GCRFNGR6\1598

Establishment of One Health Platform to Reduce the Emergence and Spread of Antibiotic Resistance in the Nile Valley (PRESAR)

Section 3 - Proposal

Proposal title

Establishment of One Health Platform to Reduce the Emergence and Spread of Antibiotic Resistance in the Nile Valley (PRESAR)

Lay summary

This project aims to build a research network on Antibiotic Resistance (ABR) in the Nile Valley. ABR is a growing global concern, with an impact not only on the lives of patients, but also presents a massive economic burden on healthcare systems. This network (PRESAR) will to bring together researchers from diverse backgrounds to address ABR from different perspectives. We will work to seek solutions to decrease the burden of infectious diseases, thereby having a positive impact on the welfare needs and subsequently economic development. The project is underpinned by promoting and maintaining a strong partnership between the UK and African academic communities, enhancing capacity to becoming world leaders in ABR research.
The overall aim is to build capacity, address multiple aspects of ABR transmission, and help create locally-relevant policies that will eventually reduce the disease burden. We aim to deliver impact regionally in Sudan, Ethiopia and Egypt, and globally by encouraging engagement, communication and dissemination of findings to the global research community.

Network objectives

Antibiotic resistance (ABR) is one of the greatest threats to global health estimated to become the leading cause of death (>10 million people) by 2050, with Low- and Middle-Income Countries (LMICs) bearing the highest rates due to weak health system, limited laboratory infrastructure and improper use of antibiotics.
ABR in LMICs is often investigated as a medical problem. Other dimensions contributing to the problem are often overlooked including population displacement and migration, agriculture and veterinary practice.
The extensive population movement and displacement In the Nile Valley (Sudan, Egypt and Ethiopia), the settlement and expansion of urbanization into agriculture and animal grazing areas, and the intensive animal husbandry systems raised the risk of resistant pathogens in the region. Nevertheless, current efforts and research to control ABR are limited to the hospitals through ongoing research collaboration with leading experts in UK and other Northern partners (TACTIC, TIBA project, S-AMR) that could be strengthened to coordinate the response to reduce and prevent the emergence and spread of ABR in the region.
We are hereby proposing to establish a research network (PRESAR) between three Nile Valley institutes: Bioscience Research Institute , Ibn Sina university (Sudan), Armer HansenResearchInstituteALERT-AHRI (Ethiopia) and Cairo University (Egypt) in collaboration with Brighton and Sussex Medical School (UK). PRESAR aims to establish a sustainable one health platform to coordinate and strengthen the collaboration between the stakeholders. **The network will address the following gaps:**

1- **The antibiotic use and prescription practice in both human and veterinary medicine**
2- **The impact of population migration and displacement on the emerge and spread of ABR**
3- **The impact of prevention of infection and control (IPC) and the strategies to enhance local compliance.**
4- **The burden of ABR on health of communities**
5- **The collaboration and communication between the medical, veterinary and social science departments.**

Furthermore, we are committed to strengthen ABR research across the region, via meetings, visits and training workshops. The network will facilitate knowledge exchange and discuss common obstacles and successes in ABR research, thereby fostering a constructive research environment across the Nile Valley region. We aim to strengthen South- South collaboration Sudan, Ethiopia and Egypt, and globally by encouraging engagement, communication and dissemination of findings to the global research community.
This network has short- and long-term goals that will benefit researchers, institutions and countries. In the short-term, we will
1- Establish a new research network involving local, regional and international experts in medical, biomedicine & social science.
2- Strengthen the collaboration between partner institutes
3- Facilitate knowledge exchange and promote engagement of scientists across the Nile Valley region.
In the long term, the network will:
- Secure significant funding to undertake a comprehensive research programme on ABR in the healthcare setting & the community.
- Identify and implement strategies that aim to prevent the emerge of ABR and reduce the burden of ABR infections to benefit the community, patients and their families
- Train young scientists in the region on ABR.
- Strengthen community engagement and knowledge in ABR.

http://tiba-partnership.org/

Re-submission status

If you have previously applied to the GCRF Networking Grants scheme, please describe how you have developed the proposal since the previous submission.

