



MINISTRY OF HEALTH



In Search of Better Health

2ND HEALTH AND CLIMATE CHANGE SCIENTIFIC CONFERENCE



BOOK OF ABSTRACTS

DATES: 28th to 30th August, 2023

VENUE: Diamond Leisure Beach and Golf Resort Diani, Kwale County



WELCOME REMARKS BY THE CHAIR



Ms. Sophie Matu - Conference Chair

Welcome to the 2nd Health and Climate Change Conference!

Ladies and Gentlemen

It is with great pleasure and a sense of purpose that I extend a warm welcome to all of you to the 2nd Health and Climate Change Conference. As the Chair of this significant gathering, I am honored to host an event that brings together passionate individuals, experts, and leaders from various fields who share a common goal: to address the critical intersection of health and climate change.

In an era where our planet faces unprecedented environmental challenges, the impact on human health cannot be ignored. Climate change poses a multifaceted threat, affecting everything from air

quality and disease patterns to access to clean water and nutrition. This conference serves as a platform to foster meaningful discussions, share groundbreaking research, and formulate innovative solutions to safeguard both the well-being of our planet and the health of its inhabitants.

Over the course of the conference, we will delve into a range of topics, including the intricate relationship between climate change and infectious diseases, the importance of resilient healthcare systems, equitable access to healthcare in the face of climate-related disasters, and the role of public policy in mitigating health risks associated with environmental changes.

Our esteemed lineup of speakers and panelists are experts in their respective fields, and their insights will undoubtedly enrich our understanding of the challenges at hand. I encourage you all to actively participate in the discussions, engage in networking opportunities, and collaborate towards actionable strategies that bridge the gap between health and climate.

I would like to express my gratitude to the organizing committee, sponsors, partners, and volunteers who have worked tirelessly to make this conference a reality. Your dedication is a testament to the urgency and importance of the issues we are addressing.

As we embark on this enlightening journey, let us remain mindful of the shared responsibility we hold in preserving the health of our planet and securing a sustainable and vibrant future for generations to come.

Once again, welcome to the 2nd Health and Climate Change Conference. May our collective efforts lead to profound insights, transformative ideas, and a renewed commitment to a healthier, more resilient world.

Organizing Secretariat

	Name	Delegation	Organization	Email
	Sophie Matu	Chair	KEMRI	Smatu44@gmail.com
	Carol Wandera	Member	KEMRI	Cwandera@kemri.go.ke
	Dr. Jane Ongango	Member	KEMRI	jrnabongo@gmail.com
	Elizabeth Kendi	Member	KEMRI	Kendipaul2004@gmail.com
	Getrude Waiharo	Member	KEMRI	Mwaiharo@kemri.go.ke
	James Wodera	Member	KEMRI	Jwodera@kemri.go.ke
	Purity Mugaruri	Member	KEMRI	Pngunju@kemri.go.ke
	Nicholas Mwikwabe	Member	KEMRI	nmwikwabe@kemri.go.ke
	Olga Mashedi	Member	KEMRI	ommashedi@gmail.com
	Anthony Wachira	Member	KEMRI	awachira@kemri.go.ke
	Lucy Kanyara	Member	KEMRI	LKanyara@kemri.go.ke
	David Kamau	Member	KEMRI	davidkamau57@gmail.com
	Dr. James Mwitari	Member	KEMRI-CAA	jmwitari@gmail.com
	Dr. Jonathan Abuga	Member	KEMRI-CAA	abugajn@gmail.com
	Arthur Gohole	Member	KEMRI-CAA	gohole.arthur@gmail.com
	Gamaliel Omondi	Member	MOH	
	Lolem Lokolile	Member	MOH	
	Ann Irungu	Member	Mama Doing Good	
	Eva Barmasse	Member	Mama Doing Good	
	Maureen Kwamboka	Member	NEMA	

Scientific

Dr. On'gang'o, - Chair
 Sophie Matu
 Gamaliel Omondi
 Dr. James Mwitari
 Dr. Jonathan Abuga
 Arthur Gohole
 Olga Mashedi
 Ann Irungu
 Lolem Lokolile

Logistics –

Carolyne Wandera - Chair
 Purity Ngunju
 Edna Wanjiku
 Elizabeth Kendi
 Getrude Waiharo

Publicity –

Wodera James
 Caroyne Wandera

Resource Mobilization

Sophie Matu – Chair
 Carolyne Wandera
 Barbara Miheso
 Ann Irungu
 Anthony Wachira

SEI Secretariat

Cynthia Sitati
 Ngongang Wandji



Prof. Khama Rogo *MB ChB, MMed O/G, Ph.D, FGOncol, FCOG (ECSA)*

Trained as an obstetrician-gynecologist, Prof. Khama Rogo earned his PhD and Fellowship in Gynecologic Oncology from Sweden, qualifying as only the second-ever Gyne-Oncologist in East Africa. He is a Fellow of the European School of Oncology.

He was awarded Kenya's first Lifetime Achievement Award in Healthcare in 2019. He has been nominated for and received the coveted Zenith Lifetime Achievement Award for Excellence in Health on June 25, 2021, in Lagos, Nigeria.

Additionally, he was recently appointed to Chair the Lake Basin Economics Bloc's Eminent Persons' Advisory Committee on Covid 19. He serves on the Boards of IntraHealth/IdealHealth (K).

After a successful career in academic medicine in three continents, he embarked on a career in international health where he has been an articulate advocate for reproductive health and rights for over two decades. He is also strongly committed to community health, quality reproductive health, and actively participated in all the definitive RH conferences of our time: Safe Motherhood (Nairobi, 1987), ICPD (Cairo, 1994), Beijing (1995) and Safe Motherhood +10 (Colombo, 1999).

