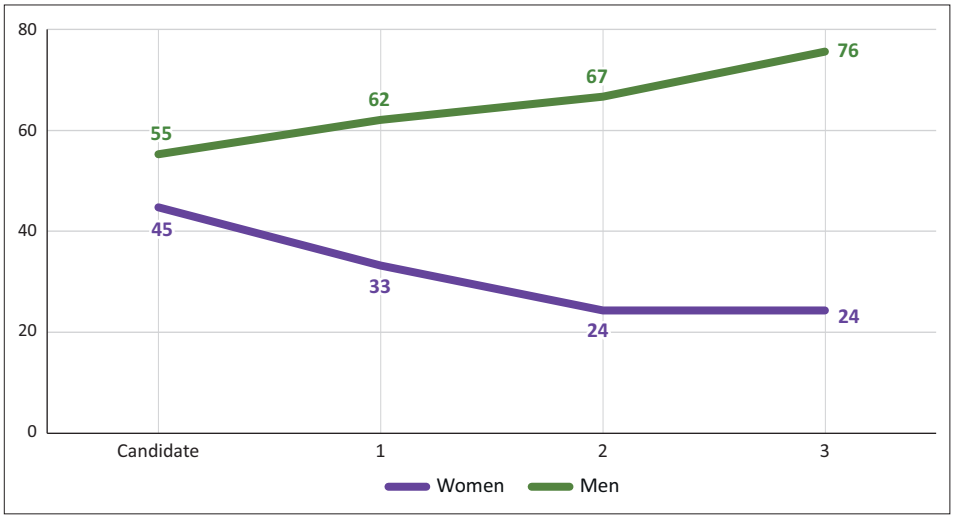

Figure 12.3. Percentage of men and women within the SNI categories. The lowest level is Candidate, followed by levels 1, 2 and 3. Source: compiled by the authors based on data from CONACYT (2021).

Up to this point, the analysis has focused on the presence of women in science and technology in Mexico through the lens of SNI membership. Another key aspect is women's participation in leadership roles in higher education institutions (HEIs) and research centres. According to a study by the National Observatory for Gender Equality in Higher Education Institutions (*Observatorio Nacional para la Igualdad de Género en las Instituciones de Educación Superior*) (ONIGIES, 2021), while the barriers women face in rising through institutional hierarchies vary by context, gender gaps remain visible in terms of both access to positions and entry levels (Figure 12.4). Although the study's scope was limited, several key findings stand out:

- In HEIs specialising in science and technology, women accounted for 48.27% of the workforce. Despite this, they were under-represented in

leadership positions, limiting their influence on decision-making and contributing to the gender wage gap.

- Positions for academic staff, senior management and the highest governing bodies are mostly assigned to men, with women occupying 34.65% of management positions in HEIs.
- In administrative and operational roles, which are not considered leadership positions, women made up 50.75% of staff.

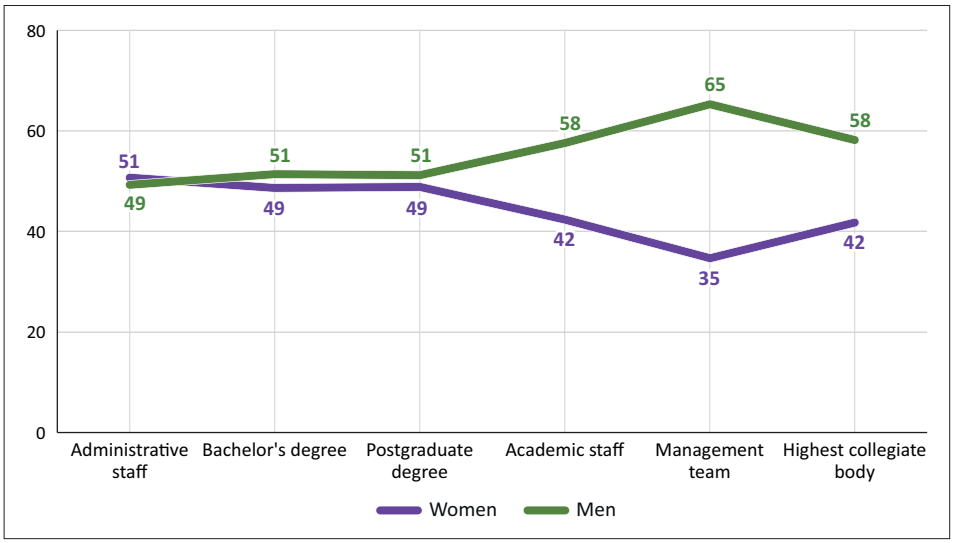

Figure 12.4. Gender distribution across academic career levels in 52 Mexican higher education institutions, 2020. Source: compiled by the authors based on data provided by the National Observatory for Gender Equality in Higher Education Institutions (ONIGIES, 2021).

GENDER EQUALITY POLICIES IN SCIENCE AND ACADEMIA

In particular, with regard to equality policy directly related to science and technology, Mexico has implemented various laws and regulations over the past two decades to foster and guarantee the equal participation of women in academic and scientific settings (see timeline in Figure 12.5).

Although CONACYT was established in 1970, it only became empowered more than 30 years later to act as the federal government's advisory and specialised body for science and technology policy. Since then, it has introduced reforms

to the Science and Technology Law (DOF, 2022b), progressively incorporating gender equality measures. Section VIII of the law explicitly mandates the integration of a gender perspective across all scientific disciplines, promoting the equal participation of men and women in science and academia. Section V encourages balanced participation, offering equal opportunities and free from discrimination, of both women and men in development and mentoring activities for the next generation. It is also stipulated that information must be provided on the differentiated impact "*on women and men of the effects of policies and programmes related to scientific, technological and innovation development*" supported by the federal government.

The 2012 SNI regulations introduced a series of gender-related actions, such as gender- balanced review panels and an additional year of recognition for pregnant researchers (CONACYT, 2012). Subsequently, the 2020 National Development Plan set out to mainstream gender perspectives in its objectives, aiming to strengthen the science, technology and innovation community and its integration with other social sectors (Consejo Nacional para Prevenir la Discriminación [CONAPRED], 2021). CONACYT's 2021 calls for proposals reflect these priorities. Notable examples include Support for Mexican Mothers Who Are Heads of Household and the Programme for the Inclusion of Indigenous Women in Postgraduate Studies for Regional Development.

In addition, the PROIGUALDAD 2020-2024 programme (INMUJERES, 2020) includes targeted strategies to promote women's participation in science, technology, engineering, energy, mathematics and robotics (INMUJERES, 2020). Specifically, its first strategic objective is to "empower women's economic autonomy to close historical inequality gaps", outlining three key actions to reduce gender inequality in STEM: 1) Organise creative workshops for girls and adolescents in science, technology, engineering, mathematics and robotics, aimed at encouraging entrepreneurship and enhancing future labour market access; 2) Promote actions that enable women to remain and advance in public sector fields such as energy, science, technology, communications and transport; 3) Promote strategic initiatives that encourage entry by women into employment in the energy, technology, engineering, communications and transport sectors.

Since 2000, Mexican legislation has laid the groundwork for a legal and institutional framework aimed at supporting girls' and young women's access to STEM education and careers in science and technology. Nevertheless,

the percentage of women in the SNI, the gender pay gap and their under-representation in leadership and decision-making positions indicate that gender parity in the sector remains elusive. Priority action includes protections pertaining to motherhood, such as longer maternity leave entitlements for pregnancy and breastfeeding, as well as longer paid paternity leave. In this regard, awareness- raising efforts and campaigns to challenge cultural gender stereotypes are essential.

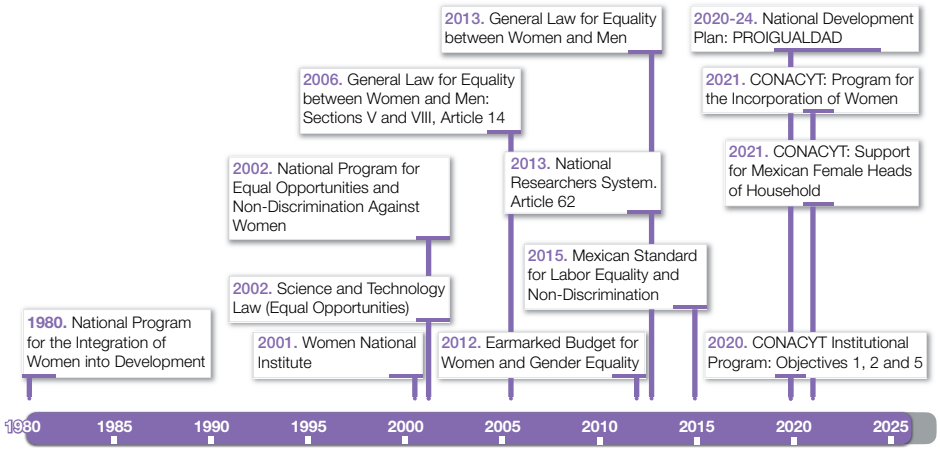

Figure 12.5. Timeline of national and academic gender equality policies implemented in Mexico.

CONCLUSIONS

- Information relating to gender in science and academia in Mexico is not compiled systematically.
- Policies have evolved significantly over the last 20 years, particularly in the past decade, reflecting the advances in general gender legislation and public policies.
- The presence of women in the science and technology sector increased significantly between 2015 and 2021; however, there is still a disproportion in the participation of men and women in senior positions, which negatively affects income and reduces women's presence in decision-making processes.
- Women researchers face greater barriers than their male colleagues in carrying out the same professional tasks, mainly due to the unequal

distribution of care and domestic responsibilities and the impact of motherhood on labour market access.

- Although since 2002 Mexican public policy, including sectoral policy in science and technology, has promoted gender equality in the country's productive, political, social and scientific spheres, it has not succeeded in bringing about a cultural shift in gender stereotypes related to the assignment of tasks and their social value.

REFERENCES

Consejo Nacional de Ciencia y Tecnología [*National Council of Science and Technology*] [CONACYT]. (2012). *Reglamento del Sistema Nacional de Investigadores [Regulations of the National System of Researchers]*. https://conahcyt.mx/wp-content/uploads/sni/archivo_historico/reglamentos_anteriores/Reglamento_2012_del_SNI.pdf

Consejo Nacional de Ciencia y Tecnología [CONACYT]. (2021). *Archivo histórico del Sistema Nacional de Investigadores (SNI)-Investigadores vigentes 2021. [Historical archive of the National System of Researchers (SNI) - Active researchers 2021]*. https://conacyt.mx/sistema- nacional-de-investigadores/archivo-historico/

Consejo Nacional para Prevenir la Discriminación [*National Council for the Prevention of Discrimination*] [CONAPRED] (2021). *Programa Nacional para la Igualdad y la No Discriminación (Pronaind) 2021-2024 [National Programme for Equality and Non-Discrimination (Pronaind) 2021-2024]*. https://sindis.conapred.org.mx/wp-content/uploads/2022/05/PRONAIND_2021- 2024_final.Ax_-1.pdf

Diario Oficial de la Federación [*Official Gazette of the Federation*] [DOF]. (2006). *Ley General para la Igualdad entre Mujeres y Hombres [General Law for Equality between Women and Men]*. https://www.diputados.gob.mx/LeyesBiblio/pdf/LGIMH.pdf

Diario Oficial de la Federación [DOF]. (2012). *Presupuesto de Egresos de la Federación para el Ejercicio Fiscal 2013 [Expenditure Budget of the Federation for the 2013 Fiscal Year]*. https://www.dof.gob.mx/nota_detalle.php?codigo=5283490&fecha=27/12/2012#gsc.tab=0

Diario Oficial de la Federación [DOF] (2022a). *Ley Federal del Trabajo. Última Reforma publicada DOF 18 de mayo de 2022. [Federal Labour Law. Last reform published DOF 18 May 2022]*. https://www.diputados.gob.mx/LeyesBiblio/pdf/LFT.pdf

Diario Oficial de la Federación [DOF] (2022b). *Ley de Ciencia y Tecnología. [Law on Science and Technology]*. https://sep.gob.mx/work/models/sep1/Resource/15111/4/images/ley_ciencia_tecnologia_01_20 22.pdf

Instituto Mexicano para la Competitividad [*Mexican Institute for Competitiveness*] [IMCO]. (2022a). *Mujer en la Economía #8m2022 [Women in the Economy #8m2022]*. https://imco.org.mx/datos-conlupadegenero/#:~:text=A%20pesar%20de%20los%20esfuerzos,empleo%20recuperado%20no%20son%20%C3%B3ptimas

Instituto Mexicano para la Competitividad [IMCO]. (2022b). *Mujeres en educación, ciencia y tecnología: más allá de la foto [Women in Education, Science and Technology: beyond the photo]*. https://imco.org.mx/37-de-las-instituciones-de-educacion-ciencia-y-tecnologia-son-dirigidas-por-una-mujer/

