2nd African Conference on Emerging Infectious Disease And Biosecurity Lagos.

Conference REPORT

27-29 JULY, 2016

Strengthening African Health Systems:
Building Resilience and Capacity to Tackle Epidemic Threats

Biosecurity and Infrastructure in the Aftermath of an Ebola Outbreak

OUTLINE (TABLE OF CONTENTS)

EXECUTIVE SUMMARY

The **2nd African Conference on Emerging Infectious Disease and Biosecurity** was held from the 27-29 July 2016, at the Eko Hotels Convention Centre in Lagos, Nigeria.

This forum brought together hundreds of participants from around the globe, including policy makers, biomedical scientists, public health stakeholders, members from the public and private health sector, and a variety of academics to discuss the rise of the era of Emerging Infectious Diseases (EID), and the parallel biosecurity threats they pose. The forum was jointly organized by the Lagos State Ministry of Health, Global Emerging Pathogens Treatment Consortium (GET), West African Taskforce for the Control of Emerging and Re-emerging Infectious Diseases (WATER), African Gong: The Pan-African Network for the Popularization of Science & Technology and Science Communication, and Mothergold Ltd.

The three-day meeting was sponsored by Global Affairs Canada and received additional funding from pharmaceutical companies (Janssen Vaccines and Prevention B.V). Attendees came from ten member states of the Economic Community of West African States (ECOWAS), Cameroon, Kenya and South Africa with delegates representing international organizations including the New Partnerships for Africa's Development Agency (NEPAD) of the African Union, and World Organization for Animal Health (OIE).

The meeting served as the annual follow up to the **'African voices and leadership in accelerating the evaluation of treatments and potential Ebola vaccines in West Africa,'** conference which took place in January 2015 in Dakar, Senegal. This previous conference culminated in the '*Declaration of the Forum of Dakar*', a multilateral international document synthesized during the height of the West African Ebola virus epidemic. The Dakar Declaration highlighted Ebola as a severe public health threat to the West African region, and provided recommendations for: (1) containing the threat, (2) identifying and promoting treatment options, and (3) galvanizing scientists, policy makers, and the African community at large to mobilize a concerted plan to action.

While the Ebola epidemic has been contained in terms of new cases of morbidity and mortality across West Africa, the deadly pathogen has not only wreaked long-lasting havoc on multiple African economies, but also remains a very active threat terms of biosecurity and biosafety at both the regional and global level. In addition to the continued discussion on Ebola virus vaccine programs and therapeutic approaches, prominent themes of the conference focused on how to: (1) optimize a regional rapid response strategy for absolute containment of dangerous biological samples (i.e. Biosafety Level-4 pathogens); and (2) develop a regional biobanking program for the Ebola virus and other emerging and re-

emerging infectious pathogens. The forum provided an opportunity for African academics/experts and members of the African community, as well as their international partners, to express their voices within a broadly represented and culturally and pragmatically cognizant context.

Canada's Global Partnership Program Team (L-R): Trevor Smith, Ken Ugwu and Stacey Mantha

Opening Ceremony of the 2nd African Conference (on stage are the Lagos State Commissioner for Health, Ambassadors, GPP Representatives, LOC, representative of the National Security Agency of Nigeria & Other Dignitaries)

The overall objective of the forum, as was the case with the first conference in Dakar was thus to further **contribute to the establishment of a common platform for the management of epidemics in West Africa,** and extending across the sub-region. To achieve this objective, the forum adopted the following revised approach:

- Plenary with keynote addresses on the major themes of the forum;
- Two roundtables discussions on ethics and community engagement;
- Plenary on group work results;
- Training workshops, and poster presentations encompassing the three sub-group faculty themes (see below); and
- Specialized working group to adapt/modify resolutions made during the conference based on progress made to the original Dakar Declaration.

The discussions focused on the **following new and previous themes**:

- Four sub-group faculty sections:
    - Emerging Infectious Diseases (EID)
    - Biosecurity and Biosafety
    - Public Learning and Understanding of Science/Science Communications
    - Vaccine Strategies
- The “One-Health approach” whereby human health is inextricably linked to its ecological context

Themes from the first conference in Dakar, on the impact of Ebola Virus Disease on the sub-region:

- Inventory of the pathology and response in Africa;
- Plasma collection, immune globulin production, review of clinical trials;
- Biosafety of plasma production and blood transfusion centers;
- Enhancement of national blood centers to integrate immune globulin production and plasma collection;
- Ethical conduct of clinical trials in public health emergencies;
- Biobanking, bio-data and biosafety of samples containing hazardous/ non-hazardous pathogens;
- Identification and support for Ebola virus survivors and associations in affected countries, with cognizance to psycho-social factors;
- Participation of survivors in the various clinical trials;
- Community engagement in the fight against Ebola virus and stigmatization/discrimination of survivors; and
- Support of national governments and their engagement in the production of immune globulin to accelerate the evaluation of treatments and vaccines against Ebola virus.

Main Recommendations from the Lagos Forum July 2016:

- Optimize a refined regional harmonization strategy to combat outbreaks of emerging and re-emerging infectious diseases and other dangerous biological agents;
- Further promote advocacy for political buy-in of African governments regarding Ebola virus vaccines and therapeutic strategies;
- Establish shared, regional biobanking facilities to contain dangerous pathogens for use in scientific research utilizing best practices maintenance capabilities;
- Greater attention is needed to be given to neglected diseases that are re-emerging (e.g. Lassa fever, Zika, etc.); and
- Strengthen financial, human and infrastructure resources to improve the African health sector.

Specific Recommendations from the Sub-group themes at the Lagos Forum, July 2016:

- <u>Biosecurity and Biobanking/EID</u>:
    - Reframe biobanking and biosecurity in the African region as a global security imperative;
    - Increase collaboration and coordination with the Biological Weapons Convention (BWC) and UN Security Council Resolution (UNSCR) 1540, in relation to the above;

- A more active regional collaboration and cooperation with the Global Health Security Agenda (GHSA) and World Health Organization (WHO) research and development (R&D) Blueprints;
- Address basic requirements for mobilizing EID responses both legal and budgetary agreements (staffing, self-contained water, power, prepositioning stockpiles of Personal Protective Equipment (PPE));
- Establish an open call for technical solutions (bedside diagnostics, bedside inactivation, room temperature storage of biological agents, and better curation of biological resources);
- Sensitize policy-makers for budgetary support to cover human resources training, procurement of equipment within the health care sector; and
- The use of software solutions to facilitate data sharing and process automation.

- Emerging Infectious Diseases:
  - Increase awareness and participation of African countries in the WHO Global Ebola Vaccine Implementation Team document;
  - Leverage the lessons learned from the last Ebola disease outbreak and adopt rapid response strategies for any future outbreak across the entire Ebola belt;
  - Clarify and better codify the emergency regulatory, policy, liability, logistic and financial responsibilities to enable a rapid response in any future outbreak; and
  - Harmonize the processes and timelines for getting vaccines (investigational and/or approved) to requesting countries once an emergency is declared.

- Public Learning & Understanding of Science/ Science Communications:
  - Promote networking on science communication at the continental level with sub-regional and national chapters;
  - Build and strengthen (1) the scientists-policy makers' forum; and (2) scientists-users of scientific data /technology interphases;
  - Promote African students' enrolment in science and technology (STEM) including a specific emphasis on women and underrepresented groups; and
  - Strengthen both human and institutional capacity in science communications in Africa.

These key recommendations developed during the Lagos forum have will be incorporated into a Revision of the Dakar Declaration, led by a specialized team of African and international academic voices.

ACRONYMS AND ABBREVIATIONS

AMR	Antimicrobial Resistance
AU	African Union
BSL-3 / BSL-4	Biosafety Level-3 / Biosafety Level-4
BWC/1540	Biological Weapons Convention / United Nations Security Council Resolution 1540
CASE	Culture, Anthropology, Sociology, & Economics
ECOWAS	Economic Community of West African States
EFPIA	European Federation of Pharmaceutical Industries and Associations
EIDs	Emerging Infectious Diseases
EVD	Ebola Virus Disease
FAO	Food and Agricultural Organization of the United Nations
GET	**Global Emerging Pathogens Treatment Consortium**
GHSA	Global Health Security Agenda
GIBACHT	Global Partnership Initiated Biosecurity Academia for Controlling Health Threats
HIV	Human Immunodeficiency Virus
HR	Human Resources
IAEA	International Atomic Energy Agency
IARC	International Agency for Research on Cancer
IHR	International Health Regulations
INTERPOL	The International Criminal Police Organization
LASUCOM	Lagos State University College Of Medicine
MSF	Médicines San Frontières (Doctors Without Borders)
NEPAD	New Partnership for Africa's Development
OIE	World Organization for Animal Health
PLUS	Public Learning and Understanding of Science
PPE	Personal Protective Equipment
TB	Tuberculosis
UNSC	United Nations Security Council
WATER	West African Task force to Combat Ebola, Emerging and Re-Emerging Threats
WG	Working Group
WHO	World Health Organization

GENERAL OVERVIEW

Context and Rationale

The Ebola epidemic that began in late 2013 across six countries in West Africa as well as a few other countries outside Africa taught the international community valuable lessons with respect to the ability to identify and neutralize emerging and re-emerging pathogens threats. The West Africa sub-region, and indeed the rest of the world, were remarkably unprepared for the outbreaks, with the epidemic resulting in over 28,000 reported cases of Ebola Virus Disease (EVD) infections and over 11,000 deaths. The effects of the epidemic were not limited to widespread morbidity, mortality, continental-scale stigmatization, and international panic within a short period of time, but also extended to a crippling of the health sectors and economies of three West African states that were affected most.

In January 2015, during the height of the epidemic, a summit titled ***'African voices and leadership in accelerating the evaluation of treatments and potential Ebola vaccines in West Africa'*** was held in Dakar, Senegal, constituting the first Ebola conference. The conference brought together scientists, clinicians, policymakers, sociologists and Ebola survivors, to establish a common platform for the management of epidemics in West Africa, specifically EVD. Eighteen months later, the epidemic appeared resolved, but it became clear in the aftermath of the epidemic that African health systems need strengthening by building the human and infrastructural capacities needed to swiftly tackle epidemic threats. The **2nd African Conference on Emerging Infectious Diseases and Biosecurity** was held in late July 2016 in Lagos, Nigeria, to continue the scientific, ethical, and political discussions on ensuring biosafety and biosecurity for the region, and preventing an epidemic of the size and severity of the Ebola outbreaks from occurring again. At this Lagos forum, new cognizance was paid to preparedness strategies for emerging and re-emerging diseases – not only against Ebola virus, but also Lassa Fever, Zika, the expansion of antimicrobial resistance, and even unidentified pathogens, all of which are beginning to raise eyebrows across the international community.

