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# Developing better measures of gender equality in STEM: the UNESCO SAGA Project

**Gender Summit 9 - Europe**

**8 November 2016**

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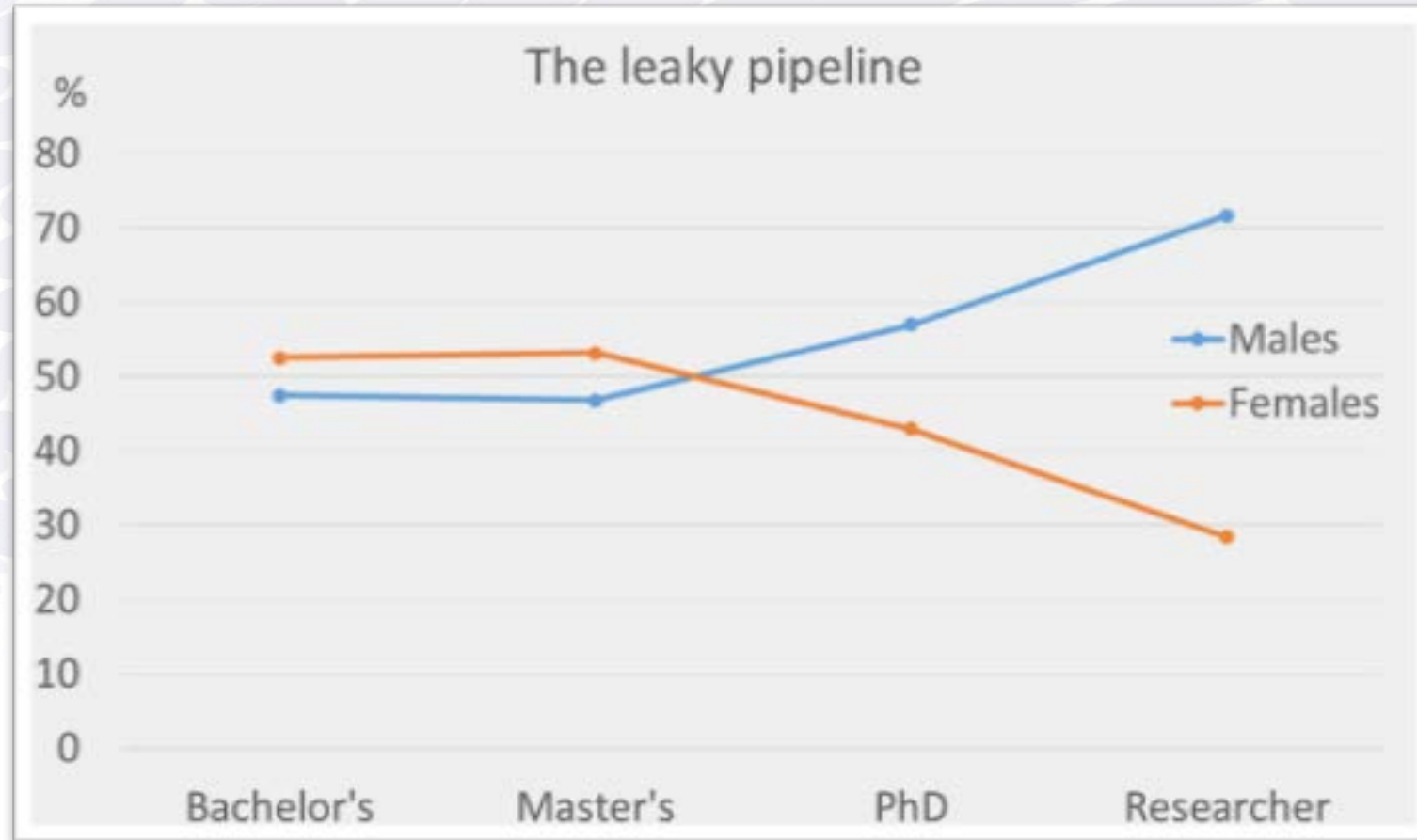
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# Women in Science



Notes: Higher education graduate data are for School Year 2013 or the latest year available since 2007. Researcher data are for the year 2013 or the latest year available since 1997. Data reported by 116 countries (or territories) representing 79% of total population worldwide. Indian higher education data come from the All India Survey on Higher Education (2011-2012)



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# UNESCO eAtlas series and UIS database

- Database: [www.uis.unesco.org/datacentre/](http://www.uis.unesco.org/datacentre/)
- UNESCO eAtlas of Gender Inequality in Education  
<http://tellmaps.com/uis/gender/>
- UNESCO eAtlas of Research and Experimental Development  
<http://www.tellmaps.com/uis/rd/>