Instituto Mexicano para la Competitividad [IMCO]. (2022c). *¿Dónde están las científicas? Brechas de género en carreras de STEM [Where are the women scientists? Gender gaps in STEM careers]*. https://imco.org.mx/en-mexico-solo-3-de-cada-10-profesionistas-stem-son-mujeres/

Instituto Nacional de Estadística y Geografía [*National Institute of Statistics and Geography*] [INEGI] and Instituto Nacional de las Mujeres [*National Institute for Women*] [INMUJERES]. (2019). *Encuesta Nacional Sobre Uso del Tiempo [ENUT] 2019 [National Survey on Time Use 2019]*. https://www.inegi.org.mx/programas/enut/2019/

Instituto Nacional de Estadística y Geografía [INEGI]. (2020). *Censo de Población y Vivienda 2020 [2020 Population and Housing Census]*. https://www.inegi.org.mx/programas/ccpv/2020/

Instituto Nacional de Estadística y Geografía [INEGI]. (2021). *Encuesta Nacional de Ocupación y Empleo (ENOE), población de 15 años y más de edad [National Survey of Occupation and Employment (ENOE), population aged 15 and over]*. https://www.inegi.org.mx/programas/enoe/15ymas/default.html#Tabulados

Instituto Nacional de Estadística y Geografía [INEGI]. (2022a). *Comunicado de Prensa Núm430/22. Estadísticas a propósito del día internacional de los pueblos indígenas[PressRelease No. 430/22. Statistics on the International Day of Indigenous Peoples]*. https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2022/EAP_PueblosInd22.pdf

Instituto Nacional de Estadística y Geografía [INEGI]. (2022b). *Sistema de Cuentas Nacionales de México. Producto Interno Bruto (PIB) [System of National Accounts of Mexico. Gross Domestic Product (GDP)]*. https://www.inegi.org.mx/temas/pib/

Instituto Nacional de las Mujeres [INMUJERES]. (2020). *Programa Nacional para la Igualdad entre Mujeres y Hombres 2020-2024. [National Programme for Equality between Women and Men 2020–2024]*. https://dof.gob.mx/nota_detalle.php?codigo=5608467&fecha=22/12/2020#gsc.tab=0

Instituto Nacional de las Mujeres [INMUJERES]. (2021). *Programa Nacional para la Igualdad entre Mujeres y Hombres 2020-2024: Avances y resultados 2021 [National Programme for Equality between Women and Men 2020-2024: Progress and results 2021]*. https://www.gob.mx/inmujeres/documentos/informes-del-programa-nacional-para-la-igualdad-entre-mujeres-y-hombres-2020-2024?state=published

International Labour Organization [ILO]. (2015). *Formalización de la economía informal: Esfera de importancia decisiva [Formalising the Informal Economy: A Critical Sphere of Action]*. https://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_412829.pdf

Norma Mexicana [*Official Mexican Standards*] [NMX]. (2015). *Igualdad laboral y no discriminación (NMX-R-025-SCFI-2015) [Labour equality and non-discrimination (NMX-R-025-SCFI-2015)]*. https://www.gob.mx/cms/uploads/attachment/file/25111/NMX-R-025-SCFI-2015_2015_DGN.pdf

Observatorio de Igualdad de Género de América Latina y el Caribe-Comisión Económica para América Latina y el Caribe [*Gender Equality Observatory for Latin America and the Caribbean-Economic Commission for Latin America and the Caribbean*] [OIG–ECLAC]. (2022). Datos por país: México [Country data: Mexico]. https://oig.cepal.org/es

Observatorio Nacional para la Igualdad de Género de América Latina y el Caribe (ONIGIES). (2020). *Resultados de igualdad de género en IES México [Gender equality results in Mexican HEIs]*. https://onigies.unam.mx/

Organisation for Economic Co-operation and Development. (2016). *Parental Leave: Where are the fathers? Men's uptake of parental leave is rising but still low*. https://www.oecd.org/policy-briefs/parental-leave-where-are-the-fathers.pdf

Organisation for Economic Co-operation and Development. (2022). *Gender wage gap (indicator)*. https://doi.org/10.1787/7cee77aa-en

Programa Nacional para la Igualdad entre Mujeres y Hombres [*National Programme for Equality between Women and Men*] [PROIGUALDAD]. (2021). *Informe de avance y resultados del Programa Nacional para la Igualdad entre Mujeres y Hombres 2021. [Progress and results report of the National Programme for Equality between Women and Men 2021]*. https://www.gob.mx/inmujeres/documentos/informes-del-programa-nacional-para-la-igualdad-entre-mujeres-y-hombres-2020-2024?state=published

World Bank. (2021). *GDP growth (annual %)-Mexico*. https://datos.bancomundial.org/indicator/NY.GDP.MKTP.KD.ZG?end=2021&locations=MX&%20start=1961&view=chart

ASIA

UNITED ARAB EMIRATES

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

The United Arab Emirates (UAE) is located in Western Asia and was founded on 2 December 1971 through the union of six Emirates, namely Abu Dhabi, Dubai, Sharjah, Ajman, Fujairah and Umm Al Quwain, and later Ras Al Khaimah. It has a total area of 83,600 km^2 and a population of 10,170,000 as of 2023, with a population density of 121.59 inhabitants/km^2, mainly concentrated in Abu Dhabi and Dubai. It is the fifth largest economy in the Middle East (after Iran, Saudi Arabia, Turkey and Israel), with a gross domestic product (GDP) of US$503 billion in 2022. Thanks to oil, it has undergone unprecedented modernisation, becoming a progressive Muslim monarchy with ministries responsible for protecting workers and, in particular, the position of women, including the Ministry of Human Resources & Emiratisation (MOHRE) and the Gender Balance Council. Immigrants account for 88.52% of the total population, with nationals representing just 11.48%. This is largely due to the range of job opportunities on offer, making it the **country with the highest percentage of immigrants** worldwide (GMI Blogger, 2022).

Men account for 68.58% of the population and women 31.42%. In 2021, there were 2,275 men for every 1,000 women, far above the global average of approximately 1,016 men per 1,000 women in the same year (Country meters, 2022). The largest age group is between 25 and 54 years, comprising 4.8 million men and 1.75 million women. The smallest group is the over-65 population, made up of 120,000 men and 50,000 women (GMI Blogger, 2022).

The UAE ranks 18th in the Gender Inequality Index of the United Nations Development Programme's 2020 Human Development Report and, according

to the World Economic Forum (Al Hinai, 2019), (currently is in the 7th position, 2024) it is classified as a leading country for gender equality in the region. In 2015, it became the first country in the Gulf Cooperation Council (GCC) to establish the Gender Balance Council, a federal entity that enhances and expands women's roles in leadership positions and reduces the gender gap.

Many young Emiratis have been the first in their families to complete secondary education. In 2007, only 20% of adults had received basic education (Abdulla and Ridge, 2011; Ridge, 2011; Sheet, 2020). Girls currently outperform boys in most Ministry of Education entrance examinations and in the English component of the Common Educational Proficiency Assessment (CEPA). In addition, results from the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS) found that girls outperformed or matched boys in mathematics and science. The secondary school curriculum has also been reformed to prioritise education in science, technology, engineering and mathematics (STEM) (Eltanahy et al., 2020), in order to ensure that young Emiratis acquire the skills needed to compete for jobs in STEM sectors after graduation (Alzaabi et al., 2021).

Despite these efforts, in 2019 female unemployment remained significantly higher than male unemployment, reaching 23.8% among women aged 25 to 29 (Statista, 2019). Data published by the Federal Competitiveness and Statistics Authority in 2017 showed that nearly 60% of Emirati women were economically active in their mid-twenties. However, this figure declines as they enter their thirties, a time when many women have children. Employment drops significantly among Emirati women in their forties (Rizvi, 2023). This can be explained by the unequal opportunities in the public sector, particularly where relocation to other cities is required, since women are culturally expected to work near their families, as well as by the lack of low-skilled jobs available to them, such as those offered by the police or the military, which attract many men who do not face these constraints. Moreover, women tend to earn less than men with the same or a lower level of education. Likewise, once they marry and have children, they have fewer opportunities, as is also the case in other countries. Mothers encourage their daughters to pursue higher education in order to ensure financial independence in the event of divorce or abandonment, which is empowering and explains why women continue to pursue higher studies despite the disparities (Abdulla, 2005).

STATISTICAL DATA ON ACADEMIC STAFFING IN THE UNITED ARAB EMIRATES

Currently, women aged over 15 represent 45.7% of the labour force, accounting for 66% of the public sector, 30% of leadership roles and 15% of technical and academic positions. Emirati women comprise 40% of those employed in education, 35% in the health sector, and 20% in social affairs. On the Abu Dhabi Stock Exchange, women make up 43% of investors, and the businesswomen's association has 14,000 members (UAE Gender Balance Council [UAE-GBC], 2020).

Prior to the discovery of oil and independence from the United Kingdom, education was based on Islam and at the start of the modernisation process in 1971 it was available only to men. However, in the Middle East, women's participation in higher education has increased at a far greater rate than that of men, such that today more than 70% of university students in the UAE are women (Abdulla and Ridge, 2011; World Bank Group, 2008). In 1975, the adult literacy rate was 54% for men and 31% for women, while today it stands at close to 95% for both genders and 95.8% for women (UAE Gender Balance Council, 2020; UNESCO, 2007). In the 2017-2018 academic year, the proportion of students in higher education rose to 66.3% across both genders (Puri-Mirza, 2020).

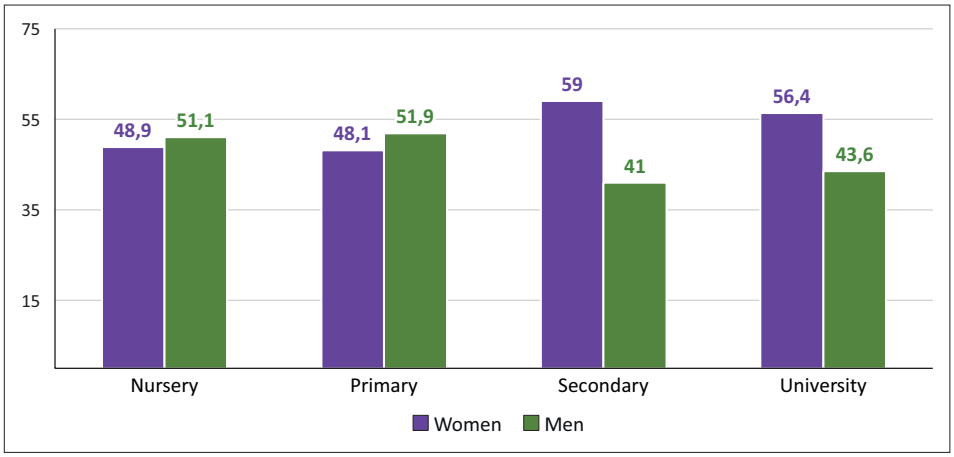

Figure 13.1. Student distribution in the United Arab Emirates (UAE) in the 2017-2018 academic year, by gender and educational level (Puri-Mirza, 2020).

In two of the country's three federal universities, women represent between 80% and 90% of the student population. Ninety-five per cent of girls who complete secondary education continue on to higher education, compared to 80% of boys. For these women, education provides a window onto a previously unknown world within a conservative society undergoing profound change. More than 10,000 students at the Higher Colleges of Technology (HCT) are women. Fifty-six per cent of STEM graduates from government universities in the UAE are women.

A meta-analysis of studies conducted between 1999 and 2019 on the gender gap and STEM educational and career pathways reviewed 72 articles that included or mentioned the UAE, finding that more women are enrolling in STEM programmes than the global average, placing the country in a leading position.

Almost two-thirds of university students are women, and several higher education institutions are dominated by women in STEM fields (Table 13.1) (Alzaabi et al., 2021). Women account for 60% of graduates from the Masdar Institute of Science and Technology in Abu Dhabi and 56% of STEM graduates from the federal university (Euronews, 2022). In 2019, 70% of all university graduates in the UAE were women, as were 46% of STEM graduates, 50% of those employed in the UAE Space Programme, and 44.5% of engineering students, one of the highest proportions globally (Zaatari, 2019). According to UNESCO, 57% of STEM graduates in Arab countries are women, while in the UAE the figure is 61%. One example of women's contribution to science is the UAE's Mars Mission, in which women made up 34% of the mission and 80% of the entire science team (Euronews, 2022). Between 2005 and 2010, the percentage of women specialising in engineering rose to 69.48%, according to the UAE Ministry of Higher Education. While in the United Kingdom and the United States the proportion of women in engineering education is around 15 to 20%, at Khalifa University in Abu Dhabi it is approximately 50%, especially in the field of robotics (Margheri, 2016; Sirimmane, 2019).

