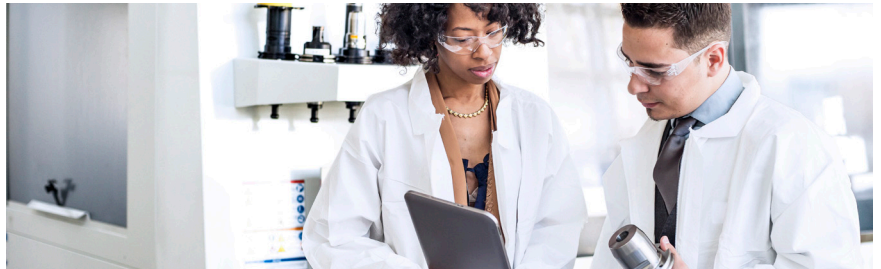




Gender Equality in Research: From Policy to Practice



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1. Introduction



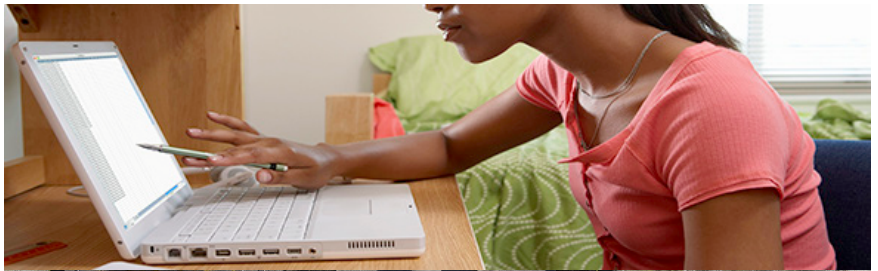
“ Statistically, women now account for 60% of undergraduates and 47% of PhD graduates in the EU and – according to the National Science Foundation (NSF) – they earn about half the doctorates in science and engineering in the United States. ”

The theme of gender inequality is often met with resistance, from both women and men, whenever it is raised. This is perhaps due to the fact that many women worldwide are now encouraged and empowered to follow whichever career they choose, and can be seen repeatedly succeeding on their own merit. Statistically, women now account for 60% of undergraduates and 47% of PhD graduates in the EU and – according to the National Science Foundation (NSF) – they earn about half the doctorates in science and engineering in the United States¹. On paper, these statistics suggest that the battle against gender inequality has already been won.

However, whilst the pool of highly-qualified women is larger than ever before, the reality is that the presence of women in (predominantly STEM-based) research has not advanced at the same rate as the number of women attaining PhDs². Ultimately, this means that the research sector is not yet fully benefitting from the wealth of female knowledge and innovation available.

This paper examines the most recent statistics relating to gender in research; the reasons why women ‘drop off’ the research radar; what is currently being done to tackle the issue of gender equality in research worldwide; and what could be done to improve the percentage of women in research in the future.

2. The current situation



The Higher Education Statistics Agency (HESA) found that around a third more women than men go on to study at degree level in the UK, with 1,314,035 women enrolling on a course in 2016-17 compared with 1,002,820 men. Yet, despite women now clearly outnumbering men in higher education, the areas in which they are qualifying are still notably disparate – in the UK, from 2005-6 to 2013-14, the number of women taking Science, Technology, Engineering and Mathematics (STEM) degrees rose by just 2%, while the take-up for men across the same period grew by 24%.

In the United States of America, a similar rise in female graduates is visible – the percentage of doctorates awarded to women in life sciences increased from 15 to 52 during the 40-year period between 1969 and 2009⁴. And, although women did earn more STEM degrees each year between 2000 and 2014, they kept pace rather than caught up with their male counterparts⁵.

Despite this obvious increase in female graduates, women still only make up approximately 34% of assistant professors and less than one fifth of full professors throughout the United States.