Prof. Rogo has served as a consultant to all major international development agencies and in all major hospitals in Kenya. He has also previously served on the FIGO Committee on Women's Sexual and Reproductive Right and represented KOGS in the FIGO Postgraduate Studies Committee at the Singapore Congress.

As IPAS Vice President for Africa and Global Affairs (1998-2000), he introduced MVA in Africa against formidable forces and built the organization's regional and global strategic vision to promote women's reproductive health and rights. He spearheaded the use of MVA and expanded its use in Africa, placing it in the hands of nurses, to expand access quality of post-abortion care.

In Kenya, he has been a strong and forthright voice in all matters of quality health care and human reproduction for over three decades. This can be seen through his previous work as a past President of the Kenya Medical Association (4 years), President of Kenya Cancer Society (8 years), and Chairman of Kenya's National Council for Population and Development. He also led the Kenya Obstetrical and Gynecological Society for many years and played a leading role in allowing Kenyan nurses to provide long term contraception (injectable and insertion) as well as the introduction of mini-laparotomy for tubal ligation.

During his tenure as President of KMA, the organization introduced a local medical indemnity scheme for doctors, the KMA Housing Scheme, KMA SACCO and he was the first representative for health professionals on the board of NHIF.

He was the founder of the Centre for the Study of Adolescence in Nairobi, the leading research entity on youth and adolescent health and development; as well as the Nairobi Oncology Centre, the first specialist cancer care and advisory clinic in East Africa.

He is the founder of The Kisumu Health and Education Trust (KMET), which focuses on adolescent reproductive health and runs the single most extensive network (franchise) of high-quality private providers of comprehensive reproductive health care in Africa and provides loans to health SMEs. KMET was the winner of the Margaret Sanger Award in 2004.

He recently catalyzed the formation of the East, Central and Southern Africa College of Obstetricians and Gynecologist (ECSACOG) to enhance quality and professionalism in reproductive health in the region, and he is proud to be the premier Foundation Fellow of the College.

He is the co-founder of two innovative hospital programs in Kenya: *Sagam Community Hospital* in rural Siaya and the *Nairobi Women's Hospital*. The NWH was, for a long time, the only specialized hospital for women in East and Central Africa, providing unique care for victims of gender-based violence and rape, as part of a comprehensive package of services.

Sagam Community Hospital is the home of the African Institute for Health Transformation (AIHT), also co-founded by Dr. Rogo, which conducts cutting edge research on health innovations and runs an online Board accredited CME for health professionals. AIHT/Sagam established the first Emergency Room service in rural Africa focusing on quality emergency care; and, in collaboration with Harvard University/ Massachusetts General Hospital and Maseno University, created the first and only post graduate (MMed) program in Family and Emergency Medicine in the region. The first Master of Medicine class graduated in 2019. AIHT/Sagam has also conducted courses in rural laparoscopic surgery (in conjunction with Kenya Endoscopic Society), and is the process of establishing a center excellence in rural Palliative Care (in conjunction with McMaster University, Kenya Palliative Care Society and African Palliative Care Association)

Dr. Rogo has previously served on the Advisory Board of The David and Lucille Packard Foundation (Palo Alto, USA), and the Board of Directors of PATH (Seattle, USA), each for the maximum 9 years. He was also on the Boards of IntraHealth (North Carolina, USA) and The Center for African Family Studies (CAFS). He also served his full term on the board of Regional Prevention of Maternal Mortality Network and was a founding member of WHO's Gender Advisory Group, serving the maximum six years. He was also a member of the Regional Task Force for Reproductive Health (WHO, UNFPA, UNICEF & WB) and the NEPAD Health Committee.

In the US, he was recently selected as the First Ambassador and Chief Advisor to US-AHA (Federation of American Health Businesses in Africa)

Prof. Rogo first joined the World Bank Group as a Senior Global Advisor for Population and Reproductive Health and has been part of every major global maternal and child health initiative over the last 20 years. He then served as the Lead Health Sector Specialist and Head of the Health in Africa Initiative - a private sector in health focused program of the World Bank Group. In this position, he drove regional and global integration of private sector in health, leveraged well over USD10 billion in new investments in the health sector in Africa and helped reform/enact over 60 laws and regulations on quality of care and ease of doing business, across both anglophone and francophone Africa.

Kenya was a major beneficiary of the HIA program: IFC loans, Patient Safety studies and projects, Joint inspection tools and reforms, the new Health Act, KEPSIE and, UHC – to name just a few.

He is well published, with over one hundred and fifty peer-reviewed papers, chapters and books. He has also presented papers and given speeches in over 200 global conferences and convocations (including TED-talks).

Prof. Rogo is a recipient of multiple awards and honors in the region and abroad, continues to pursue academia through numerous adjunct professorial appointments, lectures, supervision of post- graduate students and external examination in universities in Africa, Europe and North America.

He is a proud Rotarian and has inaugurated Africa's most rural Rotary Club in Africa in his ancestral village – *The Rotary Club of Sagam*.

Despite his accomplishments, Prof. Rogo is most proud of his longevity in the pursuit of quality and excellence in the health profession, and of being a simple villager - husband and father to a humble and caring Kenyan family.



Prof. Sam Kariuki

Sam Kariuki (DVM, MSc, PhD) obtained his DVM from the University of Nairobi (1989), MSc in Pharmacology and Toxicology, University of Nairobi (1991), and a PhD in Tropical Medicine from the Liverpool School of Tropical Medicine (LSTM) in 1997. He was awarded Doctor of Science (Honoris causa) by the LSTM in December 2022. Currently he is Director, Drugs for Neglected Diseases Initiative (DNDi) East Africa Regional Office. Previously, he was Acting Director General at the Kenya Medical Research Institute (KEMRI) (2021-2023) and Director of Research and Development (2018-2022). He is Fellow, African Academy of Sciences and a Honorary Faculty Wellcome Sanger Institute, visiting Professor of Tropical Microbiology, Nuffield Department of Medicine, University of Oxford, and the Ohio State University One-Health Initiative. He is also a member of the American Society for Microbiology and Section Editor, Journal of Medical Microbiology.

