



United Nations
Educational, Scientific and
Cultural Organization

Sustainable
Development
Goals

WOMEN IN STI: ADDRESSING THE GENDER GAP

UN-Wide capacity building workshop on
technology for development: innovation policies
for SDGs in the Arab region

18 April 2018, Amman

Alessandro Bello
SAGA Project Officer
a.bello@unesco.org



- Presentation
 - Historical framework
 - Why do we need gender equality in STI
 - What is the current situation?
 - How to address the gender gap through STI policies
- Exercise on priorities setting
- Discussion



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Historical framework



Global policy and legislative framework

Commitments on women's and girls' access to and participation in science and technology have been made by Governments at the international level.



In 1995, the Gender Working Group of the UN Commission on S&T for Development found that gender was the **missing link** in national science and technology programmes.



The **Fourth World Conference on Women** in Beijing in 1995- a milestone in the history of gender equality.

The **Beijing Platform for Action**, adopted unanimously by 189 countries, became a central document for gender equality policies around the world. It calls on Governments and all stakeholders to increase women's access to and retention in science and technology



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT
GOALS

Global policy and legislative framework

1999 UNESCO/ICSU World Conference on Science calls “for special efforts by governments, educational institutions, scientific communities, non-governmental organizations and civil society, with support from bilateral and international agencies, to ensure the full participation of women and girls in all aspects of science and technology”.

The **outcome document of the Twenty-third Special Session of the General Assembly** (2000) highlights the need to encourage and support the education of girls in science, mathematics, new technologies, including information technologies, and technical subjects

The **Commission on the Status of Women** has addressed the topic in a number of its sessions since 1996.



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Why do we need gender equality in STI

Science, technology and innovation (STI) have a crucial role in meeting all the Sustainable Development Goals (SDGs); so does gender equality.

Reducing inequality by attracting more women into STI fields will support the achievement of SDG targets 4.3, 5.5, 5.c, 9.5 and 17.18.





- A fundamental **HUMAN RIGHT**
- Sustainable Development requires **MORE SCIENCE** and more scientists
- But Sustainable Development also requires **BETTER SCIENCE**
- **Furthermore...**
 - ❖ Women play a central and vital role in society
 - ❖ Gender mainstreaming can make STI policies more effective and
 - ❖ Appropriate STI policies can enhance women's contribution to economic growth and development



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Inclusiveness benefits research

Research suggests that institutional performance is positively associated with gender balance, for example:

- a [2012 Credit Suisse study](#) of 2,360 companies globally found that those with at least one woman on the board outperformed companies without any female board members by 26% over six years.
- Another study that looked at the gender composition of [management teams in S&P 1,500 companies](#) found that women in top management positions were associated with “an increase of US\$42 million in firm value”.

Diversity has similar benefits for innovation and diversity in science also has benefits for researchers.

- A study of the [authors of 2.5 million scientific papers](#) found that publications authored by diverse groups of researchers receive more citations than do papers written by researchers of a single ethnic group.



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

What is the current situation?



United Nations
Educational, Scientific and
Cultural Organization

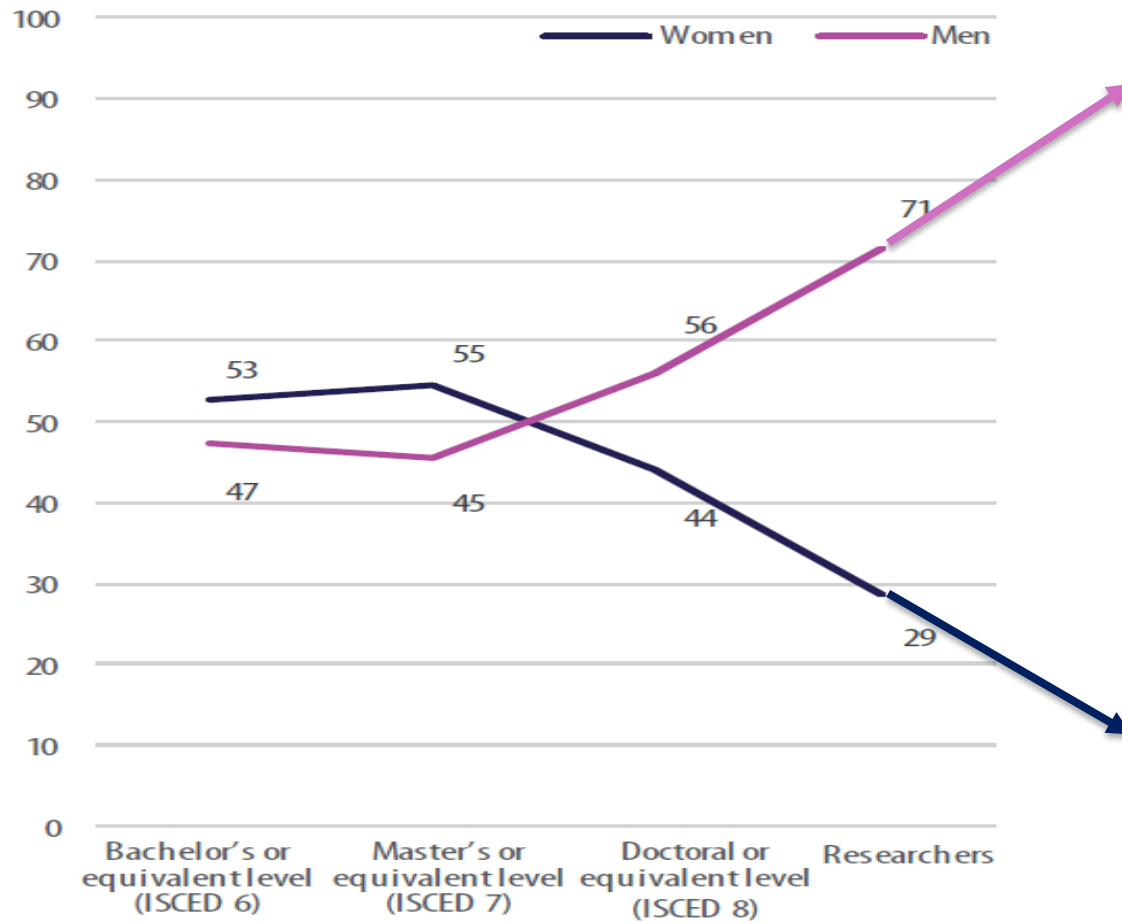


SUSTAINABLE
DEVELOPMENT
GOALS

Proportion of women and men graduates in tertiary education by programme level and those employed as researchers