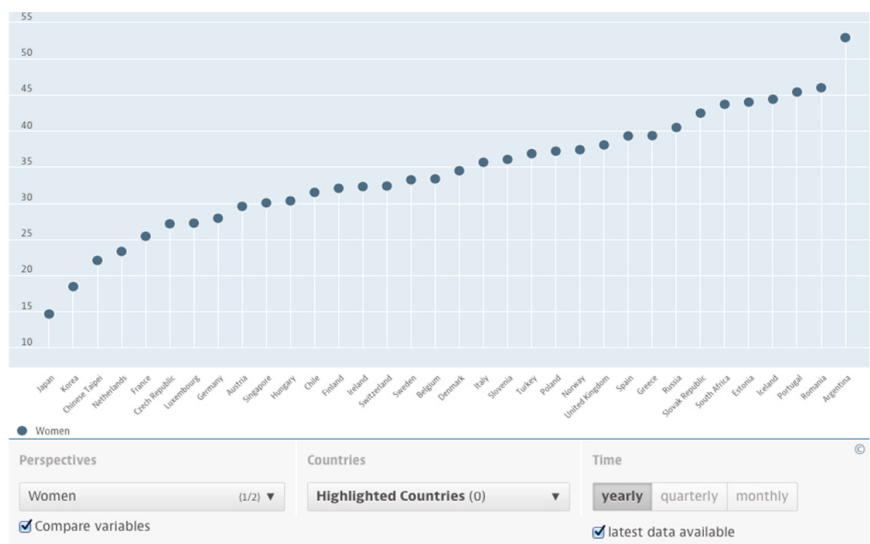
Figures from across Europe show similar inconsistencies between the number of degrees being awarded to women and their subsequent representation in research-based careers. Despite the most up-to-date data indicating that women account for 47% of PhD graduates in the EU, only 33% of researchers – and 21% of top-level Grade-A researchers – are female. Then, when considering the percentage of women working at the level of heads of institutions, the figures drop dramatically to just 20%.

The undeniable gender gap within STEM disciplines is not restricted to Europe and North America – although 60% of tertiary graduates and 45% of researchers in Latin America are women, this percentage drops to 36% in STEM disciplines. Moreover, participation of Latin American women at the higher strata of research is rare. For example, while in Brazil 49% of researchers are female, only 27% of women lead research groups, compared to 32% of men⁶.



“ The undeniable gender gap within STEM disciplines is not restricted to Europe and North America – although 60% of tertiary graduates and 45% of researchers in Latin America are women, this percentage drops to 36% in STEM disciplines. ”

Statistics from the Organisation for Economic Co-operation and Development (OECD)⁷ reinforce the fact that women worldwide are outnumbered in research roles:



Women in research role by country

3. The factors creating inequality



“ As the statistics show, women are equally as talented, innovative and capable as their male counterparts in the STEM arena. ”

When considering why there are so few women in high-level, research-based roles, it's not as simple as the, now-aged, presumption that women are just not as good as men.

As the statistics show, women are equally as talented, innovative and capable as their male counterparts in the STEM arena. The question must then become why, when so many women are accessing STEM fields in the early stages, are they failing to progress up the career ladder into lecturer, senior lecturer, researcher and professor roles?

Depending on which stage of career they are at, years of research has found that a medley of obstacles stand in a woman's path of progression as follows:

- » In higher education, personal preferences, stereotypes, the lack of role models and cultural expectations impact upon women's subject choices.
- » In career development, gender-biased recruitment, hiring and evaluation processes, restrictive regulations and norms, exclusion from networks, male-dominated culture, and work-family conflicts have significant and direct negative effects.
- » Additional barriers affecting performance and consequently career progression include lack of access to information, funding or institutional support, biased research evaluation procedures, and low recognition in the field.

However, it is important to note that these obstacles, which have been identified in academic research and studies by the European Commission, mostly pertain to developed countries.

As discussed by Ines Sanchez de Madariaga, UNESCO Chair on Gender Equality Policies in Science, Technology and Innovation, and Professor of Urban and Regional Planning at the Madrid School of Architecture, in her academic paper *Advancing Gender Equality in Research and Innovation in Europe and Beyond*⁸, vertical segregation is still a very real and very stubborn problem within the research sphere as a whole. She states that vertical segregation is produced in all fields, resulting in very few women occupying the highest levels of the profession. Noting that 'the presence of women at the highest level in science is not proportionate to the number of women who are qualified, of the correct age, and have the necessary motivations for the posts', she confirms that – finally – it is becoming widely agreed in European scientific institutions that the scarce presence of women in STEM is a waste of resources that neither science nor the economy can allow.