Over the last 20 years his team has researched and published on epidemiology and genomics of Antimicrobial Resistance (AMR) and genomic surveillance of key enteric pathogens endemic in Kenya and the region, including typhoid fever, invasive non-typhoidal salmonella, cholera and E. coli infections. He has published over 200 papers in peer-reviewed journals and written 4 chapters in textbooks of Microbiology and Infectious Diseases, majoring in Genomics and Epidemiology. For his early work on the anthroponotic transmission of *Salmonella* Typhimurium invasive bloodstream infections in children less than 5 years of age and resulting in extremely high mortality rates in Kenya and the region (Kariuki *et al.* J Med Microbiol. 2006; 55(Pt 5):585-91), he won the prestigious **Pfizer Prize** (The Royal Society) for African Scientist of the Year Award, 2012. As an expert in Antimicrobial Resistance surveillance and monitoring, he was selected as a member of the National Antimicrobial Stewardship Interagency Committee (NASIC) advising Ministry of Health on One Health approach in implementation of the National Action Plan to combat AMR. As a World Health Organization consultant for the last 15 years (WHO-AGISAR), he has provided technical advice and opinion in areas of food safety, antimicrobial resistance and infectious disease surveillance for Kenya and the region, and this has been through participating in various committees. In 2020, he was appointed as a member of the WHO Strategic and Technical Advisory Group for Antimicrobial Resistance (STAG-AMR).



Dr. John Chumo

Dr John Chumo is an environmental scientist and the current Chief Executive officer, of MaMa Doing Good with an experience of over 30 years in the environmental sciences.

He holds a Doctor of Philosophy (D.Phil.) in Environmental Studies - Environmental Information Systems from Moi University. He is keen to showcase women-led climate action as the best approach to tackling the effects of climate change and health.

He has previously worked in various capacities as County Executive Committee Member (CECM), Department of Lands, Environment and Natural Resources, County Government of Nandi, Chairman of CEC's Environmental Caucus, Council of Governors (COG), and as a Lecturer, University of Eldoret – School of Environmental Studies and School of Science, Lecturer. Other roles were as follows; Chairman Friends of Nandi Environment (FONE), Community Based Organization in Nandi County, Member of District Environment Committee (2003) – Nandi County, Chairman of Kamobo High School in Nandi County, Chairman, St Elizabeth Chekpunyuk Girls High School

He has won several awards such Environmental award of the year (2006) – East African Environmental Network (EAEN), International NGO on Environmental Conservation & Advocacy.

Professional Membership

- Environmental Impact and Auditing Expert (NEMA)
- Environment Institute of Kenya (EIK)
- Kenya Society of Environmental, Biological and Agricultural Engineers (KeSABAE)



Dr. James Mwitari

Dr Mwitari is a long serving Public Health Practitioner with over 30 years' experience in public health with substantial expertise in teaching, research, and leadership. He is currently working for KEMRI- Clean Air (Africa) Global Health Research unit as a Senior Research Fellow, Principal Investigator and Co-Director of the unit. He was formerly the Dean school of Public Health and Senior lecture in the Department of Health Systems at Amref international University. Dr Mwitari received his PhD in Epidemiology from Jomo Kenyatta University of Agriculture and Technology, Kenya, and holds an MSc in Communicable Disease Epidemiology (University of London, UK). Mwitari worked in various departments within the Kenyan Ministry of Health as well as the Ministry of Planning and National Development. His last title in the ministry of health was Deputy Director of Public Health. He now leads several international research projects on air pollution, energy and global public health including UK NIHR and FCDO funded research on technical solutions to clean energy access in informal settlements of Nairobi.



Prof. Philip Osano

Philip is the Director of Stockholm Environment Institute (SEI) Africa Center where he leads SEI's research and policy engagement on environment and development in Africa. He also serves as the Chair of the Advisory Board of the United Nations University – Institute for the Advanced Study of Sustainability (UNU-IAS) in Tokyo, Japan. He has over 20 years of experience in applied research, project coordination, policy analysis, and university teaching. He has led and co-authored more than 50 publications, including peer reviewed journal papers, technical reports and book chapters, and has been instrumental in coordinating air quality, climate change and biodiversity research and policy engagement at continental, regional and national levels across Africa. Philip holds a PhD in Geography from McGill University (Canada), an MSc in Conservation Biology from the University of Cape Town (South Africa), and a BSc in Environmental Science from Egerton University (Kenya).



Prof. Jennifer Orwa,

Associate Professor of Pharmacy with vast experience in natural products research. She is currently executing the duties of Deputy Director, Resource Development & Knowledge Management at the Kenya Medical Research Institute. She is entrusted with the responsibility of overall leadership and coordination of knowledge generation, structuring, synthesis, sharing and assessment, for evidence informed decision making in healthcare.

Prof. Orwa has received notable awards namely, Order of the Grand Worrier of Kenya (OGW) for excellence in research; Fellow of the Pharmaceutical Society of Kenya (FPSK) for leadership in professional practice and Africa Evidence Leadership Award #AELA2022 for championing use of research evidence.

She is passionate and committed to mentoring young scientists to achieve their desired experience in relevant up-to-date research methods for production of high quality research evidence to inform healthcare policy and practice in a friendly environment



Dr. Agola Lelo Eric

Personal Statement

I have been invited to participate in this proposal application titled “NIH Call Global Infectious Disease Research Training Program” by Professors Serap Aksoy and Paul Mireji. I am honored to be a part of an important study that aims at looking at applied aspects of Global Infectious Disease and capacity building at postdoctoral level. I look forward to use my knowledge and many years of research experience in studies aimed at understanding and controlling of Schistosomiasis, a neglected tropical disease that affects many in Kenya, mostly children, to benefit the trainees and also further the knowledge in this field.