Only 28,8% of world's researchers are women

and only 3% of Scientific Nobel Prizes have been awarded to women



Source: UIS, Oct 2016



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Vertical segregation

under/over representation of one gender at the top of a hierarchical structure with prestige concentrated at the top

Percentage of women who are:

- **University chancellors and vice-chancellors in public universities**
 - Brazil 14% (2010)
 - South Africa 17% (2011)
- **Vice-directors of national research centres**
 - Argentina 16% (2015)
- **Directors of scientific research institutes**
 - Mexico 10%
 - USA 23% (2012)
- **Members of academies of science**
 - more than 25% of members in only a handful of countries, including Cuba, Panama and South Africa.
- In the EU, less than 16% of tertiary institutions were headed by a woman in 2010 and just 10% of universities (EU, 2013).

Source: USR 2015



United Nations
Educational, Scientific and
Cultural Organization

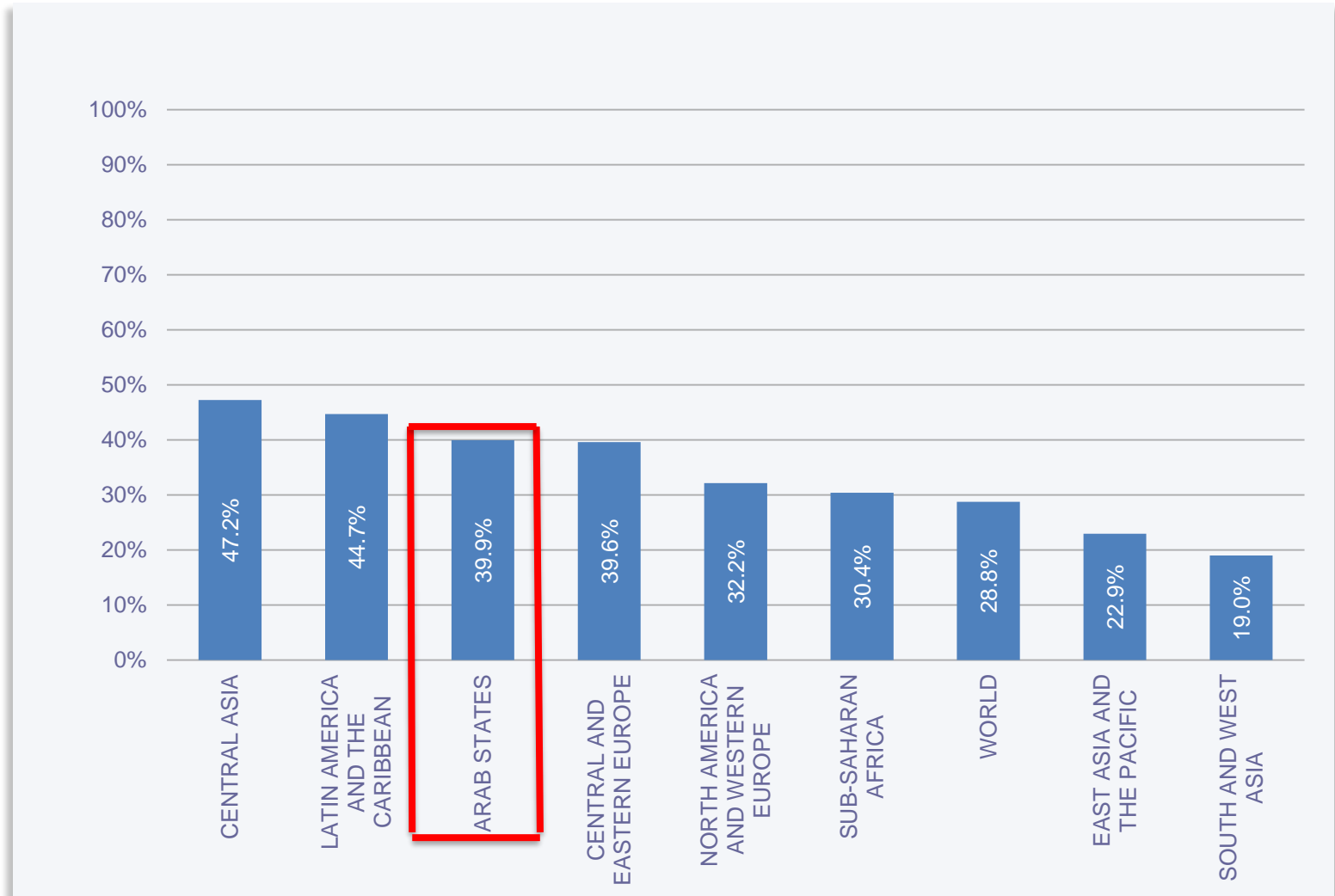


SUSTAINABLE
DEVELOPMENT GOALS

Question

- Developing or developed countries

Women researchers by region, 2014



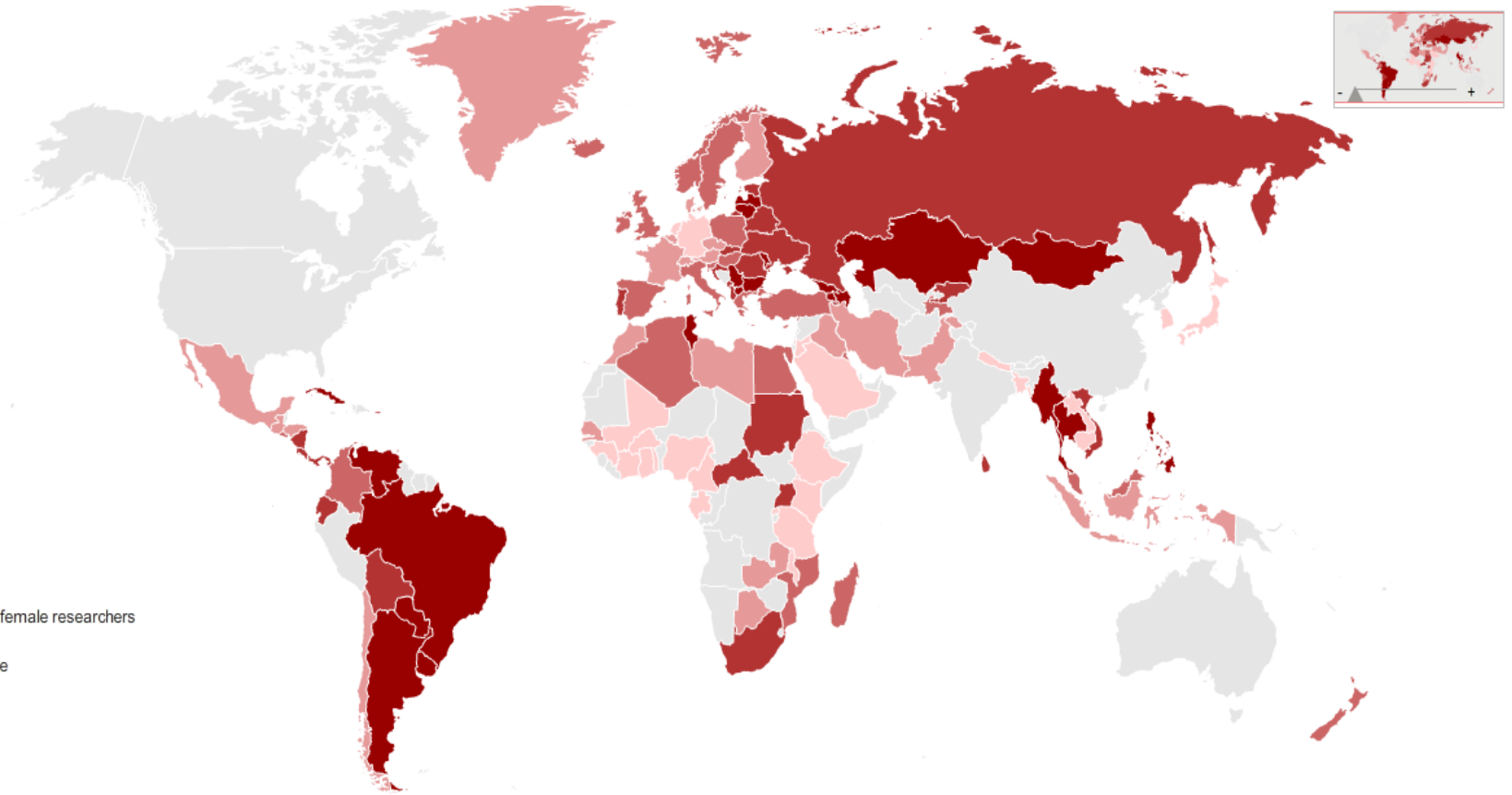
Source: UIS, Oct 2016



Percentage of women researchers in headcount

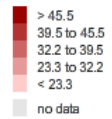
United Nations
Educational, Scientific and
Cultural Organization