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# UIS data visualisation

**WOMEN IN  
SCIENCE**

EXPLORE THE DATA FOR  
COUNTRIES AROUND THE WORLD >

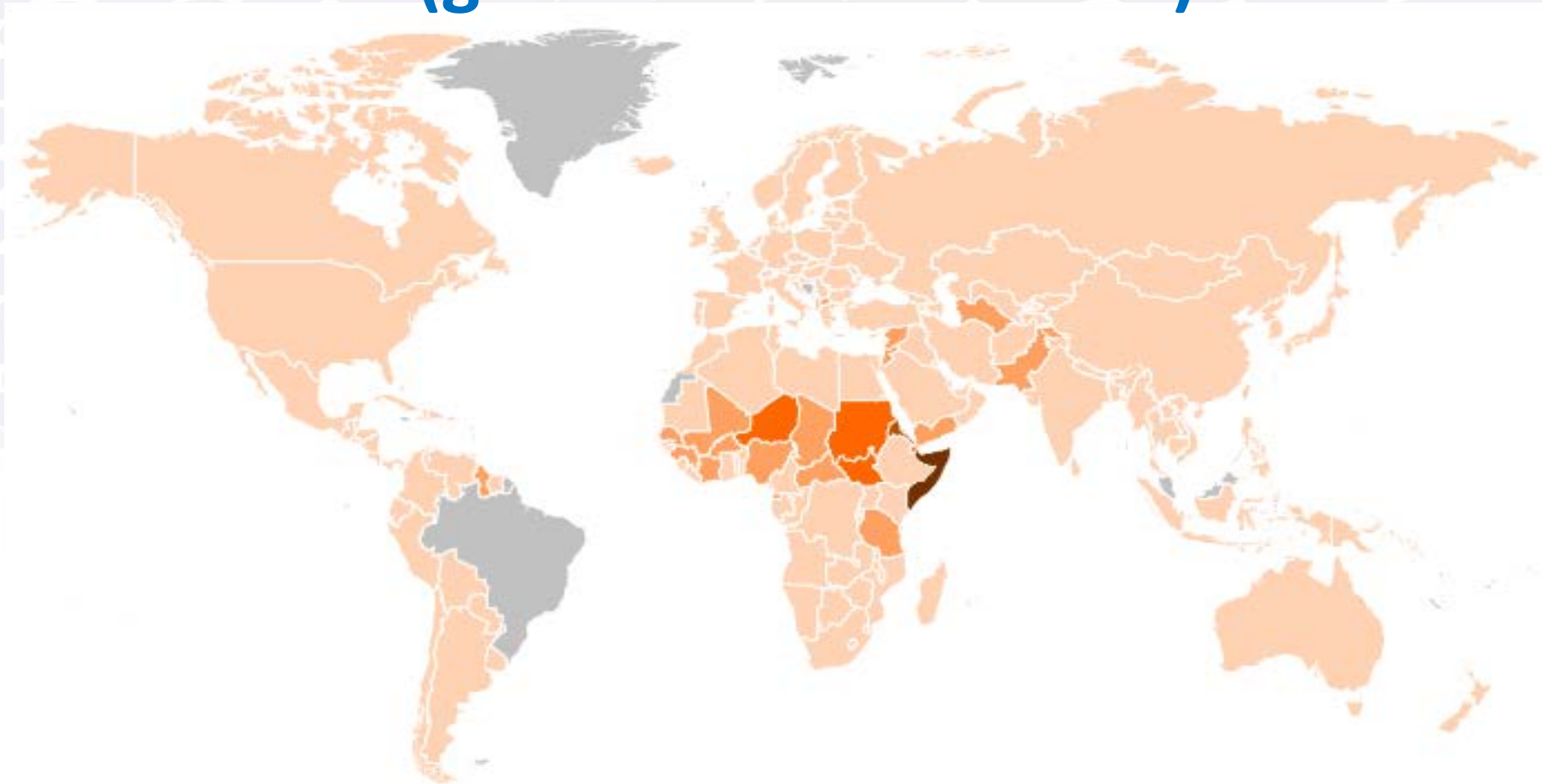
UNESCO INSTITUTE FOR STATISTICS

<http://www.uis.unesco.org/LAYOUTS/UNESCO/women-in-science/index.html#!lang=en>

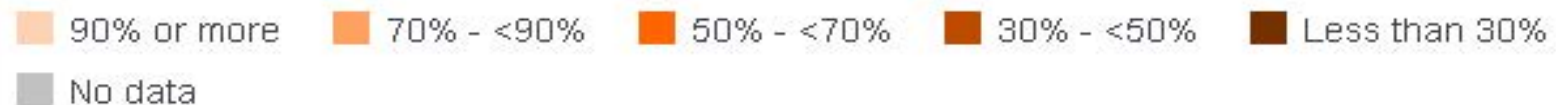


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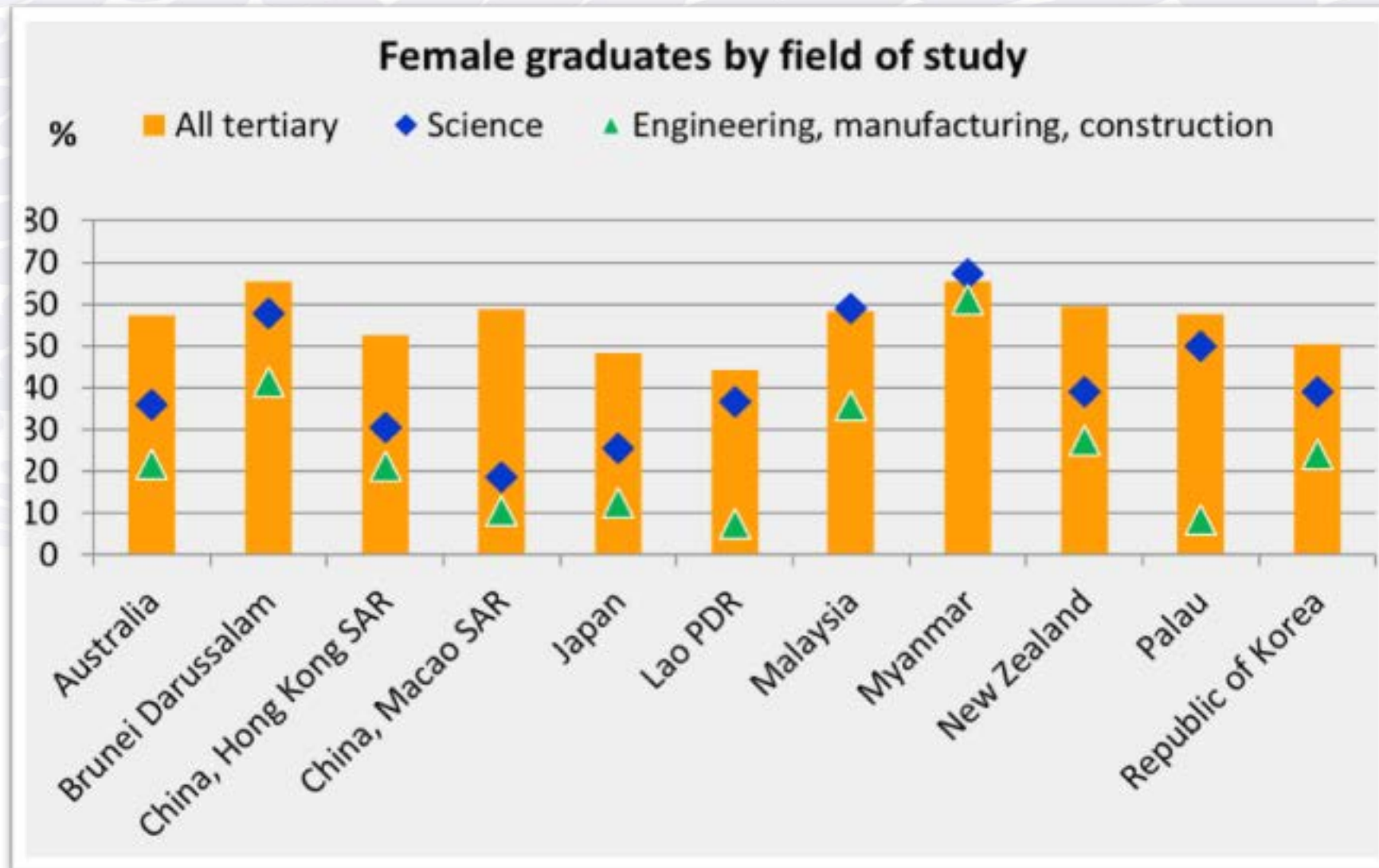
# Share of girls in primary education (gross enrolment ratio)



Data by the the UNESCO Institute for Statistics(2015)



