

Catalyzing connections, strengthening networks to improve the experiences and numbers of women in science

Global Forum on Women in Scientific Research

July 18–19, 2019 | Dakar, Senegal

2019



Catalyzing connections, strengthening networks to improve the experiences and numbers of women in science: Global Forum on Women in Scientific Research, July 18–19, 2019, Dakar, Senegal

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Contents

Acronyms	iv
Executive summary	v
Introduction	v
Why participation of women in science is low	vi
What is working for the advancement of women in science	vi
What the actors in science could do improve women’s participation in science	vii
Conclusion.....	viii
Global Forum on Women in Scientific Research 2019.....	1
Opening remarks.....	1
How the Partnership for skills in Applied Science, Engineering and Technology’s Regional Scholarship and Innovation Fund (RSIF) is widening the pipeline of women in science	2
Keynote speech: Fixing the leaky pipeline in science: What are the headwinds and the tailwinds? Which way now?.....	3
Official opening	3
How can Africa step up to increase the number of women scientists across the continent?	4
Making science more inclusive	5
Charting a course: what does the journey of building a successful science look like?.....	6
What can and should research institutions and funders do differently to support women scientists to build successful careers?	8
Why so few female PhDs? Designing a research approach to understand the international STEM shortage	9
Designing effective mentoring programs: a conversation with mentors, mentees and mentoring coordinators	10
What drives gender inequities in scientific career progression in Africa?	13
Moving beyond individual empowerment to institutional engagement.....	13
Lessons from institutions’ interventions to increase the number and experiences of female researchers.....	14
The Global Research Council: Promoting the equality and status of women in research	15
Practical approaches toward increasing the number of women leading research and managing research funding	16
How are the African science granting councils supporting gender equality and women in STEM?.....	18
What inhibits women’s participation in STEM in Africa? A presentation and validation of a study funded by the International AIDS Vaccine Initiative (IAVI)	19
Gender dimension of global scientific leadership.....	20
Closing remarks.....	20
Annex 1: Program.....	22
Thursday, July 18, 2019.....	22
Friday, July 19, 2019.....	23

Acronyms

AAS	African Academy of Sciences
AfDB	African Development Bank
ASET	Applied science, engineering and technology
AWARD	African Women in Agricultural Research and Development
DELTAS	Developing Excellence in Leadership, Training and Science
DfID	Department for International Development of the United Kingdom
GoFoWiSeR	Global Forum on Women in Scientific Research
GRC	Global Research Council
Icipe	International Center of Insect Physiology and Ecology
ICT	Information and communication technology
IDRC	International Development Research Centre
IFPRI	International Food Policy Research Institute
LRP	Liverpool School of Tropical Medicine's Learning Research Programme
NM-AIST	Nelson Mandela African Institute of Science and Technology
NRF	National Research Foundation, South Africa
OWSD	Organization for Women in Science for the Developing World
PASET	Partnership for skills in Applied Science, Engineering and Technology
RSIF	Regional Scholarship and Innovation Fund
SADC	Southern Africa Development Community
STEM	Science, technology, engineering and mathematics
STI	Science, technology and innovation
UKRI	UK Research and Innovation

Executive summary

Introduction

Globally, the levels of women in science, technology, engineering and mathematics (STEM) professions are very low and are estimated at less than 30%.¹ Besides the human rights issues associated with equity and the need to maximize human potential for development, the dearth of women in science has consequences, particularly in the conduct of science and the fittingness of its products. For example, exclusion of women researchers from science experiments could mean that factors and experiences that are unique to women may be left out in the design and execution of such experiments, biasing the emanating results or innovations. These are some of the concerns driving the momentum to pay attention to the low numbers of women in science.

Various efforts are underway among development actors, research institutions, research funders and governments to address the problem. The Global Forum on Women in Scientific Research (GoFoWiSeR) provides a platform for such actors. GoFoWiSeR brings together leaders of research institutions, research funders, female scientists and other stakeholders to learn from the progress made to expand the pool of women in science, identify gaps and come up with strategies for improving the experiences and increasing the numbers of women and in science. GoFoWiSeR's second convening, held July 18–19, 2019 in Dakar, Senegal, was supported by a consortium led by African Women in Agricultural Research and Development (AWARD) and included The African Academy of Sciences (The AAS), UK Research and Innovation (UKRI), the UK Department of International Development (DfID) East Africa Research Hub, the Carnegie Corporation of New York, the Regional Scholarship and Innovation Fund of the Partnership for Skills in Applied Sciences, Engineering and Technology (PASET), Canada's International Development Research Centre (IDRC), and South Africa's National Research Foundation (NRF).

The convening brought together 302 participants from 29 countries from Africa, Europe and the United States of America, who included leaders of research institutions, research funders, female scientists and other system actors. The forum sought to catalyze new connections and strengthen the network of actors and advocates involved in promoting women's involvement in STEM. Three major themes were addressed:

- investing in women's skills and networks
- equitable career pathways
- role of institutions and research funders in addressing systemic inequality

The Forum featured 32 speakers, whose professional life ranged from early career scientists to a recipient of the Nobel Prize for chemistry. The modalities involved plenary presentations, expert panels and breakout sessions. In general, the presentations and discussions dealt with the factors behind the paucity of women in science professions, what was working in favor of women's advancement in those professions and what the different actors could do to push the momentum for the participation of women in science in bigger numbers. This report contains summaries of the presentations at the Forum; visit https://www.slideshare.net/AWARDFellowships/edit_my_uploads for the full versions.

¹ UNESCO Institute for statistics. Women in science (<http://uis.unesco.org/en/topic/women-science>, accessed August 28, 2019).

Why participation of women in science is low

Women's absence in science professions has its origins in individual, societal and institutional factors. Individual drivers are particularly important at the higher education levels and in the work environment in research institutions, where personality traits such as a good work ethic, self-motivation and the courage to step out of one's comfort zone are key determinants of success. High professional integrity will earn the scientist credibility and may serve to insulate her against power politics. People skills also are an essential asset, particularly in handling institutional power politics. According respect to the powers in authority and being in good terms with them can open doors for the woman scientist and earn her their support for her work. How a woman scientist handles conflict could be a source of respect from her colleagues or could put her on a collision course with the management of her institution, with grave implications for her career.

Culturally defined roles and expectations tend to limit women's participation in science. This is particularly true in Africa, where many girls grow up in environments where their role is defined by their childbearing responsibilities and boys are favored in allocation of schooling resources. Messages to the effect that acquiring a PhD would make a woman unmarriageable or that a woman would be violating cultural norms if she left her family to pursue a PhD out of her country have been cited as a reason for women dropping out of their science studies. And family considerations pose difficulties in the recruitment or retention of women scientists at the higher education levels. Other societal factors have to do with the lack of support for education of girls and absence of political commitment to develop and implement policies supporting women in science.

Policies and practices in education institutions constitute important factors in the low numbers of women in science. Firstly, the theoretical approach to the teaching of science subjects at the school entry levels serves to alienate girls, who perform best in experiential learning environments and where science is linked to everyday life. Secondly, there is widespread lack of policies that cater for women's lifestyle needs. For example, the absence of structures that recognize and support women's childbearing role by providing child care facilities at the workplace and the lack of programs to encourage women scientists to resume their careers after taking a break to start a family contribute to their departure from the science profession. Thirdly, the absence of resources and support systems such as mentoring programs and networking frameworks leaves young scientists without a crucial growth resource. Fourthly, there is an acute lack of resources such as laboratory equipment, adequate funding to support families and appropriate accommodation facilities. And fifthly, stereotypes, gender biases and inadequate systems for dealing with sexual harassment affect the work environment in which women scientists operate and are an aspect in women's departure from science careers.