SUSTAINABLE
DEVELOPMENT GOALS



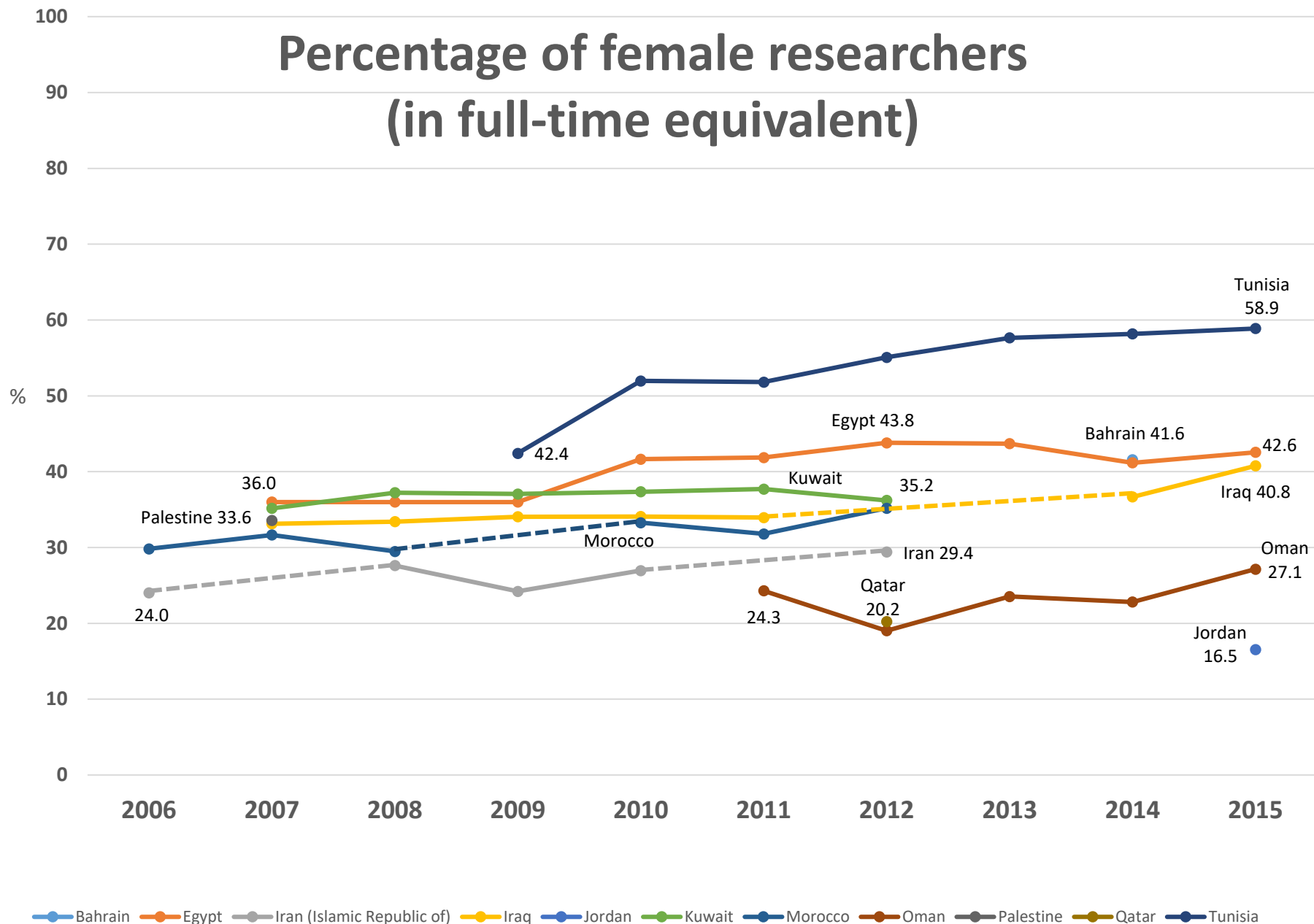
Percentage of female researchers
in headcounts

Latest Available



UNESCO UIS

Percentage of female researchers (in full-time equivalent)



Source: UNESCO Institute for Statistics



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Global gender gap in STEM fields

The global gender gap is wider within STEM fields

- At higher education levels, women represent approximately **35% of all students enrolled in STEM-related fields of study**
- There is a lack of sex-disaggregated data by STEM field of research to evaluate gender equality throughout individuals' careers.
 - Need for better data



United Nations
Educational, Scientific and
Cultural Organization



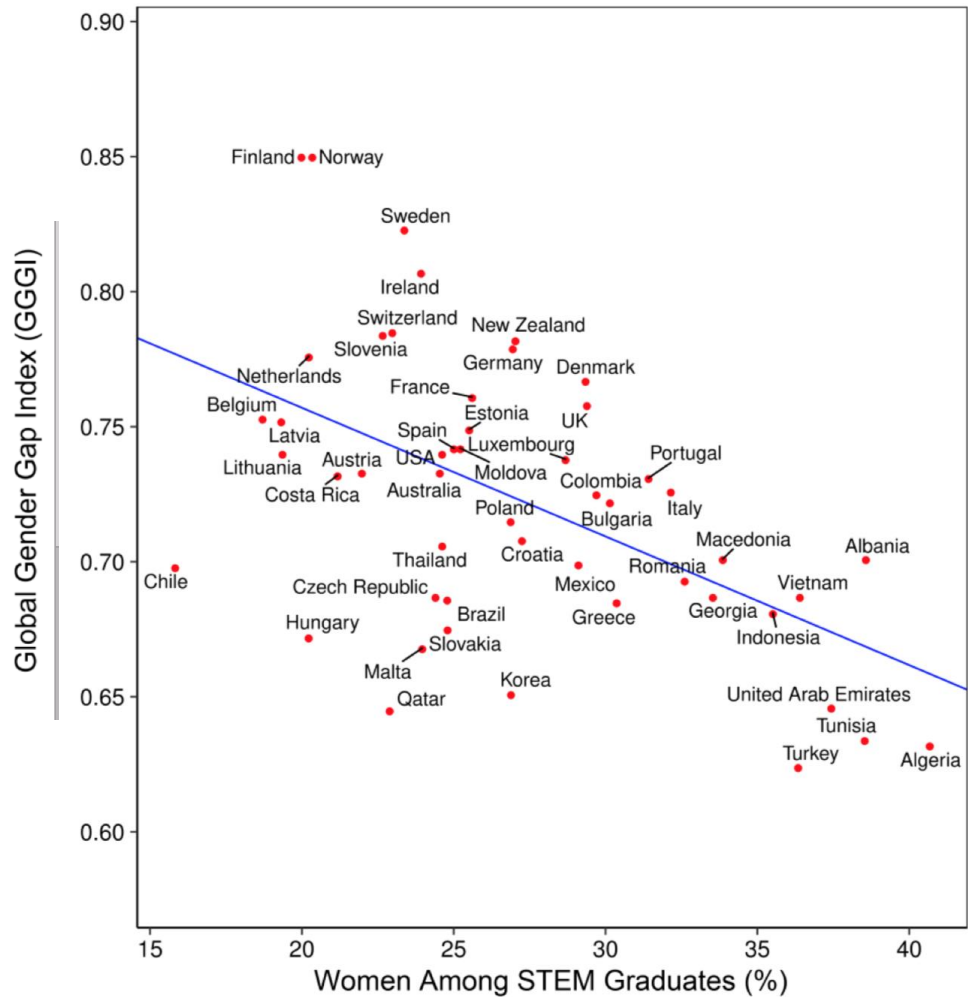
SUSTAINABLE
DEVELOPMENT
GOALS

Question

- Countries with a higher or lower gender equality index



The Gender-Equality Paradox in STEM Education



Source: Leeds Beckett University, 2018



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Share of women graduates in fields of science, engineering and agriculture (%) in Arab region