Challenges to achieving biosecurity and preparedness against potentially devastating outbreaks in Africa are heavily dependent upon two currently limiting factors, namely: (1) commitment of policymakers to adopting strong science-based research resolutions not only on the national level, but also coordinated across the sub-regional levels; and, (2) infrastructural or developmental challenges hampering home-grown scientific progress.

A recurring theme throughout the conference was the existence of a pervasive disconnect between the scientific community and policymakers, which must be strengthened especially when coordinating and mobilizing responses against pathogen outbreaks. Furthermore, due to factors such as the remarkable degree

of international and inter-regional travel that exists in our modern era, and the fact that biological threats are not bound by international borders during an outbreak, national public health policies need to adopt unwavering scientifically-informed decisions in concert across geographical regions.

The forum considered the practical applications of bio-threat reduction strategies within the current in-vivo situation. Infrastructural challenges, ranging from inadequate power and water supplies, including limited critical mass of experts are key limiting factors preventing scientific research from becoming ubiquitous across the African continent. In addition to these, regional collaboration and regulatory harmonization become an imperative, with practical considerations made.

Lastly, it is not just regional collaboration, but collaboration on the global scale that is absolutely necessary for competing against an era of emerging infectious diseases. Each country and region on the map is inextricably embedded within our global biological ecosystem, in an era where society itself is becoming increasingly globalized. In the light of the precarious changes to our ecosystem (and thus to all biodiversity, including both pathogen and non-pathogen counterparts), there is the threat that the pathogens emerging from these natural and unnatural perturbations may be used as biological weapons. It is thus a global health security imperative that pathogens emerging from outbreaks such as the West African Ebola Epidemic are rapidly, strategically neutralized.

Objectives

The key objective of the Lagos forum stems from the outcomes of the first conference in Dakar and can be summarized into the following goal: to strengthen African health systems by building the resilience and capacity necessary to tackle epidemic threats and promote biosecurity.

To accomplish this objective, the forum highlighted the following four key themes:

1. The Rise of Emerging Infectious Diseases (EIDs)
2. Biosecurity and Biosafety
3. Vaccine Development
4. Public Learning and Understanding of Science

These four themes underscored every element of the conference, both through specialized discussion of them independently, and how they become interwoven into a targeted approach to build resilience and capacity across the region.

This main objective can be further elucidated into the following elements:

- An evaluation of the aftermath of the West African Ebola epidemic cognizant to public health, economic, ethical, and cultural contexts;

- Strengthening the African Leadership to ensure regional preparedness with respect to emerging and re-emerging infectious diseases;
- Striking a balance between scientific research and ethical considerations while responding to an outbreak;
- Highlighting 'lessons learned' from the Ebola epidemic, to develop a working strategy for responding to public health crises; and
- Promoting internal and indigenous scientific research, fully intertwined with policymaking, as a key foundation in developing biosecurity in Africa.

Methodology

The format adopted for the 2nd African Conference on EIDs and Biosecurity consisted of plenary discussions, breakout groups, training workshops, and poster viewings, all of which largely pertained to the four themes of the forum.

The content of the three-day conference was divided into the following sections:

- 14 Plenary Papers revolving around the four themes (Biosecurity & Biobanking, EIDs, PLUS, Vaccines) were presented.
- Breakout Sessions: sessions worked to outline challenges faced in implementing the sub-group themes, and were carried out with the aim of integrating developed resolutions into a revision of the Dakar Declaration. The discussions mainly followed a loose-moderated caucus format, complemented by individual presentations, question and answer sessions, and panel discussions.
- Breakout Session *Resolutions*, proposed by the sub-groups were presented to the greater forum for discussions so as to form part of the modified Declaration.
- Special Training Workshops led by experts with presentations on topics including stem-cell technology and bio-threat reduction.

CONFERENCE OPENING CEREMONY

The conference commenced with an opening ceremony at the main Conference Hall of Eko Hotels and Suites, Lagos, Nigeria. Major highlights from the opening ceremony were the Welcome Address from Prof. Akin Abayomi (Principal Investigator of the Global Emerging Pathogens Treatment Consortium – GET), Dr. Jide Idris (the Lagos State Honorable Commissioner for Health), and H.E Ambassador Perry Calderwood (High Commissioner of Canada to Nigeria).

In his words of welcome, Professor Akin Abayomi stated the critical importance of Africa hosting its own indigenous meetings with a view to establishing a response mechanism to address the increasing incidences of Emerging Infectious Diseases (EID), from an African perspective. This would be done in collaboration with other global initiatives to support Africa's cause. As a follow up to the first Africa Conference on EID and Ebola held in Dakar, Senegal, on 18th January 2015—which outlined the severe infrastructural and technical deficiencies—the Lagos conference would revisit the earlier resolutions, focusing on four major aspects:

- Topics revolving around EID as an accelerating phenomenon and the aftermath of the Ebola outbreak;
- Biosecurity and Bio-threat Reduction**:** Biobanking, Bio-informatics, Biosafety, Biosecurity and Bioethics concerns in the aftermath of the largest Ebola outbreak known to man;
- Public Learning and Understanding of Science (PLUS) and Science Communication (SC); and
- The need for a Vaccine strategy for the Ebola belt of Africa.

Also worth noting are the outlined focused objectives of the Lagos Conference, which include: sharing experience and best practices; identifying regional and international opportunities for collaboration; and, initiating a harmonized African strategy to receive full political support. Prof Abayomi envisaged that the Lagos Conference would yield a heightened awareness of Africa's deficiencies and ensure ongoing discussion and dialogue among African academics, researchers, health sector professionals, and policy makers.

Dr. Idris, in his opening remarks, applauded the initiative of the Lagos Conference to consolidate the Dakar conference. He reiterated the commitment of the Lagos State Government to adopt initiatives and strategies evolving from this and similar conferences in fostering the health status of Lagos. While noting the sustained threat that EIDs pose to African countries, he highlighted the need for African Sub-Regions to be on full alert and strengthen their disease surveillance mechanisms, while scaling up emergency response preparedness. He thus concludes: "*We as a global community can only be as strong, as the weakest link and any dangerous pathogen is only one flight away".*

The Canadian High Commissioner Perry Calderwood underscored the commitment of the Government of Canada to support national, regional, multi-national and global efforts to strengthen African health systems, build resilience and capacity, and enhance biosecurity and infrastructure to tackle infectious disease threats. He spoke of the imperative of collaboration at the 'health-security interface' (that broad area that exists between the spread of natural and deliberate disease) and the importance of multi-sectoral collaboration to prevent, detect and respond to all manner of biological threats, whether naturally occurring, deliberately-caused (e.g. bioterrorism) or accidental.

Prof. Akin Abayomi (GET Principal Investigator) speaking on the envisaged outcome of the Lagos conference

Lagos State Minister for Health, Hon. Jide Idris during his Opening Remarks at the conference

Dr Lolade Wright (LASUCOM) addressing participants on Day 1 of the conference

Participants at the conference

Registration of participants and delegates

Registration of participants

The Honorable Commissioner for Health, Lagos state, Dr Jide Idris (right) addressing the media at the conference

PLENARY PRESENTATIONS & DISCUSSIONS

PLENARY 1: EMERGING INFECTIONS

Plenary 1 covered various aspects of EID on the continent beginning with Professor Tomori's overview of what EID's are, the most common and most prevalent EIDs in Africa, and factors that are helping to perpetuate the prevalence of these diseases even after so many years. Tomori also delivered a comprehensive critique of the need to address the most basic of infection prevention methods such as hand-washing and proper waste disposal in our cities (Lassa Fever in Nigeria and the rat problem brought on by lack of proper waste management) and the need for local and national governments to start investing more into their health programs, and not wait for foreign aid (USAID, WHO, CDC, EU or the African Union) to develop and fund preventive health programs in every country; so far, such programs have been temporary and funding-dependent and have not actually addressed the fundamental system-wide issues of personal and national responsibility for strengthening our health systems and improving the health and sanitation of our various communities in Africa, especially Nigeria.

Dr. Suzanne Mate spoke on her experience working in Liberia with other organizations, both local and international, in a genomic surveillance laboratory during the Ebola outbreak. She explored the synergy between scientific research and public health efforts—a topic that would be recurring throughout the conference especially in the EID outbreak sessions—and the ethics of research during an outbreak. Using her experiences as a reference point, she explored the need for possibly changing or relaxing the rules when it comes to ethical considerations imposed or expected of researchers that have been called upon to work during an outbreak. How much of the ethical guidelines and considerations of 'normal research' in the non-outbreak situations should be imposed on researchers working in an outbreak situation? Does a strict adherence hinder research and limit their work and what they can offer in such situations?

Dr. William Ampofo, gave an overview of how Influenza surveillance in Ghana is carried out. Of great note was the improvement of the program as a result of leveraging the resources of the country's military and then improving upon them, such as troop education and animal sampling in military barracks. Ampofo argued for the need to expand surveillance to include people returning to the country from areas of the world where the influenza is known to be prevalent, such as Hajj pilgrims returning from Saudi Arabia. Among the challenges faced by the program are a lack of funding, a general view held by even the staff involved in the program that influenza is not a major disease and the fact that like with most of such programs across many African countries, Flu Surveillance is not fully institutionalized but currently advocated for and carried out by

'champions'. These are the challenges that affect and place the sustainability of such programs in doubt.

Factors Fueling the Emergence of Infectious Diseases
Professor Oyewale Tomori, National Academy of Science

Prof. Oyewale Tomori and Prof. Diran Makinde

Professor Tomori provided the context for the rise of EIDs, defining them as "infections that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range," and highlighted the high burden of EIDs as in issue in Africa both in vector-borne or zoonotic sources, stemming from an interplay across man, environment, and pathogen. Specific factors the speaker identified as contributing to the rise of EID's include the following:

- Ecological changes (including, but not limited to, climate change, agricultural practices, environmental pollution, etc.),
- Human population growth, demographics, and distribution (population mobility, urbanization, human behavior/cultural factors, food preference, etc.),
- Legal and illegal international travel and trade, and
- Inadequate governance overarching these factors.

Tomori identified the African continent as particularly rife for EIDss – loosely outlining the epidemiological profiles of Yellow Fever, Cholera, Zika, Meningitis, Lassa Fever, and Ebola as recent threats across the continent, and commented on the presence of existing vaccines to reduce cases of morbidity and mortality for some of these diseases. Where vaccines are currently unavailable, Tomori noted that a long list of EIDs can be managed or prevented if cognizance is taken of issues such as unrestrained and unorganized urban expansion; sanitation management programs in such urban centers; open defecation, which leads to the spread of cholera and formerly polio; and, a perceived lack of efficacy within the African Union in securing public health with respect to EIDs and other issues.