Contribution to science

My early work was based largely on finding the genetic diversity of *S. mansoni* parasite, the causative agent of intestinal schistosomiasis. The genetic diversity of schistosome parasites is important as it tries to explain the observed diversity of the parasites particularly in their response to PZQ treatment. To accomplish this, we first had to develop molecular makers that were robust enough to detect the diversity and also to do so in a cost-effective way. Below are some of publications that resulted from this work. Steinauer, M.L, Agola, L.E., Mwangi, I.N., Mkoji, G.M., and Loker, E.S. 2008. Molecular Epidemiology of *Schistosoma mansoni*: a robust, high-throughput method to assess multiple microsatellite markers from individual miracidia. *Infection, Genetics and Evolution* 8:68-73.

Once these markers were developed, we applied them in studies that investigated the genetic diversity and structure of *S. mansoni* obtained from both the intermediate and the definitive host. Studies involving parasites obtained from the definitive hosts are of particular interest as these parasites are not accessible due to their location within the definitive host. Due to this barrier, these types of studies were often carried out using parasite material that has been passage through several hosts. This method however introduced a lot of biases. We managed to overcome this and were able to directly genotype the parasites obtained from the definitive host. Here is one of the studies relevant to this: Eric L. Agola, Ibrahim N. Mwangi, Geoffrey M. Maina, Joseph M. Kinuthia, Martin W. Transmission sites for *Schistosoma haematobium* and *Schistosoma bovis* identified in localities within the Athi River basin of Kenya using a PCR-RFLP assay. *Heliyon*. <https://doi.org/10.1016/j.heliyon.2021.e06114>

We also carried out studies aim at the control of snail vectors of Schistosomiasis. In the transmission and maintenance of schistosomiasis, the intermediate snail host plays a central role and the control of the same is by way of molluscicide the most common being niclosamine. Regulatory Influence of *Procambarus clarkii*, Girard (Decapoda: Cambaridae) On Schistosome-Transmitting Snails in Lotic Habitats within the River Athi Basin, Kenya. Maina GM, Kinuthia JM, Mutuku MW, Mwangi IN, Agola EL, Kutima HL and Mkoji GM. (2017) *International journal of Marine Biology and research*

Diagnosis of Schistosomiasis and the Soil Transmitted Helminthes (STHs) infections relies on the microscopic detection of parasite eggs in faecal samples prepared using the Kato–Katz technique or the formol-ether concentration method. While these procedures are relatively simple to perform and do not require expensive equipment, they have limited sensitivity and specificity, require expertise to make a correct diagnosis and can be tedious when processing large samples, leading to increased cases of misdiagnosis. DNA-based diagnostic tests such as polymerase chain reaction (PCR) have proven to outperform microscopy in their reliability to detect gastro-intestinal parasitic infections.



Dr. Margaret Wachu Gichuhi - Expert in Environment and Climate Change

Dr. Margaret Wachu Gichuhi is a Senior Research Fellow/Consultant in Environment and Climate Change at the Institute of Energy and Environmental Technology, Jomo Kenyatta University of Agriculture and Technology. She has a PhD in Environmental Management from Jomo Kenyatta University of Science and Technology, a Master of Arts in Environmental Planning and Management (University of Nairobi), Post-graduate Diploma in Population studies and development and a Bachelor of Education, Geography (University of Nairobi). She has extensive experience for over twenty years in Environmental and social safeguards and is an Environmental and Social Impact Assessor (ESIA) Lead expert accredited by the National Environmental Management Authority. Margaret is peer journal reviewer of the Journal of Agriculture Science and Technology (JAST).

In addition, Margaret has cooperated with various institutions in areas of research, professional input and consultations such as; Ministry of Environment and Natural Resources, NEMA, World Vision, National Council for Population and Development, Kenya Association of Manufacturers, IUCN and Women Educational Researchers of Kenya (WERK).

Dr. Margaret Gichuhi's main interest is advanced research and consultation in environmental resource management, climate change adaption and mitigation, green finance and inducting society into adopting green building policy.

Dr. Margaret Wachu Gichuhi,

Senior Research Fellow, (Environment and Climate Change)

Institute of Energy and Environmental Technology

Jomo Kenyatta University of Agriculture and Technology

P.O BOX 62000-00200

Nairobi, Kenya.

Contacts: mgichuhi@jkuat.ac.ke or maggiewachu1@gmail.com Cell Phone: +254-0722311787

TITLE: CHILDREN, CITIES AND CLIMATE: THE COSTS OF INACTION AND OPPORTUNITIES OFFERED BY GREATER AMBITION IN DECARBONISING OUR CITIES

Robert Hughes

Background: The Children, Cities and Climate Initiative was set up in 2021 to explore the intersection of urban child health and climate change.

Methods: A combination of: literature review; health co-benefits modelling; survey work to understand how children and young people are experiencing urban living in a changing climate; and participatory urban co-design with parents, children/young people. Specifically, we have modelled the impacts of changes in fossil-fuel related air pollution levels across 16 cities, and the different future exposures to urban heat across 20 African cities. Surveys looked at the experience of urban living in changing climate and developed methods to understand how heatwaves and high-pollution affect children and young people's day to day lives. In addition, we conducted an ambitious set of public engagement activities.