A joint report by the National Academy of Sciences (US), National Academy of Engineering (US) and Institute of Medicine (US)⁹ confirms that both unconscious and institutional bias still exists, noting that systematic structural constraints built into academic institutions have impeded the careers of women scientists, mathematicians and engineers. In response to this, the EC's Structural Change in Research Institutions: Enhancing Excellence, Gender Equality and Efficiency in Research in Innovation¹⁰ report identifies one of the main reasons why progress has been so slow for gender equality in research as being that many universities and research institutions lack the capacity and experience to analyse and transform the rich and often complex gender knowledge into specific gender management applicable to their structures and procedures.

The EC summarises the five main problems faced by research institutions as follows:

1. Opaqueness in decision-making processes.
2. Institutional practices inhibiting career opportunities.
3. Unconscious bias in assessing excellence.
4. Wasted opportunities and cognitive errors in knowledge, technology and innovation.
5. Employment policies and practices.

If gender inequality in research is to be truly eradicated, then these problems must be targeted in public policy worldwide.

4. But why does gender equality in research really matter



“ I find that people are generally either scared of race as a subject or believe that because they have knowledge about, say, gender, then they can simply transpose that onto race. ”

**Dr Nicola Rollock,
Deputy Director of the Centre
for Research in Race and
Education, University of
Birmingham**

Achieving gender equality in science, technology, and innovation is not simply a matter of fairness or political correctness.

According to the European Commission's 2008 report, *Mapping the Maze: Getting More Women to the Top in Research*¹¹, a more equitable gender balance is believed to enhance the recruitment of the most talented, irrespective of gender, tapping a partially unexploited resource. In its later document providing a roadmap for gender and research, *Structural Change in Research Institutions*, the Commission attested to the fact that:

“The key role given to research and innovation in striving towards a smart, sustainable and inclusive growth in Europe means that the EU should make full use of its human capital – thereby involving both men and women. Evidence shows that research performance is limited by the perpetuation of direct and indirect sex discrimination and that promoting gender equality at all levels contributes to achieving excellence and efficiency.”

Reiterating these claims made by the Commission, genSET reported in their 2011 paper *Advancing Excellence in Science through Gender Equality*¹² that gender equality is in fact a way to promote scientific and technological excellence rather than just a means of improving opportunities for women.

Another high-profile name to back women's involvement in STEM is the former UN Secretary General Ban Ki-moon, whose message for International Women's Day 2016 was:

“We have shattered so many glass ceilings, we created a carpet of shards. Now we are sweeping away the assumptions and bias of the past so women can advance across new frontiers.”¹³

His statement led the call to action for Planet 50-50 by 2030¹⁴, of which 50-50 in STEM is a significant element.



Yet it isn't just world leaders stressing the importance of fighting for gender equality in research – Dr Jim Smith, Director of Research at the Francis Crick Institute and Director of Science at the Wellcome Trust, reiterated that science is poorer for the fact that women are being lost the higher up the career ladder they get. He too firmly believes that achieving gender equality is for the good of science, stating:

“We don't want to lose our best researchers just because they happen to be women.”¹⁵

5. What is being done?



“ Through the \$4.35 billion Race to the Top competition, states were granted competitive preference in the application process if they demonstrated efforts to close the STEM gap for girls and other under-represented groups ”

Initiatives to develop and promote gender equality in research have been progressed in both Europe and the US over a number of years.

The European Commission began in 1999 by establishing two organisations to take charge of developing the public policies required to remove the barriers preventing women from advancing into and succeeding in STEM careers in Europe. These organisations, the Women and Science Unit and the Helsinki Group, aided the Commission in publishing the preliminary ETAN Report Promoting Excellence through Mainstreaming Gender Equality¹⁶ in 2001, which was the first time a global view of women in research in Europe was revealed.

In 2012, gender became one of the five priorities of the European Research Area, as outlined in A Reinforced European Research Area Partnership for Excellence and Growth¹⁷. Following this communication, the Commission adopted gender dimensions into its proposal for a regulation on the new research framework programme, Horizon 2020. As well as addressing gender imbalance through the main funding instrument, gender equality is also promoted in European Research and Innovation policy within the European Research Area in collaboration with Member States and research organisations. Both pathways pursue the following three objectives:

1. Gender equality in scientific careers
2. Gender balance in decision-making
3. Integration of the gender dimension into the content of research and innovation

In the United States, the National Science Foundation's (NSF) ADVANCE programme began in 2001 with the primary goal of supporting the development of systemic, sustainable approaches to advancing women in academic STEM fields.