What is working for the advancement of women in science

The initiatives that have been successful in enhancing the participation of women in science target the tackling of the pertinent barriers. Mentoring programs such as those run by AWARD and The AAS mostly address individual factors and could determine whether or not a young woman stays in her science career. Interventions by research and higher education institutions have included introducing flexibility in PhD programs to accommodate women's lifestyles and providing funding for women to take along their young children and caregivers when they are required to leave their home country for PhD studies.

What the actors in science could do improve women's participation in science

The individual scientist, the society, lower level learning institutions, research institutions, research funders and professional societies, which are the main actors in the field of science, all have a role to play in ensuring inclusivity in science careers. The scientist needs to define her career path early and to be creative in finding the resources she needs and in problem solving. In the interconnected world in which we live today, opportunities are boundless for the acquisition of resources that are not available in a female scientist's home institution, such as connecting with mentors and others in similar research areas or accessing literature or funding.

The part the lower level learning institutions play in preparing girls for science careers is influenced by cultural and societal factors, for example the role the culture allocates to women and girls and attitudes to girls' education. Government policies encouraging access of girls to science education and defining science teaching approaches to suit how girls learn best are needed. Dealing early with stereotypes associated with science subjects will be necessary to eliminate barriers that prevent girls from pursuing science subjects at university and other higher learning institutions.

In research institutions, work environments that cater for the work and life aspects of a female scientist, such as flexible work arrangements and modification of the study period to accommodate women's family obligations, will have a big impact on the success of women scientists. Funding will need to accommodate family needs while ensuring that women and men receive and manage similar budgets. Adequate senior postdoctoral fellowships are needed to help women continue with their studies after they have had to break from school to have families. Access to professional and personal support systems such as adequately designed, run and resourced mentoring programs is critical. Education programs on stereotypes and gender biases are essential as are effective policies and structures to address sexual harassment. To grow junior researchers will require providing them funding support, leadership and research opportunities and placements in key institutions. In addition, it will be necessary to facilitate their membership in professional associations and networks of female scientists.

How funding institutions choose the research they support and the partners they work with can help influence women's representation in science, as well as shape institutional culture. Funding institutions have the power and the tools to level the playing field so that women can compete for research funding, by developing guidelines that favor women's advancement in science and that require that the research they support meet equality and equity criteria. They can work to ensure that women's lifestyle considerations are accommodated in the planning of the research, and they can choose to have a role in determining who will manage the grant to ensure that it goes to the intended research.

Science professional societies, more than any other group, have an obligation to ensure inclusiveness in science professions, because they represent the epitome of scientific professionalism. Their members look to them for leadership and education on current trends and expect them to be examples in not only how their leadership structures are organized but also in the content of their education material. Besides that, they can be on the frontline of ensuring that distinguished women scientists are honored and of instituting affirmative action

to promote women's participation in science. For example, they could extend free membership to young female scientists from the global south, create special awards programs for younger women scientists, and facilitate mentoring relationships and exchange programs.

Conclusion

Improving the experiences and numbers of women in science will require each country to work with representatives of all science actors from the lower levels of education to the advanced research levels to define a holistic approach that will address the deep-rooted inequities in science representation. Some baby steps have been taken. What remains now is to adopt the good practices at a wider scale and address the remaining challenges by harnessing the learnings from GoFoWiSeR2019 along with other knowledge.

Global Forum on Women in Scientific Research 2019

Opening remarks

Dr Wanjiru Kamau-Rutenberg, AWARD Director

The issue of women dropping out of scientific research careers is global and the patterns are similar worldwide. Only 3% of women scientists make it to the top echelons of their professions. The universality of the problem presents opportunities for cross-cultural learning and for catalyzing collaboration to find answers. This Forum provides an excellent opportunity for cross-learning, partnership formation, and sharing of experiences so that time and effort are not expended in doing what has already been done.

Since its inception in 2008, African Women in Agricultural Research and Development (AWARD) has worked to strengthen the research and leadership skills of African women in agricultural science to empower them for success in their careers. In that decade, AWARD has found the efficacy of its empowerment model to be dependent on treating gender responsiveness as an ecosystem-wide process. Investing in women alone is not adequate as the challenges to their empowerment are systemic, and often even qualified women scientists do not rise in their science careers or they drop off. For research funders, it is important that their funding reaches equal numbers of men and women and that the grants managed by women and men be of similar size. Research institutions need to adapt to the changing social norms, e.g. to the trend that more and more men are getting involved in care work in their homes.

It is important to recognize that fixing research institutions for women scientists does not mean that only women will gain; it means that equity benefits will accrue to everyone. This is the kind of conversation that this GoFoWiSeR gathering is envisioned to engender, besides serving as a platform for cross-cultural and cross-locational sharing of information on lessons and best practices.

Professor Nelson Torto, The AAS Executive Director

The African Academy of Sciences (The AAS) works with partners such as AWARD in its efforts to support women to excel in science. Its approach regards excellence in science as the foremost criterion in selecting the scientists to support. However, The AAS has specific initiatives that serve to benefit women scientists, including:

- fostering the nomination of female scientists to the Academy
- honoring women who have distinguished themselves in science
- granting honorary membership to the Academy as a way of inspiring younger women
- hosting an affiliates program for women under 40 to encourage them to recognize the value of research, and for mentorship, as a way of linking them with senior scientists
- providing think tank and advisory services to governments to address issues relating to girls, as a way of ensuring that appropriate school policies are developed and implemented
- adopting an expanded definition of science, i.e. that science is linked to the endeavors of humans, and recognizing that arts also are science
- ensuring that girls associate The AAS work with humanity, recognizing that science that is disassociated from human activity cannot deliver sustainability

- ensuring that as many women as possible are involved in the postdoctoral programs so that they can grow their careers
- improving the research environment, research management and social environment so that women can focus on their research
- providing an open access publishing platform for sharing and exchanging scientific information

How the Partnership for skills in Applied Science, Engineering and Technology's Regional Scholarship and Innovation Fund (RSIF) is widening the pipeline of women in science

Dr Moses Osiru, icipe

The Partnership for Skills in Applied Science, Engineering and Technology (PASET) currently has the governments of Côte d'Ivoire, Ethiopia, Kenya, Rwanda and Senegal as its African members. The Regional Scholarship and Innovation Fund (RSIF) is the flagship program of PASET. It aims to support member countries to build a skilled labor force through (1) creating a stock of highly skilled scientists, professionals and innovators in ASET areas, (2) identifying and nurturing young talented Africans to further their studies in ASET fields where expertise is needed the most, (3) addressing imbalances in the number of women and disadvantaged groups in ASET fields in Africa, and (4) building African university capacity to provide relevant ASET training and to ensure continued investment in scaling up ASET education and workforce. These goals are achieved through scholarships, research grants for scientists and innovation funds. RSIF is developing a gender strategy to tackle women's underrepresentation in ASET fields in Africa.

RSIF encounters various challenges in recruiting women, including difficulties in reaching them, particularly disadvantaged groups, whose numbers are low in higher education; few women applying for funding; childbearing and family responsibilities that affect women's participation in postgraduate studies; personal and cultural factors that hinder women from pursuing postgraduate studies; and women's lack of access to scholarship calls or advertisements. The difficulties relating to retention of women in the programs include personal factors such as family considerations, and institutional factors such as lack of or inadequate mentorship programs, funding, accommodation facilities, university support systems, and mechanisms to address gender-based concerns such as sexual harassment.

The RSIF strategy under development identifies the following as the actions necessary to help women enter, remain and excel in ASET fields:

- tackle the pre-university barriers, including rebranding courses to dispel gendered myths and stereotypes
- ensure men and women receive and manage similar budgets, and provide budgets to cover families
- increase opportunities for women to enter into science by investing in training, targeting messages that encourage women; flexible programs; and a quota system to have equal numbers of men and women
- ensure educational material is gender sensitive, looking at the research itself not the people
- monitor what is happening, as a part of institutional learning
- integrate gender issues into the broader university discussion on reforming universities and building capacities

- create partnerships with key gender and international institutions to host scholars
- expand the research agenda to respond to gender specific needs, for example issues relating to women farmers

Keynote speech: Fixing the leaky pipeline in science: What are the headwinds and the tailwinds? Which way now?