The HCTs are the largest applied science higher education institution in the UAE. In the 2019-2020 academic year (Table 13.1), 93% of students enrolled at HCTs were women. Although female students dominate all fields of study at HCT level, male enrolment is slightly higher in engineering, technology and science, with 55% of men participating in STEM disciplines (HCT, 2022). Given the country's idiosyncrasies, no published data have been found on the participation of women in academia in the UAE.

Enrolment of new HCT students by type of secondary school and gender: academic year 2019-2020			
Type of school	**Women**	**Men**	**Total**
Public	4,089	568	4,657
Private	318	229	547
Total	4,407	797	5,204
HCT enrolment by division and gender 2019-2020			
Applied Media	1,196	157	1,353
Business	3,972	1,408	5,380
Information Technology	3,053	1,801	4,854
Education	947	0	947
Engineering, Technology and Science	2,541	3,062	5,603
Health Sciences	2,055	220	2,275
Professional Careers	405	96	501
Technical Studies Programme (TSP)	77	0	77
Total	14,246	6,744	20,990
UAEU enrolment by college and gender 2017-2018			
Humanities and Social Sciences	723	92	815
Sciences	465	61	526
Education	110	2	112
Economics and Business	382	143	525
Law	226	70	296
Food and Agriculture	215	18	233
Engineering	588	270	858
Medicine and Health Sciences	162	62	224
Information Technology	250	138	388
Master's degrees	218	113	331
Doctorates	38	10	48
Professional Doctorates in Pharmacy	48	22	70

Table 13.1. Higher education institutions dominated by women in STEM (HCT, 2022).

GENDER EQUALITY POLICIES IN SCIENCE AND ACADEMIA

The path to employment remains precarious for women, and among those who find work in STEM fields, few feel welcome or that their contributions are recognised. Many report having been marginalised or having encountered difficulties in securing promotions due to male antagonism. The situation is so discouraging that many women are forced to choose between accepting male-dominated hostility or leaving the profession altogether (Kemp et al., 2021; Raimi et al., 2016). This gender gap in STEM is clear and persists from university through to the workplace, according to *Bridging the Digital Gender Divide*, a report by the Organisation for Economic Co-operation and Development published in October 2018 (Organisation for Economic Co-operation and Development [OECD], 2018). There are no policies specifically addressing STEM, but laws are in place that support gender parity.

The national context is a crucial factor, as it influences the gender gap in STEM career paths (Howe-Walsh et al., 2020). Employment choices reflect perceived status: Emirati women graduates are reluctant to accept jobs that do not require postgraduate qualifications. As in other countries (Heward, 1996; Morley and Walsh, 1996; Brooks and Mackinnon, 2001), the higher education sector itself embodies the widespread problem of glass ceilings for women, who are often unable to access management positions. There are also logistical difficulties in balancing family and work life for women without the financial resources or networks to support this balance, along with cultural and social expectations to uphold religious and traditional values (Patterson et al., 2021).

In 2004, the UAE ratified the United Nations Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW, 2004). It has signed treaties aimed at protecting women's rights, such as the Convention on the Rights of the Child (1997), the Convention on Hours of Work (Industry) (1982), the Equal Remuneration Convention (1996), the Night Work (Women) Convention (1982) and the Minimum Age Convention (1996), along with improvements to maternity leave (Maternity Leave - The Official Portal of the UAE Government, 2022) and the Emiratisation process to place qualified Emiratis in government and private sector roles (TDRA, 2022; Geronimo, 2019). By law, 50% of the seats in the Federal National Council (parliament) must be held by women (UAE Gender Balance Council, 2020). These measures are intended to encourage women to improve their work-life balance and to enter the labour market, and, consequently the scientific world.

The importance of STEM education is also emphasised in the UAE Economic Vision (TDRA, 2022), a multi-year plan to develop the national economy. Although the UAE has achieved a STEM education rate of around 50%, the proportion of women in STEM professions remains low. The UAE government is developing plans to ensure an inclusive strategy to educate and train more female STEM leaders by 2030. It has launched space projects in partnership with organisations such as Masdar and expanding into fields such as robotics, with support from the Women in Engineering (WIE) Committee, through strategies aimed at building a knowledge-based economy that recognises the key role women will play in science, technology and engineering in the future.

Incentives include the AI & Robotics Award for Good, the UAE AI Award and the A2RL × DCL Autonomous Drone Championship. Other organisations, such as the Dubai Women Establishment (DWE), are actively promoting gender equality in the UAE and other GCC countries. Among its many initiatives is the UAE Women Leadership Programme, which offers leadership training programmes for Emirati women (Geronimo, 2019; Margheri, 2016).

CONCLUSIONS

- The UAE is a young country with social and cultural characteristics that directly affect women's education, resulting in constant changes in the promotion and closing the gender gap.
- The country has made considerable progress in education in a short time, thanks to a progressive government that invests in innovation and development, with a downward trend in gender discrimination, although the problem still persists.
- Despite the growing number of women engineers and STEM graduates in the UAE, employment inclusion is not always guaranteed, with challenges related to career development, recruitment and daily interactions with men in the workplace.
- More research is needed to develop strategies for improving STEM employment opportunities for women and bridging the gap from the classroom to the workplace.
- Women's voices are essential in regulation and legislation to ensure greater gender parity in future employment, along with timely legislation and government policies.

- Further studies must be carried out and published in high-impact journals on the gender gap in STEM education and women's professional advancement in the UAE.
- Initiatives are needed to spark girls' curiosity and passion for STEM, to provide visible female role models and mentors to inspire girls, and to show boys and young men the importance of women's participation in the workforce.
- Additional measures are also needed to support women in rural areas and to improve general workplace conditions and work-life balance.
- Identifying the contextual influences of the central role of the family, role models, government sponsorship and company reputation on career choice would make it possible to identify regional differences and improve our understanding of the diversity of professional influences across the region.

REFERENCES

Abdulla, F.M. (2005). Emirati women: Conceptions of education and employment. *ProQuest Dissertations and Theses*, 164. https://search.proquest.com/docview/305027141?accountid=14169

Abdulla, F. & Ridge, N. (2011, January). *Where are All the Men?* Gender, Participation and Higher Education in the United Arab Emirates. Dubai School of Government. https://www.researchgate.net/publication/266892243_Where_are_All_the_Men_Gender_Participation_and_Higher_Education_in_the_United_Arab_Emirates

Alzaabi, I., Ramírez-García, A. & Moyano, M. (2021). Gendered STEM: A Systematic Review and Applied Analysis of Female Participation in STEM in the United Arab Emirates. *Education Sciences* 2021, Vol. 11, Page 573, 11(10), 573. https://doi.org/10.3390/EDUCSCI11100573

Brooks, A. & Mackinnon, A. (eds.) (2001). Gender and the restructured university: Changing management and culture in higher education. London: Society for Research into Higher Education.

Countrymeters. (2022). United Arab Emirates population (2022) live — Countrymeters. United Nations Department of Economic and

Social Affairs: Population Division. https://countrymeters.info/en/United_Arab_Emirates

Eltanahy, M., Forawi, S. & Mansour, N. (2020). STEM Leaders & Teachers Views of Integrating Entrepreneurial Practices into STEM Education in High School in the United Arab Emirates. *Entrepreneurship Education. Springer, 3*(2), 133-149. https://doi.org/10.1007/S41959-020-00027-3

Euronews. (2022). *STEM pioneers: the UAE women empowering the Middle East. Euronews*. https://www.euronews.com/next/2022/02/21/stem-pioneers-the-uae-women-empowering-the-middle-east

Geronimo, A. (2019). *UAE leadership supports Emirati women to excel in STEM fields*. Tahawultech.com. https://www.tahawultech.com/region/uae/uae-leadership-support-emirati- women-to-excel-in-stem-fields/

GMI Blogger. (2022). *United Arab Emirates (UAE) Population Statistics 2022 | GMI*. https://www.globalmediainsight.com/blog/uae-population-statistics/

HCT. (2022). About HCT - Higher Colleges of Technology. Hct.Ac.Ae/En/About. https://hct.ac.ae/en/about-hct/

Heath, V. (2021). Women and the Fourth Industrial Revolution: An Examination of the UAE's National AI Strategy. *Artificial Intelligence in the Gulf*, 203-245. https://doi.org/10.1007/978- 981-16-0771-4_10

Heward, C. (1996). Women and careers in higher education: What is the problem? In Breaking boundaries: Women in higher education, ed. L. Morley and V. Walsh, 11-23. London: Taylor & Francis. Euronews. (2022, February 28). *STEM pioneers: the UAE women empowering the Middle East | Euronews*. https://www.euronews.com/next/2022/02/21/stem-pioneers-the-uae-women-empowering-the-middle-east

Kemp, L.J., Ahmad, N., Pappalardo, L. & Williams, A. (2021). Career calling: women STEM graduates in the United Arab Emirates. *Gender in Management, 36*(2), 169-188. https://doi.org/10.1108/GM-11-2019-0205/FULL/XML

Margheri, L. (2016). Women in Engineering, Science, and Technology in the United Arab Emirates [Women in Engineering]. *IEEE Robotics and Automation Magazine, 23*(2), 102-104. https://doi.org/10.1109/MRA.2016.2558299

Maternity leave - The Official Portal of the UAE Government. (2022). TDRA: Telecommunications and Digital Government Regulatory Authority. https://u.ae/en/information-and-services/jobs/types-of-leaves-and-entitlements-in-the-private-sector/maternity-leave

Morley, L. & Walsh, V. (1996). Breaking boundaries: Women in higher education. London: Taylor & Francis.

Organisation for Economic Co-operation and Development. (2018). *More needs to be done to bridge the digital gender divide - OECD*. https://www.oecd.org/digital/more-needs-to-be-done-to-bridge-the-digital-gender-divide.htm

Patterson, L., Varadarajan, D.S. & Saji Salim, B. (2021). Women in STEM/SET: gender gap research review of the United Arab Emirates (UAE) – a meta-analysis. *Gender in Management, 36*(8), 881-911. https://doi.org/10.1108/GM-11-2019-0201

Puri-Mirza, A. (2020). *United Arab Emirates: distribution of students by gender and educational level 2017-2018 | Statista*. Statista.com. https://www.statista.com/statistics/1096083/united-arab-emirates-distribution-of-students-by-gender-and-educational-level/

Raimi, L., Shokunbi, M.O. & Peluola, S. B. (2016). Women's under-representation and their feats in sciences, entrepreneurship, engineering, technology in Nigeria. 7th edition of The NIEW Journal – The Voice of the NAM Woman. https://www.researchgate.net/profile/Lukman-Raimi/publication/309322173_WOMEN'S_UNDER-REPRESENTATION_AND_THEIR_FEATS_IN_SCIENCES_ENTREPRENEURSHIP_ENGINEERING_AND_TECHNOLOGY/links/580a019408ae49c6a892ffcb/WOMENS-UNDER-REPRESENTATION-AND-THEIR-FEATS-IN-SCIENCES-ENTREPRENEURSHIP-ENGINEERING-AND-TECHNOLOGY.pdf#page=101

Ridge, N. (2011). *Why women graduates outnumber men in the UAE. Education – Gulf News*. https://gulfnews.com/uae/education/why-women-graduates-outnumber-men-in-the-uae- 1.790849

Rizvi, A. (2023). Helping Emirati women launch STEM careers a "national priority", says UAE envoy. The National News UAE.

https://www.thenationalnews.com/uae/education/2023/01/26/helping-emirati-women-launch- stem-careers-a-national-priority-says-uae-envoy/

Sheet, F. (2020). Fact Sheet: Education in the United Arab Emirates and Ras Al Khaimah. *Al Qasimi Foundation*, September. https://doi.org/10.18502/aqf.0154

Sirimmane, S. (2019). *How can we STEM the tide of women graduates leaving science? | World Economic Forum. Gender Inequality*. https://www.weforum.org/agenda/2019/09/stem-women-gender-equality-science-technology-engineering-mathematics/

Statista. (2019). *UAE: female unemployment rate in Abu Dhabi by age group 2019. Statista*. https://www.statista.com/statistics/898147/uae-female-unemployment-rate-in-abu-dhabi-by-age-group/

TDRA. (2022). *Vision 2021 and Emiratisation - The Official Portal of the UAE Government. UAE Government*. https://u.ae/en/information-and-services/jobs/vision-2021-and-emiratisation

UAE Gender Balance Council. (2020). *UAE Women Facts*. https://www.gbc.gov.ae/facts.html

UAEU. (2022). *United Arab Emirates University Overview*. https://www.uaeu.ac.ae/en/about/aboutuaeu.shtml

UNESCO. (2007). *Education for All Global Monitoring Report 2008: Education for All by 2015- Will We Make It? - World | ReliefWeb*. https://reliefweb.int/report/world/education-all-global-monitoring-report-2006-education-all-2015-will-we-make-it

World Bank Group. (2008). *The Road Not Traveled: Education Reform in the Middle East and North Africa*. MENA Development Reports. https://openknowledge.worldbank.org/handle/10986/6303

Zaatari, S. (2019). More women are taking up STEM opportunities in UAE. *Gulf News*. https://gulfnews.com/uae/education/more-women-are-taking-up-stem-opportunities-in-uae- 1.60765781#

JAPAN

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

Japan is a highly advanced society and the world's third-largest economy, with a GDP close to US$5 trillion, a population of more than 125 million (51.2% women), a land area of 364,555 km^2 and a population density of 347 people per km^2 concentrated in urban areas (World Bank Group, 2022). However, in terms of gender, Japan ranks 116th out of 146 countries (World Economic Forum [WEF], 2022), due to the low participation of women in the labour market and in politics, as well as the gender pay gap.

