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Are we there yet? Academies, scientific organisations, and gender

Is the representation of women in academies and scientific organisations improving, globally? A major new study shows that among the academies, representation of women in membership has risen from 13% (for academies surveyed in 2015) to 16% (for all academies surveyed in 2020).¹ The progress is good: the level of representation is shocking. In the words of Daya Reddy, past President of the International Science Council, ‘... Societies expect more diverse gender representation in science.’²

This report, however, is a goldmine of information on gender in leading scientific organisations. The study explores the dimensions of differences across disciplines and regional variation, and provides 10 clear recommendations.

Global partnerships in science

The study was a collaboration of the Gender in Science, Innovation, Technology and Engineering (GenderInSITE), the InterAcademy Partnership (IAP), and the International Science Council (ISC), and was published in September 2021.¹ In these organisations, two surveys of gender representation among academies (in IAP and ISC) and scientific unions and global organisations (in ISC) have provided some answers to the perennial question of whether there is equitable representation and recognition of women in these senior levels of the scientific community.

IAP has a membership of about 140 academies of science. ISC brings together 40 international scientific unions and associations, and more than 140 regional and national academies and scientific organisations. Together, they work across natural, mathematical and computational sciences, social sciences and the humanities, medical and health sciences, and, in some cases, arts and law. They are apex organisations of science in the inclusive and general sense of the word, as defined by UNESCO.³ These academies, scientific unions, and global organisations uphold rationality and ethics, professional integrity, and collegiality of science. In concert, they tackle the wicked problems of the planet, because they can draw on the top intellect of the global community in climate change, in pandemics, and in sustainable development. They act through providing evidence-based scientific advice to their governments and stakeholders, at global, multilateral and national levels, and through foreseeing and defining global scientific agendas. Their day-to-day work includes providing the environment for international agreement within and across sciences, for example on the names of new elements, and endorsement of the definition of the kilogram.^{4,5}

The fair representation of women in these functions is essential. The principle of universality in science⁶ links the free and responsible practice of science with equitable opportunities for access to science, and firmly opposes discrimination based on factors such as ethnic origin, religion, citizenship, language, political or other opinion, disability, and age, as well as sex, gender identity and sexual orientation. More recently, attention has also been focused on the intersectionality between these dimensions. This report specifically focuses on the situation of women, in terms of Sustainable Development Goal 5. At this point, it would be wise to say that the word ‘we’ will be used in this article for scientists and academicians of any gender, and is intended to be inclusive. Thus, ‘we’ – specifically including men – should benefit from improvement in our professional practices designed to foster the progression of women. Achieving that aim is a joint project.

The surveys were carried out by GenderInSITE (Gender In Science, Innovation, Technology and Engineering) – an international organisation promoting the role of women. It has a track record of finding deeper insights into science, more effective programmes, and more sustainable outcomes.

The methodology of the surveys was straightforward and simple, and facts were collected from 85 academies and 38 scientific unions and organisations. Comparisons were made for those academies included in the preceding IAP survey of 2015⁷, performed by the Academy of Science of South Africa (ASSAf). This short Commentary cites only a shop window of results.

Academies

The total number of academies surveyed was 215. The number providing usable responses was 85. For all senior academies in this new report, the representation of women as members in 2020 was 16% (Figure 1).

Figure 2 shows the distribution of women’s share of membership. Among the senior academies, only Cuba, Belgium, and Venezuela host academies with more than 30% women members. In ASSAf, 27% of members are women (Figure 1); elections in 2021 are likely to have increased this number. The lowest memberships of women, below 5%, are found in academies hosted in Mongolia, Brazil (medicine), the Islamic Republic of Iran, and the Republic of Korea. Women’s share of membership is at or below 10% in 19 academies (Figure 1).

Why are these fractions so low, in view of the fact that academies are top-level organisations, setting trends for the world? We might ask if the selection pool is adequate. It will immediately be noticed from Figure 2 that 10 of the young academies are near parity (45% to 55%). The South African Young Academy of Science is at the top of the list of all academies at 57%. A recommendation of the report is that senior academies can benefit by paying attention to the achievements of the younger academies. Do young academies provide a stream of bright scientists to the more elderly academies? If we compare the absolute numbers of members, in Figure 2, we observe that the

numbers of members in young academies is small enough to warrant a great deal of investment if they are to make a difference in national academy membership.