Professor Yaye Kène Gassama, Chair, Africa Union's High-Level African Panel on Emerging Technologies (APET)

Increasing the critical mass of women scientists means maximizing human potential and creating a more prosperous and gender equal society. In the current age, where technologies define and shape not only how we live and interact but also our future, it is important for women to have their own understanding of technologies and the associated challenges. This means that women need to be included in the generation of innovations. The benefits associated with inclusiveness in access to science, technology and innovation include positive, equitable and sustainable development, better performing economies, and sustainable growth and prosperity driven by knowledge. There are deficiencies in the way science is taught that render it ineffective in delivering these benefits and make it unappealing to girls. For instance:

- Its approach is theoretical and lacks connection with everyday life, questioning, documentation, experimentation or discussion.
- It is not directed at solving current problems; for example, women in rural areas, who mostly are entrepreneurs, deal directly with the consequences of climate change and they would benefit from relevant vocational training as a strategy to include them in economic production.
- It does not foster ingenuity, which is what is needed to tackle the challenges of climate change and social inequality and ensure sustainable development.
- It does not connect the learners with the opportunities that technologies are opening in agriculture, service provision, etc. and which young girls need to be encouraged to get involved in to create new niches in the global production chains.

For African countries to partake in the technological revolution, their governments need to adopt strategies that develop appropriate skills through education, research and data infrastructure, and sound regulation policies. Women's engagement with technology must be assured and they need support to make their voices heard. Women also need to stay committed to and engaged in science to develop indigenous scientific capacity and to continue to advocate for scientific evidence, which is the only way to deal with uncertainty. Women in science need to contribute to the future thinking in Africa.

Official opening

Professor N. Coumba Toure Kane, Representative of the Honorable Cheikh Oumar Hanne, Minister for Higher Education, Research and Innovation of Senegal

The Minister's speech expressed his and the Government of Senegal's commitment to the realization of GoFoWiSeR's goal of ensuring inclusion of women in science professions, highlighted the reasons why this was necessary for sustainable development, and pointed to the actions his country was taking to accomplish that goal.

Senegal considers science to be at the heart of its growth and recognizes that it cannot achieve sustainable development without an education system that fosters scientific research that addresses human needs. The current situation in regard to women in science is discouraging, though. Like elsewhere in Africa, in Senegal women are still poorly represented in science, particularly in the faculties of science and technology at university, where they constitute only 13% of the staff, and at decision-making levels. The acknowledgement that the mobilization of all human resources in the science domain is fundamental to future development needs to be translated into action, for sustainable change cannot be achieved without the inclusion of 50% of the population. Science generates knowledge, and for women to attain equality they must have equal access to science. Women can be said to be innate scientists and entrepreneurs. Most of the tasks regarded as women's work have scientific elements, e.g. preparing food. Failing to provide women access to scientific knowledge will incapacitate their creativity and limit their role as agents of change. Sustainable development cannot be pursued without the potential, competence and ideas of half of the world's population. Equal access to scientific knowledge and technology must be considered as determinant of equality and equity. Fostering inclusion of women in science will require providing young scientists and girls access to role models or mentors, the most critical factor in women's recruitment and retention in science professions. Mentors will guide the young women scientists in their science career journey.

Among the initiatives promoting women's advancement in science is the L'Oréal-UNESCO for Women in Science Programme that provides awards recognizing the scientific accomplishments of outstanding women researchers in the life sciences from Africa and the Arab States, Asia-Pacific, Europe, Latin America and North America. Senegal's contribution to the efforts to increase the numbers of women in science was the creation in 2013 of the *Projet d'appui à la promotion des enseignantes-chercheuses du Sénégal (PAPES – Support for Teachers and Researchers of Senegal project)*, whose objectives are to support career growth of young scientists and promote women in science research.

How can Africa step up to increase the number of women scientists across the continent?

Mrs Oley Lucretia Clara Dibba-Wadda, AfDB

Participation of women in science in Africa faces major barriers, emanating particularly from the weak economic state in which women are the disproportionately affected by low income and poverty. In addition, women confront gender-based discrimination, where they are hardly encouraged to pursue science; high dropout rates in science education and careers; cultural barriers; restricted access to education; poor learning outcomes; and lack of recognition of the importance of their participation in STEM and innovation. Tackling these challenges requires reframing the approach so that these core concerns and the policy ecosystems guiding gender equality become the focus; increasing gender-oriented resources in science education; and expanding partnerships.

The African Development Bank (AfDB) is committed to catalyzing the involvement of girls and women in science to build their capacities to participate in Africa's transformation, and has taken several concrete steps, including:

- increasing investments in STEM and science, technology and innovation (STI), focusing on increasing the number of women scientists across the continent
- promoting science policy dialogs
- helping to improve national and regional policy to promote the support of scientists

- developing a higher education science and technology strategy, which supports linking higher education, science and technology to the productive sector
- working with partners to support innovations
- running human capital development projects for the production of science innovations, with a special focus on girls, such as the Science Technology and Skills Development project in Rwanda, where 190 girls have been supported with ICT training at the tertiary level
- supporting science teaching, for example through initiatives such as the Tanzania technical and vocational education and training program that has trained 8000 science and mathematics teachers, most of them women, and by expanding the use of ICT in instruction
- promoting the use of ICT as a channel for education delivery to allow more women access to knowledge and skills sharing and exchange to practically address real-life situations in Africa
- training youths in Côte d'Ivoire, Kenya, Nigeria, Rwanda and Senegal in ICT and digital skills through the Coding for Employment flagship initiative to equip them for digital innovation skills. Out of the 2000 trained so far 40% have been women
- facilitating skill building for employment and community development

Making science more inclusive

Professor Martin Lee Chalfie, 2008 Nobel Laureate in Chemistry

Historically, successful women scientists have not been recognized or their stories told, and until World War II, only two women had received a Nobel Prize for scientific excellence. Things have not changed much since then. The gender gap in science careers continues to be wide, particularly for computer science, astrophysics, physics and mathematics, and it could take as long as 280 years to close the gap in computer science if gender inclusiveness efforts in science advance at their current pace. Change is required to speed up this process so that women, or half of the world's people, play their part in economic development, half of which is now based on science and technology. Some of the actions that could facilitate participation of women in science are:

- tell stories of successful women scientists
- foster partnerships right from the home, where men should do their fair share of the work
- encourage the involvement of girls in collaborative ventures with science institutions. For example, the Girl Scouts of America worked together with the National Academy of Science to develop a STEM program
- develop policies that call for government and university action to increase the participation of and funding for women in science
- professional societies to take concrete action guaranteeing women participation in science events or leadership in science bodies. For example, the American Society for Cell Biology has a list of women scientists whom it requires be considered for its scientific conferences and for inclusion in meetings of local branches, and goes as far as denying funding for meetings without gender parity. The Society of Developmental Biology has a policy that requires that competition for the position of its president involve two women one year and two men the following year

Charting a course: what does the journey of building a successful science look like?

Panel discussion

Panelists – Dr Nadia Khelef, Institut Pasteur; Professor Mabel Imbuga, immediate former Vice Chancellor, Jomo Kenyatta University of Agriculture and Technology; Dr Amel Ghouila, Sustainability and Outreach co-Chair, H3ABioNet, Tunisia; and Dr Jewelna Akorli, Memorial Institute for Medical Research, University of Ghana

Moderator – Dr Wanjiru Kamau-Rutenberg, AWARD

This panel, comprising women scientists with professional backgrounds ranging from early career scientists to leaders at the top of their career ladder, was intended to provide opportunities for cross-learning, an outcome espoused in the theme of GoFoWiSeR2019. The session aimed for an understanding of what a successful science career for a woman involves and the contributing factors.