Results: Literature review and modelling suggested that rapid and comprehensive transition away from fossil fuels could deliver substantial benefits to child health across 16 cities. Analyses under different future heat scenarios suggest that heat-related child health outcomes (under-5 mortality, diarrheal disease and preterm birth) will increase in 20 growing African cities by mid-century. These climate-related impacts will undermine projected improvements in health in Africa over coming decades. Illustrative calculations suggest that children living in informal settlements will experience a disproportionately large share of future heat-related health burdens. Survey work illustrated how children and young people are already experiencing harms associated with their current urban environments, and how they themselves have numerous ideas for how to address both root causes and direct impacts of current urban planning.

Conclusions: This work underscores the connections between child health and climate change. Furthermore, the literature, modelled estimates of future scenarios and surveyed opinions of young people provide further justification for urgent and ambitious efforts to both mitigate against climate change and to adapt to its impacts.

TITLE: THE PATHFINDER INITIATIVE: PATHWAYS TO A HEALTHY, ZERO CARBON, FUTURE

Robert Hughes

Introduction: The Pathfinder Initiative is a consortium led by researchers at the London School of Hygiene & Tropical Medicine (LSHTM) that aims to show how well-designed policies, actions and technologies can yield multiple benefits for people and planet in the transition to a healthy, net zero society. The project responds to the need for urgent and decisive action to keep within the 1.5°C target of the Paris Agreement and to reduce the health risks from climate change.

Methods: The initiative is supported by The Lancet Pathfinder Commission, a group of international experts in climate change and health and by partner organisations including C40 cities, SDSN, OECD and CDP.. The initiative collects evidence on implemented climate mitigation action and undertakes synthesis of existing research to provide practical examples of pathways to a net zero society, including through transformations of energy, transport, the built environment, food and agriculture and health care systems. It also documents the barriers to change and how these have been addressed in different contexts.

Results: Key messages from the Initiative will be published in late 2023, but central to its conclusions are the large, and often unrealised, opportunities that exist for population health to benefit from well designed, implemented and monitored decarbonisation strategies. The forthcoming Pathfinder Commission report will synthesise the current state of the literature connecting decarbonisation to health outcomes, highlighting a series of opportunities for better collaborations to build capacity and ambition, more rigorous measurement of real-world intervention at scale (to augment modelled estimates), and proposes a next phase of the initiative, to include a specific focus on the African continent.

Conclusions: The Pathfinder Initiative is a novel and timely project that seeks to accelerate the transition to healthy net zero societies by providing practical solutions that benefit multiple domains. The initiative has the potential to inform and inspire policymakers, practitioners and communities to take action for a sustainable future.

TITLE: NATURAL REGENERATION OF DRYLANDS AND ASSOCIATED PATHWAYS TO HUMAN HEALTH OUTCOMES: PERSPECTIVES FROM RURAL HOUSEHOLDS

Murage P, Asenga A, Tarimo A, Njung'e T, van der Zaan T, Chiwanga F

Background: Drylands cover approximately 41% of all land on earth and are home to 38% of the world's population. Rural communities in drylands rely on fragile ecosystems for sustenance which leads to high rates of food insecurity, poor health outcomes and low levels of well-being. Ecosystem restoration can contribute towards meeting development and conservation objectives and this has led to an increase in implementations of solutions to enhance natural ecosystems whilst addressing socio-economic challenges. However, the rate of implementation has outpaced evaluation of impact and particularly understanding of the health co-benefits.

Methods: We used in-depth group discussions across four rural villages in Tanzania to document self-perceived health and societal impacts of a widely implemented natural regeneration technique, Farmer Managed Natural Regeneration. Transcripts were coded to identify dominant themes. We thereafter applied an ecosystem cascades model to conceptualize pathways from ecosystem restoration to human health that emerged from the discussions.

Results: Respondents reported changes in ecosystem-based outcomes related to improved soil fertility, air quality and ground water retention. These ecological changes were associated with physical health benefits that included food and nutritional security, improved air and water quality, income diversification, heat adaptation and gender equality. Our adapted ecosystems cascades model demonstrates four distinct pathways through which ecological changes can impact on health outcomes: i) Simple pathways to health, ii) Complex pathways to health with one intermediary ecosystem service iii) Complex pathways to health with several intermediary ecosystem services and iv) Complex pathways to health with socio-economic mediators.

Conclusions: Our application of the cascades model show how changes in the biophysical structure of given ecosystem can result to measurable health outcomes, this framework can support empirical investigation to help define concrete metrics for monitoring and impact evaluation. Perceived health and societal benefits are critical drivers for successful implementation and scaling up of community-led conservation.

TITLE: CLIMATE CHANGE EFFECT ON PERSISTENCE OF MULTI DRUG RESISTANT TYPHOID INFECTIONS IN AN ENDEMIC SETTING

Susan Kawai

Introduction:

Typhoid fever caused by the bacterium *Salmonella enterica* serovar Typhi (*S. Typhi*) causes an estimated 25 million illnesses and approximately 200,000 deaths annually in developing countries. In Kenya, *S. Typhi* is a common cause of severe foodborne illness in urban informal settlements where inadequate sanitation facilities, limited access to clean water, and outdoor vending of cooked foods under low hygiene conditions are prevalent. Over the years, *S. Typhi* has become resistant to the currently recommended drugs for treatment of typhoid including fluoroquinolones and extended spectrum β -lactams. There is limited data on surveillance of antimicrobial resistance in *S. Typhi* and if climate change has any effect on typhoid infections as this is not routinely carried out.

Objectives:

Our study aimed at investigating the trends in resistance of *S. Typhi* over a period of 9 years. This involved comparison of resistant trends of *S. Typhi* to different antibiotics over the years. Additionally, we sort to determine the prevalence of multi drug resistant (MDR) *S. Typhi* in this population. *Salmonella Typhi* isolates from patients seeking treatment at 3 outpatient clinics, and 2 inpatient facilities in Nairobi County in an ongoing surveillance study for the period 2013-2022 were utilized.

