

Health in the climate emergency: a global perspective



The World Health Organization recently emphasized that the climate crisis is the single biggest health threat facing humanity. Until recently the adverse health effects of the climate crisis had been relatively neglected by policy-makers but that is beginning to change and must now change quickly.

Although the scale, nature and timing of adverse effects of climate change on physical and mental health, via both direct and indirect pathways, vary within and between regions of the world, there are common challenges. To achieve health equity and climate justice, these challenges must be tackled by better integration of mitigation and adaptation solutions and an increased focus on the most vulnerable groups in marginalized and disadvantaged communities. There are unprecedented threats but also unprecedented opportunities to use scientific knowledge to inform policy and practice. Much can be done now to use the evidence already available to effect rapid and decisive action to reduce long-term risks to health and bring near-term benefits, for example through the reduced air pollution that will accompany decarbonization of energy systems.

This report is the outcome of a project by the InterAcademy Partnership (IAP), the global network of more than 140 academies of science, engineering and medicine, enabling the voice of science to be heard in

addressing societal priorities. Previous work by IAP has addressed a wide range of issues for action on climate change. For example, in 2021 IAP publications included “*A net zero climate-resilient future: science, technology and the solutions for change*” and “*Climate change and biodiversity: interlinkages and policy options*”. IAP has also provided advice on the necessary scientific infrastructure and procedures to put in place worldwide, for example in 2022 with the “*Call for a global health data sharing framework for global health emergencies*”. In the present report, we concentrate on issues for identifying and implementing policy solutions countering the detrimental effects of climate change on human health.

Our inter-regional, inclusive, project based on an innovative design previously developed for the IAP project on Food and Nutrition Security and Agriculture (published in 2018), encourages academies to capture diversity in evaluating evidence from their own countries, using a transdisciplinary, systems-based approach to planetary health to inform policy options for collective and customized action. Working groups from four regional academy networks were constituted: in Africa (the Network of African Science Academies, NASAC), Asia (the Association of Academies and Societies of Sciences in Asia, AASSA), the Americas (the InterAmerican Network of Academies of Science, IANAS) and Europe (the European Academies’ Science Advisory Council, EASAC). The networks agreed on the overall scientific scope and project design and on priority questions to address as the common starting point. Publication of the regional reports was accompanied by engagement with the science and policy communities in the regions and at national level. The four regional reports and the feedback on them were then also used as a resource to prepare this fifth, global report under the auspices of an expert editorial group. The global report was independently peer reviewed and endorsed by IAP.

Our assessments are integrated across sectors, to emphasize the need for health-in-all-policies, and levels of governance – national, regional and global. The particular purpose of this global report, in supporting the regional outputs, is to advise on inter-regional matters, local-global connectivities and those issues at the science-policy interfaces that should be considered by intergovernmental organizations

From the President



There is increasing evidence for the adverse effects of climate change on human health, both physical and mental, posing serious challenges to the health gains made over recent decades. The scale, nature and timing of these problems differ across countries and within their populations, influenced by geography and socio-economic status; however, there are commonalities. Shared challenges to health from climate change necessitate that all actions taken to identify and quantify mitigation and adaptation solutions to combat the challenges of climate change focus on the most vulnerable groups, to ensure that we develop resilient, sustainable and equitable health systems, as well as correct fragmentation and imbalances in research systems and knowledge use. Climate change is a health crisis as well as an environmental crisis: the effects are experienced here and now, and the search for solutions is urgent.

In a three-year global project, IAP has worked together with its regional networks in Africa (NASAC), Asia (AASSA), the Americas (IANAS) and Europe (EASAC) to capture diversity in evaluating evidence from their own regions to inform policy for collective and customised action at national, regional and global levels. A team of more than 80 scientists from all regions of the world has contributed to the project.

Analysing extensive scientific evidence, the recent report offers a global review of the current knowledge and examines how climate change and its drivers are acting through a range of direct and indirect pathways to impact, for example:

- heat-related mortality and morbidity
- extreme events such as floods and droughts
- decreases in crop yield in some regions
- changes in the distribution of vector-borne diseases
- wildfires causing widespread exposure to air pollution

Three years after the first edition of the Open Science in the South conference, IRD, CIRAD and the Benin National Academy of Sciences, Arts and Letters have joined forces to organize the second edition of this event, which will be held in Cotonou from 25 to 27 October 2022.

The second edition topic is: “*Management and openness of research data: panorama and perspectives in Africa*”.