What has worked for women's careers?

Individual, familial, societal and institutional factors all could facilitate or curtail the progress of a woman's science career. The following factors are associated with positive outcomes for the female scientist:

Individual factors

- good personality traits such as a good work ethic, self-motivation, determination, commitment to stay on the goal and the willpower to step out of her comfort zone
- an understanding of her goals and what she must do to achieve them, the potential challenges, as well as her alternatives
- an appreciation of the fact that challenges and failures are part of growth
- high personal and professional integrity
- being a perpetual learner and consciously seeking professional improvement opportunities
- a recognition of the importance of her institution's leadership in her career progression and of the need to acknowledge and respect their authority
- documenting and securing evidence related to her career such as academic papers in case she are required to produce it for career advancement
- membership and active participation in professional networks

Familial factors

- parent's education and open-mindedness
- family support, whether moral or financial, which if lacking could be a distraction

Societal factors

- support for education of girls
- political commitment to develop and implement policies supporting women in science

Institutional factors

- mentorship opportunities and structures
- support to access knowledge on possible career pathways and growth opportunities
- freedom from the institution to be creative and to take leadership in her work
- investment in building an effective team

- opportunities to publish

What has not worked for women's careers

- ignorance of the rules, which can set a scientist on a collision course with her institution or colleagues
- cultural restrictions in the African environment that limit what women do

Navigating power structures

A woman scientist's upbringing and cultural background can undermine her ability to navigate power relations, particularly when her institution's power practices do not match her expectations. In addition, African cultures typically require respect for authority and accord automatic power to the male sex, meaning that assertiveness is a trait that many women lack and are not expected to demonstrate. The expectation of women to be perfect also can hold them back from being assertive and expressing their views. The factors considered to help women scientists to handle power relations include:

- A leader who recognizes excellence and hard work and who allows even young staff to take on leadership roles will boost a woman scientist's confidence in dealing with the power structures.
- Access to a role model or mentor can help a woman scientist to be assertive, to question gender bias, to report sexual harassment and to articulate her concerns.
- Possession of top qualifications and skills and being the best professional in her area of expertise earns a woman scientist respect and recognition and could insulate her from power struggles.
- Earning recognition as a professional unburdens a woman from the pressure of having to defend her credentials and allows her the freedom to bring a woman's perspective to an issue, especially issues affecting younger women scientists, who do not have the courage to bring them forward.
- Access to the decision-makers opens opportunities for women scientists to have their opinions considered at their institution's management level.
- Promoting innovative approaches of involving women in events and activities that allow them to succeed, e.g. changing the criteria for identifying speakers in conferences so that young women scientists participate, builds their confidence.
- Advocating and engaging with men on gender issues are necessary if we are to attain equality.
- Use of institutional and positional power by women in leadership to introduce policies that cater for women's special circumstances such as pregnancy or childrearing will empower other women to excel.
- Ignoring distractions such as the use the power of ethnicity and ensuring that she can find an alternative career path will help a woman scientist focus on what is important to her.

Common clichés that serve to perpetuate women's disempowerment

The interest of young girls in science is defined by the environment in which they live, so social views, such as those expressed in the following sayings, that show women as powerless in their relationships with men should not have a place in today's world:

- If you go for a PhD or are empowered no man will marry you.
- Behind every successful man is a woman.

- You are such a feminist, which is a statement that is usually used with a negative connotation, although a feminist is a person who believes in the social equality of the sexes.

At the same time, it is important to recognize that leaving men out of discussions on women empowerment is counterproductive if equality is the goal. Flexible policies are needed to help deal with the unique situations of women such as childbearing responsibilities and to help men who want to be involved in childcare. We need to look also at how we are raising boys and girls.

What can and should research institutions and funders do differently to support women scientists to build successful careers?

Plenary discussion

This session allowed the sharing of experiences on innovative institutional interventions and personal approaches that have helped women scientists succeed. Often women are forced to choose between pursuing further education and leaving their children behind when they have to go out of their countries for the studies. Many of these interventions deal with that:

- A program initiated at the Nelson Mandela African Institute of Science and Technology (NM-AIST) in Arusha, Tanzania, that allowed flexibility in women's PhD programs helped many women with young children or planning to get married to complete their studies, with their number growing from 4% to 57% in three years. They were allowed to take their children and a caregiver or spouse along. They averaged three years for a PhD, compared with the normal average of five to six years. A policy change allowed women to choose where to go for their studies and whom to take along as a helper. This additional cost was borne by the funder.
- Telling the stories of women who have succeeded, covering aspects of their family lives will encourage other women who want to have families and also succeed in their careers.
- Men need to be involved in discussions about the value of supporting their spouses' careers and sharing responsibilities.
- Adequate senior postdoctoral fellowships are needed to help women continue with their studies after they have had to break from school to have families.
- Grant lifecycles should be lengthened from two to five years to allow women who get pregnant during their study period to complete their studies.
- Grant call periods are usually short and have only one opportunity to apply. More application opportunities need to be provided so as not to leave out women on maternity leave or on another commitment.
- The grant cut-off age for women should be higher than for men, for example by five years, to accommodate their lifestyle factors.
- Affirmative action should be considered in assessments for recruitment or promotion if the goal is build the base of women scientists.
- School-based interventions are critical, targeting cultural barriers and teaching approaches that hold girls back from excelling in science subjects and facilitating the interaction of girls with successful women scientists through career days or similar events. Research institutions could undertake such activities as part of their community engagement initiatives or work with the ministry of education.

- Research institutions could create awards to recognize women who excel in science and also provide resources and support for their women scientists to compete for other awards.
- Both research funders and research institutions could facilitate creation of networks of female scientists.

Why so few female PhDs? Designing a research approach to understand the international STEM shortage

Breakout session

Moderators – Dr Monica Fisher, icipe, and Dr Ruth Mendum, Pennsylvania State University

This parallel session involved both presentation and interactive discussions. The presentation had the main objective of describing a proposed gender study research approach involving a baseline survey and empirical analyses (quantitative and qualitative) to elucidate the main economic, sociocultural and institutional factors that explain the low representation of women in STEM in sub-Saharan Africa and highlight the best practices currently being used to respond to those limitations. The gender study will involve site visits at 11 RSIF host universities in West and East Africa and interviews with current and former students, faculty and university administrators. Study results will help generate an evidence base that can inform an RSIF gender strategy to enhance women's participation in PhD programs and research in sub-Saharan Africa, in general, and at the RSIF host universities, in particular.

The focus groups provided a captive audience to validate the RSIF gender research approach and solicit inputs based on stakeholders' lived experiences on practical interventions for RSIF's gender strategy. Two questions guided the group discussions: (1) Do the sets of factors proposed in the RSIF gender study as key to explaining women's underrepresentation in STEM, i.e. early influences, socioeconomics, current relationships, lifestyle or career preferences, and institutional factors, resonate or contradict with your experiences? (2) What do you believe works best to recruit and retain women in STEM?