Japan's idiosyncrasies make it a unique country in terms of understanding and addressing the role of women in society and in science (García-Martín et al., 2018). In Japan, women gained access to higher education from 1875 through "women's schools" and, from 1900, through "women's universities". The first woman to earn a doctoral degree did so in 1927, which was before women had gained the right to vote (in 1947). Today, educational opportunities are fully equal, and statistics show that women have completed more years of education on average than their male peers (Steinberg, 2012). Furthermore, in the Programme for International Student Assessment (PISA), 15-year-old boys and girls achieved equally strong results in science and mathematics (Organisation for Economic Co-operation and Development [OECD], 2018).

However, this reality is not reflected in access to the labour market, the types of contracts available or the representation of women in positions of responsibility. Looking at the number of men and women in work in Japan (Figure 14.1a), there are more men than women in employment. In addition, Figure 14.1b presents 2020 data on employment sectors and contract types.

Employment is categorised into executive, regular (permanent) and non-regular (temporary) positions. Non-regular positions are typically fixed-term contracts and very often part-time. A large proportion of these temporary jobs are held by women, while the percentage is significantly lower for men.

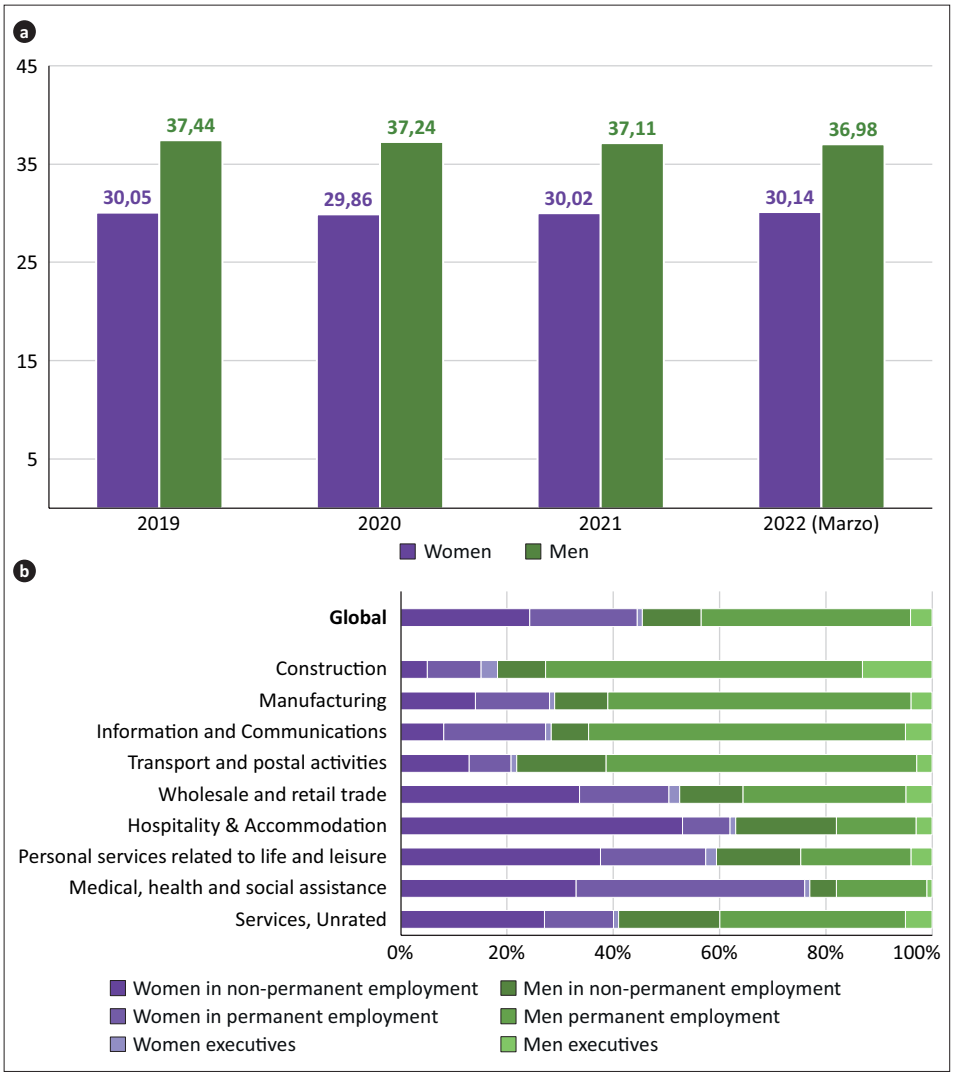

Figure 14.1. (**a**) Number of women and men in Japan's labour market between 2019 and March 2022 (millions of people by year) (compiled by the author, based on data from: Gender Equality Bureau, 2022). (**b**) Comparative chart of men and women, by percentage, sector and contract type, in 2020 (compiled by the author, based on data from: Gender Equality Bureau, 2021).

As for employment sectors, there are clearly gendered occupations and roles in Japan. Women have higher rates of employment than men in leisure services and care-related sectors, where non-permanent and part-time work is widespread. Men, by contrast, tend to work in technological, transport and manufacturing sectors. Another noteworthy statistic is the low percentage of women in executive positions, even in sectors where women represent a large proportion of the workforce.

The graphs alone cannot fully explain the situation, as Japan›s sociocultural, religious and historical characteristics also influence the gender gap in labour force participation, pay and the under-representation of women in positions of responsibility.

GENDER PERSPECTIVE IN SCIENCE AND TECHNOLOGY IN JAPAN

Given the above statistics, it is reasonable to expect similar figures in the field of science and technology. Figure 14.2 shows the historical trend in the number and percentage of women researchers in Japan. Although the share of women researchers remains very low, recent years have seen a rising trend: in 2005, only 11.9% of researchers were women, compared to 16.2% in 2018.

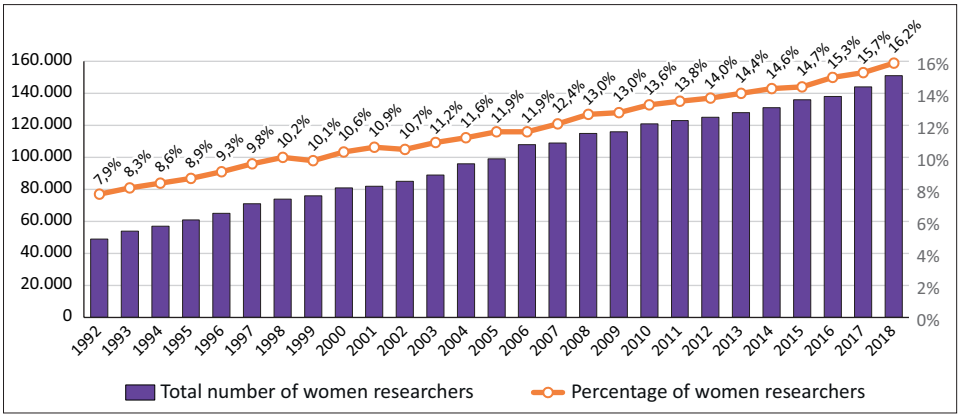

Figure 14.2. Trend in the number and percentage of women researchers in Japan. (compiled by the author based on data from The Ministry of Education, Culture, Sports, Science and Technology [MEXT], 2019).

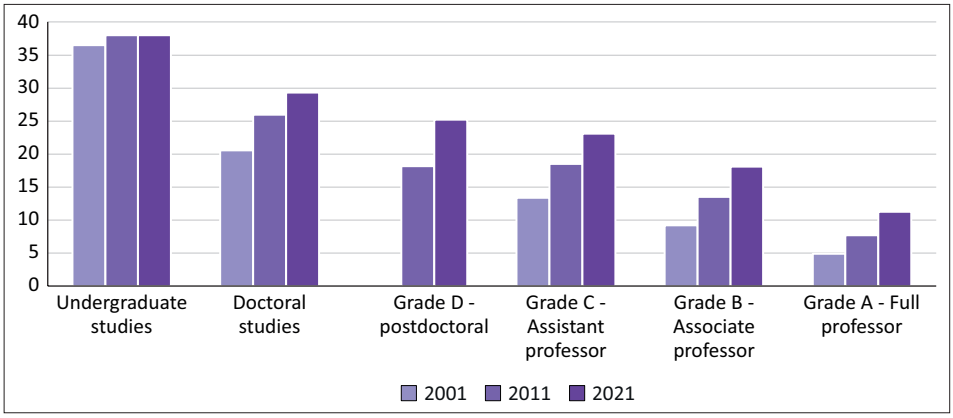

Figure 14.3. Percentage of women in Japan's national universities by rank (grade D: contract-based researcher or doctoral researcher; grade C: lecturer or assistant professor; grade B: associate professor; grade A: full professor) (compiled by the authors, based on data from the Japan Association of National Universities [JANU], 2022).

Figure 14.3 shows the percentage of women in academic positions in Japanese universities. Women represent a progressively smaller percentage as one moves up the ranks in universities (Homma et al., 2013a). Nonetheless, the overall trend is positive, as the percentage of women has increased across all ranks over the past 10 to 20 years, including at the level of full professor. As for university leadership positions, the number of female rectors has barely changed, standing at 2% in 2001 and 3.5% in both 2011 and 2021. The trend for vice-rectors, however, is more encouraging, having risen from zero in 2001 to 4.2% in 2011 and 14% in 2021 (JANU, 2022).

The low percentage of women in research, particularly in senior academic roles, contrasts with Japan's so-called scientific excellence: among the authors of the top 10% of interdisciplinary publications, the share of women is higher than that of men in Japan (Elsevier, 2017).

GENDER EQUALITY POLICIES IN SCIENCE AND ACADEMIA

Integrating a gender perspective into the scientific and innovation systems of all countries is essential, particularly in societies that are highly technological and innovative. This is the case with Japan, a country that is scientifically and technologically advanced, and ranks first in patent activity (WEF, 2020) and whose citizens have high levels of scientific knowledge and strong respect for

scientists. Despite the measures introduced and progress made in recent years, Japan still lags behind in terms of gender equality in its scientific and innovation system (Hori, 2020), and has the lowest share of women trained in science, technology, engineering and mathematics among OECD countries. Another major challenge is the low proportion of women in leadership positions. Achieving gender parity in workforce numbers and leadership positions is desirable in all sectors, but it is especially important in science and innovation, as these are the roles that will shape the country's future. Japan is aware of this and has introduced a range of policies to improve these figures. Some are long-term, and their impact will only become apparent over time. Other policies, while appearing to have limited impact, are crucial to achieving the set goals.

In science and technology specifically, initiatives have been promoted by both the government and individual institutions to address the under-representation of women in this field. Government-led measures have originated from various sectors, while universities and research institutes have also developed their own programmes to boost the number of women scientists and encourage them to remain in STEM careers (Iguchi-Ariga, 2015).

General policies that affect science and innovation

At a general level, the Japanese Government has enacted several laws and plans to promote gender equality. Two of the most relevant to science and innovation are shown in the top of Figure 14.4. The first is Law No. 78 of 1999, the "Basic Law for a Gender- equal Society", which declares the aim of creating a society in which both men and women, as equal members, are able to participate freely in every sphere and enjoy political, economic, social and cultural benefits on an equal footing, while sharing responsibilities. The second is the "Act on Promotion of Women's Participation and Advancement in the Workplace", introduced by Prime Minister Abe in 2015, which focuses on promoting women to leadership positions.