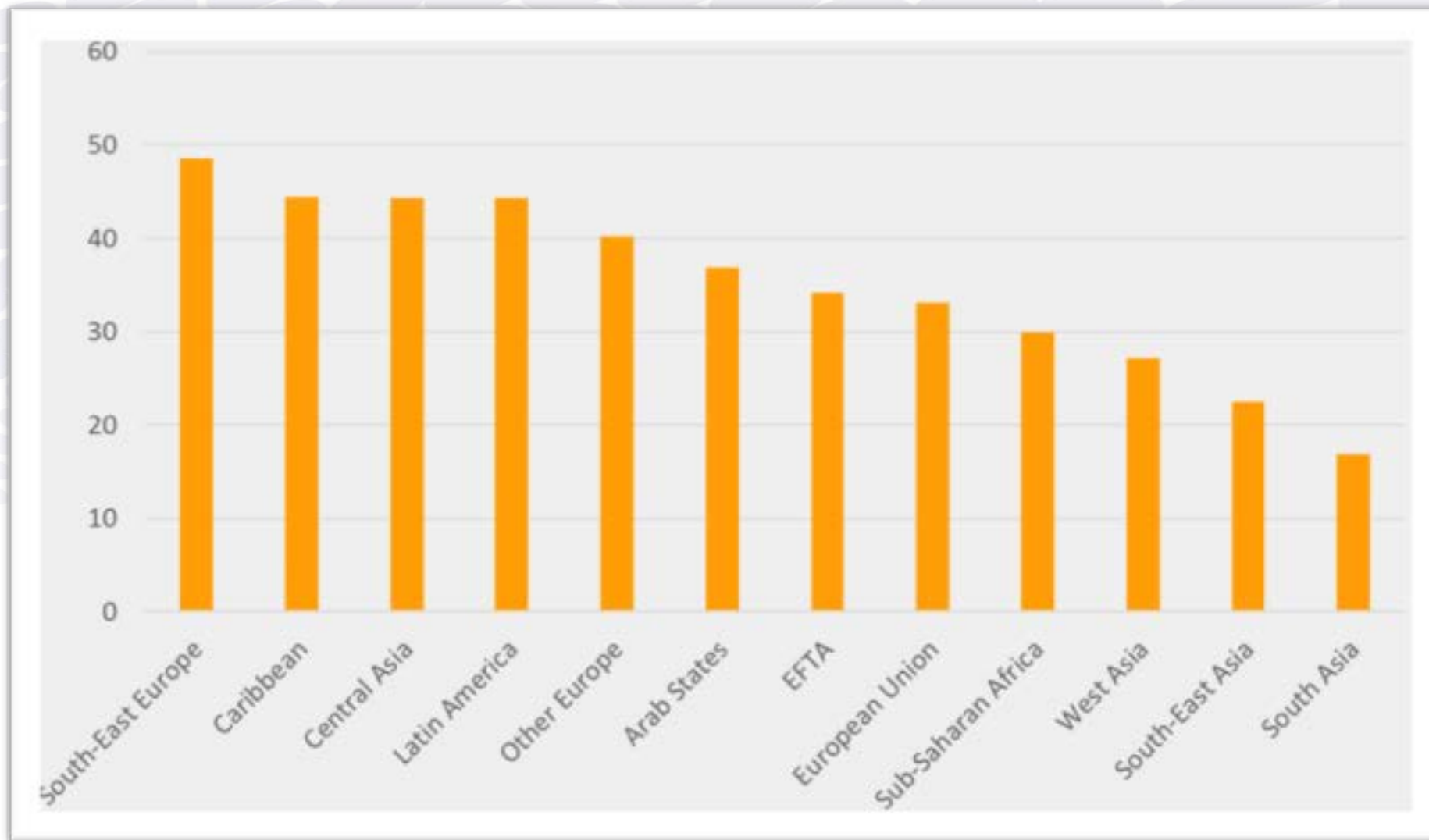
# Field of study – example for EAP



Source: UNESCO Institute for Statistics, June 2015



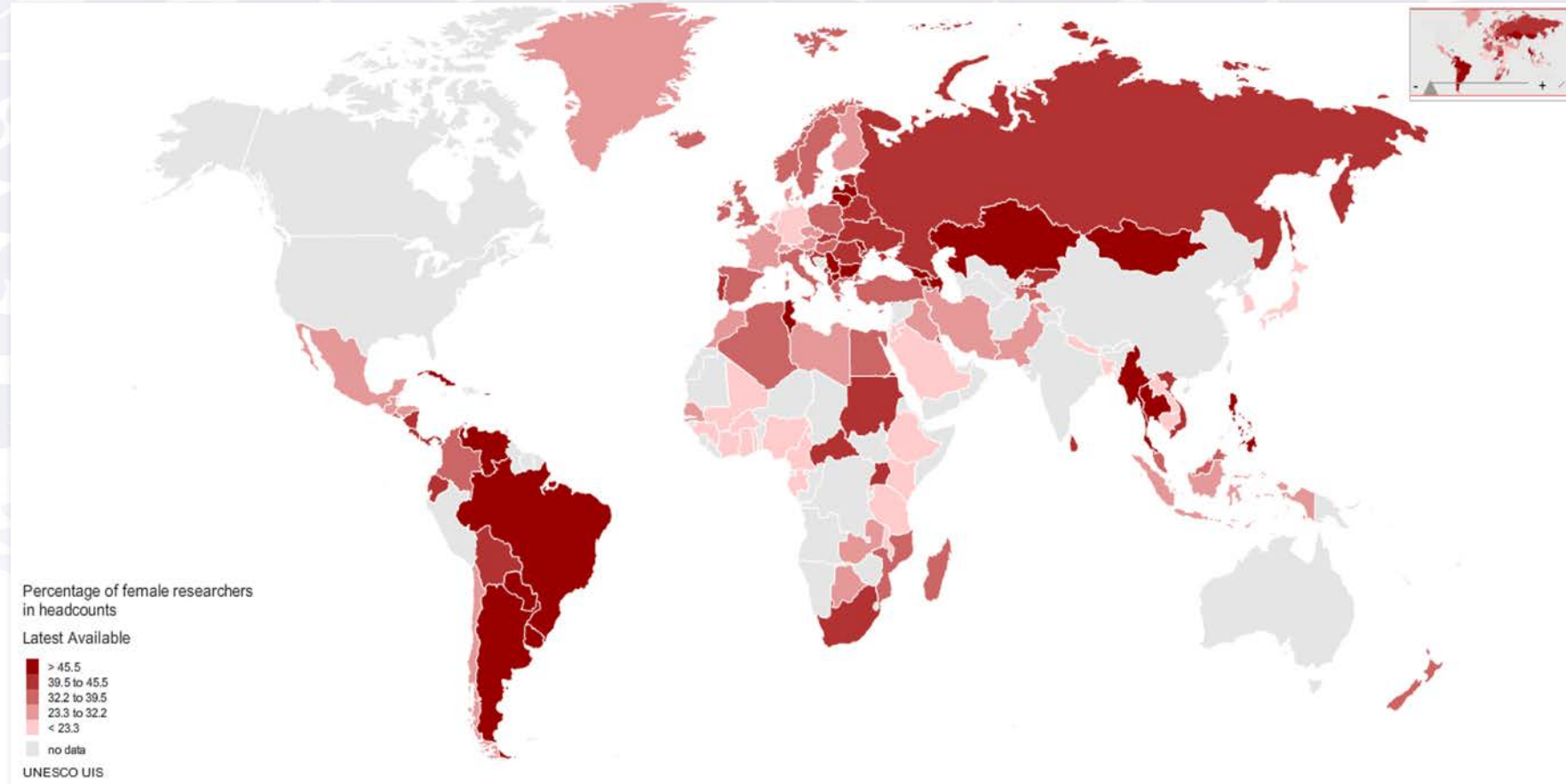
# Female researchers by region (%)