Since its inception, over 100 universities have received significant institutional transformation ADVANCE grants, and many more have secured funding to implement institutional partnerships or smaller initiatives, all of which have focused on revolutionising the persistent under-representation of women in academic STEM careers.

The establishment of the White House Council on Women and Girls and the beginning of President Obama's Administration, saw funding to promote education, training and hiring for women in STEM industries significantly increase. Through the \$4.35 billion Race to the Top¹⁸ competition, states were granted competitive preference in the application process if they demonstrated efforts to close the STEM gap for girls and other under-represented groups. Additionally, the Recovery Act considerably increased the amount of grants distributed by the NSF, including those specifically for women, resulting in women receiving over one thousand more awards than they would have received under the Foundation's regular budget.



So now, 16-18 years on, where is the world standing in regard to the under-representation of women in STEM? What exactly is being done, and what funding is there to reach gender equality goals?



... currently in the UK

The UK **Athena SWAN Charter**¹⁹ for women in science was established in 2005 to encourage and recognise commitment to advancing the careers of women in science, technology, engineering, maths and medicine (STEMM) employment in higher education and research.

In May 2015, the Charter was expanded to recognise work undertaken in arts, humanities, social sciences, business and law (AHSSBL), and in professional and support roles, and for transgender staff and students.

By applying to be a part of Athena SWAN, institutions are committing to a progressive charter, adopting these principles within their policies, practices, action plans and culture.

It is based on the following 10 key principles:

1. Acknowledging that academia cannot reach its full potential unless it can benefit from the talents of all.
2. Committing to advancing gender equality in academia, in particular, addressing the loss of women across the career pipeline and the absence of women from senior academic, professional and support roles.
3. Committing to addressing unequal gender representation across academic disciplines and professional and support functions.
4. Tackling the gender pay gap.
5. Removing the obstacles faced by women, in particular, at major points of career development and progression including the transition from PhD into a sustainable academic career.
6. Addressing the negative consequences of using short-term contracts for the retention and progression of staff in academia, particularly women.
7. Tackling the discriminatory treatment often experienced by trans people.
8. Acknowledging that advancing gender equality demands commitment and action from all levels of the organisation and in particular active leadership from those in senior roles.
9. Making and mainstreaming sustainable structural and cultural changes to advance gender equality, recognising that initiatives and actions that support individuals alone will not sufficiently advance equality.



10. Considering the intersection of gender and other factors wherever possible.

The Charter has had such a profound effect that, in a letter to the Medical Schools Council in July 2011, the Chief Medical Officer Professor Dame Sally C Davies outlined her intention that the NIHR Biomedical Research Centres and Units funding programme would not:

“...short-list any NHS/University partnership where the academic partner (generally the Medical School\Faculty of Medicine) has not achieved at least the Silver Award of the Athena SWAN Charter for Women in Science”.²⁰

Applications to ECU’s Athena SWAN Charter significantly increased in late 2012, and have continued to grow. Between November 2012 and November 2014, 437 awards were made, and 699 awards were held by October 2017. And, in 2014, ECU reached an agreement with the Higher Education Authority (HEA) in Ireland to pilot an expansion of the Charter to the Republic of Ireland, and applications are now accepted on a biannual basis.

Further information:

<https://www.ecu.ac.uk/equality-charters/athena-swan/>

<https://www.nihr.ac.uk/about-us/how-we-are-managed/our-structure/infrastructure/biomedical-research-centres.htm>



... currently in the EU

The publication of the Structural Change report took the focus away from individual researchers and shone the spotlight on the research institutions themselves. The report proposes structural change within institutions as a means to address the five problems identified earlier in this paper, in order to ensure decision making becomes more transparent, unconscious bias is removed, human resources management is modernised, and research and innovation are improved by the integration of a gender perspective, thus allowing excellence to be promoted through diversity.

The **Horizon 2020**²¹ funding programme has the following three objectives, which underpin the Commission’s activities on gender equality:

1. Fostering gender balance in Horizon 2020 research teams, in order to address the gaps in the participation of women in the Framework Programme’s projects.
2. Ensuring gender balance in decision-making, in order to reach the Commission’s target of 40% of the under-represented sex in panels and groups (50% for Advisory Groups).
3. Integrating gender/sex analysis in research and innovation content, which helps improve the scientific quality and societal relevance of the produced knowledge, technology and/or innovation.