Country	Year	Science	Engineering	Science, Engineering and Agriculture (Total)
Bahrain	2014	66.3	27.6	42.6
Jordan	2011	65.2	13.4	51.9
Lebanon	2011	61.5	26.9	43.5
Oman	2013	75.1	52.7	56.8
Palestine	2013	58.5	31.3	45.3
Qatar	2013	64.7	27.4	34.0
Saudi Arabia	2013	57.2	3.4	38.8
Sudan	2013	41.8	31.8	41.4
Tunisia	2013	63.8	41.1	55.4
UAE	2013	60.2	31.1	41.6

Source: UNESCO Institute for Statistics, July 2015



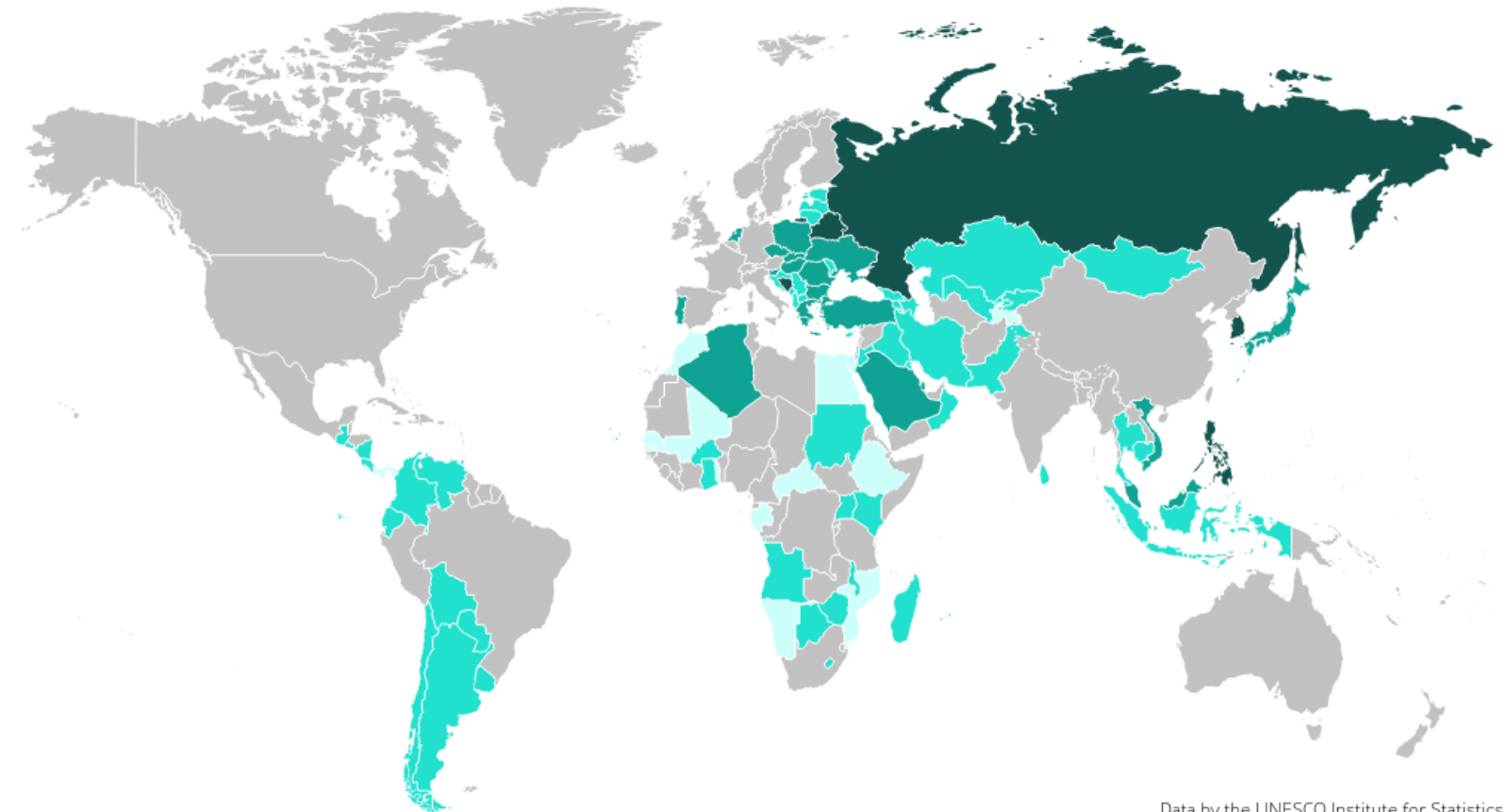
United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT
GOALS

Percentage of women researchers in “Engineering and Technology”

Researchers (HC) - Engineering and technology % (2015)