There was general agreement on the key factors influencing female shortage in STEM, viz.:

- lack of family advice, encouragement or role modelling
- lack of access to some STEM subjects in primary school
- lack of emotional support during PhD studies from relevant family members
- lack of non-family role models and mentors in childhood and adulthood
- social pressure to be married and put family first and the perception that pursuing a PhD reduces a woman's marriage prospects
- negative stigma attached to the studying abroad and attendance of conferences by women
- perception that securing a job upon completion of PhD studies will be difficult
- failure of institutions to tackle negative bias and stereotypes
- funding limitations
- lack of institutional support
- lack of suitable facilities in the PhD institution, e.g. for accommodation of families
- long duration of PhD programs
- scholarship restrictions relating to PhD completion time
- sexual harassment by supervisors and other faculty

The following were identified as promising strategies in enhancing the recruitment and retention of women in PhD programs:

- linking the PhD qualification to career progression, or relevance and competitiveness of the qualification in the institution or home country
- mentorship programs
- prestige of the PhD title
- increased funding opportunities
- availability of PhD opportunities in convenient locations
- improved facilities for research
- institutional support, such as the commitment to reserve one's job and guidance from a supervisor assigned to the candidate
- accountability of the institution to ensure that the woman scientist will complete her studies
- flexibility of the scholarship and degree program to accommodate women's lifestyles
- availability and affordability of childcare services
- access to a supportive network

Designing effective mentoring programs: a conversation with mentors, mentees and mentoring coordinators

Breakout session

Moderators – Dorothy Mukhebi, AWARD, and Dr Grace Mwaura, The AAS

This was an experience-sharing session that provided an opportunity for learning and identifying areas for improvement.

The AWARD and The AAS mentorship programs are structured schemes that aim to link young African scientists to experienced mentors to provide them with holistic guidance on how to tackle the barriers to scientific leadership in Africa. Both programs are formal in the way they are designed and are allocated adequate administrative and other resources they require to achieve their goals.

The AWARD Fellowship aims to strengthen the science and leadership skills of African women scientists to enable them to generate innovations that bring prosperity for African smallholder farmers. The Fellowship's mentoring orientation session brings mentors and mentees together to develop a plan to guide their one-year relationship. As part of their growth plan, after one year of mentorship the mentees become mentors for emerging scientists.

The AAS fellowship is a two-year scheme specifically targeted at early or mid-career postdoctoral scientists in African higher education or research institutions. The mentors are drawn from a global pool to offer the mentees the opportunity to interact with the top scientists in the world. Mentors undergo training on how to support mentees in skill building, career planning, networking, publishing, grant writing and management etc.

The factors considered as leading to a good relationship between the mentor and the mentee were similarities in their personalities; shared research or career interest; commitment to the relationship from both sides; and geographical proximity, although the new communication technologies are changing how mentoring pairs can connect and communicate. Two points that were highlighted were that (1) mentorship and supervision were two separate processes; a mentor guides the mentee to help her grow in her career, while the supervisor has an

academic or institutional role; and (2) the term “structured” is preferred to “formal” in describing an institutionalized mentorship scheme.

Benefits of mentorship

- The benefits are mutual. For example mentors build their mentoring skills and confidence and improve the skills they are helping the mentee on. The relationship can be a mutual learning experience.
- The aspect of a formal engagement brings to the relationship professionalism, enthusiasm to get organized and respect for agreements, values that will benefit the mentee’s career.
- Where networks of mentors exist, they allow access to knowledge and capacity building for mentees and give them access to senior professionals globally.
- Mentorship provides a holistic approach to the career development goals of the mentee by focusing on the mentee’s whole life-work system.
- Mentees are exposed to opportunities to publish their work.
- Mentees get a safe space for exploration of career options and obtain the skills to develop career goals using the tools provided by the mentor.
- The mentee acquires and improves her soft skills in areas such as networking, self-confidence, communication etc., as well as the skills to manage relationships, time and resources.
- There is a sense of protection for the mentee since the relationship is not patronizing, and a feeling that the mentor will help her advance even when there are obstacles.
- The mentor’s professional reputation is enhanced.
- The mentorship training gives the mentor new skills and the capacity to run a mentoring program in her institution.
- There is satisfaction and a feeling of self-fulfillment for the mentor in contributing to the forming of the mind and to the success of the mentee.

Challenges in mentoring programs

- Availability of mentors might be difficult if they are heavily committed elsewhere.
- Geographical distances might make face-to-face interaction difficult. Fortunately communication technology and the use of tools such as Skype and WhatsApp are easing this.
- Support structures for the mentorship program might be inadequate or unavailable.
- Communication barriers could exist if proficiency in the language used is not adequate for one party.
- Managing relationships with supervisors can present challenges especially if they are not involved in or informed of the mentorship arrangement.
- Age, sex and personality differences could affect the mentoring relationship. Personality matching would be difficult and would deny the mentee the opportunity to handle real-life challenges.
- Differences in technology access, use or savviness could affect the interaction of the parties.
- There is a risk of the mentee being pushed in a direction she would not want for herself.
- Intellectual property rights issues regarding outputs from the interaction could arise if the mentorship agreement does not provide for their handling.
- An untrustworthy mentor could pilferage a mentee’s ideas, so policies to protect against that are needed.

Key attributes of a good mentor

- good listening skills and willingness to consider the point of view of the mentee and to understand and accommodate the mentees' context
- willingness to transfer skills and to learn even from a novice
- ability to observe confidentiality when that is required
- flexibility
- disciplined
- dedication
- available and approachable
- respectful of the agreement signed
- more professionally senior than the mentee
- has mentoring experience
- knowledgeable about the subject and possessing something new to bring to the relationship

Qualities of a good mentee

- respectful of the mentor
- hardworking
- proactive
- creative
- a good listener
- patient
- motivated
- a dynamic go-getter
- dedicated to reach her target
- willing to learn
- brave enough to ask questions and communicate problems
- knows what she expects from the relationship
- accepts criticism in stride
- humble when dealing with the mentor
- recognizes that she is responsible for her success

Qualities of a good mentoring coordinator

- experienced
- impartial in managing relationships involving the mentee, mentor, supervisor and the institution
- has leadership capacity

How institutional support for mentoring should look

- The mentoring program should be a part of the research institution with a formal policy, structure, framework, and capacity and resources to run the mentoring activities.
- It should be ready to commit resources to support the mentor and mentee.
- It should design, fund and run the mentoring activity.

- It should authorize, facilitate and track the mentoring process using formal assessment structures and guidelines, and it should ensure that the agreement defining the responsibilities and relationships is signed by all the actors.
- It should provide formal training for mentorship.
- It should provide financial support for publishing of the mentee's research and for other activities related to her work, such as conference attendance.
- It should formalize its relationship with the AWARD program.

What drives gender inequities in scientific career progression in Africa?

Millicent Liani, Liverpool School of Tropical Medicine, UK

This gender research study, conducted under the Liverpool School of Tropical Medicine's Learning Research Programme (LRP), examined the barriers to and enablers of gender equitable scientific career pathways in DELTAS (Developing Excellence in Leadership, Training and Science)-funded African research institutions. LRP works to generate research evidence on how to equitably develop internationally competitive and effective researchers and research institutions in Africa. The areas of focus for the study were attrition points, institutional environment, recruitment and promotion processes, capacity strengthening, and institutional strategies for equitable career progression. The preliminary results found the drivers of gender inequality to be rooted in individual factors and sociocultural expectations, as well as institutional and systemic factors such as gender-related workplace environment biases, funding inequities etc. Some of the favorable institutional practices included provision of work environments that cater for work and life such as flexible working arrangements, mentorship, funding support and leadership opportunities for junior researchers.

Moving beyond individual empowerment to institutional engagement

Kenneth Macharia, AWARD

The AWARD Fellowship works to foster mentoring partnerships, develop leadership capacity, and sharpen science skills. The Fellowship seeks to develop the research capacity of women scientists, address underrepresentation of women scientists in agriculture and related fields, and improve the numbers of women scientists in decision-making and management. Its empowerment model aims to engender confidence and motivation in women scientists and equip them with the skills for leadership and for conducting good science. AWARD considers it crucial to engage with the home institution of the Fellows, recognizing that work environment dynamics, including policies and practices, have a fundamental impact on the success of women scientists. Institutional factors regarded to have positive outcomes on the scientists' achievements include opportunities for research attachments, freedom and trust for the scientist to run projects without being micromanaged, opportunities for leadership, support to complete studies, and efforts to mainstream gender in the institution's processes.