The objective is to draw up an overview of the dynamics at work and to propose places for exchange (conferences, practical workshops, poster presentations) in order to share and promote good practices.

The InterAcademy Partnership (IAP) and the Network of African Science Academies (NASAC) will initiate an 18-month study to examine a set of focal local and national urban transport initiatives across the Continent to distill lessons learned that could be applied to other cities and countries in Africa, including in the areas of electric vehicles, vehicle and fuel standards, mass and public transit and the informal transit sector.

The study will aim to input into the 2022 United Nations Climate Change Conference (COP-27) hosted by Egypt in November 2022. The final report will provide targeted recommendations for the African Union, ministries of transport, environment and finance, international development and finance institutions, and other stakeholders.

Yours Faithfully,


 PROF. MAHOUTON NORBERT
 HONKONNOU
 NASAC PRESIDENT

Activities and Events

NASAC President appointed to the Hassan II Academy of Science and Technology

His Royal Highness Mohammed VI, King of Morocco, has appointed the NASAC President Prof. Mahouton Norbert Hounkonnou, Professor of Mathematics and Physics at the University of Abomey-Calavi (UAC), as an associate member of the Hassan II Academy of Sciences and Technology.

The Hassan II Academy of Sciences and Techniques in Rabat (Morocco) announced on 21 June 2022, that His Majesty Mohammed VI, King of Morocco has given his approval for the appointment of three new members of the Academy.

Prof. Mahouton Norbert Hounkonnou, Professor of Mathematics and Physics at the University of Abomey-Calavi (UAC) joins the Hassan II Academy of Sciences and Technology as an associate member. He is admitted to the Academy as an associate member.

NASAC Vice President elected to the European Academy of Sciences and Arts.



NASAC Vice President Prof. Rajaa

NASAC Vice-President for Policy Review and Administration Prof. Rajaa CHERKAOUI EL MOURSILI has been elected as a member of the European Academy of Sciences and Arts. The European Academy of Sciences and Arts is a non-governmental, European association committed to promoting scientific and societal progress. Founded in 1990 as a learned society, 2,000 members are leading scientists, artists, and practitioners of governance, who are dedicated to innovative research, interdisciplinary and transnational collaboration as well as the exchange and dissemination of knowledge. Academy members are elected for their outstanding achievements in science, arts, and governance.

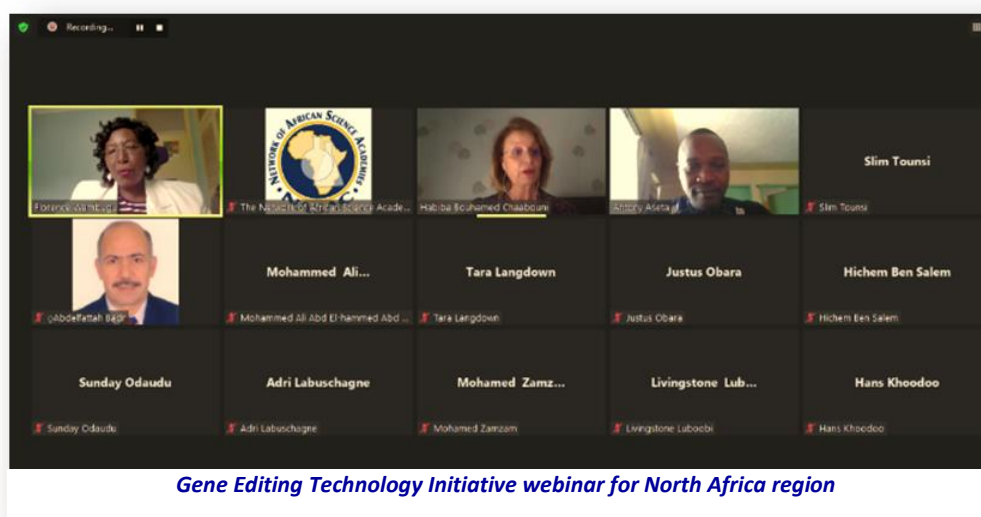
Regional Webinars on Gene Editing Technology Initiative

Africa Harvest and the Network of African Science Academies (NASAC) continued to organize series of webinars on Gene Editing Technology Initiative (GETI). These webinars aim to advocate for an enabling regulatory environment on gene editing technology towards the development and commercialization of gene editing technology products.

The targeted audiences were policymakers, regulators, public and researchers.