No Response

Start date

30 November 2020

Networking Activities

The network is planning to organize 2 regional meetings over 12 months in Khartoum.
Meeting 1: December 2020
This meeting is intended to launch the network and provide insight to the importance of multidisciplinary approach involving stake holders (policy maker, medical, veterinary, social sciences and end users of research) in ABR-related research. A 3-day workshop will facilitate the interaction of researchers and provide opportunities for engagements across different disciplines, propose common hypotheses and plan methodologies related to the emerge and spread of ABR. The objectives of this meeting are to:
1- Actively involve a range of experts: from medical, biomedical and social scientists (anthropologists, historians and political scientists) as well as policy makers and end user of research involved in AMR research
2- Setting the AMR research priority
3- Identify at least 2 common themes/potential projects combining a bio-social approach, to work towards for the duration of the network.
4- Create a platform for national and regional knowledge exchange and networking.
February 2021, April 2021, June 2021: A Teleconferences will be held between teams to discuss the planning of potential projects.
Meeting 2: September 2021
The meeting will identify research topics for proposal writing and application for funding . The meeting would also facilitate exchanges on the challenges that need to be overcome within the network and proposals for sustaining it.

Section 4 - Lead applicant

Title	First Name	Surname	ORCID ID Number
Professor	Maowia	Mukhtar	https://orcid.org/0000-0003-2183-5915

Title of current position	Director
Field of specialisation	Molecular Biology and Immunology
Current employer	Bioscience Research Institute, Ibn Sina University
Current position start date	19 March 2019
Current position end date **For permanent positions, enter 31 December 2050**	28 February 2025

Country

Select the country where your employer is based

Sudan

Summary of current research

Our current research is focused on discovery of new diagnositic biomarkers for infectious diseases, Improvement of diagnosis of emerging viral diseases and monitoring of antimicrobial drug resistance. Our institute has strong record in infectious diseases and drug resistance concentrating on one health approach

Academic Qualifications & Career History

Ph.D. Cornell University USA June 1989
M.Sc. Cornell University USA August 1985
B. V.Sc. University of Khartoum Sudan June 1982
1.Professor of infectious diseases
Institute of Endemic Diseases, University of Khartoum 2003- now
2.Director
Institute of Endemic Diseases Feb 2003 – 2006
Responsible for the Institute financial, academics, administration and development plans of the institute..
Febraury 2002 – 2006.
3. Acting Director
Responsible for financial academics and administration and development plans of the Institute activities 2001 to 2002.
4.Head, Department of Molecular Biology
Institute of Endemic Diseases
Responsible for the research, training teaching and development of Molecular Biology research and courses.
June 1994 to 2001.
5. Associate Professor
Department of Molecular Biology
Institute of Endemic Diseases
University of Khartoum
March 1998 - 2003
6. Assistant Professor
Department of Preventive Medicine and Public Health
Faculty of Veterinary Science
University of Khartoum
June 1989 to June 1994
7. Research Assistant
Department of Immunology, Microbiology and Parasitology
New York State College of Veterinary Medicine
Cornell University
USA
August 1987 to June 1989
8. Teaching assistant
Department of Immunology, Microbiology and Parasitology
New York State College of Veterinary Medicine
Cornell University
USA
September 1983 to August 1987

1. Co-chair: Human African Trypanosomiasis, Leishmaniasis and Chagas Disease reference group, TDR/ WHO May 2009 to May 2011.
2. Temporary consultant TDR to assess Tropical Diseases research and capacity building in Eretria, Yemen and Sudan 2002.
3. Temporary consultant TDR to assess tropical diseases research and capacity building in Yemen: 25 June to 03 July 2003
4. Member of The World Health Organization (WHO)/ TDR Steering Committee on Research Capability Strengthening, 1999 to 2001.
5. WHO temporary advisor and steering Committee member on Measles March 2002.