Data by the UNESCO Institute for Statistics

70% or more 50% - <70% 30% - <50% 10% - <30% Less than 10% No data



United Nations
Educational, Scientific and
Cultural Organization



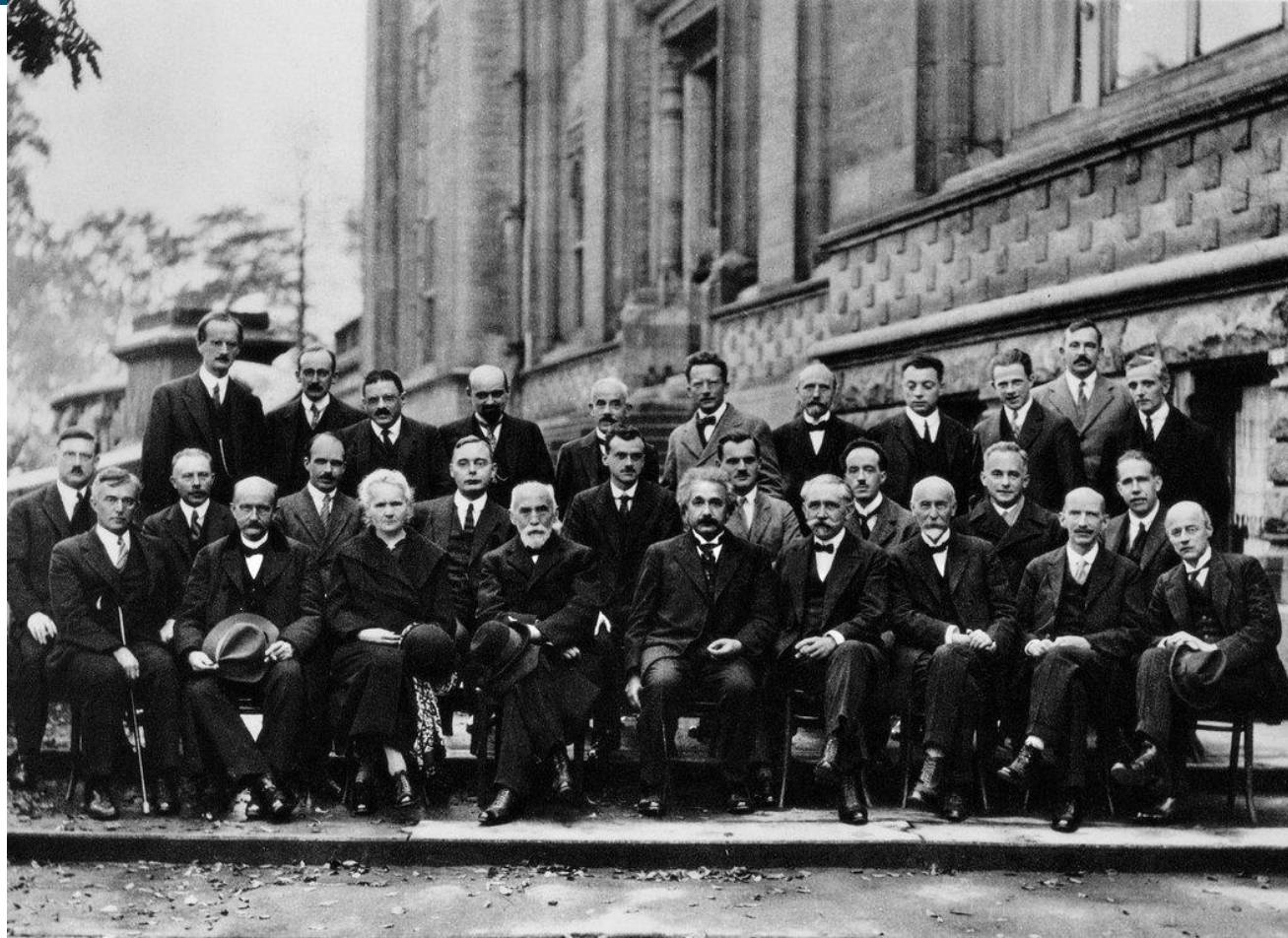
SUSTAINABLE
DEVELOPMENT GOALS

Women researchers by field of science, 2013 or closest year (%)

	Year	Natural sciences	Engineering and technology	Medical sciences	Agricultural sciences	Social sciences and humanities
Bahrain	2013	40.5	32.1	45.9	-	43.0
Egypt	2013	40.7	17.7	45.9	27.9	49.7
Iran	2010	34.3	19.6	29.5	24.5	25.5
Iraq	2011	43.6	25.7	41.4	26.1	33.7
Jordan	2008	25.7	18.4	44.1	18.7	31.7
Morocco	2011	31.5	26.3	44.1	20.5	27.1
Oman	2013	13.0	6.2	30.0	27.6	23.1
Palestine	2007	21.2	9.6	25.5	11.8	27.9
Qatar	2012	21.7	12.5	27.8	17.9	34.3
Saudi Arabia	2009	2.3	2.0	22.2	-	-

Source: UNESCO Institute for Statistics, July 2015

Have we made any progress?



Solvay Conference on Physics- 1927



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT
GOALS

1995 U.S. Women in Science and Engineering, 1960-1990: Progress Toward Equity?

Bachelor's Degrees Awarded

Graduation	Women	Men	Total	Percent Women
A. SCIENCE AND ENGINEERING				
1960	19,3622	101,575	120,937	16.0
1962	23,485	103,984	127,469	18.4
1964	32,473	120,888	153,361	21.2
1966	39,482	133,989	173,471	22.8
1968	53,463	158,711	212,174	25.2
1970	68,878	195,244	264,122	26.1
1972	77,671	203,557	281,228	27.6
1974	91,793	213,269	305,062	30.1
1976	95,597	196,577	292,174	32.7
1978	N/A	N/A	N/A	N/A
1980	105,974	186,009	291,983	36.3
1982	113,161	188,957	302,118	37.4
1984	118,016	196,650	314,666	37.5
1986	123,057	200,893	323,950	38.0
1988	122,089	186,671	308,760	39.5
1989	123,793	183,787	307,580	40.2

B. ALL DISCIPLINES

1960	141,495	228,500	369,995	38.2
1962	154,009	234,671	388,689	39.6
1964	196,625	270,319	466,944	42.1
1966	221,052	299,871	520,923	42.4
1968	274,653	358,105	632,758	43.4
1970	341,276	451,380	792,656	43.0
1972	386,683	500,590	887,273	43.6
1974	418,463	527,313	945,776	44.2
1976	420,821	504,925	925,746	45.4
1978	433,857	487,347	921,204	47.1
1980	455,806	473,611	929,417	49.0
1982	479,634	473,364	952,998	50.3
1984	491,990	482,319	974,309	50.5
1986	501,900	485,923	987,823	50.8
1988	516,520	476,842	993,362	52.0
1990	535,855	481,397	1,017,252	52.7