Lessons from institutions' interventions to increase the number and experiences of female researchers

Panel discussion

Panelists – Dr Justin Pita, Université Felix Houphouët-Boigny; Professor Roseanne Diab, GenderInSITE; Dr Katelyn C. Jones, Chicago Council on Global Affairs; Dr Tonya Blowers, Organization for Women in Science for the Developing World (OWSD)

Moderator – Dr Moses Osiru, icipe

Many institutions are involved in interventions seeking to enable the progress of women in science careers. What is working? What lessons can we learn? What can women scientists do to thrive in institutions that do not provide a conducive environment for their growth? These questions were addressed in this discussion.

What is working

- Partnerships and collaboration among small initiatives: Collectively, small groups can create influential forces capable of shaping policies to improve women's leadership in science, to help recognize the need for differential development for men and women, and to promote the application of a gender lens in research and management.
- Building and maintaining databases of women scientists: These databases would be used them to reach out to the women about relevant developments in their research fields or to invite them to events.
- Enabling mobility of women scientists to leave their country for studies: This requires innovative approaches such as south–south programs that can help women from very poor countries.
- Providing stability in early career for women who return to their home countries and could be isolated without resources: Funded fellowships with a provision for equipment and exchange programs will enrich the experience of such women.
- Enabling visibility of women scientists by providing awards for achievements in science, ensuring the presence of an international audience and media: This is an excellent approach for winning political support for an institution.
- Building communities of scientists by creating opportunities and providing funding for scientists to join local and international science societies: Such avenues can provide exposure and visibility for young scientists.

Lessons

- Addressing the challenges that women scientists face requires a holistic approach and should start with tackling the gender biases at the household level. Workplace strategies should cover sexual harassment policies, remuneration, opportunities for career advancement etc., all of which are linked, and should involve initiatives that challenge the current way of thinking.
- Institutions are important in enacting and implementing policies that are gender responsive; for scaling up initiatives; in shaping information; in defining meanings and core concepts in gender; and in facilitating how information is spread, both internally and externally. Because they are bureaucracies and can take a life of their own, institutions have the power to shape the nature of their research to achieve their goals. But they can be so focused on meanings and rules that they fail deliver on their goals, so constant vigilance and interrogation are critical actions for institutions as part of their continual process of reviewing their goals and commitments.

- It is important for institutions to engage gender specialists to address gender issues and develop gendered interventions because such specialists possess the knowledge and a holistic understanding of the concerns relating women's empowerment.
- Institutions should train their leadership and management to support women to succeed in their careers and allocate money to initiatives aimed at closing the gender gap.

How women scientists can thrive in an environment that is not conducive to their growth

A challenge that a foreign trained female scientist might encounter on returning to her home institution is that her new ideas might not find acceptance because the institution is not ready for change. Such a scientist has to find a way of continuing her interaction with peers outside her institution and with mentors and collaborators. Participating in external research events and finding the means to invite other researchers to her institution to share their expertise or for staff exchange are necessary. International level networking and membership in science associations will help her stay current with the developments in her field. Finding ways to be influential in her institution, for example by joining advisory panels, is recommended, but this should not come at the expense of her research.

The Global Research Council: Promoting the equality and status of women in research

Dorothy Ngila, National Research Fund (NRF), South Africa

The Global Research Council (GRC) comprises approximately 65 heads of public science and engineering funding agencies from around the world dedicated to promoting sharing of data and best practices for high quality collaboration among funding agencies. GRC annually develops a statement of principles on topics of mutual interest aimed at enhancing shared learning and exchange of ideas and practices amongst GRC participating organizations. In 2016 GRC endorsed its statement of principles and actions promoting the status and equality of women in research.

To address the inequality of women in research and, in turn, change and improve systems, two aspects need to be considered, as postulated in the statement of principles:

- The participation and promotion of women in the research workforce: This includes the longstanding dominance of certain demographics in academic culture and historical obstacles to women's participation within particular disciplines and fields of research.
- Integration of the gender dimension in research design and in the analysis of research outcomes.

The following actions are presented as a suite of potential activities, with the intent of providing GRC participants with the opportunity to implement those actions most suitable and beneficial to their organization and national research system:

- engage in national discussions of policy frameworks regarding equality, diversity and the status of women to ensure recognition of these issues
- collect and make available data (against consistent parameters) for comparative analysis
- incorporate the evaluation of progress towards gender-based goals

- shift the focus from the researcher track record to research opportunity
- provide training on equality and diversity policies, including the on recognition of unconscious bias and how it can be addressed
- explore pathways for women to succeed in research and to rise in leadership in policy and decision-making bodies
- consider dedicated or strategic programs, where appropriate, with the specific purpose of encouraging gender equality
- promote family friendly policies and practices in relation to caregiving obligations
- periodically review the principles and actions document
- recognize the advantages of considering the gender dimension in research and encourage it

The GRC Gender Working Group, which champions the implementation of the above-mentioned principles and actions, facilitated the launching in May 2019 of the booklet [Supporting women in research: Policies, programmes and initiatives undertaken by public funding agencies](#). The policies, programs or initiatives aligned to GRC actions that its members have introduced include:

- National Science Foundation's (USA) national measures to protect the research community from sexual harassment and bullying
- the gender equality in research and academia toolbox of the German Research Foundation
- South Africa's National Research Foundation's 2013 ministerial guidelines for improving equity in distribution of bursaries and fellowships
- adaptation by the Canadian Institutes of Health Research, the Natural Sciences and Engineering Research Council of Canada, and the Social Sciences and Humanities Research Council of Canada of the Athena SWAN charter, which seeks to encourage and recognize the commitment by higher education institutions to advance gender equality
- changes in women's upper age limits in funding applications initiated by the Natural Science Foundation of China
- introduction by the Health Research Council of New Zealand of short and blind-assessed grant applications, which resulted in females submitting 50% of the applications in 2018
- introduction of maternity leave, childcare and family friendly policies for grant holders in funding agencies representing Argentina, Australia, Brazil, China, Germany, India, Japan, New Zealand, South Africa, and Switzerland

Practical approaches toward increasing the number of women leading research and managing research funding

Panel discussion

Panelists – Dr Beverley Damonse, NRF South Africa; Ms Andrea Johnson, Carnegie Corporation of New York; Dr Alexandra Spittle, UKRI; Dr Leah Mwai, DfID East Africa Research Hub; Dr Thomas Kariuki, The AAS; Professor Soukèye Dia Tine, Direction du Financement de la Recherche et du Développement Technologique, Senegal

Moderator – Dr Katrin Glatzel, IFPRI-Dakar

Various approaches are being applied by science research funding institutions to foster gender equity in grant disbursement, but it is clear that the primary criterion for grant awards

is the quality of the proposed research. There are special efforts specifically to improve women's access to grants, however, such as the following –

- Some funders are working to level the playing field so that women can compete.
- Women's lifestyle considerations are getting accommodated in funding of research, for example maternity leave is provided for by extending funding time, and childcare costs are covered. In some cases travel costs to bring along young children and a caregiver are catered for.
- Some funders focus on programs rather than research, so they are interested in how the policies of an institution they deal with support women.
- There are instances where funders are influencing the design of programs, requiring creativity and flexibility in the conduct of PhD research to allow women's lifestyles to be accommodated.
- Investing in research infrastructure development is a direction some funders are taking to make it easier for women to work close to home.
- Some funding agencies are assuming the role of catalysts of change, although they recognize that universities have their own systems.
- In some cases funders are looking at the scalability of the intervention, if there are possibilities of teaming up of multiple partners, or if the intervention is needs based or fit for purpose.
- Some funders want to bring new voices to the conversation and to grow a new generation of African science leaders and so they are supporting cutting edge research from young scientists.
- Issues of how an institution tackles bullying, harassment and discrimination are of importance to funders.
- In Senegal, a special fund was created in 2013 to improve the numbers of women in science. This fund allows women to leave the country for science studies and facilitates their entry into science careers. It finances publication of their work and purchasing of research equipment not available in their institutions. There is transparency in selecting candidates for funding and applicants are required to submit a defined set of documents. The quality of their science is the leading criterion. The fund also enables attendance of seminars and other events.
- In South Africa consideration of multiple aspects of identity such as gender, race, income, and age has led to funding approaches that are suited to dealing with historical imbalances. Recognition of inclusivity beyond gender contributes positively to the quest for equality and equity.