Source: UNESCO Institute for Statistics, June 2015



# Share of female researchers (%)

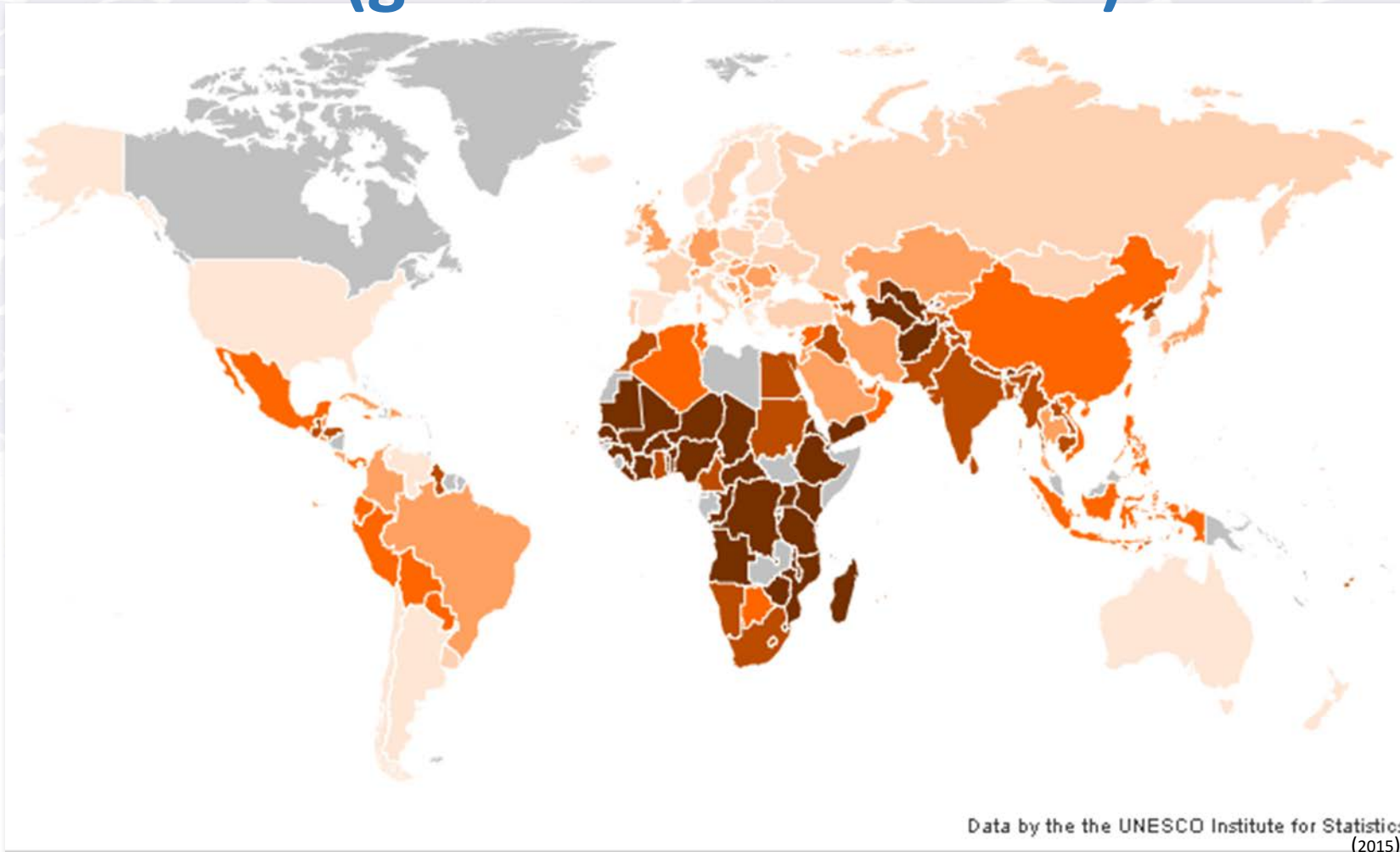






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# Share of women enrolled in tertiary education (gross enrolment ratio)