How Establishing Genomic Surveillance in Liberia during the Ebola Virus Outbreak Transitioned into a Sustainable Capacity and Enduring Partnership

Dr. Suzanne Mate, United States Department of Defense

Dr. Mate chronicled how the National Reference Laboratory and Genome Sequencing Laboratory at the Liberian Institute of Biomedical Research played a critical role in the surveillance and diagnostics, respectively, of samples from April 2014–2016 during the EVD outbreak in Liberia. These labs processed large quantities of samples daily to confirm EVD cases, in a setting where there were and still are very few laboratory facilities within the region equipped to handle large volumes of diagnostic work. She noted that the genome sequencing provided the molecular epidemiological platform to construct a genealogical map of the outbreak, which was critical in implementing adequate infection control measures.

The speaker identified the following during the 2013-2016 EVD outbreak:

- Sustained human-to-human transmission allows for the observation of new presentations of the disease;
- Persistent infections have the potential to prolong an outbreak; and
- Infection control measures are the highest priority, but tracing transmission using only an epidemiology approach is challenging.

Mate gave recommendations on enhanced coordination across groups and host nations to prevent overlapping efforts, and an evaluation of current civic infrastructure and EID history to streamline effective action plans in response packages for potential future outbreaks. The speaker concluded with an emphasis on the essential role of adequate diagnostic and surveillance capacity in combating EID outbreaks.

Dr Klement Jaidzeka and Dr. Suzanne Mate

Surveillance for Influenza
Professor William Ampofo, Noguchi Memorial Institute for Medical Research

Surveillance as a cornerstone of epidemiological research and as a key element in managing outbreaks related to emerging and re-emerging disease was highlighted by Prof. Ampofo, who detailed the structure for Influenza Virus surveillance in Ghana. The Ghanaian system is composed of year-round reporting at sentinel sites in all 10 regions, which provide weekly respiratory samples for testing and generates yearly profile reports for the country. While the program has a comprehensive structure, challenges still faced include limitations with respect to funding, public perception of influenza, inadequate harmonization with institutionalization procedures across sentinel sites, and a lack of integration of data input with the global FluID network. Despite these challenges, the study has collected comprehensive data and serves as an effective model of disease surveillance in the West African region.

PLENARY 2: THE NEED FOR A VACCINE STRATEGY FOR THE EBOLA BELT OF AFRICA

The Lagos Forum's second plenary focused on the need for a Vaccine strategy for the Ebola belt of Africa. The international community's unpreparedness for the

expansion of Ebola outbreaks to epidemic proportions was exacerbated by the absence of an effective vaccination both in terms of scientific underpinnings and methodological uncertainty in the implementation of candidate vaccines. Major ethical concerns arose with respect to reconciling traditional research approaches in determining the efficacy of experimental vaccines with an urgent need to minimize and contain widespread suffering and loss of life across the West African region during the height of the epidemic.

Presentations made during Plenary 2 discussed the efforts of multiple groups and projects, including the Guinea Ring Vaccination Trial Consortium and EBOVAC/EBOVAD Projects to address the aforementioned issues.

The Ebola Model: Guinea Ring Vaccination Trial
Dr. Moussa Doumbia, Guinea Ring Vaccination Trial Consortium

The Guinea Vaccine Trial Consortium was established "in the periphery of WHO's first high-level Ebola vaccine meeting in October 2014", during the peak of the West African EVD outbreak. Amidst community resistance across Guinea, and with the international community scrambling to conduct clinical trials, ethical concerns were raised regarding trial design, the use of placebos/experimental controls, and two key methodological challenges: namely, (1) Ebola displayed an aberrant transmission pattern, with outbreak sites limited to small focal points; and, (2) there were statistically insufficient sample sizes for traditional individual randomized trials.

The Ebola Vaccination Trial Consortium thus opted for a novel cluster trial design now known as the 'vaccination ring', to accommodate the atypical epidemiological profile of the outbreak, which was selected in accordance with the framework set up by the WHO Scientific and Technical Advisory Committee on Ebola Experimental Interventions.

The following additional points contributing to the success of the program were made:

- Close support and collaboration with Guinean National authorities was critical in implementation of the vaccine strategy;
- Collaboration with Local Social Mobilization experts;
- Rapid surveillance during the outbreak to identify and target community sites for vaccination;
- The stringent use of Informed consent to maintain ethical viability of the program;
- Vaccination taking place immediately or after 21 days as per outcome of randomization; and
- The use of participant identification cards for follow-up and infection control purposes, and high subsequent follow-up rates.

“The preliminary results suggest that the experimental vaccine against the Ebola virus (rVSV-ZEBOV) is capable of protecting the vaccinated people (after an anticipated delayed of approximately 10 days).”

GAVI Investment in Ebola Vaccine
Mr Wilson Mok, Gavi Secretariat

Mr Wilson Mok speaking on Gavi investment and dedication on vaccination

Gavi, the Vaccine Alliance, represented at the forum by Mr Wilson Mok, is a global health partnership dedicated to promoting vaccination and immunization efficacy, coverage, and sustainability. The organization was involved in the Ebola epidemic, lending support for the recovery of routine immunization and health systems by assessing vaccine production and procurement, as well as the funding system necessary for a vaccine rollout.

Mok additionally noted the following points:

- That first-generation vaccines for EVD are estimated to be insufficient for longer-term application;
- Second-generation vaccinations may benefit from multivalent immunogenicity or applications for prophylactic use; and
- The organization is committed to a second-generation EVD vaccination stockpile.

Ebola Vaccine: Janssen Ebola Vaccine-Overview of EBOVAC and EBODAV Projects

Dr. Callendret Benoit

From October 2014, in response to the Ebola Zaire epidemic in West Africa, Janssen Pharmaceutical Companies of Johnson & Johnson accelerated the development of a monovalent Ebola Zaire vaccine regimen using a heterologous prime-boost combination of Ad26.ZEBOV and MVA-BN-Filo. This acceleration, consisting of launch of multiple Phase I, II and III studies in rapid succession across the US, Europe and Africa, and rapid scaling up of production of the vaccine regimen, was possible thanks to partnerships and consortia with other companies, research institutions, and global health stakeholders and through funding from European and US public authorities.

The multivalent Ebola vaccine program, running since 2008 with US National Institutes of Health (NIH) support, has been the basis for the monovalent program, and is still ongoing in parallel with the first in human Phase 1 clinical trial planned in the short term.

The Janssen approach is a heterologous prime-boost vaccination regimen delivering similar antigens for the disease through two existing platforms: Janssen AdVac® technology and Bavarian Nordic's MVA-BN®, the first to prime the immune system and the second to boost the immune system, with the goal of producing stronger and longer-lasting immunity to a disease. Considering the sustained transmission during West Africa, the occurrence of resurgent cases, and the unpredictability of future outbreaks, a vaccine providing durable immunity will be useful to prevent and mitigate future epidemics. The current Ad26.ZEBOV/MVA-BN-Filo is an investigational Ebola Zaire vaccine regimen that uses this heterologous prime-boost approach.

Preliminary conclusions from Phase I studies suggest that Ad26.ZEBOV/MVA-BN-Filo confers durable immunity for at least 240 days and is well tolerated with an acceptable safety profile. Antibody response has been detected 14 days post prime in ≈ 80% subjects, followed by humoral and cellular responses enhanced by MVA boosting. A total of 10 Phase I, II and III clinical trials of the Janssen Ebola vaccine regimen are being conducted on a parallel track across Europe, the United States and Africa. A program dedicated to building community trust and improving acceptance and compliance with the vaccine regimen is taking place along with the Phase III study in Sierra Leone.

Janssen is pursuing efforts to seek regulatory approval in different contexts: Emergency Use Assessment and Listing (EUAL) application to WHO for use in the context of a new outbreak, and preparation for licensure in Europe, US and Africa, taking into account the current impossibility to generate human efficacy data.

Leveraging established Ad26 and MVA platform technologies, more than 2 million doses of both vaccines have been produced through large-scale manufacturing. Analyses of critical attributes of the vaccines demonstrated the consistency of the manufacturing process. Ongoing studies demonstrate that both vaccines have a stability profile compatible with existing vaccine distribution channels, making them suitable for deployment in Africa (stability > 24 months at -20°C and > 12 months at 2-8°C).

This regimen may therefore be suitable for prophylactic use in a regional or targeted population vaccine strategy, and could potentially support a preventive strategy in the context of another Ebola outbreak.

The Janssen filovirus vaccine program has been funded in part with direct Federal funds from the National Institute of Allergy and Infectious Diseases (NIAID), part of National Institutes of Health (NIH), under Contract Number HHSN272200800056C. The content of this presentation does not necessarily reflect the views or policies of the Department of Health and Human Services.
Janssen Ebola vaccine program has received funding from the Innovative Medicines Initiative 2 Joint Undertaking under Grant Numbers [EBOVAC1 (115854), EBOVAC2 (115861), EBOMAN (115850), EBODAC (115847)]. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation program and EFPIA.
This project has been funded in whole or in part with Federal funds from the Department of Health and Human Services; Office of the Assistant Secretary for Preparedness and Response; Biomedical Advanced Research and Development Authority, under Contract No. HHSO100201500008C.

PLENARY 3: PROFILE OF AN EID PUBLIC HEALTH CRISIS – THE WEST AFRICAN EBOLA OUTBREAK

Guinea, Liberia and Sierra Leone Ebola Outbreaks and Preparedness for Future Outbreaks - Panel Discussion

Speakers: Professor Sahr Gevao, Dr. Stephen Kennedy, Professor Oumou Sow

Survivor Testimonies

Mr Yusif Koromo and Mr Prince Clarke

Yusif Koromo and Prince Clarke shared their experiences during the Ebola epidemics in Liberia and Sierra Leone. As a common experience, they related how many members of their families succumbed to the disease. While they were aware of the symptoms of the disease, its appearance in their families posed no apparent danger initially, being presented without any of the extreme symptoms. The peak of their contact with the disease was the genuine intention to care for

loved ones within their families, while the real dangers of the EVD crept underneath. Only after falling seriously ill did they realize the gravity of being infected by the disease. No longer able to help family members, and confined to treatment centers, they fought vigorously for their lives. Their courage and perseverance paid off as their recovery unexpectedly began.

Having survived the disease, they volunteered their services to the teams working tirelessly toward halting the epidemic. Their message was one of hope for Africa in the face of a hopeless situation, as often posed by infectious disease epidemics. The courage to stand and face our own problems was an essential message from the testimonies of the survivors to the delegates at the session. This consolidates the main aim of the 2nd African Conference on EID.