So far Eastern, Central, Western and Northern Africa have already held their webinars targeting different audiences.

This project is scheduled to conclude in June 2022.



NASAC- UNTBLDCs Academy Development Initiative

NASAC partnered with the United Nations Technology Bank for Least Developed Countries (UNTBLDCs) to establish science academies in Africa. Under this initiative, 4 countries (Angola, DRC, Lesotho and Malawi) have launched new academies. An additional 6 countries will be pursued to launch science academies this year – Chad, Mali, Niger, Sierra Leone, Mauritania and Central Africa Republic. So far hybrid virtual platforms have been utilized for the launch events. Additional support has been sought from IAP to support these new academies in the short-term so as to facilitate application to NASAC and IAP membership. NASAC-UNTBLDCs held their second quarterly meeting with the new academies on 5 July 2022. The purpose of the meeting was to emphasize on the importance of academy development programme in contributing to the strengthening of the STI policy where academies of science produce evidence based advice.

Climate Change and Health (CCH) report: Protecting human health against climate change in Africa



There is growing evidence from reports of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) that climate change is having detrimental effects on the health of the African population and is in turn cascading into other sectors such as agriculture and food security, thereby adversely affecting livelihood, food security and the economy.

In this report, the Network of African Science Academies (NASAC) reviews current evidence for the detrimental health effects and chart a way of reducing these effects through mitigation and adaptation measures using innovative indigenous approaches in Africa. Climate change differentially and adversely affects vulnerable populations across the continent; the report draws attention to this vulnerability and suggests ways of coping with it. Please click [here](#) to download a copy of the report.

Congolese Academy of Sciences (ACCOS): Induction ceremony for new members

The induction ceremony for 10 new members of the Congolese Academy of Sciences (ACCOS) took place at Kinshasa in the Sultani River Hotel on June 8, 2022 and had two highlights.

First, a scientific morning on the theme: "*the development of the DRC faced with the challenges of the sustainable and judicious development of its natural and human resources* " This theme was developed through 5 presentations:

- Compliance with environmental standards and control of the exploitation of natural resources;
- Exploitation of natural resources in the development of the DRC;
- Fight against the illicit exploitation of natural resources;
- Importance of using data for effective policies and programs: the case of human and natural resources;
- How to move from curse to shared prosperity

It was found that despite its significant geological and mining potential, the DRC has incomplete and insufficient data on its potential and exploits only 14 minerals.

The environmental standards provided by the legislators are little applied. It was thus recommended to produce sufficient data on natural resources by national institutions in order to better plan the development of value chains, human resources and technologies. Dialogue between scientists and stakeholders should be encouraged to stimulate local processing of natural products

Secondly, in the afternoon, the main induction ceremony took place, chaired by Professor Muyembe JJ, President of ACCOS and the Secretary General at the Ministry of Scientific Research and Technological Innovation, representing the Minister. There was one honorary member, eight full members and one corresponding member. The representation by section is as follows: two members for Physical and Applied Sciences, two members for Medical and Natural Sciences, two members for Arts and Letters and three for Humanities and Social Sciences. The corresponding member comes from the Congolese diaspora. During the ceremony, the president of NASAC, Professor Norbert Hounkonnou addressed his word of encouragement to ACCOS via ZOOM.

This ceremony was rebroadcast several times by television channels in the country and aroused the admiration especially of Congolese from outside and inside the country.

The West African Academy Exchange Project

In 2021, the Nigerian Academy of Science (NAS), the Academie Nationale de Sciences, Arts et Lettres du Benin (ANSALB), and a team of Liberian scientists (working towards the establishment of a national academy in Liberia), developed a project aimed at strengthening partnership and collaboration between science academies in West Africa. Specifically, this project, tagged *the West African Academy Exchange Project*, sought to create a platform for capacity-building through knowledge-sharing and learning between the participating academies, as well as foster mentorship and support for the effort towards establishing a Liberian national academy.

The key activities implemented under the project were a pair of two-day exchange visits held in April 2022; the first to the NAS Secretariat in Lagos, Nigeria from 25th to 26th April, and the second to the ANSALB Secretariat in Cotonou, Benin Republic from 28th to 29th April. Unfortunately, the Liberian team could not participate eventually. These visits afforded fellows and staff of both academies the opportunity to share experiences, perspectives, and lessons in academy governance and operations. Discussions during both visits covered areas including strategic planning, stakeholder engagement, science advocacy, resource mobilization, administration, financial management, project management, as well as proposal development.