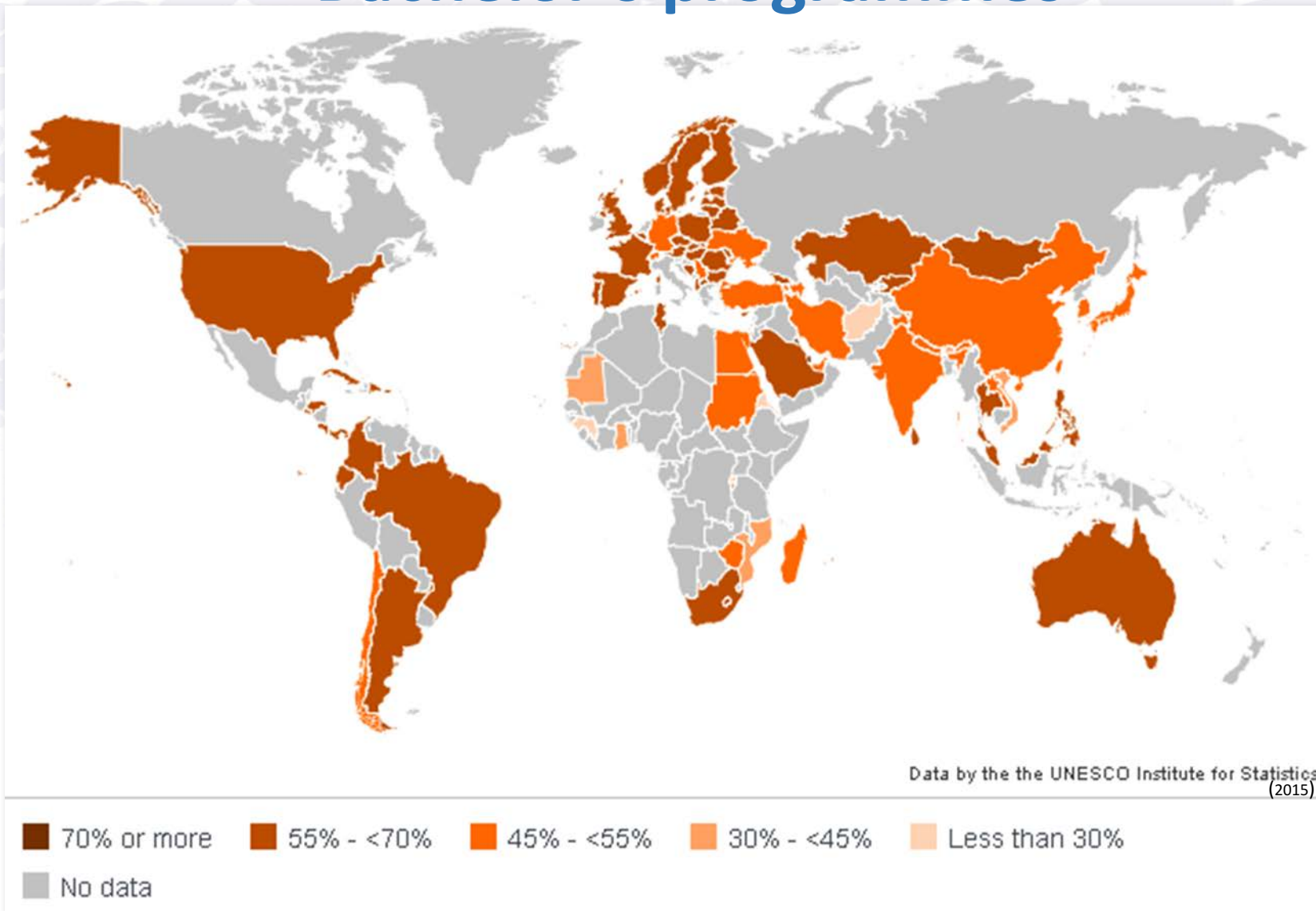


90% or more 70% - <90% 50% - <70% 30% - <50% 10% - <30%  
Less than 10% No data



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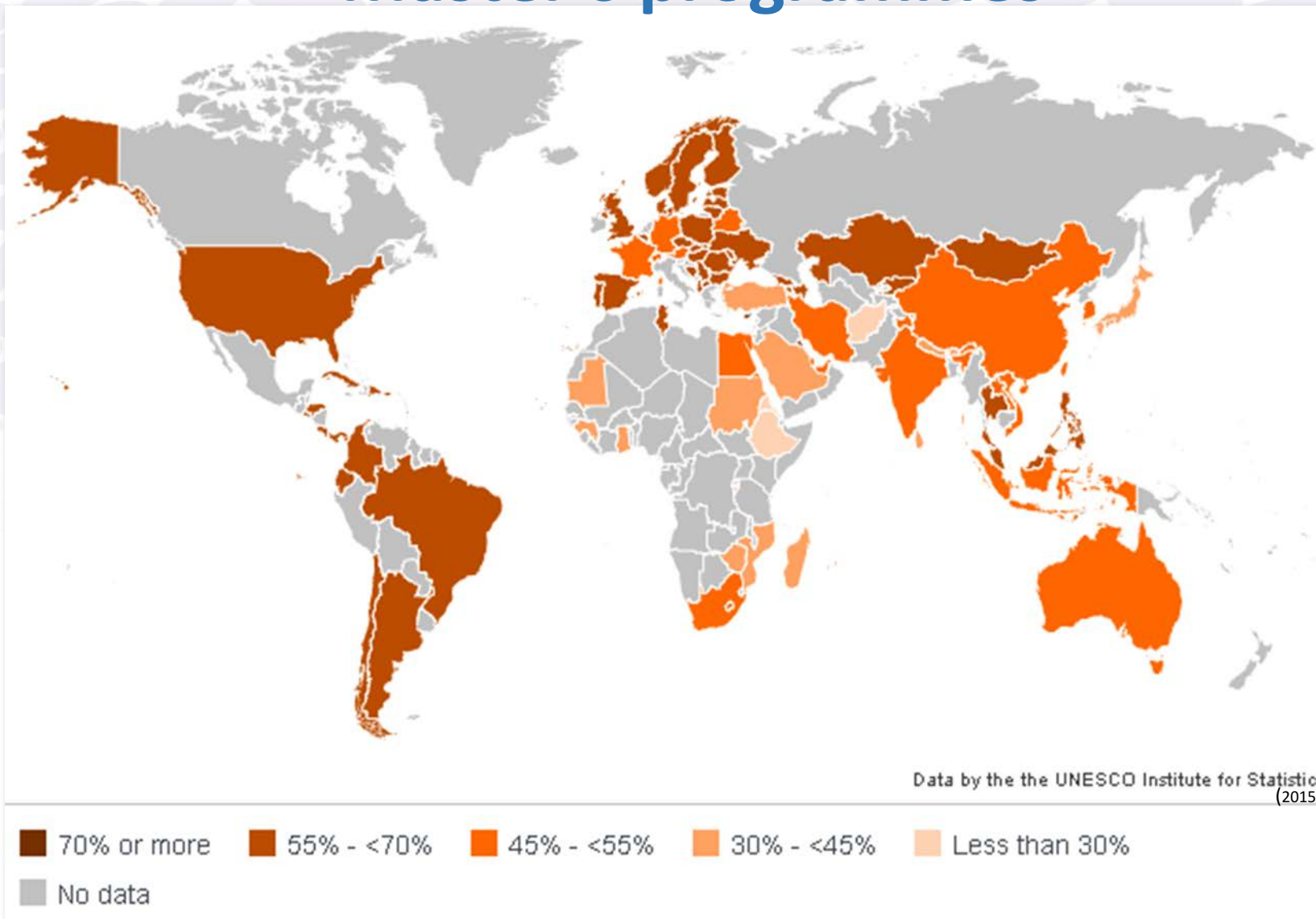
# Share of female graduates from Bachelor's programmes





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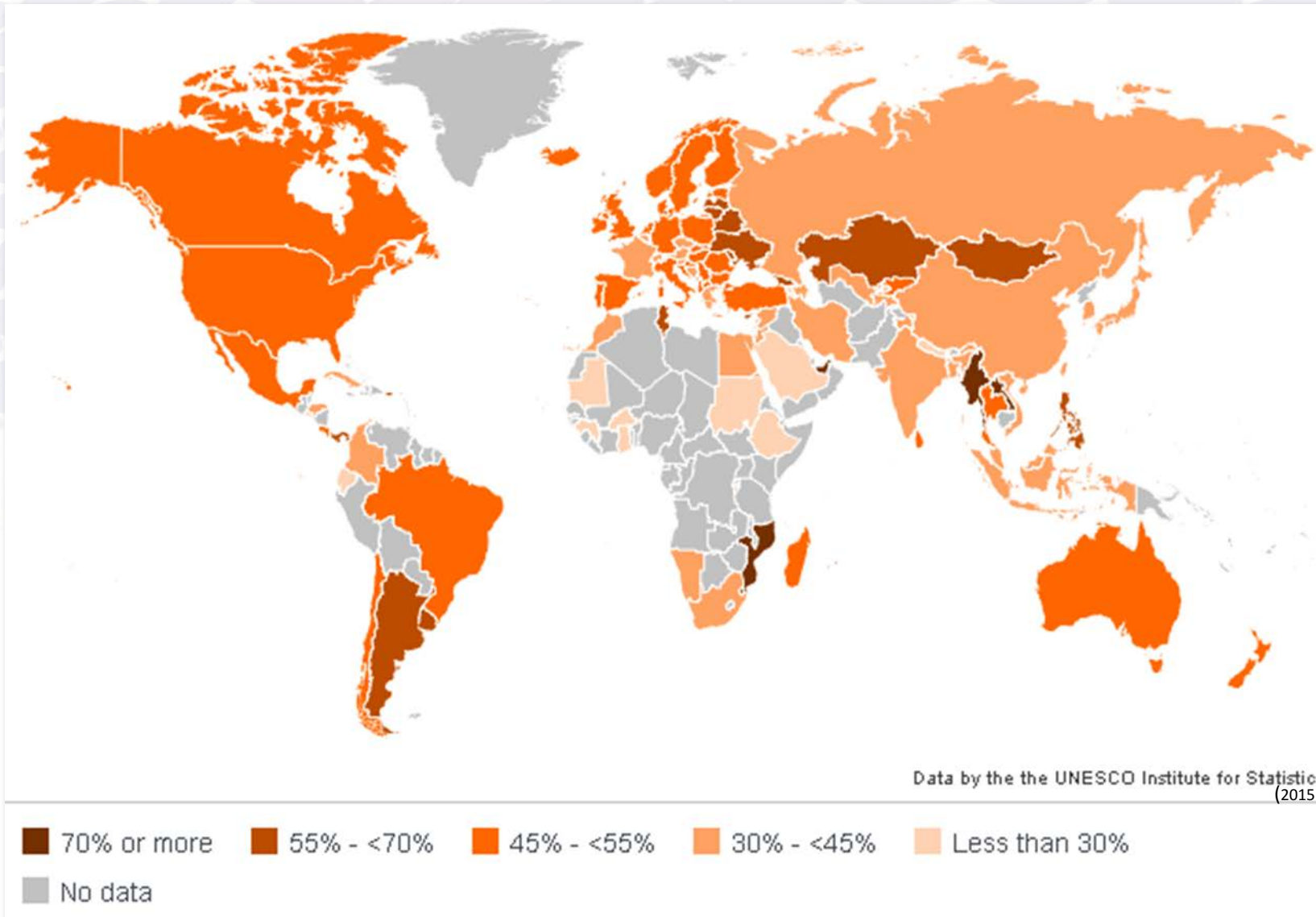
# Share of female graduates from Master's programmes