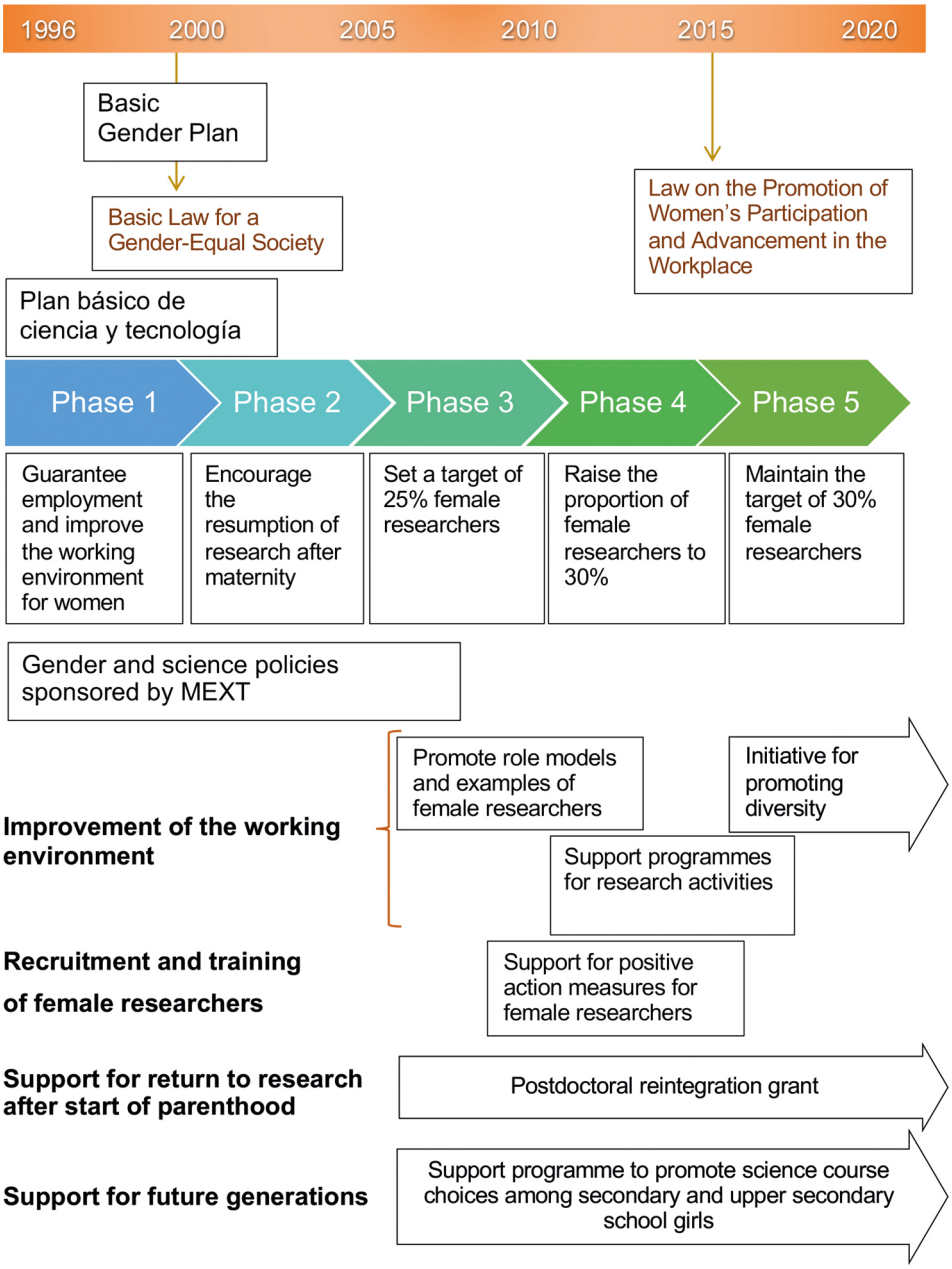

Figure 14.4. Gender-focused policies in Japan's academic, scientific and technology systems (compiled by the author and adapted from Saitoh and Gasser, 2021. Modified from MEXT, 2020).

Basic Science and Technology Plans

The government's multifaceted approach to gender and science is based on three pillars, depending on the area of implementation (Saitoh & Gasser, 2021). The first of these is the series of five-year Basic Science and Technology Plans (Figure 14.4, *"Basic Science and Technology Plan"*), which have progressively incorporated more ambitious gender equality measures. The First Plan (1996-2000) aimed to ensure women's employment and improve their working environment. The Second Plan (2001-2005) included measures to support women researchers returning to work after childbirth or caring for children. It was not until the Third Plan (2006-2010) that a numerical target of 25% was set for hiring women researchers across all STEM disciplines. The Fourth Plan (2011- 2015) sought to accelerate previous measures and aimed for a 30% recruitment rate in STEM disciplines. The Fifth Plan (2016-2020) continued setting recruitment targets for women and promoted their access to leadership positions, in line with the 2015 "Act on Promotion of Women's Participation and Advancement in the Workplace" mentioned under general policy. Specifically, it set goals of 30% for associate professors and 20% for full professors and other key academic roles, in accordance with the Basic Plan for Gender Equality.

These are the targets outlined in the respective plans. Many of these initiatives are voluntary, but it is worth noting that they are supported by funding for the efforts made by universities and research institutes. These projects (Figure 14.4, "*Gender and Science Policies Sponsored by MEXT*") have a duration of between two and six years and receive significant financial backing (MEXT, 2020).

Policies from the Ministry of Education, Culture, Sports, Science and Technology In line with these laws and objectives, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has implemented a number of programmes aimed at improving the research environment for women scientists (*bottom of Figure 14.4*). Among them is the "Support for Positive Action for Female Researchers" programme (2009-2013), which sought to actively increase the number of women researchers and accelerate their career progression. This initiative included a positive action plan that reserved specific positions for women and provided support to help them balance their personal and professional lives. These programmes were implemented in universities and research institutes to strengthen institutional support systems for women scientists on campus. As a result, 88 universities and research institutions across Japan received funding and progressively improved their working environments.

Examples include the introduction of on-campus nurseries and the option to hire research technicians assigned to women scientists who had become mothers (or to fathers, if the mother also worked full time), allowing them to continue their research activities (Homma et al., 2013b). Moreover, as in many other sectors in Japan, a significant number of women leave scientific careers due to parenthood, resulting in a major loss of talent. To address this, the successful "Postdoctoral Return Programme" was launched in 2006, enabling outstanding researchers to return to scientific careers after childbirth and/or childcare. Equally important is investment in future generations, which is why the "Next Generation Support Plan" is currently being implemented to encourage female secondary and upper-secondary school students to study STEM degrees, including courses taught by women at the forefront of science and technology.

Although the figures remain low, all these efforts have led to a doubling in the number of women in science and research over the past 20 years. It is vitally important to continue working to increase the number of women researchers, improve their working conditions and enhance their research capabilities, not only from a gender equality standpoint, but also to foster diversity in scientific and organisational activities. In Japan, where family roles are strongly gendered, it is crucial to support the development of future women leaders by promoting a balance between research and life events such as childbirth and childcare, and to build a system in which women can fully realise their potential.

CONCLUSIONS

- Japan has the lowest proportion of women scientists and technologists among OECD countries.
- The trend is moving in a positive direction, as the percentage of women in science and technology has risen from 8% to 16% over the past 20 years, but the figure remains insufficient.
- Japan recognises the serious issue of talent loss and has adopted laws and set targets to attract and retain women in science and technology. These measures include funding and changes to the working environment to enable a better work- life balance.
- All actions to facilitate the entry and retention of women in the scientific and technological fields are viewed positively and are expected to produce successful long-term outcomes.

- To ensure a real impact, change must come not only from government policy but also from a shift in attitudes across society, within the scientific community and among women scientists themselves.

REFERENCES

Elsevier. *The Researcher Journey through a gender lens.* Focus on Japan. (2017).

García-Martín, F., Rosich, M., de Vega, S., San Gabriel, A. & Amengual, O. (2018). Mujer y Ciencia en Japón [*Women and Science in Japan*]. *Revista Fundación Ramón Areces* [*Ramón Areces Foundation Journal*], *19*, 111-121.

Gender Equality Bureau, Cabinet Office, Government of Japan. (2021). *The White Paper on Gender Equality 2021*. https://www.gender.go.jp/english_contents/about_danjo/whitepaper/pdf/ewp2021.pdf

Gender Equality Bureau, Cabinet Office, Government of Japan. (2022). *The White Paper on Gender Equality 2022. Special Feature*. https://www.gender.go.jp/english_contents/about_danjo/whitepaper/pdf/special_feature.pdf

Homma, M.K., Motohashi, R. & Ohtsubo, H. (2013). Japan's Lagging Gender Equality. *Science Magazine, 340*, 428-430.

Homma, M.K., Motohashi, R. & Ohtsubo, H. (2013). Maximizing the potential of Scientists in Japan: promoting equal participation for women scientists through leadership development. *Genes to Cells, 18*, 529-532.

Hori, R.S. (2020). Progress and problems of gender equality in Japanese academics and geosciences. *Adv. Geosci., 53*, 195-203. https://doi.org/10.5194/adgeo-53-195-2020

Iguchi-Ariga, S.M.M. (2015). We've only just begun: What worked and what has not worked well so far for the promotion of women scientists in Japan. In *Advancing Women in Science: An International Perspective*. W. Pearson, Jr. et al., eds. Springer International Publishing (Switzerland).

Japan Inter-Society Liaison Association Committee for Promoting Equal Participation of Men and Women in Science and Engineering (EPMEWSE). (2017). *The 4th Large-Scale Survey of Actual Conditions of Gender Equality in Scientific and Technological Professions. Survey Report. Concise Summary*. https://www.djrenrakukai.org/doc_pdf/2017/4th_enq/4th_enq_survey_report_en_v2.pdf

Ministry of Education, Culture, Sports, Science and Technology (MEXT). (2019). *Current status of S&T in Japan and other selected countries / R&D personnel. Indicators of Science and Technology, 2019*. https://www.mext.go.jp/en/content/20200728-mxt_kouhou02- 000009058_04.pdf

Ministry of Education, Culture, Sports, Science and Technology (MEXT). (2020). Public call for proposals under the Initiative for the Realisation of a Diverse Research Environment. Working document from the Ministry of Education, Culture, Sports, Science and Technology, Office of Science and Technology Policy, Human Resources Policy Division, Office for the Promotion of Human Resources Policy (original in Japanese).https://www.jst.go.jp/shincho/koubo/2020koubo/diversityR2-koubosetsumeikaisiryo.pdf

Organisation for Economic Co-operation and Development. (2018). *Programme for International Student Assessment (PISA). Results from 2018, Country Note: Japan*.
https://www.oecd.org/pisa/publications/PISA2018_CN_JPN.pdf

Saitoh, N. & Gasser, S.M. (2021). Nadeshiko Revisited. *EMBO reports, 22*, e5252.

Steinberg, C. & Nakane, M. (2012). Can Women Save Japan? *IMF Working paper*. https://www.imf.org/external/pubs/ft/wp/2012/wp12248.pdf

The Japan Association of National Universities (JANU). (2022). *Report on the implementation of gender equality promotion in national universities*. Report of the 18th follow-up survey. Pages 29, 34 and 35 (original in Japanese). https://www.janu.jp/wp/wp-content/uploads/2022/02/202201houkoku_01.pdf

World Bank Group. (2022). Country: Japan.
https://data.worldbank.org/country/JP

World Economic Forum. (2020). *Global Competitiveness Report Special Edition 2020: How Countries are Performing on the Road to Recovery*.
https://www.weforum.org/reports/the-global-competitiveness-report-2020/in-full/infographics-14b60f7c60

World Economic Forum. (2022). *Global Gender Gap Report 2022*.
https://www3.weforum.org/docs/WEF_GGGR_2022.pdf

OCEANIA

AUSTRALIA

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INTRODUCTION AND SOCIOCULTURAL CONTEXT

With an area of approximately 7.7 million square kilometres, Australia is the sixth-largest country in the world. However, with a population of approximately 25.4 million, it is one of the least densely populated countries globally (3.3 people/km^2). With a gross domestic product of US$1.5 trillion in 2021, Australia accounts for 1.15% of the global economy (World Bank Group, n.d.), placed as the 19th most competitive country in the world and the fifth most competitive among Asia-Pacific countries in 2022 (International Institute for Management Development [IMD], 2022).

Australia is a federal nation comprising six states and two territories. As a result, there are clear distinctions between federal policies (which apply across the whole country) and regional policies, which fall under the jurisdiction of each state and territory. This administrative structure means that the availability of statistical and gender policy data varies by region. To provide a general overview of the sociocultural context, the Australian Bureau of Statistics conducts a federal census every five years. Therefore, the demographic and basic statistical data presented in this section refer to the most recent census conducted in 2020. However, in light of the effects of COVID-19 on unemployment figures, more recent data have been provided where relevant.

Women account for a slight majority of Australia's population (50.7%) compared to men (49.3%). With a very low unemployment rate (3.5% in June 2022), between 2019 and 2020, 67.6% of women of working age (20-74 years) were in employment, although the proportion of women working part time

(43%) was high compared to men (16%). Looking at overall percentages, the greatest gender disparity in workforce participation is seen in the 30-39 age group, where 22.5% of women were outside the labour force in comparison to 8.3% of men (Australian Bureau of Statistics [ABS], 2022). In a country where a high percentage of the population has completed school education (80.8% of women, 79.4% of men) and access to higher education is widespread (64.3% of women and 62.7% of men), in 2020 the proportion of women who had completed a university degree at any level (from bachelor's to doctorate levels) exceeded that of men (ABS, 2022) (Table 15.1).