Doctoral Degrees Awarded

Graduation	Women	Men	Total	Percent Women
A. SCIENCE AND ENGINEERING				
1960	381	5,674	6,056	6.3
1962	501	6,748	7,249	6.9
1964	636	8,389	9,025	7.0
1966	911	10,545	11,456	7.9
1968	1,295	13,116	14,411	9.0
1970	1,626	16,105	17,731	9.2
1972	2,101	16,839	18,940	11.1
1974	2,590	15,870	18,460	14.0
1976	2,986	14,886	17,872	16.7
1978	3,103	14,270	17,373	17.9
1980	3,884	13,639	17,523	22.2
1982	4,270	13,747	18,017	23.7
1984	4,704	13,810	18,514	25.4
1986	5,084	14,167	19,251	26.4
1988	5,577	15,164	20,741	26.9
1990	6,274	16,399	22,673	27.7

B. ALL DISCIPLINES

1960	1,028	8,801	9,829	10.4
1962	1,245	10,377	11,622	10.7
1964	1,535	12,955	14,490	10.6
1966	2,116	16,121	18,237	11.6
1968	2,906	20,183	23,089	12.6
1970	3,976	25,890	29,866	13.3
1972	5,273	28,090	33,363	15.8
1974	6,451	27,365	33,816	19.1
1976	7,797	26,267	34,064	21.6
1978	8,473	23,658	32,131	26.4
1980	9,672	22,943	32,615	29.6
1982	10,483	22,224	32,707	32.0
1984	11,145	22,064	33,209	33.6
1986	11,834	21,819	33,653	35.2
1988	12,247	22,592	34,839	35.2
1990	13,019	22,566	35,586	36.6



Progress but a persistent 'generation effect'

It is not simply a matter of waiting for female tertiary graduates to make their way through the system.

- Gaps and barriers persist throughout the scientific research system.
- In the USA, numbers have remained stagnant and even decreased in some fields over the past decade, whereas there has been little change in the gender balance in the EU for positions of leadership and prestige (EU, 2013).
- Eurostat uses the term 'generation effect' to refer to a gender imbalance in the research population which increases with age rather than evening out.



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Gender Gap Closing

The pace of change has slowed over the last 3 years and based on the current trajectory, with all else remaining equal, **it will take 168 years** for the world to close this economic gap completely

The Global Gender Gap Report
World Economic Forum



- Gender parity

is a numerical concept for same proportions in representation and participation. Gender parity does not necessarily imply gender equality.

- Gender equity

is the process of being fair to men and women. Targeted measures must often be put in place to compensate for the historical and social disadvantages that prevent women and men from operating as equals.

- Gender equality

exists when women and men enjoy the same status and have equal conditions, treatment and opportunities.

Terminology: gender equity illustrated



Source: An image from the film *The Good Governance Recipe*, The Water Rooms project, UNESCO World Water Assessment Programme.



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Question

- Company has 53% of female employees and 47% of male employees. Can we say that the company reached gender equality?



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

How to address the gender gap through STI policies



United Nations
Educational, Scientific and
Cultural Organization

SUSTAINABLE
DEVELOPMENT GOALS

STI policies towards gender equality

No “one-size-fits-all” formula

Social norms and
stereotypes

Primary and
secondary
education

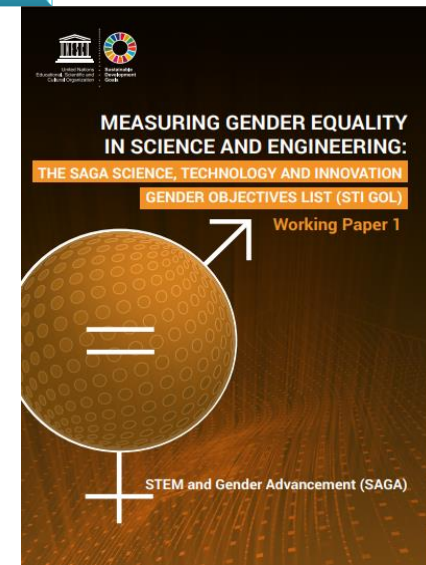
Higher education

Career
progression

Research content,
practice

Policy-making

Entrepreneurship
and
innovation





United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

1. Change perceptions, attitudes, behaviours, social norms and stereotypes towards women in STEM in society

- | | |
|-----|--|
| 1.1 | Promote awareness of and overcome non conscious and cultural gender biases widely expressed as gender stereotypes, among scientists, educators, policy-makers, research organizations, the media, and the public at large. |
| 1.2 | Promote visibility of women with STEM qualifications and in STEM careers, especially leadership positions in governments, business enterprises, universities, and research organizations. |
| 1.3 | Mainstream gender perspectives in science communication and informal and non-formal STEM education activities, including in science centres and museums. |

Examples:

Women: Protagonists of Science. Today's Girls, Tomorrow's Scientists

Fostering next-generation of women Scientists

Scientist Selfies – Instagramming to change public perceptions of scientists



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Educate parents/caregivers on how best to advocate for advanced STEM opportunities for their daughters

2. Engage girls and young women in STEM primary and secondary education, as well as technical and vocational education and training

- | | |
|-----|--|
| 2.1 | Promote S&E vocations to girls and young women, including by stimulating interest, fostering in-depth knowledge about S&E career issues, and presenting role models. |
| 2.2 | Mainstream the gender perspective in educational content (teacher training, curricula, pedagogical methods, and teaching material). |
| 2.3 | Promote gender-sensitive pedagogical approaches to STEM teaching, including encouraging hands-on training and experiments. |
| 2.4 | Promote gender balance among STEM teachers. |
| 2.5 | Promote gender equality in STEM school-to-work transitions. |

Secondary Schools Girl's Award (Malawi); The Swedish preschool; Improvement of knowledge about science and technologies among youth and support to equal rights in science (Lithuania);
Girls' STEAM Camp held in Rwanda



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

3. Attraction, access to and retention of women in STEM higher education at all levels

3.1	Promote access of and attract women to STEM higher education (including Masters and Ph.D.), including through specific scholarships and awards.
3.2	Prevent gender bias in the student admission and financial aid processes process.
3.3	Promote retention of women in STEM higher education at all levels, including through gender-sensitive mentoring, workshops and networks.
3.4	Prevent gender-based discrimination and sexual harassment at all levels, including Masters and Ph.D.
3.5	Promote gender equality in international mobility of students.
3.6	Promote day care/child care facilities for students particularly at STEM higher education institutions.