6. Member of Country coordination Committee Sudan for the Global Fund 2005 to now.
7. Member of the National Research Council, Federal Ministry of Health, Khartoum, Sudan.
8. Member of National Ethical Committee Federal Ministry of Health Sudan

List your key and/or relevant publications

Evolution of P. falciparum drug resistance genes following artemisinin combination therapy (ACT) in Sudan. Hamza babiker, Amani Bakhiet; Amani Kheir; Mohamed Abdelraheem, Maowia Mukhtar and Ali Sultan.
Transactions of the Royal Society for Tropical Medicine and Hygiene 2019 Aug 1. pii: trz059. doi: 10.1093/trstmh/trz059 PMID: 31369106

High Prevalence of New Delhi Metalo β-Lactamases in Multidrug-Resistant (MDR) Klebsiella.pneumoniae Sequence Type 101 in Khartoum Hospitals". Enas Osman; Nagwa Elamin; Lena Elhassan and Maowia M. Mukhtar. January 2019. Journal of Infection and Public Health 12(1):143. DOI: 10.1016/j.jiph.2018.10.116

Molecular Characterization of CTX-M ESBLs among Pathogenic Enterobacteriaceae isolated from different regions in Sudan
Hisham N Altayb1*, Mohamed A M Siddig2, Nagwa M El Amin3, Ahmed Ibrahim Hashim1 Maowia M. Mukhtar
Global Advanced Research Journal of Microbiology (ISSN: 2315-5116) Vol. 7(2) pp. 040-046, April, 2018

Detection of novel SHV Extended-Spectrum Beta- Lactamase gene mutation in Klebsiella pneumoniae isolated from patient in Eastern Sudan. Hisham N Altayb, Nagwa M El Amin, Maowia M. Mukhtar, Mohamed A. Hassan and Mohamed A M Siddig. 2015. Current research in microbiology and biotechnology. 3(1):542-549.

Synthesis, Characterization, and Antileishmanial Activity of Certain Quinoline-4-carboxylic Acids. Mazin Abdelwahid; Tilal Elsaman; Malik Suliman Mohamed; Sara A. Latif; Maowia M. Mukhtar, Magdi Awadalla Mohamed; February 2019; Journal of Chemistry 2019(ID 2859637):1-9. DOI: 10.1155/2019/2859637

Section 5 - Co-applicant

Title	First Name	Surname	ORCID ID Number
Dr	Leena	Al-Hassan	https://orcid.org /0000-0002-0506-050X

Title of current position	Research Fellow
Field of specialisation	Global Health, Infectious Diseases, Antibiotic Resistance
Current employer	University of Sussex

Current position start date	01 February 2014
Current position end date **For permanent positions, enter 31 December 2050**	31 December 2050

Summary of current research

Since joining BSMS in 2014, I have been working within the Department of Global Health and Infection (GHI), developing research projects in antibiotic resistance in low- and middle-income countries. My research on the mechanisms of antibiotic resistance in hospital acquired infections, focusing mainly on carbapenem resistance in Acinetobacter baumannii and Klebsiella pneumoniae from North and sub-Saharan Africa. Several research projects have focused mainly on investigating the molecular epidemiology and genome sequencing. Capacity building of local researchers in Sudan and Egypt in AMR research and methodology has been an important element of my work.
BSMS has followed an outstanding research trajectory in the field of infection, developing an internationally recognised profile and identified global health and infection (GHI) as areas of outstanding achievement. AMR is one of our most fruitful research areas with a dynamic and multidisciplinary team.

Academic Qualifications & Career History

2019- to date: Research Fellow in Global Health and Infection (permanent position).
2014-2019: Postdoctoral Research Fellow in Global Health & coordinator of the Wellcome Trust Brighton and Sussex for Global Health Research.
2010-2013: PhD in Medical Microbiology from the University of Edinburgh.
2009-2012: Clinical Research Associate in Infectious Diseases at the Children's Cancer Hospital 57357, Egypt.
2005-2009: BSc Biomedical Sciences (Hons) Infectious Diseases

List your key and/or relevant publications

E. A. Osman, N. El-Amin, E. A.E. Adrees, L. Al-Hassan, M. Mukhtar (2020). Comparing conventional, biochemical and genotypic methods for accurate identification of Klebsiella pneumoniae in Sudan. Access Microbiology epub ahead of print Feb 2020.