There is recognition that acquisition of a science education will not necessarily guarantee career success in the home institution, and funders are responding to this. For example, to allow women to do what they are trained for instead of what their university wants, some funders are ensuring that the person who gets the grant has the main role in how it will be used. In South Africa, where returning academicians get so much work that they have no time for research, a fund has been created to fast-track their career development.

Age-related mandatory retirement might curtail career advancement and affect the numbers of women scientists. Universities are dealing with this by taking on some of the retired staff in mentoring or other non-fulltime positions.

How are the African science granting councils supporting gender equality and women in STEM?

Breakout session

Moderator – Dr Diakalia Sanogo, IDRC

Science granting councils have an excellent opportunity to increase participation of women in science through their human capital development role, particularly in making decisions on beneficiary selection, fund disbursements and calls for proposals, all of which can be articulated in ways that facilitate women's participation. The Science Granting Councils Initiative (SGCI) supports 15 science granting councils in Africa to eliminate systemic barriers to women's active participation in science by building their capacity to (1) manage research and improve the quality of proposals, (2) monitor and evaluate projects, (3) facilitate science, technology and innovation and transfer of knowledge to the private sector, and (4) network in their own countries with policy-makers and across countries. Representatives from some of the councils from Burkina Faso, Malawi, Mozambique, Senegal and Zimbabwe participating in the initiative shared their experiences on how they were helping participation of women in science.

Burkina Faso – Burkina Faso's research system has no gender policy. A research fund established 10 years ago has had only 18% female participation with only 15% succeeding. Gender considerations are in the selection criteria but account for only 10% of the requirements. A team has been set up to facilitate inclusion of women's lifestyle aspects in the selection criteria, undertake training and facilitate networking. Some 80% of the women in research are young and the retiring group will be needed to guide them. Development of a gender component is underway, as well as setting up of a quota so more women get into science. To encourage women's participation in research as project leaders, calls for proposals are open even to those without degrees. The requirement is that the projects be endorsed by the hosting institution.

Malawi – The National Commission for Science and Technology of Malawi uses collaboration as an approach to mainstream gender in its research. Through this approach its mentorship program has helped 2,000 mentees since 2010. Exposure of high school girls to science at work helps them to choose to pursue science careers. All activities are documented and numbers are tracked for monitoring and learning purposes. Also science, technology and innovation surveys are consulted to see the number of women scientists in Malawi. To support women become project leaders, capacity building is provided in proposal writing, as well as facilitation of response to calls.

Mozambique – Mozambique is confronting the challenges of bias against women in science research and their low numbers. The National Research Fund's gender strategy was developed to promote gender equality and tackle obstacles in the advancement of women in their research careers by catalyzing the creation and dissemination of effective equity measures that recognize the differences in women and men and facilitate gender mainstreaming in all policy-making levels and stages. The concrete steps require disseminating information on gender equality through education and communication; promoting equal treatment and opportunities in participation in research; increasing the number of women in STEM as a priority; decreasing wage inequality; and promoting work-life balance. Mozambique is working to adopt the Protocol on Gender and Development of the Southern Africa Development Community (SADC). The private sector and research institutions

in Mozambique collaborate to generate products that meet specific needs of the private sector.

Senegal – Membership in SGCI allows Senegal access to resources for research. A partnership with the Burkina Faso Science Granting Council has facilitated collaboration in research proposal submission to SGCI and conduct of research.

Zimbabwe – Zimbabwe as a country has no gender or inclusiveness strategy, but the Research Council of Zimbabwe, which has a gender policy with eight actions, advises the government on gender matters. The Council is encouraging more women to be involved in STEM and research. It has supported efforts to reduce systematic barriers to gender equity. The challenges include women's failure to apply for funding, their absence in research leadership and their unwillingness to be away from their home to study. Zimbabwe subscribes to the SADC Protocol on Gender and Development. As a way to ensure that research results translate into useable outputs, Zimbabwe is working with the private sector to promote demand-driven research, promoting the uptake of industrial research.

Cross-cutting themes

It is critical that research institutions connect with the private sector, as technologies emanating from research will be valueless without their conversion into useful products by the private sector. Research for purely academic purposes does not have much use. Research institutions should be seen as one of three actors: innovators, industry or government. Research and industry can work together to develop research themes, and industry can provide funding and also opportunities for research. Deliberate efforts are needed to strengthen these linkages.

In diversity and inclusivity conversations relating to women it is important to remember that women are not homogeneous, and these conversations should adopt a holistic view of women's circumstances and be context specific.

The gender policies and strategies promoted by SGCI can be domesticated. Opportunities exist in the countries for science granting councils to play a role in engendering mainstreaming of gender and supporting women in STEM. But even where countries do not have gender support structures, creativity on the part of women scientists can yield results. For example, in Benin, which does not participate in SGCI or have a specific policy or strategy favoring women in accessing grants, a window at university for research funding for multidisciplinary groups has helped women rise professionally. In addition, an association of women in science has published a book on all women active in science in the country, which facilitates their networking. A government initiative is providing free schooling for girls.

What inhibits women's participation in STEM in Africa? A presentation and validation of a study funded by the International AIDS Vaccine Initiative (IAVI) *Breakout session*

Moderator – Ms Allen Mukhwana, The AAS

Scientific evidence on women's participation in STEM is needed to develop effective policies and strategies to address the factors contributing to their low numbers. But such evidence is lacking in the global south or is fragmented. This study, which targeted women in higher

education, industries and high level technical institutions, aimed to be a first step in filling that gap.

The preliminary findings indicate that access to a mentor or role model is the most important factor in women's involvement in STEM. The main reasons women chose STEM courses for university were their self-assessment of their capability to handle them, having a woman role model or mentor, and being prepared for the courses. Having a role model or mentor was the main influence in the decision to stay in STEM at the higher education level, followed by supporting policies and training opportunities. Opportunities for training and empowerment, funding for innovation and scholarships, and availability of resources and equipment were the top factors for women's retention in research and development institutions.

Family responsibilities and the difficulty of finding a work-life balance were seen as the main reasons for the low numbers of women in STEM. Other top factors were the perceived lack of commitment by women, their perceived low qualifications compared to men, unsupportive work environments and gender bias.

Defining the approaches to increase the numbers of women in STEM will need to involve community level strategies targeting cultural orientations; investing in women's education and family friendly policies; ensuring recognition of women at work and that they are safe; providing funding support for institutions of higher learning; and targeting inclusiveness as an area to influence in decisions of funding institutions.

Gender dimension of global scientific leadership

Phyllis Kalele, GenderInSITE

The 2019 report of GenderInSITE on "Pathways to success: bringing a gender lens to the scientific leadership of global challenges" offers a unique perspective to the addressing of globalized challenges that recognizes the work already done, looks at levels not usually looked at and at the difficulty of institutionalizing policies, considers politics and power relations, and highlights the intertwined relationship between the research institution and the individual research scientist. The approach recognizes the roots of the career progression differences between women and men and identifies six personal pathways to success. The recommendations call for the linking of the many training and leadership initiatives and opportunities to enhance women's position in international science; targeting young scientists to build their success; gathering gender-related evidence to inform international science and policy; creating gender policies at all levels of international science; and constantly advocating for and providing resources for gender equality in science initiatives.