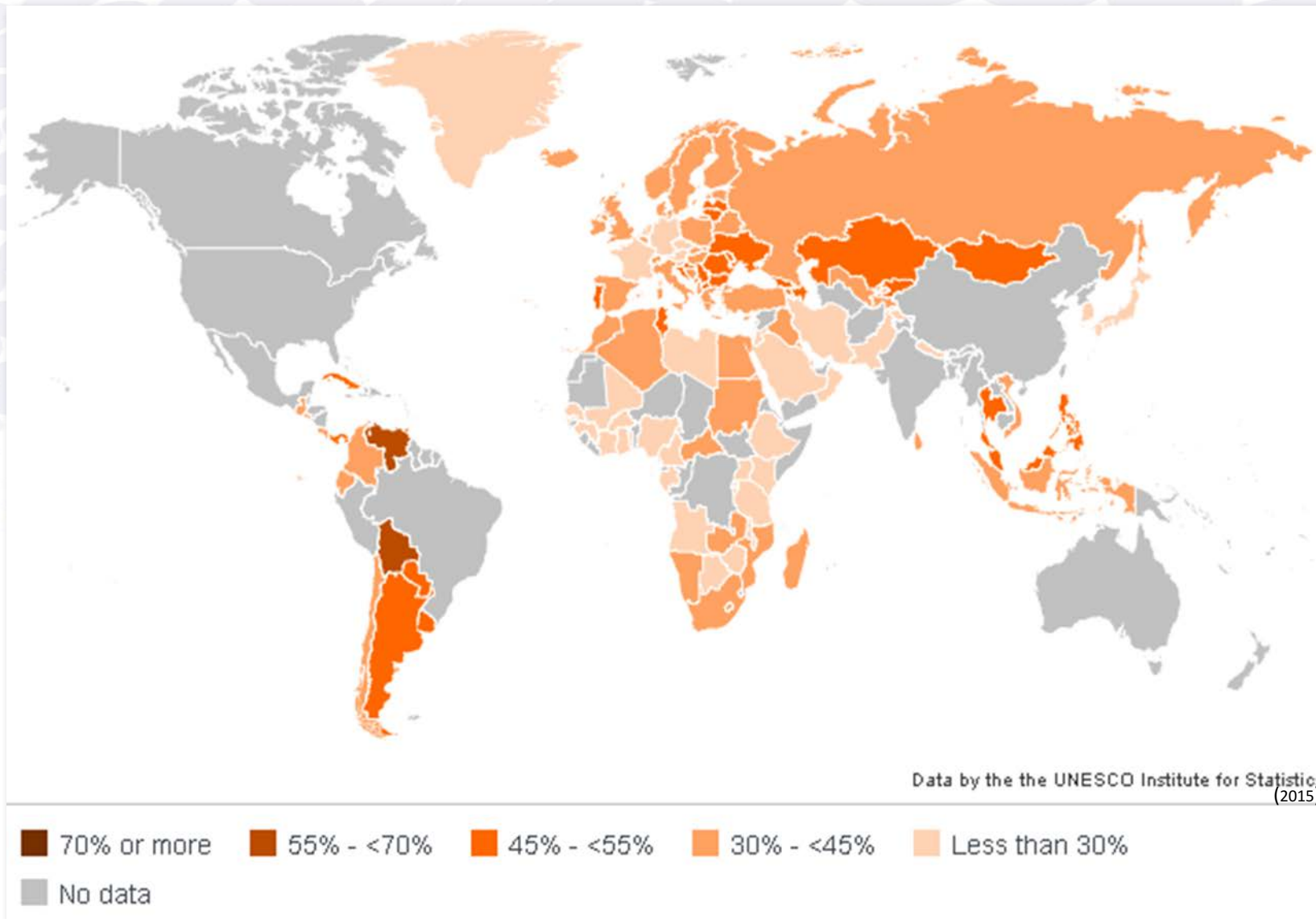
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# Share of graduates from PhD programmes





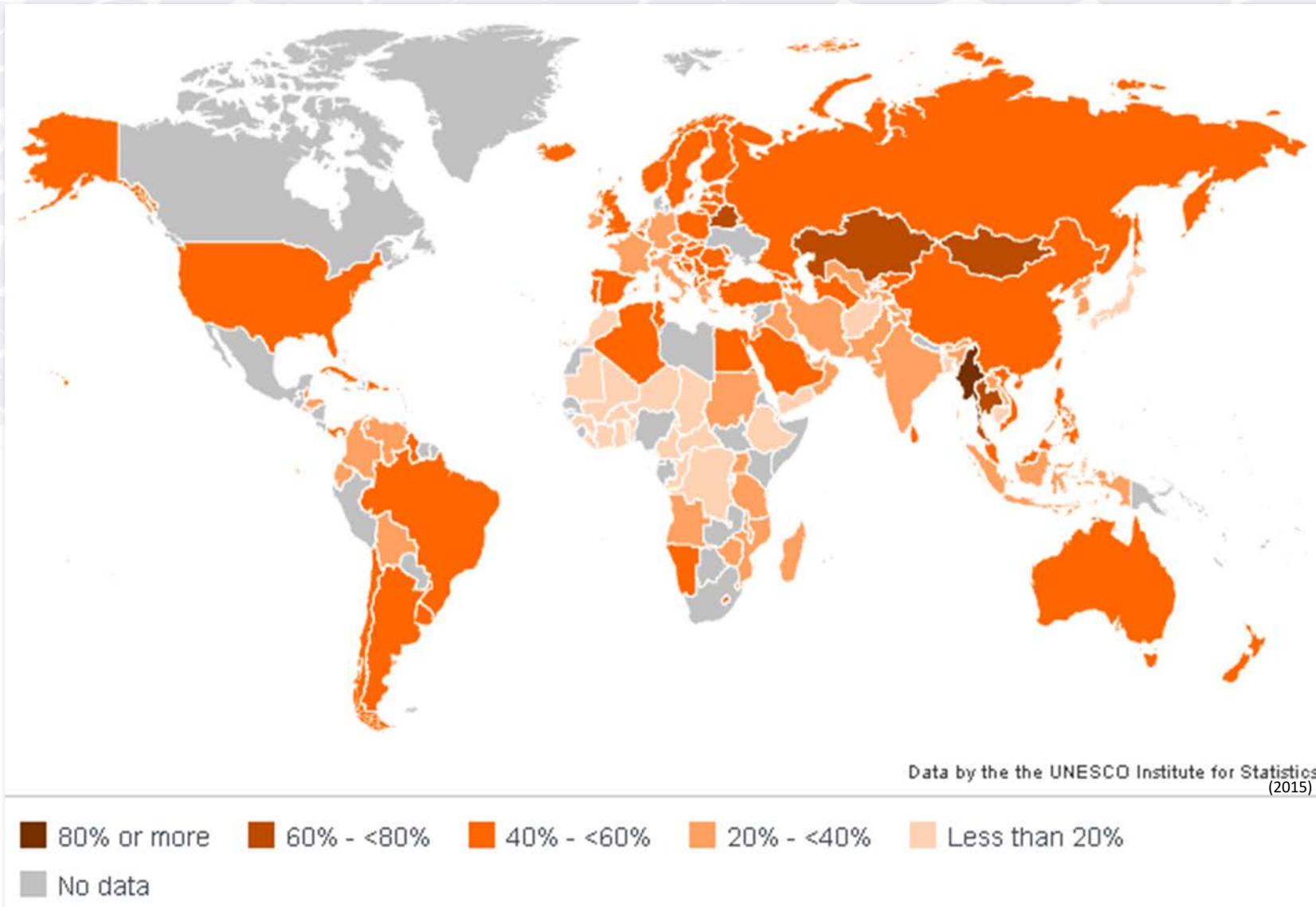
# Share of women in total researchers





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# Share of female teachers in tertiary education





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# STEM and Gender Advancement (SAGA)

A global UNESCO project with the support of Sida



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# Key SDG targets 4.3, 5.5, 5.c, 9.5 & 17.18

- **4.3** By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university
- **5.5** Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life
- **5.c** Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels
- **9.5** Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending
- **17.18** By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts







## SAGA's ultimate objectives

**Increase the number of scientists and broaden their viewpoints so that countries can achieve the Sustainable Development Goals**

- ❖ Reduce the **gender gap in scientific and engineering fields** in all countries at all levels of education and research
- ❖ Analyse **gender related policies and indicators** and how they affect the gender balance in STEM
- ❖ Strengthen gender equality perspectives in **science policy design**



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## SAGA Expected Results

- ❖ Member States, UNESCO and others enabled to **measure the status of women and girls in science** using **sound methodologies** and **tested indicators** on gender equality in STEM and **data** included in the UIS database.
- ❖ An **updated inventory of policy instruments affecting gender equality in STEM** incorporated into the Global Observatory on Science Technology and Innovation Policy Instruments (GO→SPIN).
- ❖ A critical mass of officials in pilot countries **trained to collect data**.
- ❖ Technical Papers, including a final one of proposed **standard practices for surveys** on gender policy instruments and indicators on STEM published.