Role of Journalism in Emergency States: Challenges of Nigerian Health Journalists in Covering the 2014 EVD Outbreak
Ms. Yinka Shokunbi

Based on the account of one journalist at the frontline in reporting the Ebola cases in Nigeria, Ms. Shokunbi re-iterated the lack of knowledge among most journalists reporting urgent healthcare issues around Africa. She stated two significant factors that engender the lack of understanding and communication of infectious disease outbreaks and the control measures being taken:

- The disinterest shown by the key agencies involved in carrying the media along, giving relevant updates and making sure that journalists are fully and adequately informed about the situation and the measures being taken; and,
- A lack of emphasis on healthcare education among health reporters in Africa.

She further revealed that journalists are not able to adequately inform the public about the nature of the health situations, and often misrepresent important information. Recognizing that the media is often the main, and sometimes the only, source of information for much of the population, Ms. Shokunbi noted the need for collaboration between healthcare agencies and the media. Such collaboration would ensure that the right information is passed on to the public; noting that a well-informed public is a major step towards halting epidemics often arising from emerging and re-emerging infectious diseases. Secondly, she argued for the need to train journalists in reporting epidemics, which is quite different from other kinds of information they report.

PLENARY 4: PUBLIC LEARNING AND UNDERSTANDING OF SCIENCE – STRATEGIES TO COMBAT EIDs

STISA 2024: Science Communication Policy and Program Development in Africa

Keynote Presenter: Dr. Mahama Ouedraogo (Acting Director: Human Resources, Science and Technology, Africa Union Commission (AUC-HRST)).

Dr. Ouedraogo outlined a concise timeline of the trajectory of science and technology policy development in Africa, at the continental level, beginning with the Lagos Declaration in the 1980s that committed African governments to a target of spending at least 1% of GDP on Science and Technology Research and Development (R&D). He bemoaned the fact that very few African governments had reached these low targets, set so long ago, and the profound implications of this under-funding on the development path of the continent, given that no continent can develop without science and technology at the core of its vision, development planning and implementation.

Dr. Ouedraogo highlighted the current African Union 10-year framework for scientific development, the *Science, Technology and Innovation Strategy for Africa* (STISA-2024) which was adopted by African Heads of State in 2014, and its **six priorities** on: 1) Eradication of Hunger and achieving Food Security; 2) Prevention and Control of Diseases; 3) **Communication (Physical & Intellectual Mobility**); 4) Protection of our Space; 5) Live Together-build the Society; and, 6) Wealth Creation.

Dr. Ouedraogo also summarized the vision of the African Union to reinstate the place of science and technology at the core of Africa's sustainable development, as envisioned in the AU's continental development strategy, *Agenda 2063, 'The Africa We Want'*. Despite Africa's wealth in natural resources, her ability to tap into these rests on the learning and understanding of science. Against this background, the African Union sees the need to re-establish the learning of science and technology, at all levels, in the education of African children. One of the major challenges is that much scientific knowledge is created, stored and transmitted in highly technical terms. This poses great difficulty in teaching basic science, especially at lower educational levels.

Dr. Mahama Ouedraogo (AUC-HRST) (left) and Dr Javier Gabaldon (MSF)

These challenges were posed to the Forum of the 2nd African Conference on EIDs, to consider as critical to be overcome, beginning with the conference itself. Dr. Ouedraogo noted that while the African Union is committed to applying the benefits of science towards Africa's development, the onus rests on its academics, scientists, and researchers to forge new paths to simplify and amplify the communication and learning of science and technology, in languages, contexts, and paradigms that are understandable and relevant to Africa's population.

Science Communications Development: Global Trends, Latin America, and EID's

Prof. Andre Ramos, Federal University of Santa Catarina (UFSC), Brazil.

Prof. Ramos outlined the global development trajectory of science communication, from the time of scientists such as Galileo, who faced skepticism about their scientific discoveries including religious persecution, and sought to engage the public directly in the understanding of their scientific innovations, to present day scenarios which involve the use of social media, and various challenges to the communication of scientific innovations that still occur within the realms of culture, religion, socio-economic inequalities, lack of diversity and inclusion, gender inequalities, and the urban-rural divide, etc.

Prof. Ramos also highlighted developments on the science communication and PLUS landscape in Latin America, including the formation and growth of Red-POP, the Latin American science communication network, which is 25 years old, and the Brazilian Association for the Advancement of Science (SBPC), which is also 25 years old, as examples of the strong infrastructure that exists in Latin America for the delivery of science communication. This infrastructure has been well utilized in the drive to address the current Zika Virus epidemic in the region.

In spite of these developments, however, the Latin American region just as the African region, is also still battling with challenges on a number of fronts, such as: securing adequate funding for science communication programs; sustaining government focus and priorities on science and technology programs in general, and in science communication, in particular, at a time when national budgets have been cut due to the economic downturn; capacity-building of scientists and researchers to meet the demand for the enhanced outreach of science communication programs, particularly into rural areas and to rural dwellers and populations.

PLENARY 5: BIOSECURITY – GLOBAL HEALTH SECURITY

Plenary five (as well as the subsequent three plenaries) commenced a focused discussion on the topics of biosecurity and biosafety. Plenary 5 consisted of the following sections:

Global Health Security Agenda (GHSA)

Ambassador Bonnie Jenkins

The vision of the GHSA, an international multi-lateral and multi-sectorial effort to identify deliberate and naturally occurring disease threats follows the One Health approach, the notion that human health is intertwined with that of animal ecology and our food security. Ambassador Jenkins gave a brief background of the GHSA, which is now comprised of 50 countries and contains 11 action packages to prevent, detect, and respond to public health threats, which has rapidly become a global, rather than uniquely American effort. Biosafety and biosecurity comprise the GHSA's third action package.

Ambassador Bonnie Jenkins making her presentation at the conference

Jenkins outlined the GHSA program, attributing its success to:

- Joint external evaluations;
- Individualized country roadmaps consisting of both baseline assessments and specific incremental goals/milestones;
- A global partnership against the spread of weapons and materials of mass destruction; and,
- A structure consisting of specialized working groups, academic research, and extensive collaboration with the private sector.

She named the following African countries that are participating in the GHSA as of August 2016: South Africa, Ethiopia, Kenya, DR Congo, Zimbabwe, Mozambique, Mali, Tanzania, Guinea, Ivory Coast, Liberia, Senegal, Cameroon, Ghana, Gambia, Burkina Faso, Uganda, and Sierra Leone.

Biological Weapons Convention (BWC)
Dr. Piers Millett, Biosecu.re

(L-R) Kenneth Ugwu, Piers Millett, Prof.Akin Osibogun and a colleague.

Dr. Piers Millett of Biosecu.re provided the forum with an overview of the United Nations Security Council (UNSC) Resolution 1540, of which the Biological Weapons Convention (BWC) is a component. The resolution promotes the peaceful use of biological science and technology, by condemning and prohibiting the manufacture, retention, distribution, etc. of biological agents by non-State actors which can be used for nefarious purposes and thus pose a global biosecurity risk. Millett noted the following elements contributing to BWC shared annual data under the Confidence-Building Measures returns:

- Labs (high Containment Labs (BSL4) and biodefense facilities);
- Unusual disease events;
- Publication policy;
- National implementation measures;
- Past offensive / defensive activities; and,
- Vaccine production capacity

While there is widespread global support for the BWC, it is worth noting the limitations in the form of a lack of institutionalized enforcement (such as the agencies which regulate nuclear and chemical weapons). Due to the ecological and public health complexities of agents which could potentially be used as biological weapons, an elaborate and interconnected 'network of networks'

(including but not limited to the World Organization for Animal Health, the Food and Agriculture Organization, the World Health Organization, the Organization for the Prohibition of Chemical Weapons, and Interpol) has instead formed.

World Organization for Animal Health (OIE)
Dr. Julie Sinclair, United States Center for Disease Control

(L-R) Dr. Elizabeth Rasekoala and Dr. Julie R. Sinclair

Dr. Sinclair, the CDC One Health Office's assignee to the World Organization for Animal Health (OIE) highlighted the following key points on animal and veterinary health within a biosecurity context:

- As per the One-Health approach, human public health is ecologically inseparable from animal health.
- Animal pathogens can be used as bioweapons, both against humans and other animals (the latter threatening our agricultural supply).
- There exists a well-documented list of biological disasters of animal origin (rabbit hemorrhagic fever, avian influenza, etc.).
- Reducing biological threats to animal populations is beneficial to and enhances existing health systems.
- Issues such as Antimicrobial Resistance (AMR) display a well-established link with the agricultural use of antibiotics in animal species.

It is also worth noting that observed outbreaks of many emerging and re-emerging infectious diseases, including the Ebola virus, are oftentimes directly linked to or correlate with corresponding outbreaks in animal species.

Interpol: Project RHINO Overview
Ms Rebecca Hoile, Interpol Bioterrorism Prevention Unit

Project RHINO is a US State Department initiative launched in 2015 in an effort to effectively respond to the Ebola outbreak, and conduct hazard assessment, infection control, national coordination, and organizational infrastructure. The project targeted the six highest risk countries (Liberia, Guinea, Nigeria, Mali, Sierra Leone and Senegal). Meetings and workshops representing national and border police units, counter terrorism groups and civil defense were held in Senegal in July 2015, and comprehensive gap analyses were conducted to identify and mobilize a coordinated Ebola response. Future plans include a point of contact meeting in September 2016 and follow-up work with individual affected countries.

Global Partnership Program (GPP)
Mr Trevor Smith

While Canada's Global Partnership Program (GPP) is an international security initiative with a mandate to prevent terrorist or state acquisition and use of biological and other weapons of mass destruction, it recognizes that a strong global partnership is required at the 'health-security interface', where the interests and activities of two very different sectors intersect and align. Smith outlined the nature and scope of biosecurity, biosafety and disease surveillance activities pursued by GPP in Africa, and stressed the critical role that must be played by partner nations in Africa to ensure sustainability, success and impact of support provided by the international community. Smith referenced an ongoing GPP collaboration with GET and the Government of Sierra Leone on Ebola samples, and expressed the willingness of GPP to explore further opportunities for cooperation with partner counties to address biological threats.

Trevor Smith of GPP and Canada's Ambassador to Nigeria, HE Perry Calderwood

(L-R): The Hon. Commissioner for Health, Lagos State- Hon. Jide Idris, Canada's Ambassador to Nigeria, HE Perry Calderwood, Mr Trevor Smith and Prof. Akin Abayomi

PLENARY 6 – BIOSECURITY & BIOBANKING

Strengthening Biosecurity

Speaker: Dr Piers Millett, Biosecu.re

Dr Millett presentation identified existing global platforms for managing natural, deliberate, and non-deliberate biological, chemical and radio nuclear public health threats (WHA 55.16, 2002). He noted the need to strengthen global biosecurity in terms of biotechnology, which can be used for nefarious purposes, using the Ebola virus as a prime example as the world shifts to post-Ebola biosecurity management. Emphasis was placed on synthetic biology since as deadly pathogens are investigated, the use of biotechnological research for harm poses a global public health risk.