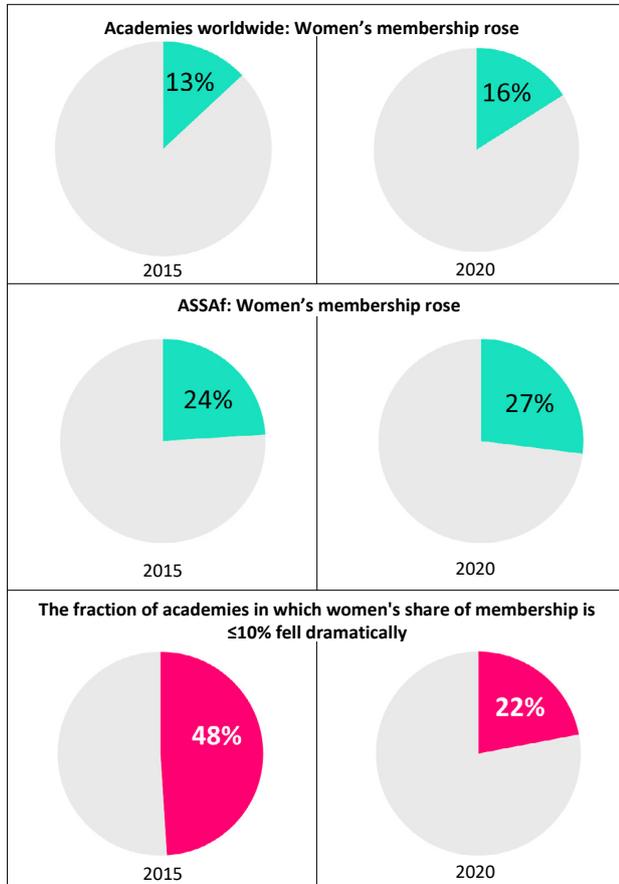


Figure 1: Representation of women in academy membership. Figures are calculated for participants in each survey, in 2020¹ and 2015⁷.

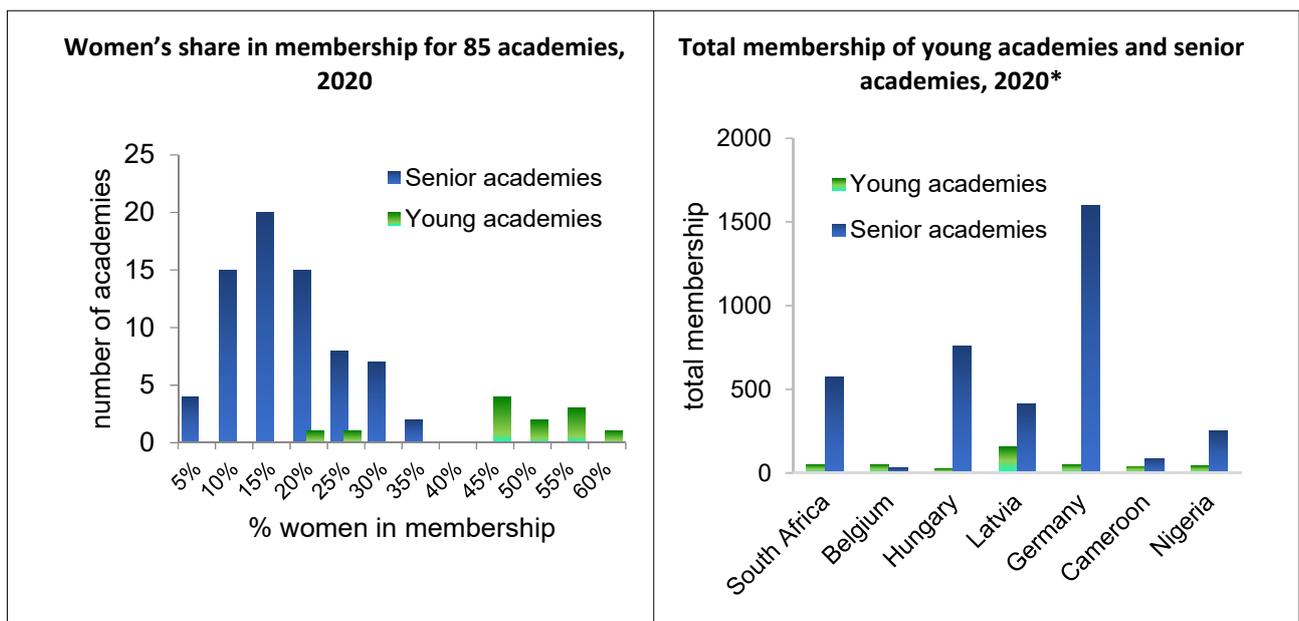
A second possible reason for large gender gaps may be inaction by academies on gender issues. Of the 215 academy members of IAP and ISC, only 85 returned unique usable responses. Then, in an inspired question in the 2020 survey, GenderInSITE enquired of participants in the first survey of 2015 whether they had read or acted upon that survey report. Only 4 of the 20 respondents indicated that they took any action to implement any of the four recommendations made in that report: collecting and analysing gender disaggregated data, publishing those data in their annual report, reporting on the gender dimensions of IAP's activities, and providing permanent organisational structures for strategic direction on gender mainstreaming (Figure 3). This could be due to their assessment that they did not need to take any new actions.