The project enhanced collaboration and partnership between the participating academies and provided avenue for knowledge exchange. An output from the project is a policy brief having some key lessons and recommendations. The brief will soon be disseminated.



First exchange visit to NAS secretariat, Lagos



Second exchange visit to ANSALB Secretariat, Cotonou

National Academy for Cote d'Ivoire (ASCAD) sub regional seminar

The Department of Exact Sciences of ASCAD organized, on 31 May and 1 June 2022, a sub-regional seminar on "Great Advances in Mathematical Teaching and Research in Côte d'Ivoire", held in Abidjan at the Headquarters of the Regional Episcopal Conference of West Africa (CERAO).

On this occasion, a tribute was paid to Prof Saliou TOURE, founding member of ASCAD and 1st Mathematician of Côte d'Ivoire. He is also President of the International University of Grand-Bassam (IUGB), an institution where the American curriculum is in force. He was previously, and for several years, the Minister of Higher Education and Scientific Research of Côte d'Ivoire.

Among the distinguished guests at this seminar was the President of NASAC, Prof. Norbert Hounkonnou, also a mathematician.

Nigeria Academy of Science (NAS) Celebrates the Insulin Centennial

The Nigerian Academy of Science (NAS) hosted a webinar, themed *Celebrating the Insulin Centennial: An Enduring Legacy for Science* to commemorate the centennial celebration of insulin discovery. The objectives of the webinar were to discuss the discovery of insulin in diabetes management, the disease burden of diabetes in Nigeria, lessons learnt from insulin availability over the last 100 years, and possible progress towards the cure for diabetes.

The webinar was held on 8 June 2022

The webinar recording can be viewed on the NAS YouTube channel (<https://www.youtube.com/watch?v=P5N42IWv5c8>)

Award ceremony for honorary doctorates

On 20 June 2022, an exceptional ceremony to award the honorary doctorate degree was held in the Marthe Condat auditorium. Organized by the University of Toulouse III - Paul Sabatier, this solemn ceremony rewarded three international scientists for the excellence of their work. Created in 1918, this title is one of the most prestigious distinctions awarded by French universities to honor "personalities of foreign nationality for outstanding services rendered to the sciences, letters or arts, to France or to the university. NASAC President Prof. Norbert Hounkonnou was amongst the three international scientists who were awarded an honorary doctorate degree for his exceptional work.



NASAC President Prof. Hounkonnou, Jean-Marc Broto and Nick Hall

Announcements and Appointments

Kenya National Academy of Sciences (KNAS) new office bearers

With effect from March 2022, The Kenya National Academy of Sciences (KNAS) new office bearers are as below:



PROF. MICHIEKA, W. RATEMO

Chairman

BSc (Rutgers, USA), M.Ed (Rutgers, USA),) PhD. (Rutgers, USA), EBS, SS.

Prof. Michieka is a member of the University of Nairobi and Founding Vice Chancellor of JKUAT. He is currently the Honorary Secretary of KNAS. He is a graduate and Distinguished Professor of Rutgers University where he obtained his Bsc, MSc, and PhD in Agriculture specializing in weed Science and Environment. He got a Postdoctoral post at the International Institute of Tropical Agriculture (IITA) in Ibadan Nigeria prior to his appointment at the University of Nairobi as a lecturer in 1980. Prof. Michieka has held national and international positions cutting across academic and community services. He served as the: Director General of National Environment and Management Authority (NEMA); Chairman of the Kenyatta University Council; Chairman of the Kenya Agricultural Research Institute (KARI); chairman of the Kenya Education Network (KENET); chairman Inter-University Council for East Africa (IUCEA); chairman of the African Scientific Research and Innovation Council (ASRIC) and Patron of Japanese Ex-Participants (JEPAK). Other committees where he has served include: Kenya Marine and Fisheries Institute (KEMFRI), Commission for Higher Education, currently CUE, and Member Environmental Institute of Kenya (EIK). He was the Chairman of Weed Science Society of Eastern Africa, Member of FAO Weed Specialists, member of the Compliance Committee of the Kyoto Protocol of United Nations Framework Convention on Climate Change (UNFCCC), and Founder of the African Institute for Capacity development, AICAD. While in NEMA, he articulated environmental pollution and degradation and produced the first state of our environment publication. Prof. Michieka has done extensive research in weed science, with special emphasis on chemical weed control. He is a strong proponent of using integrated pest ecosystem management systems in the tropics to avoid environmental pollution. Prof. Michieka is a member of many national and international organizations in weed research and environment. He has trained several masters and PhD students engaged in various local and international organizations. He has published widely in local and international journals and has published four books including Taxonomy of East African weeds translated into Kiswahili plus other university textbooks.