The following additional points were made:

- Loopholes in terms of access to dangerous agents need to be identified and addressed post-Ebola;
- The use of screening protocols (such as the one published by the International Gene Synthesis Consortium(IGSC)/International Association for Synthetic Biology (IASB) Code of Conduct) are necessary for maintaining biosecurity and biosafety;
- Screening procedures need to be employed and utilized within biosecurity database; and,
- The need for national guidelines, such as the US Federal Screening Framework Guidance for Providers of Synthetic Double-Stranded DNA.

Strengthening Biobanking

Pasquale De Blasio

Pasquale De Blasio, the GET Consortium's Biobanking/Biosafety Working Group Chair, identified the critical importance of African countries developing bio-banks for highly infectious/dangerous pathogens, notably Ebola. He noted that over 300,000 Ebola-related samples were generated, and it is essential that they are properly managed to yield opportunities for fruitful biomedical research. The use of the samples is critical both in terms of clinical applications (clinical trials/vaccine development) and also in terms of basic research into the nature of the filovirus.

Cynthia Robinson and Mr Pasquale De Blasio

Biobanking of Category A pathogens requires specialized facilities, with IARC Guidelines outlined by the presenter. Highly trained personnel, BSL3/4, clinical databases, an elaborate and functional IT interface, adequate and reliable laboratory infrastructure (e.g. ultra-low temperature freezer storage), government/institutional commitment, and sustainability plans are necessary requirements for such biobanking.

De Blasio noted that, from a biosecurity perspective, it is critical that African countries develop and expand bio-banks (like the developing H3Africa Bio-repository) to effectively respond to the emergence and re-emergence of deadly infectious diseases.

Biosecurity keynote speakers (R-L): Trevor Smith, Dr. Julia R. Sinclair, Dr. Piers Millett, Ambassador Bonnie Jenkins, Pasquale De Blasio & Ms. Chinonyerem Lawrence Welle

PLENARY 7 – BIOSECURITY IN ACTION

GET Consortium Sierra Leone Project

Retrospective Biobanking and Data Rescue Project

Speakers

- *Mr John Vandy Rogers, Office of National Security*
- *Mr Josephus J. Ellie, Sierra Leone GET Project Manager*
- *Ms Shola Williams*
- *Mr Hakeem Savage*
- *Dr. Brian Conton*
- *Dr. Modupe Taylor-Pearce*

Subsequent to an outbreak of the magnitude observed in the Ebola epidemic, Sierra Leone identified biobanking as the optimal biosecurity imperative for managing Ebola samples, rather than export or destruction. Each and every sample needs to be accounted for in order to secure biosafety and allow for future research to be conducted. The project involves sample and data rescue, capacity building for the project team and stakeholders, and scientific documentation. Dr. Modupe Taylor-Pearce noted the importance in "prior planning" as a critical theme in mobilizing an aggressive response to an outbreak, rather than reactionary management as it emerges and progresses.

The security sector of Sierra Leone conducted a risk assessment to evaluate lethality of samples, protocols of repositories, and to identify active regional groups capable of using samples for political/bio-terrorism purposes (for

example, Al Shabaab, Boko Haram, ISIS, and Al Qaeda). Implementing a retrospective biobanking project involves coordination across clinical/medical, scientific, accounting, administrative, information technology, political, and ethical spheres. In terms of collating and managing sample data, documentation and identification of 'orphan' or "bastard samples" is conducted, and data is assessed to generate a "pedigree value" for each sample. Pedigree values were used as an objective measure of sample quality, with samples having higher pedigree values being used in biomedical research. The entire collection of data is then audited and validated.

PLENARY 8 – BIOSECURITY IN PRACTICE

Health Security: A Perspective from Mali

Ms. Kadiatou Dao, National Institute of Public Health Research (INRSP)

Ms Dao, a CRDF RCM fellow, discussed Mali's current international policies related to biosafety (such as the arrangements with the IAEA, GHSA, Nuclear Non-Proliferation Treaty, Biological Weapons Convention and Chemical Weapons Convention, etc), noting the lack of a national policy platform on biosecurity. The Capstone Project thus seeks to raise awareness in biosecurity and biosafety in Mali, targeting policymakers and healthcare professionals, amongst other groups.

Key points from Mali's Capstone Project Model:

- Overlap across BWC, UNSCR 1540, international health regulations and the GHSA in terms of biosecurity;
- Emphasis on the use of biological agents not only for research but also potentially as public health threats; and
- Draws attention to re-initiate a dialogue with the UNSCR 1540 Committee via the submission of a Mali report.

Ms. Chinonyerem Lawrence Welle (INTERPOL Project RHINO Nigeria Coordinator) & Ms. Kadiatou Dao (INRSP) shared a biosecurity perspective from Mali

Biosecurity & Law Enforcement in Nigeria

Ms. Chinonyerem Lawrence Welle, Superintendent of Police (Nigeria Police Force), INTERPOL Project RHINO Nigeria Coordinator

The Nigeria Police Force, working with INTERPOL following the outbreak, has collaborated with the National Centre for Biotechnology Information in a process to reduce risks of bioterrorism by addressing current threats and identifying vulnerability. Specific key objectives, shared by Dr. Welle are as follows:

- Promote a system of adequate training for members of the police force in order for them to play an active preventive role in thwarting bioterrorism efforts;
- Collaboration with regulatory bodies to enforce adequate documentation of potentially harmful biological agents by securing their storage in research laboratories and hospitals;
- Collaboration with National Immigration/Customs Services to prevent transnational transport of biological agents;
- Collaboration with the National Biosafety Management Agency, Federal Ministry of Health, and Federal Ministry of Agriculture to ensure that biosecurity in the form of preventing bio-terrorism remains a national imperative; and,
- Ensure the prosecution of offenders and investigating potential threats.

The German Partnership Program for Excellence in Biological and Health Security

Dr. Stefan Kloth, Robert Koch Institute

Dr. Stefan Kloth of Robert Koch Institute speaks on German Partnership Program for Excellence

The German Partnership Program for Excellence in Biological and Health Security is funded by the German Federal Foreign Office, under the Global Partnership against the Spread of Weapons and Material of Mass Destruction (G7). The initiative is centered around capacity development through biosafety and biosecurity, surveillance, detection and diagnostics, networking, and awareness paradigms. The program is global in scale, with 20 active projects across 22 countries, and emphasis seen in the North and West African regions, including the following:

- Guinea, Liberia, and Sierra Leone – Bernhardt Nocht Institute for Tropical Medicine;
- Côte d'Ivoire – Robert Koch Institute (labs for Ebola diagnostics, training centers, and mobile labs);
- Mali - Bundeswehr Institute of Microbiology (IMB), GIZ & Fondation Merieux'
- Nigeria – Bernhard Nocht Institute for Tropical Medicine (Ebola Diagnostic training/ lab infrastructure support);
- Morocco, Sudan, Tunisia – Robert Koch Institute (Ebola-prevention)

The Global Partnership Initiated Biosecurity Academia for Controlling Health Threats (GIBACHT)
Dr. Habtamu Taddele, GIBACHT

Dr. Taddele described GIBACHT as a "Biosecurity and Biosafety oriented international training-program for postgraduates with several years of pertinent work experience." The program, which targets epidemiology graduates and public health professionals, runs in a series of cohorts assigned to intensive bilateral and multilateral cooperation projects. Case studies are underway pertaining to human-animal health surveillance, Marburg Virus case studies (note: Marburg is a filovirus closely related to Ebola Virus), community outbreaks in rural settings, and outbreak investigations of known (i.e. Crimean Congo Haemorrhagic Fever) and unknown diseases. GIBACHT plays a critical role in providing both intensive training for the next generation of scientists, and also propelling biomedical research in public health and epidemiology for emerging and re-emerging infectious diseases, especially in Africa.

Dr. Habtamu Taddle of GIBACHT speaking on biosecurity and biosafety

(L-R): Prof. Akin Abayomi, The Hon. Commissioner for Health. Lagos State- Dr. Jide Idris and the Representative of the Minister of Health, Prof. John Idoko

(L-R): Prof. Akin Osibogun (LOC CHAIRMAN) and Dr. Adesina Fagbenro-Byron (Mothergold)

PLENARY 9 - ETHICS

Prof Godfrey Tangwa again brought to the forefront the ethical challenges of conducting research during an outbreak; the patient should be treated with dignity at all times and the wellbeing of the patient should at all times supersede the need for research and/or research data. While acknowledging the challenges, it was reiterated that resources should be directed only towards actions that mitigate suffering and improve health. When the epidemic has been brought under control and disaster averted, then, and only then could research in its normal form be conducted. The 1996 Travon case in Kano, Nigeria where treatment that hadn't been put through clinical trial was provided to patients during a meningitis outbreak was cited as a powerful example of the pitfalls of conducting scientific research during an outbreak.

Francis Kombe elaborated on the concerns and challenges above by emphasizing that panic and confusion are characteristics of most outbreak situations. Making sure that the local communities' needs and goals are aligned with those of the scientific community working to quell the outbreak is a major first step to avoiding potential ethical exploitation in the name of research. Making sure that the local communities have basic knowledge of what their rights are in participating in such research will also help in achieving long lasting solutions to such challenges.

Gloria Mason lamented the weak state of the ethical regulations concerning research in all three affected countries, which were revealed during the outbreak. Finding these gaps resulted in a regional collaboration effort in the form of the Mano River Union (MRU) Consortium, with the same ethical research rules applying across all three countries under PREVAC (a joint Liberia-US study intended to inoculate citizens of the MRU countries). Other recommendations resulting from this initiative included the establishment of a joint ethical and regulatory committee to review clinical trial applications in the region, as this would reduce the burden for such reviews being placed on individual countries.

Prof. Tangwa speaks on Ethics and its challenges on the continent

Participants and delegates at the conference (L-R): Perm. Sec Lagos State Ministry of Health, Dr. Adesina Fagbenro-Byron (MG), Dr. O.Taiwo (DHCPRS), Prof. Akin Abayomi, Mrs. Salako (LSMoH)

PLENARY 10 – Public Learning and Understanding of Science (PLUS)

The theme for this plenary session was '**Science Communication & PLUS in the '*Africa We Want*' – Continental, International and National Perspectives'.** The Plenary consisted of the following sections:

Bridging the Gap between Producers and Consumers of Science
Dr. Mahama Ouedraogo - Acting Director: Human Resources, Science and Technology, Africa Union Commission (AUC-HRST)

Dr. Ouedraogo emphasised the following takeaway points in his presentation:

- To make policy effective, we can never underscore communication. We also need an innovative approach to funding which borders on how to mobilize domestic African resources, including how to mobilize the private sectors;
- There is a need all over Africa for ordinary people to learn and understand science. There is a challenge of communicating science to the public and public understanding of science. However, challenging this may be, we

need to take into account the imperative that, in order for African citizens to appreciate and benefit from scientific achievements, we need to learn science and popularize science;
- There is a need for more effective communication between African researchers, scientists and academics and African policy-makers at all levels—national, regional and continental—so as to further enrich and populate the science policy development landscape with innovative ideas, programs and enhanced capacities.