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# Project implementation

## Phase 1 2015-2016

- Research and development of tools and methodology

## Phase 2 2016-2017

- Country and regional interventions

## Phase 3 2018

- Manual and publications

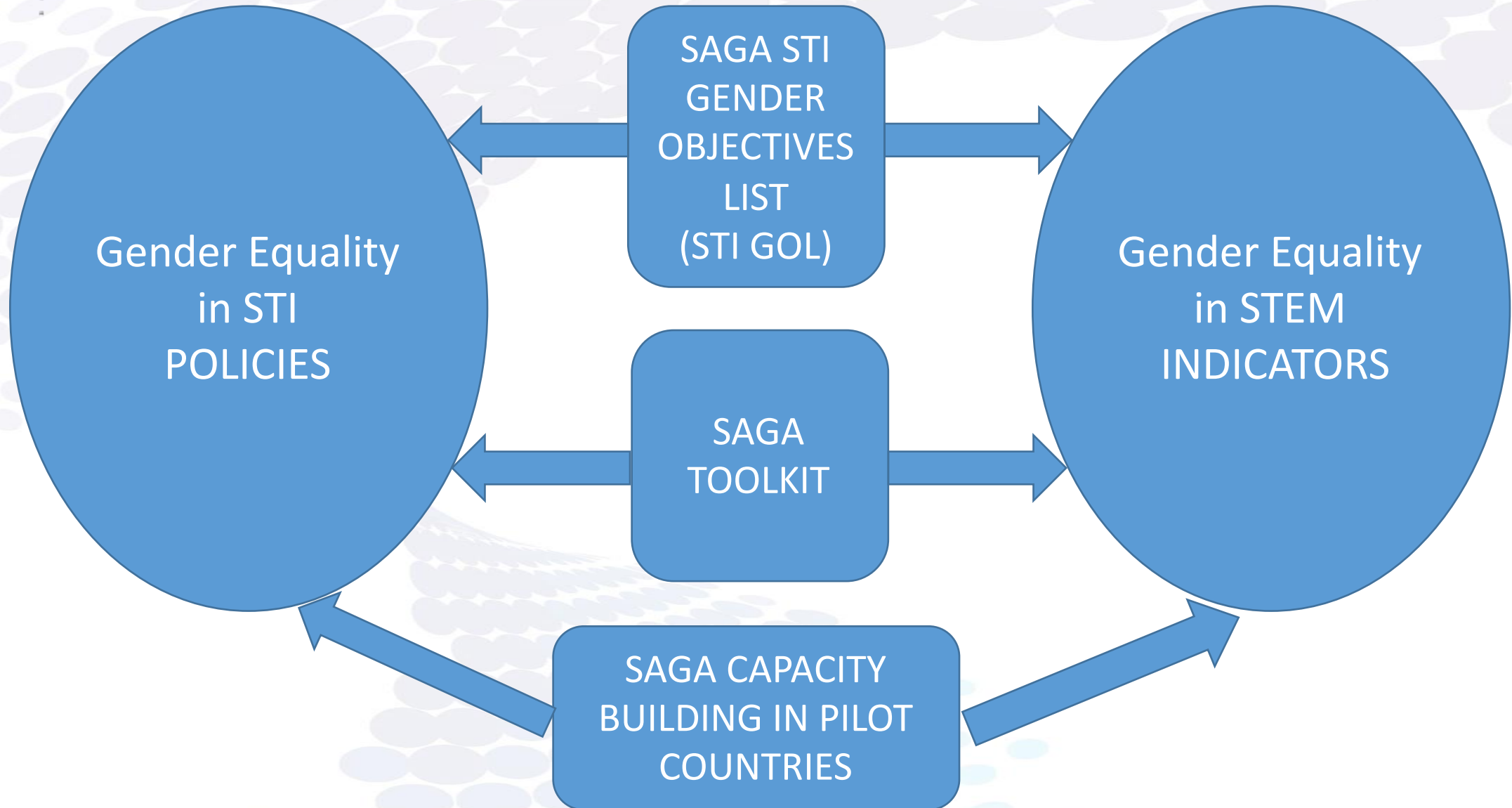
First pilot in Uruguay in September 2016. Quebec (province) starting in December. Thailand, Argentina, Jordan and other countries have also shown interest



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# Means of implementation

- ❖ **Strengthen gender equality perspectives in science policy design**
  - ❑ Providing knowledge on how to achieve gender equality in STI, including the critical steps necessary to design better STI policies focused on gender equality from different angles
  - ❑ Undertaking an inventory and gap analysis of policy instruments that affect gender equality in STI
  
- ❖ **Improve measurement of gender related indicators and how they affect the gender balance in STEM**
  - ❑ Developing new and better indicators to provide tools for evidence-based policy-making
  
- ❖ **Build capacity in Member States**



# SAGA Science, Technology and Innovation Gender Objectives List (STI GOL)

- ❖ Enables the categorization of STI policies and policy instruments, and indicators.
- ❖ Assists in identifying gaps in the STI policy mix and aims at encompassing all aspects of gender equality in STI policy making.
- ❖ Aims at encompassing all aspects of gender equality in policy making, as identified through research conducted in the framework of SAGA.
- ❖ Allows the mapping of existing indicators to gender objectives and facilitate identifying gaps.





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# 7 Gender Objectives

Social norms and  
stereotypes

Primary and  
secondary  
education

Higher education

Career  
progression

Research  
content, practice

Policy-making

Entrepreneurship  
and  
innovation



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# 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 in 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.





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## **2 – Engage girls and young women in STEM primary and secondary education, as well as in 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.



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## **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 PhD), including through specific scholarships and awards.
- 3.2 – Prevent gender bias in the student admission 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 particularly at graduate level, including Masters and PhD.
- 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.



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## 4 – Gender equality in career progression for 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:
  - Gender equality in remuneration
  - Preventing gender bias in performance evaluation criteria (including productivity measurement)
  - Adequate safety and security fieldwork
  - Sexual harassment prevention policies and procedures.
- 4.3 – Ensure gender equality in access to opportunities in the workplace:
  - Training and conferences
  - Research teams, networks (national and international), expert panels and advisory groups
  - Publications and patent applications
  - Financial and non-financial incentives
  - Recognition, rewards and awards.



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## 4 – Gender equality in career progression for scientists and engineers (S&E) (2)

4.4 – Promote work-life balance through among others:

- 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).



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## **4 – Gender equality in career progression for scientists and engineers (S&E) (3)**

- 4.7 – Promote transformations of STI institutions and organizations (structure, governance, policies, norms and values) aimed at achieving gender equality.
- 4.8 – Ensure gender equality in S&E professional certifications, in particular engineering accreditation.



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## **5 – Promote 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.



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## 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.):

- Education policy
- Higher education policy
- STI policy
- Economic policy
- Workforce policy
- SDGs / international policies



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## 6 – Promote gender equality in STEM-related policy-making

6.2 – Ensure gender mainstreaming and prioritization on gender equality in STEM-related policy design, monitoring and evaluation:

- Education policy
- Higher education policy
- STI policy
- Economic policy
- Workforce policy
- SDGs / international policies





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## **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.



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## **7 – Promote gender equality in science and technology-based entrepreneurship and innovation activities**

- 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.