Examples:

Support for Girls in Science Courses (Japan)

Loans program of the Ministry of Higher and Tertiary Education, Science and Technology Development (Zimbabwe);



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

4. Gender equality in career progression for women scientists and engineers (S&E)

- | | |
|-----|---|
| 4.1 | Ensure gender equality in access to job opportunities, recruitment criteria and processes. |
| 4.2 | Promote equal work conditions through, among others: <ul style="list-style-type: none">• gender balance in remuneration• preventing gender bias in performance evaluation criteria (including productivity measurement)• adequate safety and security of fieldwork• sexual harassment prevention policies and procedures. |
| 4.3 | Ensure gender equality in access to opportunities in the workplace: <ul style="list-style-type: none">• training and conferences• research teams, networks (national and international), expert panels and advisory groups• publications and patent applications, including preventing bias in review• financial and non-financial incentives• recognitions, rewards and awards |



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

4. Gender equality in career progression for women scientists and engineers (S&E)

- | | |
|-----|--|
| 4.4 | Promote work–life balance through, among others: <ul style="list-style-type: none">• infrastructure for child care• flexible working hours• reduction and redistribution of unpaid care and domestic care• family leave for both parents• appropriate re-entry mechanisms to the S&E workforce after career break or family leave. |
| 4.5 | Promote gender equality in international mobility of post-docs and researchers, and facilitate women’s return. |
| 4.6 | Promote gender balance in leadership positions in S&E occupations (including decision making and research). |

Extension during pre- and postnatal period and parental permission (Chile);
Maternity leave and Application for scholarship extension (Argentina);
‘Fixing the women’ to ‘Fixing the institutions’



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

5. Promoting the gender dimension in research content, practice and agendas

- | | |
|-----|--|
| 5.1 | Establish specific gender-oriented R&D programmes, including research on gender in STEM and on the gender dimension of the country's research agenda and portfolio. |
| 5.2 | Incorporate gender dimensions into the evaluation of R&D projects. |
| 5.3 | Promote gender-sensitive analysis in research hypotheses and consideration of sex of research subjects. |
| 5.4 | Promote gender responsive and gender-sensitive research dissemination and science communication, including through science centres and museums, science journalism, specific conferences, workshops, and publications. |

Measures to ensure that applicants consider the role of sex-gender factors in research content (Belgium)



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

«There is also a gender dimension to the definition of research projects. While there are research projects in which sex and/or gender may not be relevant in terms of the research content , it is well established that , where relevant, not integrating sex and gender analysis into the design, implementation, evaluation and dissemination of the research can lead to poor results and missed opportunities».

«The Council will only fund excellent research, and excellent research fully considers whether a potential sex and/or gender dimension is relevant to the research content and fully integrates sex/gender analysis where relevant, thereby ensuring maximum impact, societal benefit and optimising innovation in Irish research».

The Irish Research Council- Gender strategy and action plan



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

6. Promote gender equality in STEM-related policy-making

- | | |
|-----|---|
| 6.1 | Ensure gender balance in STEM-related policy design (decision makers, consultative committees, expert groups, etc.): <ul style="list-style-type: none">• Education policy• Higher education policy• STI policy• Economic policy• Workforce policy• SDGs/international policies. |
| 6.2 | Ensure gender mainstreaming and prioritization of gender equality in STEM-related policy design, monitoring and evaluation: <ul style="list-style-type: none">• Education policy• Higher education policy• STI policy• Economic policy• Workforce policy• SDGs/international policies. |

South Africa, Brazil, Rwanda, India, Ghana, China and the Republic of Korea are just a few countries which have developed policies to more effectively integrate gender into national STI systems. National Policy Framework for Gender Equality in South Africa



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

7. Promote gender equality in science and technology-based entrepreneurship and innovation activities

7.1	Promote gender equality in access to seed capital, angel investors, venture capital, and similar start-up financing.
7.2	Ensure equal access to public support for innovation for women-owned firms.
7.3	Ensure visibility of women entrepreneurs as role models.
7.4	Ensure women's access to mentorship and participation in the design and implementation of gender-sensitive training in entrepreneurship, innovation management, and Intellectual Property Rights.
7.5	Promote networks of women entrepreneurs and women's participation in entrepreneurship networks.
7.6	Promote gendered innovation approaches.
7.7	Promote external incentives and recognition for women-led innovation and acceptance of women innovators in society.
7.8	Promote gender equality in the access and use of enabling technology, in particular information and communication technology.
7.9	Promote a gender balanced workforce and equal opportunities in start-up companies.

Premio Nacional a la Innovación de Guatemala (Guatemala)

Malaysian Foundation for Innovation-Yim (Malaysia)



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Mapping policies and instruments on gender equality within policies in STI

Identifying barriers and driving factors to careers in science and engineering





United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Exercise on priorities setting



United Nations
Educational, Scientific and
Cultural Organization



SUSTAINABLE
DEVELOPMENT GOALS

Thank you!

شكراً

a.bello@unesco.org

<https://en.unesco.org/saga>