Insights in Science Communication and PLUS from Latin America
Prof. Andre Ramos, Federal University of Santa Catarina (UFSC), Brazil.

Prof. Ramos emphasized the following takeaways in his presentation:
The challenges on science communication and PLUS in Latin America and Africa provide a shared learning incentive for both regions to grow the requisite solidarity and collaborative frameworks in this arena, through developing the following platforms:

- Africa and Latin America share numerous historical and socio-economic elements, and yet, co-operative actions between scientists and researchers across both continents, are very few and far between. Science and culture are inseparable. If we want science to improve human lives, we need to think of a Science for ***all***, and in order for this to be realized, scientific knowledge must be shared. African and Latin American scientists and researchers should be working to develop joint initiatives and projects in this regard.
- Africa and Latin America are both continents with large rural populations. Over 75% of the world's poorest people live in rural areas and one third of them are indigenous people. Empowering rural dwellers is one of the prime ways of bringing development. Fighting this type of marginalization through science communication outreach can also help fight conflicts, including emerging infectious diseases, because there is a convergence between poverty and these crises. In taking scientific knowledge to rural areas, our core principles should be Inter-disciplinarily, respect for culture, and real experience sharing.

Science Communication and PLUS Efforts in Mozambique
Mr. Joao Cossa - Head of Department of Communication, Ministry of Science and Technology, Higher and Technical Vocational Education, Mozambique

Mr. Cossa's presentation highlighted the developments in the growth trajectory of the Ministry of Science and Technology, Higher and Technical Vocational Education, in Mozambique, and the policy imperatives that have driven the evolution of the Ministries' brief over the past decade. He also showcased

programs of the Ministry which are focused on enhancing science education and science communication, such as the Mozambique National Science Fair which takes place annually in October, and is a national platform for raising the profile of science and technology, in education, socio-economic development, research, science and society, and wealth and job creation.

Cossa emphasized the following points in his presentation:

- African scientists and researchers should not wait for governments to take the lead all the time. They should be pro-active in approaching governments with ideas, proposals and initiatives, and should also take leadership for science communication and science and society projects;
- African governments need to do more to bring the private sectors on board in terms of funding, innovative ideas and programs on science communication. Government resources will always be limited and under pressure, hence the need to seek alternatives, such as the private sectors;
- African governments need to be mindful of the socio-economic challenges of youth, gender inequalities, urban-rural divides, etc., and to take these into account in the development of frameworks for science communication and PLUS, so that all sections of society benefit and not just a small elite in the urban areas.

Science Communication and PLUS as an African Imperative
Ms. Syntia Nchangwi - GET

Ms. Nchangwi's presentation focused on the three pillars of policy, practice and programs, as well as capacity-building developments for science communication and PLUS in Africa. She highlighted the growing gaps between international developments in the field and in Africa, articulating the danger that as a continent, we could be forever left behind in these fields if we do not address the imperatives of taking concerted, focused and strategic action now, at all levels, national, sub-regional and continental.

Ms. Nchangwi emphasized the critical role that science communication and PLUS could have played in the prevention, mitigation and control of the Ebola epidemic, and the need for PLUS to be fully embedded and integrated into these systems for future learning and capacity-building. We should not be waiting for the next crisis to hit before we take these lessons on board, and close the gaps in the understanding and scientific knowledge base of our communities, so that they are better prepared and able to build their resilience to EID's.

Nchangwi emphasized the following takeaways in her presentation:

- African scientists and researchers must undergo a profound mind-set change in which they commit to science communication and PLUS as an integral core part of their mission and work, rather than an added-on.

- African scientists and researchers need to take up leadership and be pro-active in coming up with strategies, good practice and sustainable platforms for enhanced science communication and PLUS across the continent, and demonstrate that African-derived approaches can deliver impact for communities across the continent, including in the context of African indigenous languages as effective mediums for the delivery of these activities; and,
- African senior researchers should act as mentors and role models for young and emerging researchers and scientists, in order to engender and boost their interests, knowledge and practice of science communication and PLUS.

Professor Godfrey B. Tangwa & Ms Syntia Nchangwi of GET Ethics Work Group

PLENARY 11 – VACCINE

Presentation by Professor Charles Shey Wiysonge (Stellenbosch University, South Africa) on behalf of the World Health Organization (WHO) and the Global Ebola Vaccine Implementation Team (GEVIT)

Prof. Wiysonge spoke on the immunization practice and process utilized by WHO for vaccines and immunization. He described the work of the WHO Strategic Advisory Group of Experts (SAGE) on Immunization, as the primary policy advisory body at the global level, supported by other institutional frameworks at

the continental and national levels, as well as various industry stakeholders. SAGE in its capacity as the advisory arm of the WHO, sets various provisional recommendations and conclusions on the use, dissemination, and communication of vaccines during an outbreak. Furthermore, Wisonge shed light on the scope and objectives on the Global Ebola Vaccine Implementation Team that have been working to plan for the future use of Ebola vaccines in an outbreak response. The modus operandi of GEVIT comprise of a steering group and three working groups to coordinate and support the WHO-led plan.

A presentation on the randomized controlled trial of the safety and immunogenicity of Two Ebola Vaccines was given by Dr. Mark Kieh (Partnership for Research on Ebola Virus in Liberia I Research Team). Dr. Kieh mentioned that two candidate Ebola virus vaccines were being studied as part of a test through a partnership between the Governments of Liberia and United States of America. At the primary endpoints (safety), there were serious adverse events in the first month following vaccination and at the secondary endpoints (safety and immunogenicity) there were targeted signs and symptoms during the first month. The two candidate Ebola vaccines trial brought forth a number of proven hypotheses on antibodies, placebo, and HIV/AIDS.

PLENARY 12 – HIV CURE & AEDES AEGYPTI VECTOR

Dr. Kambiz Shekdar provided a case study focusing on the cure for HIV/AIDS instead of settling for and being satisfied with the current state of management with antiretroviral drugs. Drawing from the 1997 naturally occurring cure using stem cells of an HIV^+ person and AIDS cure biology (Chromovert technology), he explored how viable this personalized, expensive but forward-looking method could help us reach the goal of eradicating HIV/AIDS for good, from the world and Africa in particular. More so, it is cheaper and more sustainable than the current continuous use of drugs. By taking the burden away from patients having to continuously monitor several health indicators such as their cell counts, blood counts etc. while at the same time taking medication, we would not only be improving the quality of life, but at the same time reducing the burden of disease for HIV patients.

Continuing with the topic diversity and underscoring the depth of EID issues, Dr Klement Jaidzeka provided a closer look at not a disease, but vectors; the Aedes mosquitos, especially the *Aedes aegypti*a. He explored their origins in Africa and their current global distribution, especially around the tropics where they help transmit Yellow Fever, Dengue Fever, Zika, and Chikungunya. Despite being around for over 50 years, these diseases have become more prevalent lately and in wider regions of the world than before. This, thanks to their adaptation to more alkaline, brackish water, which has enabled their larvae to develop in conditions, especially around urban areas (empty soda and beer cans, fast food containers),

as well as coastal areas where fresh water from melting glaciers meets salty ocean waters, reducing their alkalinity to levels that are now suitable for the adapted mosquitos to breeding.

GET'S consortium team at the conference

SPECIAL EVENTS

The Special Events section of the conference, which occurred at the conclusion of Day 1, had presentations aimed at sparking further discussion within a slightly more informal atmosphere over dinner. Chairs of the sub-themes outlined activities to occur on the following day, and the time slot was used to present project launches – both within the realms of academia and entertainment.

Ebola TV Series Pitch

Nigerian-born Hollywood actor, Hakeem Kae-Kazim presented an artistic approach for further communicating the African Voices West African Ebola Virus Epidemic - through cinematic film. He presented a concept for a television series that chronicles the epidemic and its consequences through a holistic lens, which pays cognizance to the dynamic humanistic and culturally ecological context in which the epidemic emerged.

The goal of his presentation was as an initial step to garner support for the proposed TV series on Ebola, told from an African perspective. The concept is to inform and educate the general population and highlight the importance of biosecurity preparedness on the regional and global scales in the ongoing fight against EIDs.

Antimicrobial Resistance Project Launch

The launch of the GET Consortium's research project on the topic of Antimicrobial Resistance (AMR) was presented by Ms Maureen Nabila Cowan of the University of Virginia, a research assistant for GET. She described AMR as a major global health security threat and emerging biosecurity threat that is currently not receiving adequate attention. The GET Consortium's research project aims to conduct an evaluation of the African region's current AMR status and develop a working strategy for tracking and containing AMR expansion. She highlighted the following as revealed in the WHO Cause of Death Statistics:

- Most of the most common causes of death in the developing world are infectious diseases;
- There is a rise in rates of resistance across these diseases, as well as acceleration of this rise;
- There is a prominent dearth of AMR surveillance data for the African region, making AMR strategies in the region especially weak;
- Reports have shown that there will be an estimated 10 million additional deaths per year due to rises in AMR rates, corresponding to a 100 trillion USD total GDP loss by 2050; and,
- The African continent is projected to be hit disproportionately hard by the expansion of AMR due to socio-economic and infrastructural challenges, both in terms of morbidity/mortality and massive economic loss.

Cowan concluded with the following recommendations:

- Increased cognizance needs to be given to AMR as a regional threat on the regional state level;
- Strengthened efforts to capture surveillance data across the region as a more practical starting point for containing AMR; and,
- Combatting AMR on the national level within the context of existing programs dedicated to higher-priority infectious disease threats (Malaria, HIV, and TB).

Nigerian-born Hollywood actor, Hakeem Kae-Kazim and Dr Adesina Fagbenro-Byron (Mothergold)

African EID Book Project

The GET-EID Book launch was championed by the CASE Working Group of the GET consortium. The project was conceived in early 2016 as part of the strategic activities of the CASE working group. Editors of the book include Mr. Godfrey Tangwa, Professor Akin Abayomi, Mr. Samuel Ujewe and Mr. Nchangwi Syntia.

The book project was presented on the first day of the workshop as a special event. The presentation was done by Godfrey Tangwa and Nchangwi Syntia.

Key discussion points included:

- Title of Book: *An African Indigenous Response to Epidemics - A Global Health Perspective*.
- Aim: To capture, within a given time frame, the state of the art, science, preparedness and evolution of deadly epidemics in Africa.
- The book will be a multi-disciplinary publication with authors from diverse disciplinary backgrounds co-authoring chapters.
- Key areas of focus: Public Health, Health Policy, Biosecurity, Socio-cultural Issues, Ethics of research in Epidemics; Science Communication; the role of the media in epidemics situation; the African Diaspora and its role in Epidemics in Africa.
- Book will have approximately 15 chapters.