L. Al-Hassan & L. Al-Madboly (2020). Molecular characterisation of an Acinetobacter baumannii outbreak. Infection Prevention in Practice epub ahead of print.

L. Al-Hassan, M. Zafer, H. El-Mahallawy (2019). Multiple Sequence Types Responsible for Healthcare-associated Acinetobacter baumannii Outbreaks in a Single Centre. BMC Infectious Diseases 19:829.

N. El Amin, E. Osman, L. Al-Hassan, I. Abdalrahman (2019). Epidemiology of Antibiotic Resistance in Culture-positive Hospitalized Patients in Selected Hospitals in Khartoum, Sudan. Sudan Journal of Medical Sciences 14(1):15-23.

L. Al-Hassan, A. Opazo, H. El-Mahallawy, & S.G.B. Amyes (2015). The Role of IS6 Family Promoters of blaOXA-58 in Conferring Carbapenem Resistance in Acinetobacter baumannii. Journal of Global Antimicrobial Resistance 3: 5-8.

Section 6 - Network

Core Partners

Core Partner Number	Country of residence	Name of individual and Institution	Contribution of core partner to the network
1	Ethiopia	Adane Mehrit, Armauer Hansen Research Institute (AHRI)	ALERT-AHRI is a biomedical research institute with a strong focus on infectious diseases. AHRI has extensive links with Ethiopian universities and academics, as well as the Ministry of Health in Ethiopia which would be useful important to involve regional stakeholders. AHRI also has strong links with social science academics that would be vital in the network.
2	Egypt	Hadir El-Mahallawy - Cairo University	Cairo University has a number of research-active hospitals. Their role in the network would be to bring the local expertise, and help in planning strategies in successful infection prevention policies, and antimicrobial stewardship.

3	Ethiopia	Yimtubezinash Woldeamanuel - Black Lion Hospital	This is the largest tertiary referral hospital in Ethiopia, and they have an active research link with McGill Global Health Program to reduce overuse of infection and improve diagnostics. Their role would be to bring the local expertise in how ABR is addressed locally and in the community.
4	Sudan	Einas Awad - Ibn Sina University	Ibn Sina University is taking an active role in medical research and is supporting local capacity building, research and education in AMR in Sudan.
5	Sudan	Kamal Elhajj - Ahfad University for Women	Prof Kamal is a consultant microbiologist with a long-standing expertise in conducting AMR research in Sudan. His expertise would be important to address relevant clinical issues and how we can best target future interventions in infection prevention and control in the healthcare settings and the community.

Collaborators

We aim to include a wide range of disciplines, from social to biomedical scientists in order to build an interdisciplinary core to the research network.

For the social science element of the network, we will collaborate with experts in anthropology, international relations, and global health policy:
-Dr Papreen Nahar – Brighton and Sussex Medical School, UK.
-Dr Anne Roemer-Mahler – Centre for Global Health Policy, University of Sussex, UK.
Expertise in combining bio-social approaches in the ABR research:
-Dr Makeda Semret - McGill University, Canada.
-Dr Louis-Patrick Haraoui - Sherbrooke University, Canada.
Expertise in medical microbiology and infectious diseases from a clinical perpective:
-Dr James Price - Imperial College, London, UK.
-Prof Jordi Vila - Institute of Global Health, University of Barcelona, Spain.
Expertise in genomics and molecular epidemiology of resistance:
-Dr Ignasi Vila – Institute of Global Health, University of Barcelona, Spain.
-Dr Paul Higgins - Institute of Medical Microbiology, Immunology and Hygiene, Germany.

Section 7 - ODA & GCRF compliance

Which country/countries on the DAC list **will directly benefit from this proposal?**

Sudan

Egypt

Ethiopia

No Response

No Response

No Response

How is your proposal directly and primarily relevant to the development challenges of these countries?