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## Instrument

Extension during pre- and postnatal period and parental permission

## STI GOL Level 2

**Medium term**  
4.4 Promote work-life balance through

## STI GOL Level 1

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



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# SAGA Toolkit

- ❖ Provides countries with a set of instruments for improved measurement of gender in STEM and to support the design of better STI policies.
- ❖ Provides practical tools to monitor and evaluate gender equality and to integrate gender aspects in STI policies in a field where solid information is still lacking and analysis is frequently based primarily on anecdotal evidence.
- ❖ Establishes a new basis for evidence-based policy making, including impact assessment and policy design.





# The SAGA Toolkit

Science, Technology and Innovation  
Gender Objectives List (STI GOL)

SAGA  
Matrix

Policies

Survey of STI  
Policies and  
Instruments

Indicators

Survey of Drivers  
and Barriers to  
Careers in Science  
and Engineering

Existing data



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## For whom is the Toolkit

- All concerned with gender equality in STEM in education and S&E workforce, including:
  - National governments
  - Statistics offices
  - National science foundations
  - Policy-makers and decision-makers
  - Research institutions
  - Development agencies...

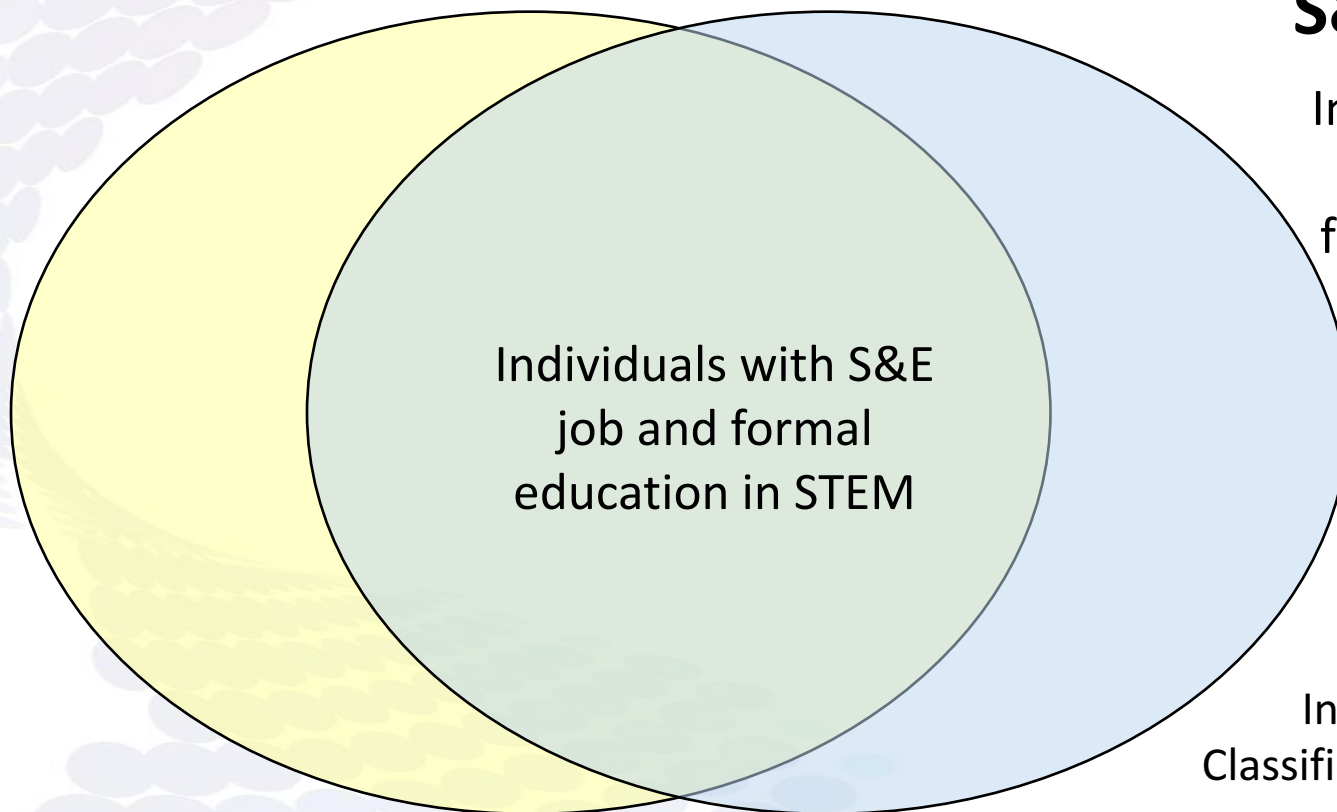


# STEM population: Definitions and classifications

## STEM education

Individuals with a formal education, training or professional experience in STEM, but not in an S&E job

International Standard  
Classification of Education  
(ISCED)



## S&E workforce

Individuals with S&E job but without a formal education in STEM

International Standard  
Classification of Occupation  
(ISCO)



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# SAGA Matrix

- ❖ Tool to help linkages between STI gender objectives and indicators, using the STI GOL as an interface.
- ❖ Each gender objective is matched with indicators to highlight the information needed for evidence in assessing gender-related STI policies.
  - The information may already be existing but not used as evidence for policies
  - It may be missing and ways of accessing the missing information are suggested.





# SAGA Matrix

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

Objectives		Policies and instruments	Indicators	Data Sources
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.	National Award for Innovation in Guatemala (unofficial translation)	Demographic distribution of scientists, educators, policy-makers, research organizations, media, public at large in all communication strategies related to STEM	<ul style="list-style-type: none"><li>• Databases of scientists</li><li>• Administrative data from Ministry of Education</li><li>• Polls and surveys of public opinion</li></ul> <b>Survey of Drivers and Barriers to Careers in S&amp;E</b> Module Attitudes and social norms



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# SAGA Instruments

- ❖ Survey of Science, Technology and Innovation Policies and Instruments
- ❖ The Survey of Drivers and Barriers to Careers in Science and Engineering
- ❖ Guidelines and methodologies for existing sources of data:
  - ❖ research and experimental development (R&D) surveys
  - ❖ surveys of formal education
  - ❖ researchers database...



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# Survey of Science, Technology and Innovation Policies and Instruments

- ❖ The survey collects information on different facets of STI policies, such as the legal and institutional framework, the policies in place, and the decisions and actions taken to promote, regulate and use STI.
- ❖ Follows the conceptual approach and methodology of the UNESCO Global Observatory of Science, Technology and Innovation Policy Instruments (GO-SPIN).
- ❖ Helps policy-makers, policy analysts and scholars to cluster policies, detect flaws in the policy mix, and establish an agenda for filling the gaps.



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# Survey of Drivers and Barriers to Careers in Science and Engineering

- ❖ Addresses the lack of knowledge by providing the tools to better understand the drivers and barriers to S&E careers and address gender equality in STEM.
- ❖ Developed closely in conjunction with the STI GOL to assist in the collection of information on drivers and barriers to careers in science and engineering (S&E).



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# Survey of Drivers and Barriers to Careers in Science and Engineering

Includes modules on the following themes:

- Education experience
- Postdoctoral experience
- Transition to workforce
- Workforce experience
- Recognition and awards
- Work-life balance
- Time use
- Career breaks
- Work policies
- Discrimination and harassment
- Attitudes and social norms
- Role models
- Funding
- Respondent's characteristics



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## Data Sources

- ❖ Research and experimental development surveys
- ❖ Surveys of formal education
- ❖ CV and researchers databases
- ❖ Academies and professional associations
- ❖ Research funding agencies
- ❖ Information on outputs such as bibliometrics and patents
- ❖ Mobility surveys
- ❖ Time use surveys
- ❖ Surveys on holders of advanced qualifications

# SAGA Advisory Committee and Partners





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**Be part of the change,  
be part of SAGA!**





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**#SAGA**

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