Thirdly, we note that women are lost from scientific careers at a higher rate than men. Both men and women face serious obstacles in science; both overcome barriers and make real impact. There are, however, disadvantages affecting women in almost every aspect of a career in science, as was demonstrated in the Gender Gap project sponsored by ISC, eight scientific unions, GenderInSITE, the Organization for Women in Science for the Developing World (OWSD) and UNESCO over the years 2017–2020.⁸ Women report that they are treated with less respect than men, and have access to fewer facilities and opportunities. Gender gaps that may appear minor at first glance tend to compound over the years, in a process of cumulative disadvantage for women.⁹

A data-backed analysis of gender patterns in publication usefully quantified attrition rates in the production of papers. Using automated gender inference¹⁰ on a comprehensive mathematical publication database, authorships could be tracked over time. For mathematicians, the attrition rates were about 5% higher, over a 10-year period, for women than for men.⁸ There is a significant gender gap in publication, with an impact on promotion and grant success.⁸

These factors are likely to leave the academies in a position in which the selection pool contains significantly fewer women than men.

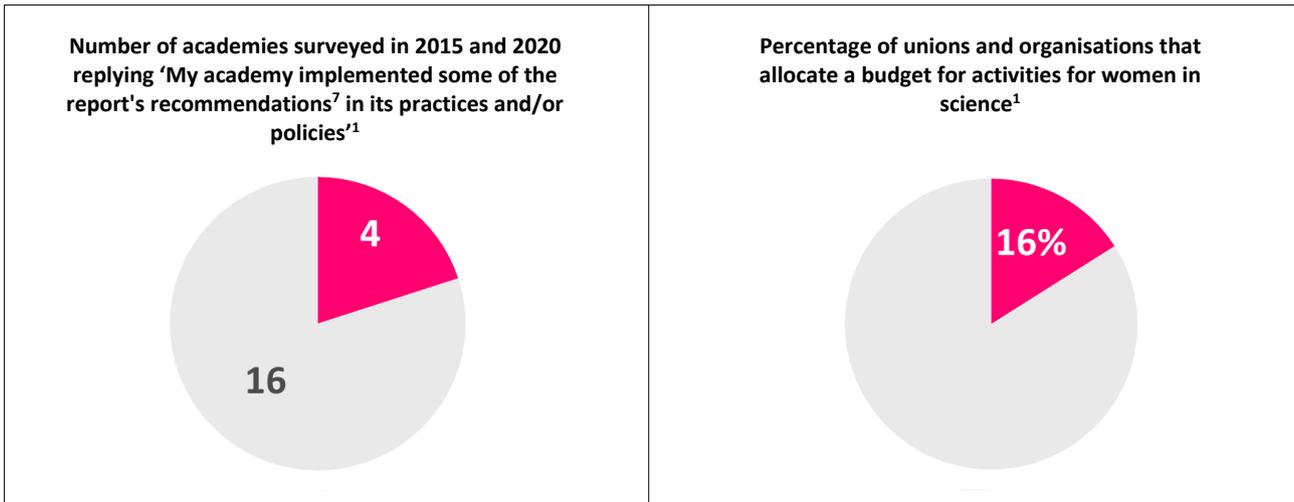
A fourth point: in academy elections, are we encountering conscious or unconscious bias (among both women and men), possibly compounded by cumbersome election mechanisms, where it is easier to vote for well-known colleagues than to make the effort to assess accomplishments? Perceptions of brilliance connected to gender are known to influence career choices¹¹ and might possibly influence elections.



*Some countries host more than one senior academy; only one for each country is used for illustration here.

Data source: 'Results of two global surveys'¹.

Figure 2: Can young academies change the pipeline?



Data source: 'Results of two global surveys'¹.

Figure 3: Two indications of actions.