Closing remarks

Professor Soukeye Dia Tine, Ministry of Higher Education, Research and Innovation of Senegal

The closing speech re-echoed the commitment of the Minister for Higher Education, Research and Innovation and the Government of Senegal to working with GoFoWiSeR and other partners to attain the objective of increasing the numbers and improving the experiences of women in science careers. It recognized that the discussion in the Forum was clear that science, technology and innovation (STI) had a critical role in social and economic development. But resources to ensure appropriate inclusion of STI in academic programs

were limited, particularly in Africa. In Senegal, science research confronts important challenges, for example in funding and researcher shortages at the higher education levels, where African researchers represent only 1% of the world's pool. This indicates that the number of women scientists is extremely low, especially at the decision-making levels. There has to be a paradigm shift, and that will require partnerships such as partnerships to fund research, to build researcher capacity, and to foster inclusion of women in science, because not doing that will mean that 50% of the world's population will be left behind in development. Senegal will need to develop a strategy to address its STI challenges, and the Minister for Higher Education, Research and Innovation is committed to the realization of that. The theme discussed over the last two days in the Forum is important to Senegal, and the recommendations that will come out of the meeting will be invaluable inputs in the country's definition of its strategy for achieving its socioeconomic development goals.

Annex 1: Program

Thursday, July 18, 2019	
08:30–10:00	<p>Session 1 High-level opening</p> <p>Introduction and welcome <i>Francis Nuwame, MC</i></p> <p>AWARD Director <i>Dr Wanjiru Kamau-Rutenberg, AWARD</i></p> <p>The AAS Executive Director <i>Prof Nelson Torto, AAS</i></p> <p>How is the Africa’s Partnership for skills in Applied Sciences, Engineering and Technology (PASET) widening the pipeline of women in science? <i>Dr Moses Osiru, icipe</i></p> <p>Keynote speech: Fixing the leaky pipeline in science: What are the headwinds and the tailwinds? Which way now? <i>Professor Yaye Kène Gassama, Académie Nationale des Sciences Techniques du Sénégal</i></p> <p>Official opening <i>Coumba Touré Kane, Special Advisor to the Minister of Higher Education, Research and Innovation, Senegal</i></p>
Coffee break (10:00-10:30)	
10:30–13:00	<p>Session 2 Setting the scene</p> <p>How can Africa step up to increase the numbers of women scientists? <i>Mrs Oley Lucretia Clara Dibba-Wadda, AfDB</i></p> <p>Panel discussion Charting a course: What does the journey of building a successful science career look like? <i>Panelists:</i></p> <ul style="list-style-type: none"> • <i>Dr Nadia Khelef, Institut Pasteur</i> • <i>Professor Mabel Imbuga, Jomo Kenyatta University of Agricultural and Technology (JKUAT)</i> • <i>Dr Amel Ghouila, Sustainability and Outreach co-chair, H3ABioNet, Tunisia</i> • <i>Dr Jewelna Akorli, Memorial Institute for Medical Research, University of Ghana</i> <p><i>Moderator: Dr Wanjiru Kamau-Rutenberg, AWARD</i></p> <p>Fishbowl conversation What can and should research institutions and funders do differently to support women scientists to build successful careers? <i>All participants</i></p>
Lunch (13:00–14:00)	

14:00–16:30	<p>Session 3 Investing in women’s skills and networks</p> <p>Overview of parallel sessions <i>Mr Francis Nuwame</i></p> <p>Parallel sessions Why so few female PhDs? Designing a research approach to understand the international STEM shortage <i>Moderators: Dr Monica Fisher, icipe, and Dr Ruth Mendum, Pennsylvania State University</i></p> <p>Designing effective mentoring programs; A conversation with mentors, mentees and mentoring coordinators <i>Moderators: Ms Dorothy Mukhebi, AWARD, and Dr Grace Mwaura, The AAS</i></p> <p>Plenary presentations from groups and wrap up</p>
18:00–20:00 – Gala dinner (<i>formal or traditional attire</i>)	
Friday, July 19, 2019	
08:30–10:30	<p>Session 4 Addressing Systemic Inequality: The role of research institutions</p> <p>Welcome and recap of day one <i>Mr Francis Nuwame</i></p> <p>Gender inequities in science careers: the what are underlying social, cultural and institutional drivers and processes that produce <i>Ms Millicent Liani, Liverpool School of Tropical Medicine, United Kingdom</i></p> <p>Beyond individual empowerment to institutional engagement <i>Mr Kenneth Macharia, AWARD</i></p> <p>Panel discussion Lessons from institutions’ interventions to increase the number and experiences of female researchers</p> <p><i>Panelists</i></p> <ul style="list-style-type: none"> • <i>Dr Justin Pita, Université Felix Houphouët-Boigny</i> • <i>Professor Roseanne Diab, GenderInSITE</i> • <i>Dr Katelyn C. Jones, The Chicago Council on Global Affairs</i> • <i>Dr Tonya Blowers, Organization for Women in Science for the Developing World (OWSD)</i> <p><i>Moderator: Dr Moses Osiru, icipe</i></p>
Coffee break (10:30–11:00)	
11:00–13:00	<p>Session 5 Addressing systemic inequality: The role of research funders</p> <p>Global Research Council report on policies, actions and approaches toward increasing funding for women researchers</p> <ul style="list-style-type: none"> • <i>Ms Dorothy Ngila, NRF South Africa</i>

	<p>Panel discussion Practical approaches toward increasing the number of women leading research and managing research funding</p> <p><i>Panelists</i></p> <ul style="list-style-type: none"> • <i>Dr Beverley Damonse, NRF South Africa</i> • <i>Ms Andrea Johnson, Carnegie Corporation of New York</i> • <i>Dr Alexandra Spittle, UKRI</i> • <i>Dr Leah Mwai, DfID East Africa Research Hub</i> • <i>Dr Tom Kariuki, The AAS</i> • <i>Prof. Soukèye Dia Tine, Directorate of Financing Research and Technological Development Senegal</i> <p>Moderator: <i>Dr Katrin Glatzel, IFPRI-Dakar</i></p>
Lunch break (13:00–14:00)	
14:00– 16:00	<p>Session 6 Equitable career pathways</p> <p>Parallel sessions (All participants) Panel discussion: How are the African Science Granting Councils supporting gender equality and women in STEM? Moderator: <i>Dr Diakalia Sanogo, IDRC</i></p> <p><i>Panelists</i></p> <ul style="list-style-type: none"> • <i>Mrs Dr Aminata Kaboré, SGCI Gender Focal Point - Le Fonds National pour la Recherche et de, l'Innovation pour le Développement (FONRID), Burkina Faso</i> • <i>Mrs Gift Kadzamira, National Commission for Science and Technology NCST, Malawi</i> • <i>Mrs Primrose Panai Chikowore, Research Council of Zimbabwe (RCZ)</i> • <i>Mrs Dirce M. Madeira, Fundo Nacional de Investigação (FNI), Mozambique</i> <p>Moderated conversation: What inhibits women's participation in STEM in Africa? A presentation and validation of a study funded by the International Aids Vaccine Initiative (IAVI) Moderator: <i>Ms Allen Mukhwana, The AAS</i></p>
16:00– 17:00	<p>Which way forward? Recommendations and wrap up</p> <p>Presentation and launch of GenderInSITE report on equitable career pathways <i>Ms Phyllis Kalele, GenderInSITE</i></p> <p>Closing</p> <p><i>Professor Soukeye Dia Tine</i></p>

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