These objectives are integrated in the Commission provisions for the implementation of Horizon 2020 at each stage of the research and innovation cycle.

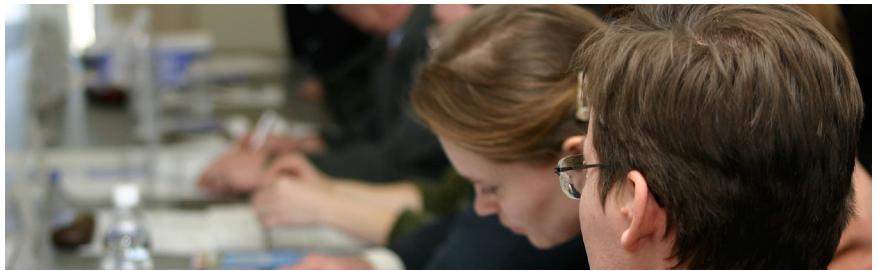
As well as actively seeking to encourage gender balance in Horizon 2020 research teams, a novelty of the programme is the inclusion of 'gender training' among the eligible costs of an action. The aim is to encourage researchers to further develop and share gender expertise in relation to the funded project. The annex of the Work Programme explicitly refers to the possibility of including gender trainings as an activity in proposals as well as to the type of costs that would actually be eligible.

In addition, when signing the Grant Agreement, beneficiaries 'must take all measures to promote equal opportunities between men and women in the implementation of the action' and 'must aim, to the extent possible, for a gender balance at all levels of personnel assigned to the action, including at supervisory and managerial level'. The Commission will use the following indicators on an annual basis to determine the prevalence of gender as a cross-cutting issue in all its successfully funded projects:

- » Percentage of women participants in Horizon 2020 projects.
- » Percentage of women project coordinators in Horizon 2020.
- » Percentage of women in advisory groups, expert groups, evaluation groups and panels.
- » Percentage of projects with gender dimension in the project design.

The **Gender Equality Network in the European Research Area (GENERA)**²² is a [Horizon 2020](#) project aiming at continuing, monitoring and improving the Gender Equality Plans of Research Institutions and Organisations specifically in the physics research field. These three actions will be performed by a Consortium of 13 beneficiary partner Research Performing and Research Funding Organisations and several associate partners and observers.

The end goal is to propose and create organisational structures allowing physics research in Europe to benefit from the greater presence of talented women at all levels, and which can open up more opportunities for women to create successful careers in physics research and in related fields. GENERA will also create liaisons with schools and propose suitable programmes to foster the field of physics from early stages and to propose measures that can be adopted by middle and high schools.



Another collaboration in Europe tackling gender inequality in research is **genSET – gender in science**²³. It is an innovative project aiming to improve the excellence of European science through inclusion of the gender dimension in research and science knowledge making. This provides a forum for sustainable dialogue between European science leaders, science stakeholder institutions, gender experts, and science strategy decision-makers to help implement effective overall gender strategies.

Initially, funding for genSET was secured from the European Commission, FP7 programme and while the EC phase of the project ended in March 2012, genSET continues as a programme now run by Portia Ltd. In 2001, genSET established the Gender Summits.

Since its inception in Europe, the Summit platform has migrated to different global regions (Africa, Asia-Pacific, North and Latin America) where the formulation responds to the regional context as well as building global links to support global change. In 2018, the Summit will be held in London for the first time, and the theme will be 'United in Science and through Science'.

After UCL initiated the campaign in 2014, the University of East Anglia (UEA)

Further information:

<https://genera-project.com/>



... currently in the US

The **ADVANCE** programme run by the National Science Foundation has provided \$10 million each year since its inception in 2001 to support new projects²⁴.

In total, NSF has invested over \$270 million to support ADVANCE projects at more than one hundred different institutions of higher education and STEM- related, not-for-profit organisations in 41 states, the District of Columbia, and Puerto Rico (including 24 Experimental Program to Stimulate Competitive Research, EPSCoR, jurisdictions).

It currently supports the following three types of projects:

- 1. Institutional Transformation** to support comprehensive, institution-wide projects at institutions of higher education to transform institutional practices and climate.
- 2. Adaption track** to support the adaptation and implementation of evidence-based organizational change strategies, ideally from among those developed and implemented by ADVANCE projects.
- 3. Partnerships for Adaptation, Implementation, and Dissemination (PAID)** to support institutions of higher education, professional societies, and/



or other STEM-related, not-for-profit organisations to undertake projects that vary in size and scope.