Type of qualification	Women	Men
Undergraduate/Bachelor's degree	22.7%	17.5%
Master's degrees	11.1%	8.8%
Doctorates	8.5%	7.9%

Table 15.1. Percentage of men and women by academic qualification obtained.

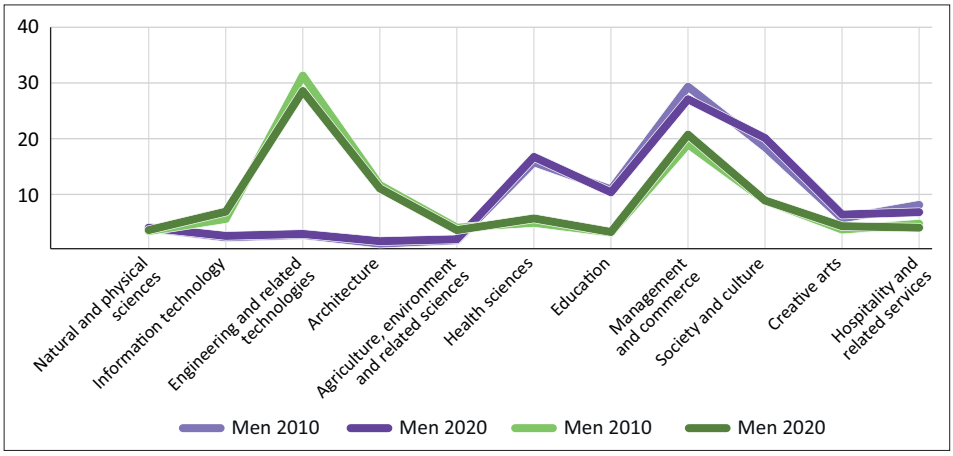

Figure 15.1. Degree programmes selected by gender between 2010 and 2020. Compiled by the author based on data from the Australian Bureau of Statistics (ABS).

With regard to fields of study, there are clear gender-based differences in subject choices, with women most commonly choosing management and commerce (26.9%), society and culture (19.9%) and health sciences (16.5%).

Among men, the most popular fields are engineering and related technologies (28.4%), management and commerce (20.5%), followed by architecture and construction (10.9%). This bias in the choice of research fields documented in 2020 is similar to that recorded in the previous decade (Figure 15.1).

STATISTICAL DATA ON ACADEMIC STAFFING IN AUSTRALIA

Australian universities consistently contribute to Australia being ranked among the top 10 countries for gender equality in academia (Gilbert et al., 2021). There are programmes supporting equal pay, gender equality and diversity initiatives, and a commitment to the Science in Australia Gender Equality (SAGE) initiative (Manyweathers et al., 2020; Winchester and Browning, 2015). Given these precedents, Australian academia would appear to be on track to break glass ceilings (Teelken et al., 2021) by eliminating barriers that hinder women from securing academic leadership and senior roles (Wilson, 2014), and by ensuring that female academics with family responsibilities are not disproportionately affected by gender bias, which is often exacerbated after motherhood (Williams, 2005). However, these accreditation frameworks, citations and interventions have not yet succeeded in meaningfully addressing gender discrimination (Ovseiko et al., 2017; Poggio, 2018).

In 2021, the Australian Government's Department of Education and Employment published data covering the previous five years on the percentage of academic staff (ABS, 2021). The selected statistics highlight differences in the division of labour by gender.

When considering all academic staff, both part-time and full-time, in research as well as teaching and research roles, the percentage of women is higher than that of men. However, gender disparities are evident in the breakdown of university staff across research-only, teaching-only and combined roles. In research-only positions, figures from the past five years show similar percentages for women and men.

In teaching-only roles, women are overrepresented, with 60% of these positions being held by women. In combined research and teaching roles, the proportion of women is approximately 10% higher than that of men (Figure 15.2).

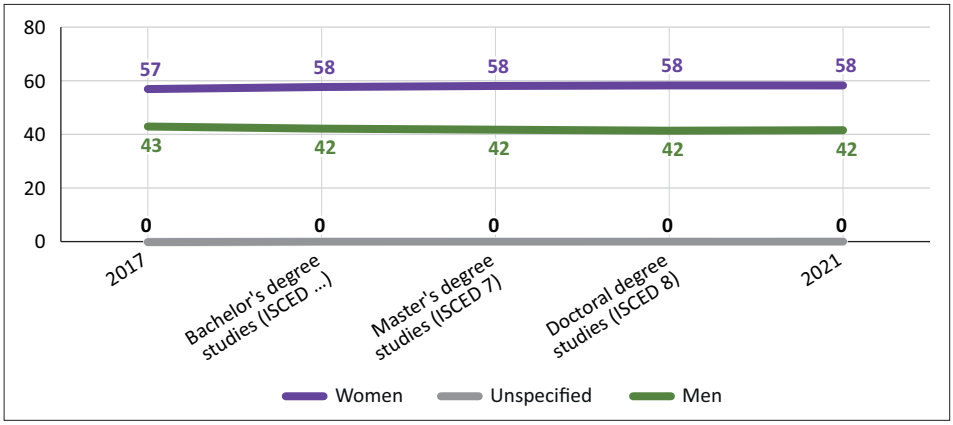

Figure 15.2. Percentage of academic staff in combined teaching and research positions, by gender. Compiled by the author based on data from the Australian Government Department of Education and Employment.

In STEM disciplines, Australia has the lowest proportion of girls choosing STEM subjects in the Asia-Pacific region, at 27%, compared to 76% in China and 69% in India (Australian Academy of Sciences [AAS], 2019).

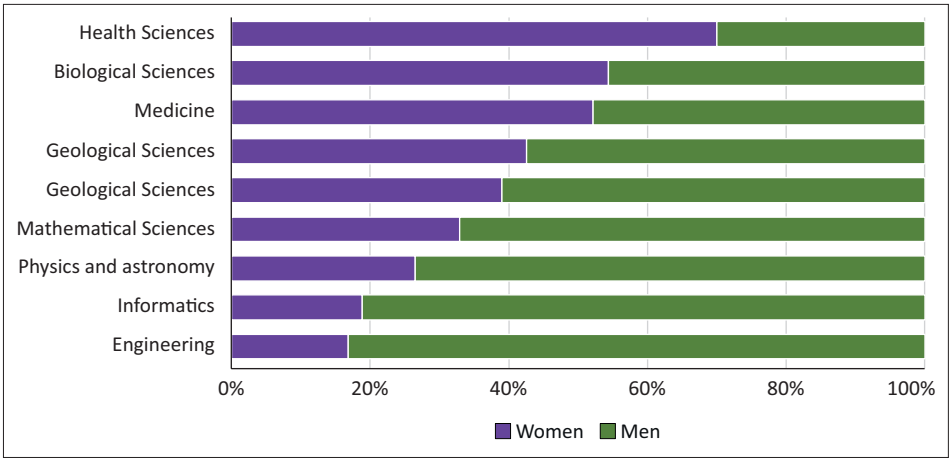

Figure 15.3. Percentage of women and men enrolled in STEM degrees, by discipline. Compiled by the author based on data from the Women in STEM fields (AAS, 2019). Even in disciplines where women represent more than 50%, their proportion drops significantly after the early and middle stages of research careers. The issue of retaining and promoting women in STEM fields is evident in the distribution of academic positions, with the percentage of female academics declining at senior levels, producing a scissor-shaped curve (AAS, 2019) (Figure 15.4).

In 2019, the proportion of women relative to men enrolled in STEM degrees ranged from 17% in engineering and 19% in computer science to 70% in health sciences (Figure 15.3).

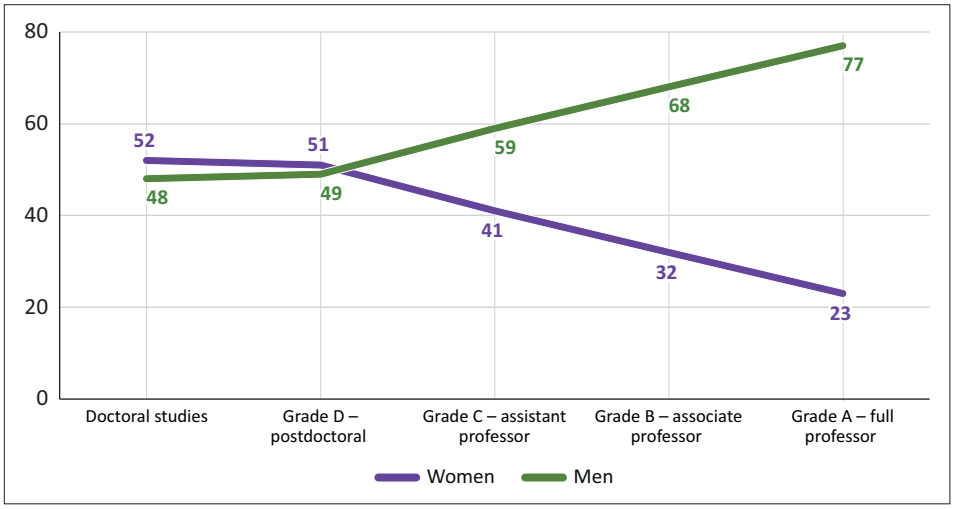

Figure 15.4. Percentage of men and women by academic position in STEM disciplines. Compiled by the author based on data from the Women in STEM fields (AAS, 2019).

Compared with STEM disciplines, the different HASS (Humanities, Arts and Social Sciences) fields make up the largest component of the Australian university system, accounting for 65% of enrolments between 2002 and 2011 (Turner and Brass, 2014). Within these fields, management and commerce make up the largest share of total enrolments across Australian universities, with 26% of students, followed by society and culture (21%), education (9%), creative arts (7%) and architecture and construction (2%). Among the programmes classified under society and culture, 64% of enrolments were women, although the distribution varies widely across sub-fields, from 50% in Philosophy and Theology to as high as 83% in Human Welfare Studies (Turner and Brass, 2014). In creative arts, 61.5% of enrolments in 2011 were women, while in education, 75.4% of enrolments were women (Turner and Brass, 2014) (Table 15.2).

	Women	Men
Architecture and construction	35%	65%
Education	74%	26%
Management and commerce	47%	53%
Society and culture	61%	39%
Creative arts	63%	37%
Total HASS	56%	44%
Total STEM (excluding Health Sciences and Agriculture)	28%	72%

Table 15.2. Demographic characteristics of enrolments in HASS and STEM disciplines in 2011. Compiled by the author based on the report on Humanities, Arts and Social Sciences (Turner and Brass, 2014).

Although more women choose HASS degrees, this does not lead to a higher proportion of women in senior academic positions within these disciplines. Overall, the percentage of female professors (grade A, equivalent to Level E in the Australian education system) remains very low compared to the proportion of men promoted to these roles (Australian Research Council [ARC], 2019).

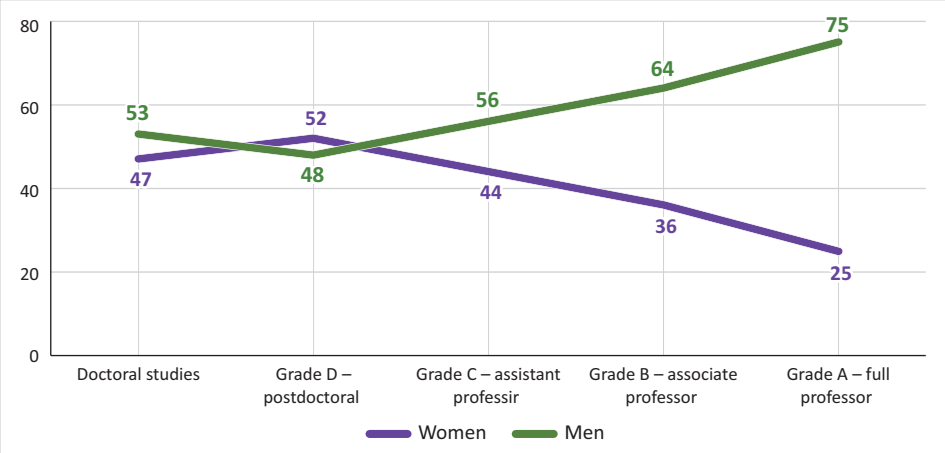

Figure 15.5. Percentage of men and women by academic position in the Australian university system. Compiled by the author, based on data from the national research assessment, Excellence in Research for Australia (ERA), published by the Australian Research Council (ARC) in 2019.