PROF. NGAIRA, W. KHAOMA JOSEPHINE

Hon. Treasurer

PhD & MSc. (Moi University) B.Ed., (UoN), IGU, Sigma Xi.

Prof. Ngaira is a scholar, an educator, a researcher, a mentor, a consultant, and administrator of great repute. She is a Winner, Scientist of the year 2021, in physical Geography, Climatology (<https://achievementscenter.com/Josephine-Ngaira>). She who was born in Yalusi village, Bungoma County in 1960. Prof. Ngaira is a full Professor of Geography (Climatology) of Masinde Muliro University of Science and Technology. She earned a PhD in Geography (Climatology), in 1999 and MSc in Geography (Climatology) in 1993, both from Moi University, Kenya. She earned a B.Ed Arts, (Geography and Religion) from the University of Nairobi in 1983. Prof. Ngaira

attended Mukumu Girls High School for both “O” and “A” Level education. She scored *Division 1* in East African Certificate of Education (EACE), scored 16 out of 19 points (grades B,B,B,4) in EAACE in the year 1978. She has four (4) Professional Certificates. She is globally recognized as an expert and authority in Climatology, Climate Change, and Environmental Sciences. She was a panel speaker at the 22nd session of the UN Commission on science and Technology for Development in Geneva, Switzerland 2019(<https://www.flickr.com/photos/53390373@N06/47065336304/>) and was an Expert Reviewer with the 5th IPCC Assessment Report. Prof. Ngaira rose through ranks from Tutorial Fellow (1993) to Full Professor in 2008. She has given twelve (12) invited keynote lectures on climate change, Water and environmental science both nationally and internationally: Teaching and Supervisions. Prof Ngaira has taught twenty three (23) Science courses in the University, She developed eleven STEM course; six Bachelors, three Masters and two PhD degree courses in Climate Change, Geography, Environmental Science and Disaster Management which are being taught in Kenyan Universities. Prof. Ngaira has supervised over twenty (20) postgraduate students, examined over forty research theses and projects. Before 1993, Prof. Ngaira taught Geography and Religion in various High Schools and Teacher Training colleges in Kenya between 1983 and 1992 including Mang’u National School, Kamiti high and Kaptumo high schools, then taught at Mosoriot TTC, Eregi TTCi and Moi Diploma Teacher Training College. She has been awarded so many awards for her research experience. She has published widely including; Three (3) University level text books, Five (5) Chapters in text books, Forty six (46) journal papers, Twelve (12) keynote published lectures and eight (8) online commentaries. She has presented over Forty (40) papers in both National and International conferences. Prof. Ngaira is affiliated to seventeen (17) Professional Bodies. The most outstanding and active ones include: Fellow, Kenya National Academy of Sciences (FNAS), Full Member, The Scientific Research Honor Society (Sigma Xi,) Member and Chairperson-International Geographic Union (IGU) Kenya Chapter, Member, International Center for Climate Change Adaptation and Development (ICCCAD) plus others. Prof Ngaira is serving as Hon. Treasurer, Kenya National Academy of Science and Chairperson, International Geographical Union (IGU) Kenya Chapter. She is the chairperson of Professors forum at MMUST. She has served as Deputy Vice Chancellor, Academics and Student Affairs (MMUST) 2013-2018. Member of Maseno University Council, 2008-2011, Founding Director, School of Environment and Earth Sciences (Maseno University) 2004-2012, Chairperson, Department of Geography, 2001-2003, Chairperson, Board of Governors, Sang’alo Institute of Science and Technology, 2014-2017 Chief Editor, Maseno Journal of Education, Arts and Science (MJEAS), 1996-2006, Chairperson, Maseno University SACCO Society, 2001-2004, Member, Universities Joint Admissions Board (JAB), 2005-2012, Vice Chairperson, appointments and promotions Board Masinde Muliro University, Member, University Senate 2001 to date, Board Member, University Tender Committee, 2005-2011. Prof. Ngaira developed a total of fourteen academic related policies and strategies which have improved management of University Education in Kenya. Some include; Policy on Admitting female students to Kenyan Universities at 2 points lower than the cut-off points, which was implemented in 2010 to increase the number of female students joining universities, The Chaplaincy policy, Talent scholarship policy in force at MMUST, Examination Irregularity policy, Examination Resit and Retake policy, Conference Funding policies. Awards Received, Prof Ngaira has received twenty three (23) academic and professional awards in forms of Certificates, Cups, Plates and Emblems from both the National and International institutions.