- Format: Print - with an ISBN; an electronic format which can be purchased in full or *à la carte* as individual chapters.
- Readership: Global health practitioners; public health students and experts; humanitarian organizations; infectious disease researchers; policy makers.
- Task team is in contact with a potential publisher (Elsevier).
- The book's concept note was reviewed by the Grants Writing and Publications Working group.

Areas for Intervention

- Peer reviewers needed.
- Task team to finalize discussions with publishers.
- Deadline to submit chapters: 30th July. This may have to be extended.
- Volunteers needed to write reviews for the book.
- Need to contact journal editors who may be interested in considering a book review.
- Need to identify a leading expert in emerging infectious diseases to write the preface.
- Suggestions have been made to include other chapters. This will be reviewed by the task team.

Day 3 Morning Workshops

Two workshops were held on Day 3 of the forum: (1) Ida Biunno's introduction to Stem Cell Biology and its intersection with Emerging Infectious Diseases, and (2) Yinka Shokunbi's discussion on the role of journalism in emergency states, in terms of challenges that Nigerian health journalists faced while covering the 2014 EVD outbreak.

BREAKOUT SESSIONS

Methodology / Rationale

Day 2 of the Lagos forum centered on the four conference themes: (1) Emerging Infectious Diseases, (2) Biosecurity/Biobanking, (3) Vaccine Strategy, and (4) Public Learning and Understanding of Science.

The purpose of the breakout sessions was to assemble sub-group faculty and delegates to discuss and develop theme-centered recommendations for strengthening the Dakar Declaration. Within the individual breakout groups, panel-led moderated caucus, presentation, and Q&A were held. The sub-groups reported back using power point templates.

BREAKOUT SESSION: BIOSECURITY & BIOBANKING

Biosecurity & Biobanking Discussion

The biosecurity/biobanking group that met during the Breakout Session on Day 2 was one of the larger sub-groups, and organized a panel discussion that included scientists, academics, and policymakers from the African region, delegates from the World Health Organization (WHO). World Organization for Animal Health (OIE), and Canadian Global Affairs.

Key points made included:

- A lack of awareness as to what biobanking is, and its potential usefulness in ensuring biosafety across the region;
- The notion of competing risks and threats – prioritizing biobanking within more immediate biosecurity and public health concerns to the region, such as HIV, Malaria, and Tuberculosis;
- Sustainability – how African states can open up the resource streams to ensure the long-term viability of biobanking programs;
- Challenges with international coordination and the possibility of regional cooperative, rather than independent institutional biobanking programs;
- Compliance assessment/auditing and metrics for progress (recalling the GHSA Action Package 3 roadmaps; and,
- Clear decisions on where the balance between security and health/research should be (and when restrictions should start).

Biosecurity & Biobanking Resolutions

The Biosecurity & Biobanking sub-faculty shared the following recommendations and solutions with the greater Lagos forum with respect to the potential development and implementation of a biobanking program in the region.

Facilities / Infrastructural Details

With the Western-style BSL-3 / BSL-4 infrastructures proving sub-optimal for many regions in Africa (due to inadequate staffing, water, and power requirements), there is a need to develop a new style of self-sustainable lab (i.e. one employing the use of renewable energy and self-contained water). There is also the need to develop and sustain the indigenous maintenance capability of facilities. Both legal and budgetary agreements need to be in advanced, with foresight across multi-lateral partners (in the case of regional biobanking facilities). The sub-faculty recommended that PPE is stored on-site and easily accessible to the facility, so as to prevent recurrence of challenges in sending PPE to sites as observed during the late Ebola outbreak. Additionally, the sub-faculty recommended:

- Simplified requirements whilst meeting best practices – via engineering solutions such as using key in parallel with biometric locks;
- Taking advantage of technical advances that reduce the need for containment (genetic work that does not require isolates); and,
- It was noted that the GET Consortium is to produce an open call for technical solutions (bedside diagnostics, bedside inactivation, room temp storage, etc.).

Human Resources

- Enduring training resources, such as video clips to help address turnover of staff;
- Engaging policy makers in a more sustained manner to unlock support and associated budget (using both top-down and bottom-up approaches);
- Sensitizing existing human resources that can become national champions, such as ethics committees, regulators or security personnel;
- Promoting exchanges and collaborative work to share knowledge, skills and facilities – there is an offer from the UK Royal College of Pathology; and
- Contributing to long term planning to address bottleneck factors, such as education.

Information/Informatics

- Identify platforms & portals to share the results of collaborations;
- Take advantage of existing platforms to strengthen biosecurity and biobanking, e.g. occupational health & safety software;

- Software solutions to facilitate data sharing and process automation; and,
- Ensure that informatics solutions help build trust, e.g. reliable for confidentiality.

Mechanisms for Action

- Build on a One Health concept to further strengthen work across the human/animal disease interface;
- Develop concrete sustainability plans, including both government and PPP support;
- Reframe biosecurity and biobanking as a global security imperative (rather than a national security issue as in the case of biological and radiological weaponry);
- Identify common standards for health security (possibly based on Human Resources core capacity);
- Craft African-led solutions that work in the longer-term through structured plans for:
    - Recovery & reintegration
    - Process & risk mitigation;
- Increasing coordination with BWC/UNSCR 1540;
- Active collaboration with Global Partnership at health security interface; and
- Active collaboration with GHSA and WHO R&D Blueprint.

Biosecurity/ Biobanking Summary / Takeaway

The Dakar Conference, which was held in January 2015 during the peak of the Ebola outbreak, focused more on reactionary rather than proactive measures to managing the public health crisis. The Lagos Conference, by comparison, held developmental biosecurity and biosafety on the African continent as a cornerstone. In particular, the need for regional biobanking system(s) within Africa as a means of establishing the laboratory and scientific infrastructure of the region was highlighted. Through biobanking, extensive and fool-proof management of Category A pathogens is possible, which sets the platform for research development and a coordinated top-down effort necessary for preventing bioterrorism.

Establishing a bio-bank, anywhere in the world, requires a large-scale coordinated effort, and sustainable plan in order to receive intrinsic long-term benefits. As a result, special cognizance to uniquely “African factors” are reflected in the aforementioned recommendations and resolution produced by the Lagos Conference, with the ultimate goal of promoting biosecurity and biosafety to the level required in order to adequately and proactively respond to threats of emerging and re-emerging infectious diseases – both naturally-occurring or deliberate. ----------

BREAKOUT SESSION: EMERGING INFECTIOUS DISEASES (EIDs)

Report of Breakaway Group Presentation and Consultation meeting EID Sub-Faculty

Emerging Infectious Diseases (EID) in Africa, as well as other parts of the world is no respecter of persons, and international borders. Due to globalization, the world has become increasingly connected than ever before and travelling is now easy. This in effect means that an EID may arise in Africa or anywhere else in the world and affect many people/populations.

It is in this spirit, that the main theme for this conference was centered on EID. The Ebola Emerging Infectious Diseases Sub-Faculty working group composed of 13 participants reflecting on "*Era of Emerging Infectious Diseases and the aftermath of the Ebola Outbreak."* The focus of papers in this sub-faculty was on:

- New EID trends such as Lassa, Zika, MERs, SARS, and Pandemic Influenza;
- Plasma and Plasmapheresis agenda for West Africa;
- Survivors and Survivor Welfare; and,
- Clinical trials.

The session was chaired by Dr. Stephen Kennedy, and the reporting was carried out by Mr. Francis Kombe of KEMRI (Wellcome Trust Research Program), and Mr Henry Berrian of GET. The latter undertook the reporting of the working session.

The main issues identified by the group were:

(i) **The Objective of Research during an Epidemic:** it was discussed and debated that during an epidemic, the primary objective of research should not be to gather data, but contribute to the treatment and improving the condition of those infected. Ethical consideration is imperative in research as it puts the focus on the patients, as human beings. Ethical principles in research should be non-maleficence, beneficence, justified and be autonomous.

(ii) **Psychosocial effects of an outbreak**: an outbreak such as the Ebola goes beyond those directly involved in the treatment and care, but massively impact the community, city or nation. Some of these include psychological distress such as depression, anxiety, stress and post-traumatic stress which may be alleviated if psychiatrists and other mental health practitioners become integral to case management, clinical, and recovery teams.

(iii) **The importance of Positive Psychology in post-traumatic treatments**: positive psychology (optimism, resilience and meaning in life) could be beneficial in the treatment of Ebola victims. In addition, longitudinal social science studies (anthropology/psychology) could unpack discrepancy between health problems and positive psychological states.

(iv) **Social impact of Ebola:** The Ebola outbreak caused micro and macro socio-economic impact in the affected countries such as fear and stigmatization, shutting down of schools, closure of businesses and national borders, amongst others. Most importantly, the Ebola situation exposed the weaknesses of health systems in the affected countries and the need to have an integrated and complementary health system that is proactive.

(v) **Knowledge of EVD among Health Workers:** Health workers have poor knowledge of EVD prevention practices, especially, laboratory technicians and junior health workers. There is therefore the immediate need for continuous medical education and training for health workers on knowledge and practice of EVD infection and prevention;

(vi) **The Use of Convalescent blood in the treatment of Ebola victims:** Scientific study conducted in Sierra Leone revealed that whole blood transfusion was instrumental in reducing mortality and viral load. Furthermore, there is a significant difference in the blood groups between survivors of Ebola and the dead; deaths were lower in A+, but higher in O+.

(vii) **Bridging the gap in Ebola-Lassa fever outbreak preparedness and response in West Africa:** Lassa is still under reported in most parts of West Africa. It is imperative that Lassa fever is prioritized. There is renewed attention needed to focus on as well as have successfully controlled clinical case, management and infection control and health awareness.

(viii) **Stem cell research and engineering**: The response to HIV is limited and must be reconsidered. Cellular engineering can be used to mimic HIV resistance and provide cure for HIV/AIDS. Furthermore, stem cell engineering is providing hope in bringing solutions to unchartered research areas and can potentially provide cure for complex diseases facing Africa.

The session concluded with a call for participants in the EID Sub-faculty to reconvene after lunch to formulate resolutions that will form part of the outcomes of the conference.