Methods:

S. Typhi isolates from blood and stool collected from cases in 2013–2018 and 2020–2022, and stool alone from controls, were analyzed. Positively confirmed *S. Typhi* isolates were tested for susceptibility to 14 antibiotics using the Kirby Bauer disc diffusion technique. Selected MDR isolates were subjected to polymerase chain reaction (PCR) to investigate resistance genes.

Results:

On average, the study reported high trends of resistance especially against first line antibiotics over the 9 years; ampicillin (58%), sulfamethoxazole-trimethoprim (56%) and chloramphenicol (48%). Reduced susceptibility to ciprofloxacin was observed at 26%. Prevalence of MDR *S. Typhi* was reported to be 180/421 (43%); 125 (69%) from cases and 55 (31%) from controls. From the 43 MDR isolates subjected to PCR, 32 (74%) were positive for presence of bla_{TEM} genes.

Conclusion/Recommendations:

Resistant trends reported did not give a general increasing or decreasing trend as they were based on the number of *S. Typhi* isolated annually. Increased resistance to nalidixic acid was an indication of reduced susceptibility to ciprofloxacin which is a current treatment for typhoid infections. Our study did not report any association of Typhoid infections to hot temperatures or rain fall. Our study also reported that controls (carriers) equally play an important role in typhoid disease transmission in the community. Routine surveillance of circulating *S. Typhi* R-phenotypes in the environment is recommended.

TITLE: IN-KITCHEN AEROSOL EXPOSURE IN KOROGOCHO INFORMAL SETTLEMENT IN NAIROBI

Cynthia Sitati¹, Anderson Kehbila¹, , William Apondo, George Njoroge¹ and Philip Osano¹

¹ Stockholm Environment Institute

In urban set-ups, the use of charcoal as a source of energy is predominant among the urban poor (low-income earners). In the urban informal settlements such as the Korogocho slums in Nairobi, households rely on kerosene and charcoal for cooking. In some cases, it has been reported that some of the poorest households in these informal settlements use plastic waste, cloth rags, and other unconventional fuels due to unaffordability to access conventional sources of energy. As a result, the fuels generate high levels of harmful indoor air pollutants. This study was part of the wider project in which we assessed exposure to in-kitchen particulate matter (PM_{2.5} and PM₁₀) in 60 low-income homes across 12 cities, including Nairobi (Kenya). We assessed indoor air pollution exposure by monitoring aerosol and carbon dioxide data in five different households in the informal settlement of Korogocho in Nairobi. We engaged stakeholders through co-designed webinars, outreach, and capacity-building activities. The results showed that fuel, kitchen volume, cooking type, and ventilation were the most prominent factors affecting in-kitchen exposure. There is an urgent need for increased awareness of improved cooking practices and minimizing passive occupancy in kitchens to mitigate harmful cooking emissions.

Monitoring ambient air pollution to determine patient exposure in health facilities

Ngongang Wandji¹, and Manasi Kumar² et al.

¹ Stockholm Environment Institute,²University of Nairobi

This presentation will cover the result from ambient air pollution monitoring in two health facilities in Nairobi and Nakuru, and discuss the implications for patient exposure and vulnerability to poor air quality. Additionally, we present ongoing work to link air pollution and climate change to mental health and wellbeing in Nairobi and Kilifi Counties.

TITLE: DISTRIBUTION OF SCHISTOSOMA HAEMATOBIIUM AND SCHISTOSOMA BOVIS TRANSMISSION SITES IDENTIFIED IN LOCALITIES WITHIN THE ATHI RIVER BASIN OF KENYA IN RELATIONS TO CLIMATE CHANGE

Eric L. Agola, Ibrahim N. Mwangi, Geoffrey M. Maina, Joseph M. Kinuthia, Martin W. Mutuku.

Background: The epidemiology of human urinary schistosomiasis caused by *Schistosoma haematobium* can be complicated by the presence of ruminant schistosomiasis caused, primarily by *Schistosoma bovis*. The two schistosome species may be transmitted by the same *Bulinus* species, may occur sympatrically in the same habitat, and their cercariae similar in morphology therefore, difficult to tell them apart. Screening of snails collected from freshwater habitats for schistosome infections is often used to identify transmission. However, pin-pointing sites involved in *S. haematobium* transmission can be complicated by the presence of the bovine schistosome.

Methodology: A survey of snails was carried out for one year across different climatic seasons to determine the distribution of the schistosome snail host and to determine the effect of climate on the transmission ecology of Schistosomiasis. A PCR-RFLP method targeting a segment of the second internal transcribed spacer (ITS2) region of the ribosomal DNA (rDNA) in the schistosomes was used to identify mammalian schistosome cercariae shed by bulinid snails collected from endemic freshwater habitats within south-eastern Kenya, with the aim to identify the transmission sites

Results: A total of 5,034 bulinid snails were collected from 41 different sites over a period of one year. These were screened for schistosome infections, and out of these, 43 (<1%) were found to be shedding mammalian cercariae. On analysis using the Polymerase chain reaction- Restriction Fragment Length Polymorphisms (PCR-RFLP) assay, cercariae from 32 snails were identified as *S. haematobium* while cercariae from 11 snails turned out to be *S. bovis*. Only two sites out of 40 namely Kisukioni and Katiwa, were active transmission sites. Both sites were active transmission sites for both *S. haematobium* and *S. bovis*. The assay reliably identified and distinguished between *S. haematobium* and *S. bovis* cercariae, even when only a few cercariae (5–10) were present in the sample, or when parasite DNA concentrations were as low as five pico grammes (5pg).

Conclusion: There was significant variation in the distribution of the snail intermediate host and both the animal and human, *S. haematobium* and *S. bovis* respectively. This was attributed to change in climate that affected the transmission ecology of the parasite.