PROF. BAKI, O. PAUL

Hon. Secretary

PhD, MSc., BSc.(UoN).



Prof. Baki was born in Rageng’ni Sub-location of East Uyoma Location of the then Siaya District. Prof. Baki attended Rageng’ni Primary School, Cardinal Otunga High

School (Mosocho) for O-Levels, St. Mary's Yala for Advanced Level before proceeding to the University of Nairobi for his degree: Bachelor of Science in Physics and Mathematics (1992), Masters of Science in Physics (1994), and Doctor of Philosophy in Theoretical Physics (1999). In the University system, he was first appointed Graduate Assistant (1993), and rose through the ranks to become an Associate Professor (2009) in the Department of Physics, University of Nairobi and thereafter to full Professor of Physics (2014) at the Technical University of Kenya. He has served as Associate Dean (2011- 2013) and Director of the School of Physical Sciences and Technology (2013- 2018) at the Technical University of Kenya. Professor Baki is an accomplished space physicist with extensive international networks and good publications record, supervision of graduate students and serves as a reviewer with top notch journals in Space Physics, which includes inter-alia, Advances in Space Research, Journal of Atmospheric and Solar Terrestrial Physics. Baki is affiliated to many professional organizations, namely: International Astronomical Union (IAU), East African Astronomical Society, Physics Society of Kenya, African Geophysical Society, among others. He sits on many international committees: Scientific Committee on Solar-Terrestrial Physics (SCOSTEP), Chair, Inter-ministerial Committee on Square Kilometer Array (SKA) and is an accomplished policy maker e.g. member of the African Union Space Working Group, which developed the African Space Policy & Space strategy as well as Statutes for the African Space Agency; member, United Nations Committee on Peaceful Uses of Outer Space (UNCOPUOS)-specifically Expert Group C (Space Weather) on Long term sustainability of Outer Space Activities; chair of committee that drafted Kenya Space Policy & Strategy, which paved way for the establishment of the Kenya Space Agency. He has participated in the development of key Government of Kenya strategic documents such as Medium Term Plans (MTP) for the Ministry of Education , namely (MTP II 2013-2017 & MTP III 2018-2022), and the strategy for the establishment of National Physical Sciences Research Laboratory. Prof. Baki appeared in the 2014 edition of Marquis Who's Who in Physical Sciences in the World and has been awarded certificate of excellence in peer review of the Journal of Atmospheric and Solar-Terrestrial Physics (2015 & 2017). Prof. Baki joined Kenya National Academy of Sciences as a Member in 2003 and became a Fellow in 2011. His Vision is to see Kenya become a key player in the Global Space Industry in the same league as NASA and ROSCOMOS of Russia.

Mauritius Academy of Science and Technology (MAST) new President



Dr. Abdess Salem Saumtally

Dr Abdess Salem Saumtally was elected as the new President of the Mauritius Academy of Science and Technology (MAST) for 2022-2024. He has been a Member of MAST since 2008 and was inducted as Fellow of the Academy in 2013.

The Council for 2022-2024 comprises Prof G Mohamedbhai (1st Vice President), Prof Y Ramma (2nd Vice President), Dr M Atchia (Immediate Past President and PRO), Prof S Jugessur (Founder President), Dr R Bholah (Secretary), Dr A Dookun-Saumtally (Assistant Secretary), Dr R Bhagooli (Treasurer), Dr Y Maudarbocus (Past President - Assistant Treasurer), Dr J C Autrey (Past President – Member), and Dr D Caussy (Member).

Nigeria Academy of Science (NAS) President Conferred with the NHEA Lifetime Achievement Award



*NAS President, Prof.
Ekanem Ikpi Braide*

The President of the Nigerian Academy of Science, Professor Ekanem Ikpi Braide FAS was conferred with the Lifetime Achievement Award by The Nigerian Healthcare Excellence Award (NHEA).