The Academy of Sciences in Cuba pointed out that without continued work, "there exists the possibility of moving backward if we don't keep the activism and underlining gender issues in the internal life of the academy"¹¹. How is merit judged by voting members in a population in which measures of excellence have been defined to suit a historically dominant population? For women, presentation of selected top papers is likely to be a better indicator of excellence than a count of published papers.¹²

Hope is provided by Ngila et al.¹³:

Science academies are well placed to contribute towards strengthening of national systems of innovation through advocating for an increased participation of girls and women in science. To successfully do so, academies would need to overcome challenges faced with regard to women's representation in their own ranks and women's resultant full participation in the activities of national science academies.

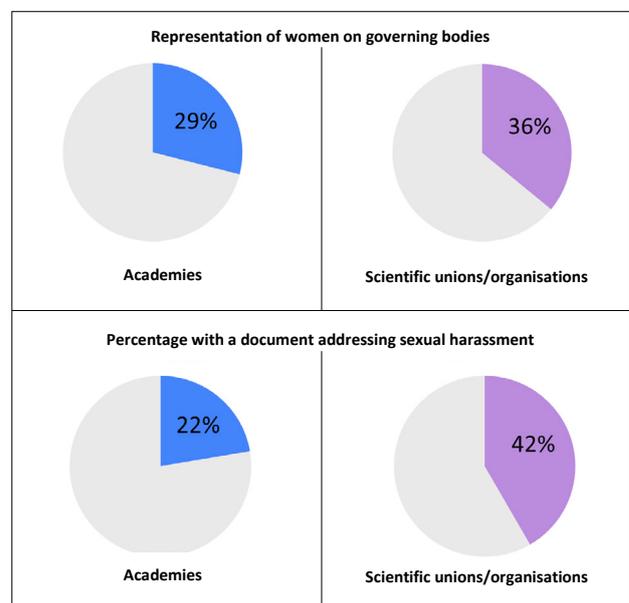
Unions and scientific organisations

Of the 38 disciplinary unions and associations surveyed, about half have only countries as members. Membership could not be surveyed as thoroughly as among academies, and the results for disciplinary unions and scientific organisations are discussed in comparisons below. These organisations have membership and strategic mechanisms different from those of academies.

Leadership of leadership

Academies and scientific organisations have had more success in reaching for gender parity in their leadership. Women are presidents or co-chairs of 21% of academies, and 37% of unions and scientific organisations. Representation on governing bodies is considerably higher than the membership averages (Figure 4) and the percentage of women in the governing bodies in unions and associations ranges from 67% in the social sciences to 24% for physical and natural sciences.

It is worth noting that *both* men and women in presidential or chairing positions exercise a surprisingly large degree of influence in setting a course for inclusion and diversity in strategy and membership, and eradicating systemic bias. A leader who shirks the responsibility for universality is able to bring the entire organisation to a halt, not only in terms of gender, but in terms of racial diversity, intersectionality, and the dimensions of fairness, respect, and integrity.



Data source: 'Results of two global surveys'¹.

Figure 4: Leadership and a sample of policy documentation.

Budget

The painful experience of gender champions is that very little is accomplished without a budget. Among disciplinary unions and associations, 16% allocate a budget to implement activities related to gender equality (Figure 3). In the International Union of Pure and Applied Physics (IUPAP), the largest single allocation to a Commission or Working Group is that for Women in Physics. This ensures anchor funding for major events, and provides women with conference travel grants. 'Technology grants' were introduced in 2020 to enable women in developing countries to fund data and set up connectivity to attend virtual conferences.

Sexual harassment

The ISC Gender Gap Global Survey⁸, to which there were 32 346 respondents from 159 countries, provides clear evidence concerning sexual harassment in the careers of women. Those that indicated that they had personally experienced sexual harassment at school or work were approximately 25% of women and approximately 4% of men, with some variation across disciplines and regions. Sexual harassment cannot be tolerated. Major scientific organisations do have a role to play,



through their policies, statements, ethics, and their expectations of their member organisations. The apex organisations have the power to set the example for the scientific community.

However, few academies, but more unions and organisations, have a document that addresses sexual harassment in the workplace (Figure 4). These policies sometimes include a Code of Conduct, or a policy for conferences, but action in a case is usually a harrowing process for all involved. Building strong culture and science identity within a discipline is an essential task of academies and unions to prevent unacceptable behaviour and provide a safe, welcoming, and inclusive environment.