TITLE: DISTRIBUTION OF SCHISTOSOMA HAEMATOBIIUM AND SCHISTOSOMA BOVIS TRANSMISSION SITES IDENTIFIED IN LOCALITIES WITHIN THE ATHI RIVER BASIN OF KENYA IN RELATIONS TO CLIMATE CHANGE

Eric L. Agola, Ibrahim N. Mwangi, Geoffrey M. Maina, Joseph M. Kinuthia, Martin W. Mutuku.

Background: The epidemiology of human urinary schistosomiasis caused by *Schistosoma haematobium* can be complicated by the presence of ruminant schistosomiasis caused, primarily by *Schistosoma bovis*. The two schistosome species may be transmitted by the same *Bulinus* species, may occur sympatrically in the same habitat, and their cercariae similar in morphology therefore, difficult to tell them apart. Screening of snails collected from freshwater habitats for schistosome infections is often used to identify transmission. However, pin-pointing sites involved in *S. haematobium* transmission can be complicated by the presence of the bovine schistosome.

Methodology: A survey of snails was carried out for one year across different climatic seasons to determine the distribution of the schistosome snail host and to determine the effect of climate on the transmission ecology of Schistosomiasis. A PCR-RFLP method targeting a segment of the second internal transcribed spacer (ITS2) region of the ribosomal DNA (rDNA) in the schistosomes was used to identify mammalian schistosome cercariae shed by bulinid snails collected from endemic freshwater habitats within south-eastern Kenya, with the aim to identify the transmission sites

Results: A total of 5,034 bulinid snails were collected from 41 different sites over a period of one year. These were screened for schistosome infections, and out of these, 43 (<1%) were found to be shedding mammalian cercariae. On analysis using the Polymerase chain reaction- Restriction Fragment Length Polymorphisms (PCR-RFLP) assay, cercariae from 32 snails were identified as *S. haematobium* while cercariae from 11 snails turned out to be *S. bovis*. Only two sites out of 40 namely Kisukioni and Katiwa, were active transmission sites. Both sites were active transmission sites for both *S. haematobium* and *S. bovis*. The assay reliably identified and distinguished between *S. haematobium* and *S. bovis* cercariae, even when only a few cercariae (5–10) were present in the sample, or when parasite DNA concentrations were as low as five pico grammes (5pg).

Conclusion: There was significant variation in the distribution of the snail intermediate host and both the animal and human, *S. haematobium* and *S. bovis* respectively. This was attributed to change in climate that affected the transmission ecology of the parasite.

TITLE: “THIS SMOKE WILL FINISH US”: IMPACTS OF SCHOOL COOKING WITH POLLUTING FUELS ON AIR QUALITY, HEALTH AND EDUCATION IN THREE SCHOOLS IN URBAN NAIROBI, KENYA

Emily Nix^{1*}, Willah Nabukwangwa^{2,3†}, James Mwitari³, Federico Lorenzetti¹, Arthur Gohole^{2,3}, Serena Saligari¹, Matthew Shupler¹, Michael Abbott¹, Ghislaine Rosa¹, Rachel Anderson de Cuevas¹, Margaret Nyongesa², Elisa Puzzolo¹ and Daniel Pope¹

¹Department of Public Health, Policy and Systems, University of Liverpool, Liverpool, United Kingdom

²School of Public Health, Amref International University, Nairobi, Kenya

³Kenya Medical Research Institute, Nairobi, Kenya

Background:

Links between cooking with polluting fuels (e.g., wood, charcoal), and its effects on environment and health are well-established. However, few studies have been conducted in schools that rely on such fuels for catering. This study presents the first investigation of air pollution, cooking, and health in schools in Nairobi, Kenya.

Method:

We carried out an in-depth mixed-methods study in three schools (two primary schools and a college) in Mukuru informal settlement using wood and/or charcoal for catering. 24-hour air pollution measurements (particulate matter (PM_{2.5}) and carbon monoxide (CO)) were collected to assess concentrations in the main kitchen and a nearby classroom, and personal exposure of the main cook. Surveys with catering staff collected data on perspectives on air pollution and health symptoms and focus groups were conducted with catering staff, teachers and senior management to understand the impacts on health and the school environment.

Results:

Air pollution monitoring revealed that PM_{2.5} levels surpassed World Health Organization (WHO) interim guidelines, in all schools – with levels three times higher (107.6µg/m³) in classrooms, ten times higher (316.2µg/m³) in kitchens and cooks' exposure nearly six times higher (200.9µg/m³). Peak levels of pollution were found to be closely linked to cooking times, where concentrations doubled in classrooms and tripled in kitchens during cooking periods. Health concerns were raised by catering staff, who cited deteriorating health and experienced wheezing, chest pains, eye irritation and headaches – and frequently avoided the smoke. Substantial disturbance to classes from smoke was reported by teachers, with students experiencing coughing and sneezing.

CONCLUSION:

Transitioning to cleaner cooking options is essential for improved air quality, health, and education. Support is now needed to enable cooking transitions in schools to create a healthy and safe learning environment

Occurrence and burden of burns from cooking in peri-urban Cameroon, Ghana, and Kenya: results from surveys of household cooks

Gohole Arthur¹, Jonathan A. Abuga¹, James Mwitari¹, Willah Nabukwangwa¹, Samuel Iddi², Reginald Quansah², Theresa Tawiah³, Kwaku Poku Asante³, Judith Mangeni⁴, Edna Sang⁴, Diana Menya⁴, Miranda Baame⁵, Emmanuel Betang⁵, Bertrand Hugo Mbatichou Ngahane³, Matthew Shupler⁶, Elisa Puzzolo⁶, Daniel Pope⁶