The **STRIDE programme** (Science and Technology Recruiting to Improve Diversity and Excellence Committee) at the University of Michigan, which benefitted from ADVANCE, has also seen great success in advancing equality in research²⁵.

Initially, there were a number of factors that inhibited the University's success at recruiting, largely a result of inattention and of ignorance about the effect of unconscious bias on the outcome of the process. However, through a process of introducing senior faculty, both men and women, to the academic theory and data on evaluation bias and on aspects of academic climate that may feel unwelcoming or hostile, the University was able to engage a group of senior faculty in creating an approach to recruitment that resulted in wider pools of excellent candidates. Since this, the university reports significant progress regarding recruitment of women in science and engineering fields, from 13% of all new hires to 28% (pre- and post-ADVANCE).

Stanford University also stands as a strong indicator for gender parity commitment, with their Gendered Innovations programme having a positive impact on advisory board equality and management group parity²⁶. Its family-friendly policies are taking precedence for further development including the promotion of maternity policies and funding avenues with female researchers in mind.

Further information:

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5383

<http://advance.umich.edu/strideResources.php#>

<https://genderedinnovations.stanford.edu>

6. Recommendations for future progress



The EU project **genSET** produced a report with 13 recommendations for increasing gender equality in research²⁷. These are as follows:

1. Leaders need to 'buy into' the importance of the gender dimension in research.
2. Scientists (and managers) should be trained in methods of sex and gender analysis.
3. The use of methods for sex and gender analysis must be considered in all assessments.
4. Research teams should be gender diverse.
5. All committees, panels should be gender balanced.
6. Diversity in leadership style should be encouraged.
7. Women already in scientific institutions should be made more visible.
8. Research quality rather than quantity should be assessed.
9. Researchers with heavy committee burdens should be provided with additional support.
10. Policies on working conditions should be reviewed.
11. Special strategies developed to attract women to research positions.
12. Explicit public targets to improve gender balance.
13. Gender issues must be part of evaluations and strategies.

At the end of its Structural Change report, the EC identified the following objectives to be achieved by:

The European Commission:

- » Attach gender requirements to all funding programmes.
- » Create a well-funded, dedicated programme to promote the structural change in research institutions (on the model of the ADVANCE programme in the US).
- » Gender mainstream all EC activities in R&I.
- » Re-establish the Women and Gender Unit in the EC Research and Innovation Directorate-General, ensure that it has sufficient expertise, personnel, financial resources, stability, and create an advisory position on women and gender in the Cabinet.
- » Create a well-funded, high-quality leadership development (up-skilling) programme.
- » Ensure that researcher mobility measures incorporate the gender dimension.



European-wide organisations:

- » Demonstrate leadership.
- » Identify, publicise and promote gender equality best practices.
- » Establish an award for well-performing institutions, as appropriate.
- » Create a panel of experts, higher-level group of high status men and women to advise, monitor gender in research.

Gatekeepers of Scientific Excellence:

- » Eradicate institutionalised bias.
- » Address evaluation bias.

Universities and Research Institutions:

- » Ensure gender dimension is integrated into the undergraduate and postgraduate curricula, across the university.
- » Adopt an Equality Plan, and include audit results.
- » Sign up to and follow a set of good practices, for example genSET recommendations.

7. Conclusion



Now that Horizon 2020 has launched its final Work Programme, the results of the European Commission's commitment to considering gender as a cross-cutting issue throughout the entire work programme should start to reveal themselves soon.

The heightened awareness of the challenges faced by both individual women in research and the research institutions required to tackle them should also enable unconscious bias to become a thing of the past. And, with both funding from the world's wealthiest nations and the desire to recruit and retain women in research more visible and consistent than ever before, it is plausible to expect new paths to be forged for both the promotion of gender equality in research and policy surrounding it too.

2018 has seen the Centenary of the Women's Vote in countries including Austria, Germany, the UK and Ireland and the 107th International Women's Day. The UN Secretary-General's message on the day was that:

“Achieving gender equality and empowering women and girls is the unfinished business of our time, and the greatest human rights challenge in our world.

“The activism and advocacy of generations of women has borne fruit. There are more girls in school than ever before; more women are doing paid work and in senior roles in the private sector, academia, politics and in international organizations, including the United Nations.”

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