Applicants should support this statement with statistics. (250 words max)

Antibiotic resistance in the healthcare setting and community is a global problem, with huge impact on individuals, healthcare systems and communities. Through the proposed network, we are committed to improving the health and wellbeing of people by reducing the burden of infectious diseases and the transmission of resistance in Sudan and the Nile Valley region. This can only be achieved through coordinated multi-disciplinary research where the factors and drivers of resistance are explored from different disciplines and combined to create the whole picture. To improve the local healthcare systems, we must foster and promote a sustainable, rich research environment in the region.
The UK government's commissioned review on AMR by Jim O'Neil estimated that the economic burden of resistance is EUR1.5 billion (per annum) in Europe, in comparison to the estimated burden in LMIC being 3x higher, with an estimated cost of ~€7 billion per annum. Several studies have confirmed that resistant organisms significantly increase hospital admission days and consequently economic costs (Ref: Zhen 2019, Naylor 2019). This creates a significant burden on the local healthcare systems as well as individuals who are commonly required to bear the costs of prolonged hospitalisation and treatments. Furthermore, there

is a need to address ABR transmission in the community, where antibiotic consumption in unregulated in both human and animals. Through the proposed network, we aim to enhance investments and capacity for local scientists enabling them to propose solutions for the local health problems thereby improving health and wellbeing of people.

How do you expect the outcome of your proposed activities will promote the economic development and welfare of a country/countries on the DAC list? (250 words max)

Irrational antibiotic consumption both in the healthcare and community is one of the key drivers of ABR in Sudan and across many LMICs. This consequently creates an economic burden on individuals, who may have to cover the economic costs, as well many other sectors (healthcare, agriculture & animal farming) who have to all bear the consequences of increased resistance rates. By researching the many factors relating to ABR transmission, and particularly involving social scientists, the outcomes (both in the short- and long-term) will provide vital, contextual information to governments, policy makers, local-authorities, non-governmental organisations and other stakeholders about the determinants of health, illness and healthcare delivery and use. Improving the health and well-being of society by limiting the burden of resistant infections will inevitably lead to improved economic standards across the societies. For example, hospitals would be able to use their resources on improving diagnostic facilities rather than increasing the use of last-resort antibiotics (such as vancomycin and carbapenems). Through community engagement and understanding behaviours, we would also be able to reduce unnecessary consumption of antibiotics. Furthermore, we aim to have several research projects stemming from the network, thereby obtaining more research funding to strengthen the local research environment.

Global Challenge Area

All proposals funded by the Global Challenges Research Fund must be focused towards a Global Challenge Area. More information is available in the GCRF strategy document.

Please select the Global Challenge Area(s) you will be addressing in this proposal.

Primary theme

Equitable Access to Sustainable Development

Primary sub-theme

Sustainable health and well being

Secondary theme

Sustainable Economies and Societies

Secondary sub-theme

Sustainable livelihoods supported by strong foundations for inclusive economic growth

GCRF Challenge Area

This proposal aims to create a sustainable research network that will work collectively on addressing a major challenge in the Nile Valley's health and wellbeing: antibiotic resistance transmission. We aim to increase skills and the knowledge-base by supporting the development and strengthening of research capacity in Sudan, Egypt and Ethiopia. The proposed network is problem-and-solution-focused, by encouraging researchers to investigate different factors relating to ABR transmission in order to propose realistic solutions to improve the health of people, addressing Goal 3 in the SDGs. We are committed to research excellence by bringing together world-leading experts from diverse backgrounds with the common aim of reducing infections and improving the wellbeing of people. We are committed to building local capacity of scientists who will lead research design, and plan for implementation and uptake. In the long term, local impact will be seen within local institutions where research will thrive, and the community where limiting the spread of ABR will lead to improved overall health.
The long term sustainability and growth of this partnership is vital. This network will enable us to consolidate ongoing efforts (i.e. TIBA http://tiba-partnership.org/, S-AMR https://www.bioscience-isu.org/index.php) to promoting research, allow us to produce strong data, and strengthen local capacity which in turn will put us in a strong position to establish a centre of excellence in AMR research in the region. If successful, this will support an environment that facilitates essential education, training and experience that will benefit scientists and the communities we serve locally, nationally and globally.

No Response