1. Centre for Respiratory Diseases Research (CRDR), Kenya Medical Research Institute (KEMRI), Nairobi, Kenya
2. School of Public Health, University of Ghana, Accra, Ghana
3. Kintampo Health Research Centre, Kintampo, Ghana
4. School of Public Health, Moi University, Eldoret, Kenya
5. Douala General Hospital, Douala, Cameroon
6. Department of Public Health, Policy and Systems, University of Liverpool, Liverpool, United Kingdom

Introduction and study objectives

- Globally, there are at least 7.1 million burn-related injuries, 18 million disability-adjusted life years, and over 250,000 deaths caused by burns (Chen et al., 2021; WHO, 2018).
- Over 90 percent of burns occur in low-and middle-income countries (LMICs) with an estimated minimum of 180,000 deaths (WHO, 2018).
- Children and women, who are typically the primary cook, are disproportionately affected by burns, there is a dearth of epidemiological evidence on the burden of cooking-related burns among these populations in LMICs.
- We determined the prevalence, severity, and causes of cooking-related burns, and assessed whether the choice of primary cooking fuel (biomass fuels (e.g. wood and charcoal) vs liquefied petroleum gas (LPG)) impacted their prevalence.

Materials and Methods

Study design and sites

- The burns study is part of the CLEAN-Air Africa research program (<https://cleanairafrica.com/>).
- A multi-country cross-sectional survey was conducted between 2019-2020 in Mbalmayo in Central Cameroon, Obuasi in the Ashanti region, Ghana, and Eldoret in Uasin-Gishu County in Western Kenya.

Figure 1: Map showing the study sites in Kenya, Cameroon, and Ghana



Data collection methods and analysis

- A similar approach was used in the identification and assessment of eligible study participants in each of the participating communities.
- Each selected study site underwent 1 week of community engagement and sensitization.
- All households in the selected locations were enumerated and a random sample of about 2,000 households was selected for a rapid community survey.
- In-depth surveys were conducted in all consenting households by trained field enumerators who administered questionnaires to the primary cook or the head of the household.
- Statistical analyses including estimations of proportions and assessment of associations conducted in R software.

Results

- One in 10 adults (10%, 128 of 1240) and 42 in 1240 (3%) children reported experiencing a burn in the last 12 months.
- The self-reported occurrence of burns in adults was higher (24%) in Cameroon than in Ghana and Kenya (3% and 3%, respectively).
- The prevalence of burns in children was similar across the three countries (4% in Cameroon, 3% in Ghana, and 3% in Kenya).
- The severity (leaving a scar) was high in both adults (73%) and children (83%).
- Choice of stove (LPG or biomass fuel) did not appear to be associated with adult burns in Ghana and Kenya (OR=0.73 and OR=1.42 $p>0.05$ respectively).
- Children in households primarily cooking with LPG had lower odds of experiencing burns (OR=0.30, 95%CI 0.05-1.59), although this did not reach statistical significance.
- The use of an LPG stove, however, appeared to reduce the risk of severe burns in children (OR=0.49, 95%CI 0.25-0.92).

Conclusion

- Cooking-related burns are a frequent and debilitating issue for both adults and children. The experience of burns is highly context-specific.
- Excess prevalence of burns in Cameroon compared with Kenya and Ghana warrants additional research investigation.

DNDi

Best Science
for the Most Neglected

DRUGS FOR NEGLECTED DISEASES initiative:

Advancing Innovation to
Tackle Neglected Diseases

The Drugs for Neglected Diseases initiative (DNDi) is a not-for-profit medical research organization that discovers, develops, and delivers safe, effective, and affordable treatments for neglected people.

DNDi is developing medicines for sleeping sickness, leishmaniasis, Chagas disease, river blindness, mycetoma, dengue, paediatric HIV, advanced HIV disease, cryptococcal meningitis, and hepatitis C.

Its research priorities include children's health, gender equity and gender-responsive R&D, and diseases impacted by climate change. Since its creation in 2003, DNDi has joined with public and private partners across the globe to deliver twelve new treatments, saving millions of lives.

About Neglected Tropical Diseases

Neglected tropical diseases (NTDs) are a diverse group of 20 conditions affecting more than one billion people that are mainly prevalent in tropical areas, such where they mostly affect impoverished communities and disproportionately affect women and children.



"DNDi has delivered delivered 12 affordable new treatments for six deadly diseases for the past 20 years

www.dndi.org

Join our conversations:

facebook.com/dndi.org, | twitter.com/dndi, | linkedin.com/company/dndi,
instagram.com/drugsforneglecteddiseases, | youtube.com/dndiconnect



OUR VISION

To save lives and improve the health of people living with neglected diseases by using an alternative model to develop drugs for these diseases, and by ensuring equitable access to treatment.



For more information, contact us on:
P.O. Box 21936-00505, Nairobi, Kenya
Tel: +254 20 5003 400
infoafrica@dndi.org



KENYA MEDICAL RESEARCH INSTITUTE

Products & Services

In Search of Better Health

Disinfectants



Kem-rub Sanitizer

- > Alcohol based Sanitizer
- > WHO-recommended
- > Guarantees 99% riddance of pathogens
- > Superior Quality



TB-Cide

- > Chlorine based stabilized decontaminant
- 5-5.6% w/v
- > Proven activity against Mycobacterium spp
- > Superior package, superior quality

Rapid Test Kits



Plasmocheck

Rapid Malaria Test Kit

Results Within 30 Mins



HEPCELL

Hepatitis Rapid Test Kit

Other Products and Services



Culture Media

- > Internationally approved
- > ISO 9001:2015 and ISO 13485:2016 conditions
- > Delivery under strict cold-chain



KEM-VTM

Viral Transport Medium (VTM)

- > 204* 3ml tubes
- > 80*1ml tubes



Proficiency Test Kits

Covid-19 & HIV



SCAN QR TO VISIT CONFERENCE WEBSITE