GENDER EQUALITY POLICIES IN THE SCIENTIFIC SECTOR IN AUSTRALIA

In 2012, the Australian Parliament passed the Workplace Gender Equality Act 2012, which replaced the earlier Equal Opportunity for Women in the Workplace Act enacted in 1999 (Australian Government, 2012). This new legislation was structured around the following objectives:

- To promote and enhance gender equality in employment and in the workplace, including pay equity between men and women.
- To support employers in dismantling barriers to enable full and equitable participation of women in working life.
- To encourage the elimination of gender discrimination in employment practices, including matters related to family responsibilities.
- To promote workplace consultation between employers and employees on issues related to gender equality in employment and the workplace.
- To improve the productivity and competitiveness of Australian industries by advancing gender equality in the workplace.

The Act also established the Workplace Gender Equality Agency (WGEA), a federal government agency responsible for promoting and improving gender equality in Australian workplaces (WGEA, 1986).

Over the past 30 years, Australian universities have been actively committed to promote gender equality through legislation (Australian Government, 2012), regulatory frameworks (Tertiary Education Quality Standards Agency [TEQSA], 2014), national strategic plans (Universities Australia, 2010) and institutional frameworks (SAGE, 2015). One of the initiatives with the strongest institutional and governmental support is the Science in Australia Gender Equality (SAGE) programme (SAGE, 2015).

SAGE was established in 2014 at a national gender equality conference, where representatives from universities and research centres agreed to adopt the Athena Swan Charter in Australia (SAGE, 2015). In the same year, funding was secured for a pilot project from the Australian Academy of Science (AAS), the Australian Academy of Technology and Engineering (ATSE), individual sponsors and participating institutions.

In 2015, following the presentation of the pilot programme to Parliament, the Australian Government agreed to allocate A$ 2 million to expand and evaluate the SAGE programme. Since 2016, institutions participating in SAGE have been engaged in the process of obtaining SAGE Athena Swan accreditation, with numerous applications submitted for a Bronze Athena Swan Award in 2019. The year 2020 marked a milestone for SAGE, with 24 institutions accredited, receiving A$1.8 million in additional funding from the Australian Government and the successful transition of SAGE to an independent entity.

The main objectives of SAGE are:

- To accredit and reward higher education institutions and research centres for developing initiatives related to gender equality, diversity and inclusion.
- To raise awareness and develop institutional capacity to advance gender equality, diversity and inclusion in tertiary education, the research sector and the broader community.
- To collaborate with like-minded organisations to support initiatives that address systemic issues in gender equality, diversity and inclusion.

SAGE is currently the only organisation in Australia authorised to issue grants and awards under the Athena Swan Charter.

As several authors have noted (e.g. Gilbert et al., 2021), efforts by institutions and organisations to promote gender equality have led to gradual but steady progress in the representation of women in academia. Nevertheless, the prevailing gender equality discourse still masks gender asymmetries that are firmly rooted in the everyday culture and ideology of academia.

CONCLUSIONS

- In Australia, women outnumber men, with a high proportion of women of working age. However, the unemployment rate is higher among women.
- The percentage of women in full-time employment is lower than that of men, a disparity that is particularly marked in the 30-39 age group, which largely coincides with periods of child-rearing and family responsibilities, most of which fall to women.
- More women than men complete higher education at both undergraduate and postgraduate levels.
- There are marked differences in the research fields selected by women and men, with little change over the past decade.

- Despite government efforts to promote gender equality in academic and scientific fields, significant gender disparities persist in terms of representation by discipline, and women continue to be under-represented in senior academic (professorship) and leadership positions.

REFERENCES

Australian Academy of Sciences [AAS] (2019). Women in STEM Decadal Plan. https://www.science.org.au/support/analysis/decadal-plans-science/women-in-stem-decadal-plan

Australian Bureau of Statistics (2022). https://www.abs.gov.au/statistics/people/people-and-communities/gender-indicators-australia/latest-release

Australian Bureau of Statistics, Education and Work in Australia 2021. https://www.abs.gov.au/statistics/people/education/education-and-work-australia/latest-release Australian Government (2012). Workplace Gender Equality Act 2012. Canberra: WGE ACT Australian Research Council, ERA 2018-Excellence in Research for Australia: Gender, 2019. https://dataportal.arc.gov.au/era/nationalreport/2018/pages/section1/gender/

Gilbert E., O'Shea M. & Duffy S. (2021). Gender equality mainstreaming and the Australian academy: paradoxical effects? Discover Psychology 1:7. https://doi.org/10.1007/s44202-021-00008-0

International Institute for Management Development-World Competitiveness Rankings (2022). https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness

Manyweathers J., Lymn J., Rurenga G., Murrell-Orgill K., Cameron S. & Thomas C. (2020). The lived experience of gender and gender equity policies at a regional Australian University. Social Sciences 9 (115):1-11. https://doi.org/10.3390/socsci9070115

Ovseiko O.V., Chapple A., Edmunds L.D. & Ziebland S. (2017). Advancing gender equality through the Athena SWAN Charter for Women in Science: an exploratory study of women's and men's perceptions. Health Research Policy and Systems 15(12):1-13. https://doi.org/10.1186/s12961- 017-0177-9

Poggio B. (2018) Gender politics in academia in the neoliberal age. In: Messerschmidt JW, Martin PY, Messner MA & Connell R, editors. Gender reckonings: new social theory and research. New York: NYU Press. https://doi.org/10.18574/nyu/9781479866342.003.0013

Science in Australia Gender Equality, SAGE (2015). https://sciencegenderequity.org.au/about/

Teelken C., Taminiau Y. & Rosenmöller C. (2021). Career mobility from associate to full professor in academia: micro-political practices and implicit gender stereotypes. *Studies in Higher Education*. 46(4):836-50. https://doi.org/10.1080/03075079.2019.1655725

Tertiary Education Quality Standards Agency (2014). The role and functions of TEQSA https://www.teqsa.gov.au/

Turner, G. & Brass, K. (2014). Mapping the Humanities, Arts and Social Sciences in Australia. Australian Academy of the Humanities, Canberra.

Universities Australia (2010) *Australia strategy for women: 2011-2014.* https://planipolis.iiep.unesco.org/sites/default/files/ressources/australia_universities_strategy_women.pdf

Williams J.C. (2005). The glass ceiling and the maternal wall in academia. *New Directions for Higher Education* 130:91-105. https://doi.org/10.1002/he.181

Wilson E. (2014). Diversity, culture and the glass ceiling. *Journal of Cultural Diversity 21*(3):83.

Winchester H.P.M. & Browning L. Gender equality in academia: a critical reflection (2015). Journal of Higher Education Policy and Management 37(3):269-81. https://doi.org/10.1080/1360080X.2015.1034427

Workplace Gender Equality Agency, Australian Government (1986) https://www.wgea.gov.au/

World Bank Group (n.d.). International Development, Poverty & Sustainability. https://www.worldbank.org

FINAL CONCLUSIONS

FINAL CONCLUSIONS ON THE 14 COUNTRIES IN THE WHITE PAPER[1]

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This White Paper aims to provide a window into the situation in each region and to understand the realities in the 14 countries included in this study (Figure 16.1, top right). We observe a common outcome: to varying degrees, parity does not exist in the countries covered in this review, especially in senior

[1] The data in this book cover the period up to 2022, so any subsequent measures taken in the countries studied are not included. Throughout these chapters, we primarily refer to the female gender or women and the male gender or men. This study has limitations, as it only includes these two specific genders (female and male) and does not examine the representation of other genders (transgender, non-binary and others). Future studies should include all genders in a more inclusive approach that moves beyond the gender binary.

leadership roles, meaning that further action and initiatives are still needed to foster and support equality. As authors, our aim in this white paper is to highlight and contextualise existing measures so they can serve as references in other regions and as starting points for future initiatives. Only by understanding the successful approaches adopted elsewhere can we adopt a global perspective without disregarding the idiosyncrasies of each country.

Throughout this work, it has become clear that gender inequalities persist in the scientific and academic spheres, despite the efforts made. Women continue to face discrimination and sexism, both in the humanities and particularly in STEM disciplines, from the earliest stages and with challenges intensifying as their academic and professional careers advance.

When referring to gender inequality, it can be contextualised in two forms: vertical segregation and horizontal segregation.

In general terms, horizontal segregation refers to the unequal distribution of individuals across different sectors. In academia and research, this is reflected in the marked concentration of women in certain fields such as the humanities and care-related disciplines, where their presence is significantly greater. By contrast, in STEM fields, gender stereotypes persist, as evidenced by the lower representation of women, particularly in engineering, mathematics and physics, where the gender gap is especially stark. As shown in Figure 16.1, top left, Australia is the only country in the White Paper where the proportion of women in science exceeds 50%. Nevertheless, it is encouraging to see that in many of the countries studied, the percentage is close to or above 40%.

Vertical segregation refers to the progressive decline in the proportion of women as one moves up the hierarchy of positions of responsibility. From a vertical perspective of scientific and academic careers, the well-known scissor-shaped curve observed in most of the countries in the study reflects this segregation. Although more women are entering university, senior management and leadership roles continue to be predominantly held by men. This is due to various barriers that prevent women from accessing these roles, including the sticky floor and the well-known glass ceiling.

In academia and research, the sticky floor refers to the higher proportion of women engaged in service roles in their institutions, important work that benefits all academic and research institutions, but which lacks visibility and significance when applying for promotions. This in turn results in lower output

in other areas, such as teaching or research, which reduces opportunities for career advancement and pay rises.

Alongside the sticky floor is the glass ceiling, an invisible barrier caused by a wide range of factors and causes, but with a shared outcome: a shamefully high number of qualified women not reaching the highest levels of leadership and management.

Although there may appear to be significant variation between countries (Figure 16.1), they all share a common feature: regardless of the proportion of women entering higher education, senior leadership roles remain predominantly occupied by men. As shown in the graphs in Figure 16.1, the gender distribution across the academic and research hierarchy reveals that in most countries, men and women are relatively equally represented at grade C level, corresponding to postdoctoral positions. However, this parity disappears at higher levels, with the proportion of women falling sharply to around 20% at grade A, equivalent to full professor. Not a single one of the 14 countries included in the study departs from this pattern (Figure 16.1, top left, grade A - Full professor).

The direct consequences of women's exclusion from leadership roles include the gender pay gap, unequal opportunities for personal and professional development and the under-representation of women in leadership positions. The latter is especially significant for society, as academia and research play a key role in shaping the present and future of society. It is essential for leadership positions to reflect gender diversity, given their influence on policy and decision-making. Greater inclusion of women in senior roles could lead to more gender-sensitive decisions that are fairer and based on broader perspectives.

One possible explanation for the scarcity of women in leadership positions across countries is that some women may choose not to pursue these roles and may opt not to apply for positions of responsibility. Another phenomenon that affects women in academia is the "leaky pipeline", a vivid metaphor illustrating how, drop by drop, women exit the academic pipeline. Although steps are being taken to address this problem, with some countries showing more progress than others (Table 16.1), it remains necessary to reinforce support for individuals in academia and research, particularly at critical life stages such as parenthood and caregiving responsibilities. In this regard, there are still countries such as Switzerland where, despite a high level of economic development, childcare continues to fall to women, which is unsurprising given the limited measures to promote work-life balance. We believe that it is also important to recognise

and value tasks and activities that benefit academic institutions yet fall outside conventional research metrics.