Disciplines and regions

The report provides a useful comparison across disciplines and regions. It is not unexpected that the largest representation of women is found in biological and social sciences, with computer and mathematical sciences trailing – but this fact in itself should lead us to investigate the contrasts in environments and career choices, to learn what is working so effectively. As observed in the participant feedback in the report, ‘Global comparisons present the current status, and the relevant evidence has the potential to prompt both established and new academies into action’¹. The unions emphasised that regional action is essential.

Working in concert

Survey methodologies fit together in a jigsaw. The UNESCO SAGA (STEM and Gender Advancement) structure for measuring gender equality¹⁴ is an outstanding framework and similar to that used in this report. Other methodologies provide interlocking reading matter. The Global Survey of mathematical, computing, and natural scientists used a snowball sampling method through ISC disciplinary unions and associations to shed light on *what* obstacles and successes are encountered by both men and women.⁸ The data-backed study of patterns in publication provides profound insight through automated gender inference for millions of papers and preprints.^{8,10} Conceptual structure, based on the SAGA Gender Objectives List¹⁵, was developed and tested, and was used to research and produce a database of evaluated interventions⁸.

Many academies and organisations have cooperative links with OWSD, TWAS (The World Academy of Science), UNESCO, GenderInSITE, and their regional umbrellas such as the Network of African Science Academies (NASAC). Many celebrate 11 February, the International Day of Women and Girls in Science. The Standing Committee on Gender Equality in Science was formed in 2021, and works across scientific unions and associations.

Foresight

Why is it that, when initiatives to empower women in science come to an end, the situation often snaps back to the way it was originally? I have often asked the question of my colleagues in a spirit of inquiry. The reply which appears to hold the key is: ‘Because the underlying culture has not changed.’ We have had a startling illustration of this answer with the effect of the pandemic on the careers of academic women in South Africa¹⁶, and we may well be facing disastrous consequences for equality in years to come.

This study¹⁶ shows that, during the COVID-19 pandemic, a third of women surveyed reported making no progress towards a significant academic product, and 95% with toddlers indicated that childcare had a high impact on their work. Of competing household chores with highest impact, 44% indicated childcare and 43% schoolwork. Universities are called on to acknowledge this potential problem, and to adjust the timelines in the appointment and advancement of female academics.¹⁶

Are we there yet?

No, we are not there yet. There has, however, been encouraging, measurable improvement. Some organisations are attaining parity in membership, notably young academies. Their practices lead the way: recommendation 9 suggests, for example, that senior academies would do well to learn from the practices of young academies.

It is discouraging to note that 19 academies have women’s share of membership at or below 10%, and that of 215 academies, only 85 responded.¹ It is a not-unexpected observation that useful reports are not read, still more that no action is taken – unless, of course, no action was necessary, a proposition that awaits investigation within the data that have been presented.

The President of ISC, Peter Gluckman, comments:

This survey confirms what many of us suspected. The number of science organisations systematically monitoring progress on gender equality remains low and must be extended. The report also highlights insufficient knowledge about action on gender equality in science institutions around the world. Large umbrella organisations like the ISC and the IAP have a responsibility to ensure that we, as a global scientific community, assess progress and exchange of information about policies that work in different contexts. I hope that what we have now started with our membership will continue and inspire other organisations.

Final word

As a source of potential actions, this report is outstanding. It provides a route map through which organisations and academies can locate and refer to each other’s documents and charters – the appendices are particularly rich and useful in this respect for any organisation that is seeking tested interventions. It is a good handbook for comparison between disciplines, regions and organisational structures. Reporting across countries and regions prompts introspection and possibly action. This report should be read, and its recommendations (see Box) should be considered at a strategic level.

The gender lens should be applied by all leaders of academies, scientific unions, and global organisations, to fulfil their mandate and take a stand for humanity in science, as well as science for humanity. The anticipated setback associated with COVID-19 challenges in the careers of women will need both acknowledgement and action.

Recommendations	
Each of these thumbnail headings is fully explained in the source report ¹ .	
1.	Extension of survey
2.	Analysis of gender-related organisational policy, structure and actions
3.	Development of a central repository
4.	Incorporation of regional considerations
5.	Advancing women to leadership positions
6.	Consideration of diversity and inclusivity
7.	Analysis of discipline-based gender transformation
8.	Establishment of monitoring and evaluation frameworks
9.	Identification of lessons from young academies
10.	Shift from a focus on ‘numbers’ to institutional and knowledge transformation
A recommendation within the present Commentary: read the report.	

Acknowledgement

Data from the ‘Results of two global surveys’¹ were published under a CC BY 4.0 licence and have been used to construct the figures in this Commentary.



Competing interests

I have no competing interests to declare.

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