Professor Braide who is Academy's first Female President is an accomplished parasitologist/epidemiologist and academician. She is the Pro-Chancellor of Arthur Jarvis University, Akpabuyo, former Vice-Chancellor of Cross River State University of Technology (CRUTECH) Calabar, and was the pioneer Vice-Chancellor, Federal University, Lafia. She holds a Bachelor's degree in Zoology (Uni-Ife), as well as Masters and Doctorate degrees in Parasitology/Epidemiology from Cornell, USA. She also holds a certificate in Epidemiological Methods from Southampton University.

On the Spotlight

Protecting human health against climate change in Africa

There is growing evidence from reports of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) that climate change is having detrimental effects on the health of the African population and is in turn cascading into other sectors such as agriculture and food security, thereby adversely affecting livelihood, food security and the economy.

In this report, the Network of African Science Academies (NASAC) reviews current evidence for the detrimental health effects and chart a way of reducing these effects through mitigation and adaptation measures using innovative indigenous approaches in Africa. Climate change differentially and adversely affects vulnerable populations across the continent; the report draws attention to this vulnerability and suggests ways of coping with it.

For substantial progress to be made in reducing the adverse health impacts, the root causes of climate change and its impacts must be addressed at policy levels. However, policymakers in Africa have not been adequately sensitized to implement changes to protect human health from the adverse effects of climate change. Health effects resulting from climate change will undermine attainment of the UN Sustainable Development Goals (SDGs). SDGs are tied to climate change: for example SDG 13 calls for climate action, while SDG 2 calls for zero hunger and SDG 3 calls for good health. Monitoring of SDG performance shows many African countries are trailing behind in attaining the set goals and indicators, and if climate change is not addressed at the policy level it will further exacerbate the situation and render attaining SDGs difficult. This will negatively affect economic development, which will have a spiral effect on health.

The report's objectives can be briefly summarized as follows:

Make best use of the current evidence base to formulate policy on climate change and health in a coordinated and harmonious manner for the whole of Africa to address urgent actions on climate change adaptation and mitigation and to raise the visibility of human health as major concerns.

Highlight the existing knowledge gaps and raise call-to-action research to fill them.

Improve health risk communication at all levels from grass-root to policy levels.

The report's conclusions resound with what has been echoed in the field by the UNFCCC, World Health Organization (WHO) and the Lancet Commission, among others. These sources are used as the basis for understanding the situation in Africa and are discussed extensively in the ensuing chapters. NASAC's contribution is aimed at adding value to the existing knowledge base by synthesising a single report that incorporates the plethora of information. The report highlights the fragmented and missing knowledge gaps as an impetus for action, presenting opposite views and synchrony where they exist. This is done by considering the core values of academies of being free of vested interest and accountable to society as beacon of truth. In doing so, NASAC aims to catalyse and spur further discussions and actions among academies, the scientific community, relevant stakeholders and policymakers at national and Africa-wide levels.

The present report was written after consultation with a group of experts nominated by the NASAC's member academies. Through their cooperation between NASAC and the German National Academy Leopoldina, top African scientists with expertise on this topic agreed to review the existing evidence base on climate change and health in Africa, and to revisit the adaptation question and assess the mitigation strategies to produce a set of recommendations.

Member Academy Feature

Botswana Academy of Science (BAS)

Advancing women participation in science communication

Science communication is critical for the growth of science within the society. It should not be limited to the scientific community, at its best it also bridges the gap between the scientists and the public and thus spreads the reach of scientific work and promote the public's understanding of science (Treise & Weigold, 2002). The public's understanding of science is critical given that it is the public who fund research through their taxes and participate in research as subjects as well as the ultimate consumers of research discoveries (Karikari, Yawson, & Quansan, 2016). Increased science communication also leads to attraction of funding from the government and investors at large and also has the potential to influence government regulatory decisions and policy formulation, thus how a scientist communicates is absolutely vital (Yeo, 2013).

The need for the acquisition, verification and dissemination of reliable information is especially critical during a pandemic, on both scientific activities and scientific findings. The disseminating of such information through reliable individuals and institutions allows for proper vetting of information as opposed to sensationalized and unverified sources which mostly incite fear and confusion. With the current covid-19 pandemic public interest in science and science information has been increasing at an exponential rate and it has thus become critical for scientists to communicate science through various platforms not only for purposes of authenticity and quality but also to achieve radical shift in science perceptions. The participation of women in such platforms has been seen to be lacking in Botswana with men predominantly leading COVID-19 discussions in both the traditional media and digital platforms, this therefore requires the application of a gender lens.