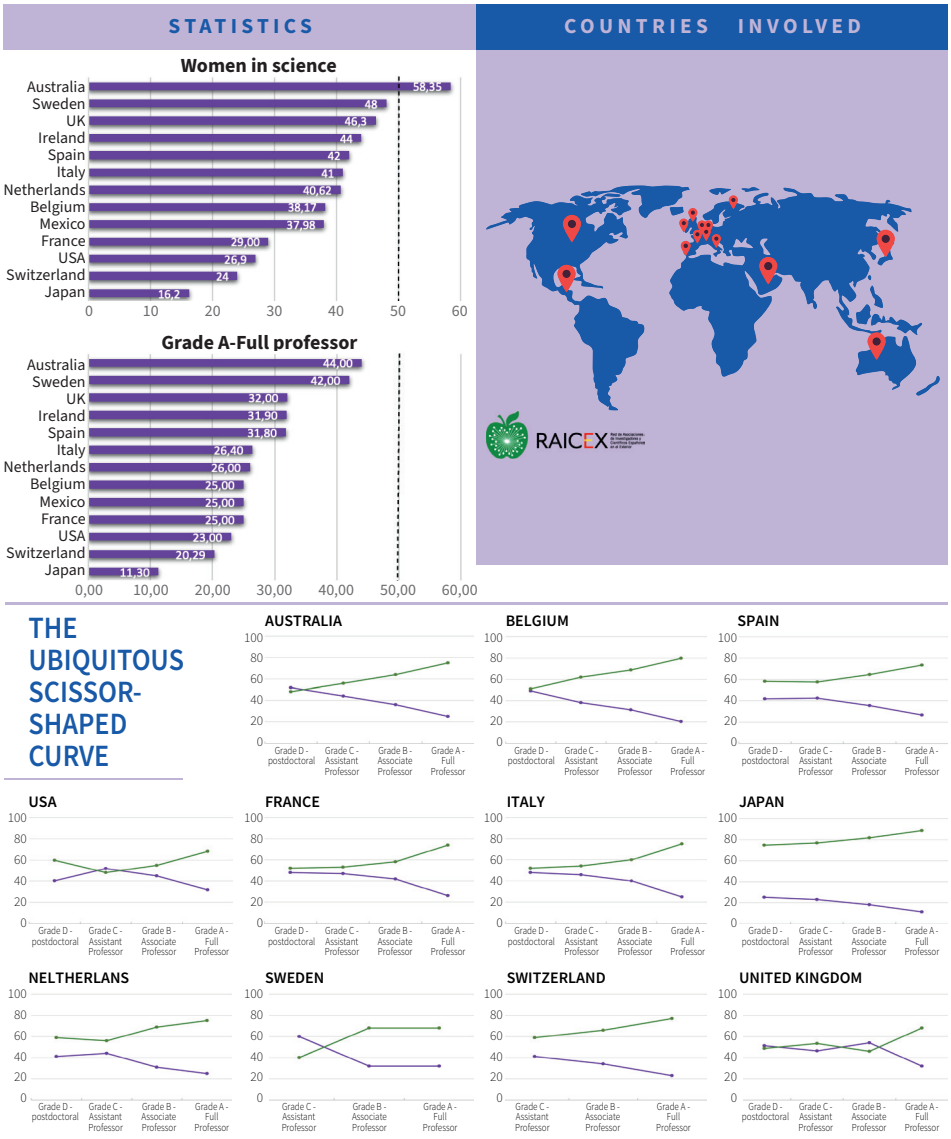

Figure 16.1. Data extracted from the study of countries in this White Paper for which data are available. Top right: countries studied in this White Paper. Top left: statistical graph showing all countries studied, with the percentage of women in science and the percentage of women in grade A. Bottom: graphs displaying the percentage of women (in purple) and men (in green) in each country.

Among the countries included in this study with available data, Japan presents the most concerning ratios, which faces a structural issue with the number of women researchers. However, it does not exhibit as sharp a decline in senior positions as other countries, such as Australia and Belgium, which shift from near parity in early research stages to ratios as low as one woman out of every four people in full professor roles. In many of the countries analysed, there is cause for optimism. While grade A positions remain difficult to access, greater gender equality is evident in early and intermediate roles, as seen in Spain, Italy and the Netherlands. The United States and the United Kingdom also stand out for significant parity in grade B positions.

INDICATORS	Belgium	Spain	France	Ireland	Italy	Nether.	UK	Sweden	Switzer.	USA	Mexico	UAE	Japan	Australia
National statistics on the proportion of female and male researchers	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	---	✓	✓
Percentage of women in science and research above 45%	✗	✓	✗	✓	✗	✗	✓	✓	✓	✗	✗	---	✗	✓
Percentage of women in senior roles approaching parity	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	---	✓	✗	✗
Support for research in gender studies	✓(1)	✓	✓	✓	---	✓(1)	---	---	---	✓	✓	---	✓	✓
National Equality Plan including science, research and innovation	✓	✓	✓	✓	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓
The National Research Plan includes a gender dimension	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Specific funding programmes for women (2)	✗	✗	✓	✓	✗	✓	✗	✓	✓	✓	✓	✓	✓	✓
Extension clauses/promotion plans after maternity leave (3)	✓	✓	✗	✗	✓	✓	✓	✓	✗	✓	✗	---	✓	✓
Institutional gender equality plans	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Gender equality seal in academic and research centres	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✓	---	✗	✓
Financial incentives for institutions that promote careers	---	✗	✗	✗	✗	✓	✓	---	✗	✗	---	---	✓	--
Promotion of STEM careers for girls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

A line (---) indicates that no data were found.
(1) Included within broader diversity and inclusivity initiatives.
(2) Governmental, institutional, non-governmental or private foundations.
(3) May be linked to specific programmes, grants or subsidies.

Table 16.1. Summary and comparison of gender-related indicators in the academic and research sectors of the countries studied. (USA: United States of America, UAE: United Arab Emirates).

Table 16.1 provides a comparison of gender equality indicators in academia and research across the 14 countries analysed, based on a set of specific indicators. It is important to note that data are not available for all indicators in every country. In 13 of the 14 countries studied, national statistics on the proportion of women and men in science are available through governmental, institutional or association sources. The data show that only six of the 13 countries exceed a 45% ratio of women in science. However, it is encouraging to observe that,

almost across the board, women's participation in science and technology is on the rise, suggesting that promotional policies are beginning to bear fruit. Nevertheless, as noted above, gender parity in positions of responsibility has yet to be achieved in most countries covered by the study.

Gender studies are essential to generate data, assess impact and design appropriate measures. It is worth highlighting that not all countries actively promote gender research. Those investing more in this area are often those where a more evident drop in parity can be observed, such as Sweden, for example. According to the 2023 Gender Gap Index,[2] Sweden is one of the countries with the most equitable distribution of resources and opportunities between men and women, while Spain also ranks among the top 20 of the 142 countries studied. In terms of governmental action, the analysis focused on national plans. All of the countries covered in this White Paper include measures related to science, research and innovation within their National Equality Plans. Moreover, within National Research Plans, it is particularly noteworthy that in every country examined, gender is a required dimension in the development of a National Plan. On the other hand, it has been found that many women are unable to access positions of responsibility or leave academic careers altogether. Ambitious measures are therefore needed to redress this imbalance. Ten of the countries analysed have specific funding programmes for women, provided by either the public or private sector. In addition, given that motherhood often marks a turning point for women in science and research, nine countries have recognised the need for further support and have introduced specific measures to address this, such as tailored funding schemes and policies aimed at supporting and retaining talented women in academia. In the future, it will be possible to assess whether these measures have led to real progress or failed to produce the intended impact.

Turning to the institutions where science and research are carried out, gender equality plans are in place in all the countries studied. These institutions are generally autonomous, and many government-led measures are only implemented when there is institutional willingness to do so. For this reason, several countries, including the United Kingdom, Australia, France and Mexico, have developed gender equality accreditation systems in science and

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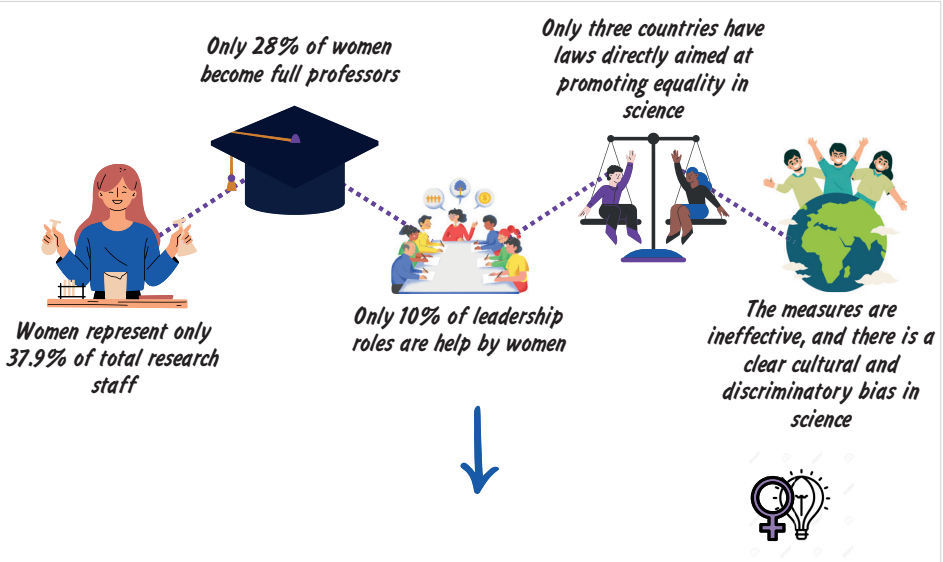
[2] Global Gender Gap Index. 2024. https://datosmacro.expansion.com/demografia/indice-brecha-genero-global

academia. These systems require institutions to undergo a specific evaluation in order to obtain a recognised seal of approval. Only those institutions that pass the assessment are granted access to specific funding opportunities or other benefits. Similarly, countries such as the United Kingdom, the Netherlands and Japan offer financial incentives to institutions that actively promote the careers of women. Among the 14 countries in the study, only the six countries mentioned have implemented at least one of these two indicators, thereby encouraging institutions to foster gender equality and build more diverse and equitable working environments.

The final indicator examined concerns future generations. As previously noted, horizontal segregation remains a persistent issue in academia and research, with very low percentages of young women choosing applied science degrees, particularly in technical fields. It is very encouraging to see that there are unanimous efforts to promote STEM careers among girls, which, along with other measures, is helping to level out the graph between men and women in lower-ranking positions, shifting from a scissor-shaped curve to one resembling a clamp-shaped curve.

The country-by-country view of Table 16.1 reveals that Australia has a high number of green indicators, which correlate with stronger statistical outcomes, although there is still-room for improvement regarding the advancement of women. Mexico ranks next, and stands out for the fact that, despite a low percentage of women in science and research, its measures have been successful in supporting women's advancement to grade A. Japan also presents an interesting case, as it is responding to the low number of women researchers by implementing multiple measures to address the lack of diversity in academia and research. European countries and the United States show comparable profiles, with several pursuing the development of accreditations or seals that promote gender-equal institutions. It is encouraging to see that a number of green indicators appear across nearly all countries in the study, such as the publication of gender-disaggregated statistics in science and research, the inclusion of gender perspectives in research plans, mandatory gender equality plans at institutional level and the promotion of STEM careers among future generations.



- In **all countries**, regardless of culture, there is a **gender gap** in science, with women under-represented in many scientific fields and cultural barriers.
- **Although all countries have adopted more general gender equality policies** that include science-related components, **specific laws** addressing gender equality in **this sector are very limited**.
- There is a **lack of studies on the impact** of the implemented equality policies and their effects.
- There is a **lack of regulatory oversight** as to whether equality policies are being meaningfully implemented.

Figure 16.2. Summary and conclusions drawn from the statistical data and gender policies of the countries in this study.

Figure 16.2 presents a summary of the key findings and conclusions of this White Paper. Following the analysis of the 14 countries covered, where similar trends appear from north to south and from east to west, our recommendation is to build institutions that are fairer, more inclusive and grounded in gender equity. Across the 13 countries for which data are available, women account for an average of 37.9% of those working in academia and research. With regard to promotion to grade A (full professors), only 28% of women reach this level, and it is particularly concerning that just 10% of positions and roles of responsibility are held by women. Among the many factors at play, women may abandon promotion

or leave their academic careers altogether due to a range of issues, including the structure of the academic system itself. We cannot ignore the fact that, speaking broadly, academia has been shaped and structured by and for individuals with specific traits and attributes. Academia, research, the system itself, is made up of people. Not all academics or researchers, regardless of gender, are willing to conform to traditional organisational roles and cultural expectations. To foster academic and research excellence in all its diversity, the system must evolve towards a more holistic and multifaceted assessment of individuals, valuing a wide range of skills and capabilities beyond a single, traditional definition of what makes an excellent academic. It is necessary to promote recognition of tasks and activities that, though historically undervalued, play an essential role within institutions, as well as to encourage gender-equal leadership positions. In conclusion, it is essential to conduct a thorough, collaborative reassessment of the academic system and its organisational structure.

All stakeholders involved must share responsibility for creating a more equitable and inclusive environment. It should therefore be a priority to implement legislation specifically designed to address gender equality in science and research, tackling both horizontal and vertical segregation. By doing so, we can build academic and research institutions that are more diverse, equal and inclusive, enhancing productivity and innovation and ensuring that all individuals, regardless of gender, ethnicity or individual identity and lifestyle, enjoy equal opportunities to contribute to the evolution, development and progress of academic and research institutions.

Are there specific national or universal factors underlying gender (in)equality in science and academia? Are there global initiatives and policies aimed at promoting equality? What drives gender equality in science and academia?

Directed and coordinated by the Research and Gender Commission (IgR) of the Network of Associations of Spanish Researchers and Scientists Abroad (RAICEX), the *White Paper on Gender Policies in Science and Academia* provides a multidimensional analysis of the situation of women scientists in 14 countries across four continents.

From the realities of research practice to equal opportunity policies, this study reveals a complex landscape. Through rigorous comparisons, it examines the existing barriers and challenges, as well as the policies and strategies implemented to address the inequalities faced by women academics and scientists worldwide.

The book, the result of the collective effort of scientists with direct experience in science and/or academia in the countries examined, offers a reflection on the role of academia in building a more equitable future. Essential reading for academics, policymakers, and anyone interested in gender equality in science.

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