Perhaps this correlates to the fact that all around African, women's participation in Science, Technology, Engineering and Mathematics (STEM) is reported to be lagging behind compared to the participation of men. Women are especially underrepresented in higher education and positions in STEM (Mukhwana, Abuya, Matanda, Omumbo, & Mabuka, 2020). The 2015 United Nations Educational, Scientific and Cultural Organization (UNESCO) science report reveals that women are not well represented in fields such as engineering, transportation, energy, information technology and computing, women are not well represented (UNESCO, 2015). In 2016 a study on engineering education for women in Botswana, which noted that women are a minority in the university engineering courses (Baryeh, Squire, & Mogomotsi, 2016) and the authors concluded that women's under-representation is due to "lack of counselling and information on engineering, difficulties in understanding scientific and mathematical concepts, absence of women role models and discouragement from people, among others" (Baryeh, Squire, & Mogomotsi, 2016). For more Botswana women to gain interest in STEM there has to be effective science communication by women in the STEM community, trailblazing women in STEM should act as role models and be invited to schools, workshops and seminars in order to impart the relevance of science in women's lives (Baryeh, Squire, & Mogomotsi, 2016). To this effect BAS in partnership with several stakeholders, conducted an online survey on advancing women participation in science communication in order to investigate this lack of participation and workshop women in overcoming whatever barriers that hinder them from active scientific communication.

The lack of women participation is of concern in that in failing to communicate science women miss out on opportunities of broadening their network and becoming visible to girl children who need role models and mentors in science. The country misses out on the diversity women could bring to the conversation. Here we report on the involvement of Botswana women in science communication, the challenges they face and possible means of enabling an environment for participation of women in science.

Data Collection Activities

A qualitative design approach was used for the study and data was collected through a four-part online questionnaire/ survey. The first part collected respondents' personal/demographic information. The second part of the questionnaire concentrated on the respondents' profession and education background and involvement in science research and publications. Third part collected data on participants' awareness and training in scientific writing and presentation, then last part of the questionnaire served to collect data on respondents' multimedia publications. The questionnaire also had a component where participants give consent to being interviewed should that be required.

About NASAC

The Network of African Science Academies (NASAC) was established on 13 December 2001 in Nairobi, Kenya and is currently the affiliate Network for InterAcademy Partnership (IAP) in Africa.

NASAC is a consortium of merit-based science academies in Africa that aspires to make the “voice of science” heard by policy and decision makers within and outside the continent. NASAC is dedicated to enhancing the capacity of existing national science academies and champions in the cause for creation of new academies where none exist

As at November 2019, NASAC comprised of the following twenty-eight members:

1. **African** Academy of Sciences (AAS)
2. **Algerian** Academy of Science and Technology (AAST)
3. Académie Nationale des Sciences, Arts et Lettres du **Bénin** (ANSALB)
4. **Botswana** Academy of Sciences (BAS)
5. Académie Nationale des Sciences du **Burkina** (ANSB)
6. **Burundi** Academy of Sciences and Technology (BAST)
7. **Cameroon** Academy of Sciences (CAS)
8. Académie Nationale des Sciences et Technologies du **Congo** (ANSTC)
9. Académie des sciences, des arts, des cultures d'Afrique et des diasporas africaines, **Cote d'Ivoire** (ASCAD)
10. Academy of Scientific Research and Technology, **Egypt** (ASRT) – *Provisional Member*
11. **Ethiopian** Academy of Science (EAS)
12. **Ghana** Academy of Arts and Sciences (GAAS)
13. **Kenya** National Academy of Sciences (KNAS)
14. **Madagascar's** National Academy of Arts Letters and Sciences
15. **Mauritius** Academy of Science and Technology (MAST)
16. Hassan II Academy of Science and Technology in **Morocco**
17. Academy of Sciences of **Mozambique** (ASM)
18. **Nigerian** Academy of Science (NAS)
19. **Rwanda** Academy of Sciences (RAS)
20. Académie des Sciences et Techniques du **Sénégal** (ANSTS)
21. Academy of **Science of South** Africa (ASSAf)
22. **Sudanese** National Academy of Science (SNAS)
23. **Tanzania** Academy of Sciences (TAS)
24. Académie Nationale Des Sciences, Arts Et Lettres Du **Togo** (ANSALT)
25. **Tunisia** Academy of Sciences Arts and Letters
26. **Uganda** National Academy of Sciences (UNAS)
27. **Zambia** Academy of Sciences (ZaAS)
28. **Zimbabwe** Academy of Sciences (ZAS)

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