Next Steps and Way Forward

As a result of the main issues, the EID Sub-faculty reflected on how to augment the Dakar Declarations, especially the need to "*accelerate the evaluation of promising treatment options and vaccine candidates against EVD and other emerging and re-emerging highly infectious pathogens."*

The following resolutions were made to policy makers, health care practitioners, researchers and scientists, academics and other respective stakeholders:

- In an EID epidemic, focus should be on reducing mortality and morbidity;
- An appropriate ethical framework needs to be developed with significant input from African ethicists to fit into the unique situations of EID epidemics to achieve the desired health outcomes;
- Encourage the application of positive psychology within an African context to address EID epidemics in their early stages in order to improve outcomes for survivors, next of kin and contacts;
- An improved collaboration among all EID researchers, particularly those working in sociology, anthropology and psychology, as is already taking place among clinical researchers;
- Adequate attention should be given to Lassa fever to reduce their potential of developing into pandemics;
- Early identification of programs and innovations that have been successfully used in previous outbreaks, and which can be tailored to improve the response during other outbreaks;
- The integration of survivor healthcare services into routine healthcare systems; and,
- Recognition of the importance of mental health as a key contributor to the growing burden of disease on the continent.

Dr. Kennedy closed the session with an appreciation to all the presenters as well as a quick recap of the presentations. In addition, he highlighted the hard work of all the speakers, the detailed scientific and theoretical richness of the presentations, and their contribution towards EID as well as the enhancing the Dakar Declarations.

(L-R): Dr Samuel Ujewe and Dr Kambiz Shekdar of RFTCA

LOC Members (L-R): Dr. Erinsoho, Dr. Abiola Idowu and Dr. Abdulsalam

BREAKOUT SESSION: PUBLIC LEARNING & UNDERSTANDING OF SCIENCE (PLUS) – STRATEGIES TO COMBAT EID's

This session was co-chaired by Dr. Elizabeth Rasekoala (African Gong) and Dr. Mahama Ouedraogo (Acting Director: Human Resources, Science and Technology, Africa Union Commission AUC-HRST).

Dr. Elizabeth Rasekoala of African Gong Co-Chairing Science Communication and PLUS break out session with Dr. Mahama Ouedraogo of (AUC-HRST)

Discussions centred on the following **sub-themes**:

- Science Communication and PLUS in Africa: Policy Development Challenges and Opportunities;
- Good Practice programs and projects implementation – African Models for Science Communication and PLUS as a containment strategy for EID;
- Strengthen evidence base through sharing of research, information and Capacity-building; and,
- Discussions, Drafting and consensus on the PLUS Faculty Communiqué and Call for Action document.

Key Discussion Points

The session flagged the following issues:

- The dearth of Science Communication and PLUS policies, program and capacities in Africa;
- The importance of fostering networking on science communication at the continental level - perhaps taking the form of sub-regional and national chapters;
- The need to advocate for policies and programs on science communication in Africa;
- The importance of building and/or strengthening the researcher-policymaker relationship;
- The need to strengthen communication links between scientists and the general public; and
- The urgent need to strengthen human and institutional capacity in science communication and PLUS in Africa.

To set the stage for discussions on these sub-themes, the following presentations were made by participants who had submitted **Abstracts** for Oral presentation at the Conference:

- 'Scientifying' villagers or 'Villageising' Scientists: A false disjunctive dichotomy in the communication conundrum. (Prof. Godfrey Tangwa)
- How do Residents of Ebola Affected Areas Perceive and Respond to Ebola Virus Disease? An Urban Attitude Survey in Lagos, Nigeria. (Dr. Adeyeye Peter Olusegun)
- Infectious Diseases and Just Healthcare Access: An African Ethical Framework for Policy Reform. (Dr. Samuel Ujewe)
- Knowledge, Beliefs and Malpractices regarding Prevention of Ebola Virus Disease in a Rural Community of North Western Nigeria. (Joshua, I..A., *et. al*.)
- African and Latin America: Rebuilding Old Bridges through Science Communication. (Prof. Andre Ramos)
- Reaching the Marginalized: The Example of an Inclusive Scientific Communication Program. (Ramos *et. al.)*

Science Communication and PLUS Resolutions

The highlight was on the importance of effective science communication and public learning and understanding of science, and specifically, on how African populations can interact with scientific information in a language they can relate to. There was a general agreement to the effect that this has implications for

health research in Africa, and the overall welfare of African populations. The following resolutions were reached at the end the session:

- African Scientists and academics are encouraged to learn to communicate their research findings to the public in a language that is easy to understand. This would enhance more effective community engagement practices in research, and the promotion of public understanding of the sciences. It may also facilitate public debate on issues relating to science and technology.
- In communicating science to African populations, Scientists need to take into consideration relevant cultural norms, beliefs and practices.
- There is need for communication between researchers, policy makers and community leaders. This would enhance policymakers' understanding of science and technology matters that are relevant for effective policy-making and development. It would further enhance greater communication between scientists, policy makers and society as a whole.
- Scientists need to engage investors and diverse stakeholders' in a sustained conversation, thereby encouraging them to invest in science and technology related activities in Africa. Such conversations are only possible if both sectors can learn the art and practice of science communication, through empowering capacity-building, knowledge sharing and engagement platforms.
- There is an increasing demand for African professionals with skills in the public communication of science and technology.
- Networking among researchers and academics of varying specializations and professionals in the scientific industry, is key in promoting science communication and PLUS in Africa.

At the end of these discussions, the following areas of **interventions** were proposed:

- There is need to support policy development for science communication and PLUS in Africa;
- Practice and Program development for science communication and PLUS should be encouraged in Africa;
- There is an urgent need for capacity building in science communication and PLUS in Africa;
- Science communication should be mainstreamed in all aspects of the other Conference thematic on infectious and emerging diseases;
- Monitoring and Evaluation (M&E) frameworks should be developed for all science communication and PLUS activities to assess, enhance and sustain impact and good practice;

- African governments should promote the development/strengthening of science communication and PLUS in their national Science, Technology and Innovation (STI) policy frameworks;
- The need for the training of communicators in Science; science journalism, and the mass media;
- The establishment of science communication/PLUS Scientific Awards in Africa with different focus on youth, women, etc. Themes can be selected based on current and emerging issues (e.g. Ebola research, climate change, food security, etc.);
- The establishment of African Research Grants' program targeting science communication and PLUS research initiatives;
- The establishment and promotion of Science Centers, Science Museums, and Libraries (e.g. the Library of Alexandria), in African countries, with special targets for children and youth.
- The establishment of a Public Lecture Series to be delivered by renowned African scientists who can act as role models for African youth, raise the profile of science on the continent, and generate interest in science communication and PLUS;
- Promoting STEM education at all levels, with specific emphasis on girls and women;
- Promote alternative funding mechanisms for science communication and PLUS program, particularly focusing on domestic (mostly African funds);
- A consensus statement and **Call to Action document** should be established on the PLUS Faculty's Communiqué, and once finalized, should be widely disseminated to all stakeholders and relevant institutions, at national, sub-regional, regional and international levels.

Major –General Abimbola Amusu , Commandant, Nigerian Army Medical Corp and School

BREAKOUT SESSION: VACCINE STRATEGIES FOR THE EBOLA BELT

Efforts from the biomedical research community are still underway to produce a vaccination that can be effectively and safely used to prevent EVD.

The breakout session for Ebola vaccine strategies acknowledge the accomplishments in vaccine development/deployment since the Dakar declaration, including increased national/regional capacity in Africa, and noted that preliminary results from vaccine trials have been very encouraging.

Vaccine Strategies Recommendations

- Maintain the momentum in vaccine development/deployment including research and development of vaccines with improved characteristics;
- Keep all vaccine strategies open: beyond deployment in an emergency for outbreak response, consider other strategies such as prophylactic use in different populations;
- Community engagement/communication is critical for success of any vaccine deployment;
- Leverage the lessons learned from the last outbreak and adopt a proactive approach to respond to an outbreak emergency across the entire Ebola belt. This includes: clarifying and better codifying the emergency regulatory, policy, liability, logistic and financial responsibilities to enable a rapid response in any future outbreak;
- Harmonize the processes and timelines for getting vaccines (investigational and/or approved) to requesting countries once an emergency is declared;
- Increase the ability to overcome logistic hurdles in vaccine deployment; and
- Increase awareness and participation of African countries in the WHO Global Ebola Vaccine Implementation Team document.

MEETING OF THE MANO RIVER UNION COUNTRIES

The Mano River Union countries with Ebola epidemic – Liberia, Guinea, and Sierra Leone, in particular, were devastated not only in terms of extensive morbidity and mortality but also in terms of their economies and health sector infrastructures. This conference set up a relatively informal launch meeting between 26 delegates from these three countries to provide a platform for discussion of their current situations and a roadmap for future preparedness and collaboration against future potential outbreaks, whether it is an emerging or re-emerging infectious disease that poses a large public health threat.

Key Points of the Meeting:

- Call for strengthened formal collaboration across the three countries, specifically in the form of harmonized policies with respect to border control, and uniform guidelines for strategically responding to threats to biosafety;
- The three countries collectively lost $15 billion USD within the span of one year due to the Ebola crisis, and World Bank estimates predict the countries will need a minimum of three years to resuscitate their economies from the aftermath;
- Discontent with the response from the greater international community during the outbreak, with respect to issues of national sovereignty;
- The need to engage state borders, politicians, the African community, and ensure that even those at the most vulnerable end of society are educated with respect to biosecurity and biosafety;
- The Lagos Conference has galvanized the advocacy for a regional biobanking, bioinformatics, and biosecurity framework; and
- Affirmation that the only type of funding that will be accepted is that which does not compromise national sovereignty.

PLENARY 14: DOING DEVELOPMENT DIFFERENTLY

Doing Development Differently

Dr. Sina Fagbenro-Bryon

In concluding the Lagos Conference proceedings, Dr. Sina Fagbenro-Byron, who was a key host, re-emphasized the position of all delegates in leading the path towards a different way of developing Africa. He insists that Africans move away from attempting to be superheroes and champion a course for collaboration in solving our common problems, especially those related to EIDs. His call was a reassertion of Mothergold Consulting's strategy to enhance sustainable development strategies for Africa – adopting a sector-wide approach, focusing on: governance, public service delivery, inter-sectorial coordination, and organizational capacity building.

Dr. Fagbenro-Bryon points to a resonance between Mothergold Consulting's initiative and those stimulated at the Lagos Conference, and shows how these could bring about a different way of developing Africa. A key aspect is that which engenders inter-sectorial collaboration, and collaboration between academics, researchers and policy makers, to enhance Africa's capacity to address its varied healthcare challenges. He concluded that each sector or stakeholder, however small, is essential in the network that would ensure a robust response to EIDs in Africa, leading to sustainable development in the continent.

LOC Vice chairman – Dr. Adesina Fagbenro-Byron, Mothergold

Closing Ceremony

The 2nd African Conference on Emerging Infectious Diseases and Biosecurity concluded at 6 pm on July 29th, 2016.

The Annual General Meeting of GET Consortium members took place after the Conference.

The 3rd African Conference on EID and Biosecurity will be held in Ghana in 2017 and the hosts will be the Noguchi Memorial Institute of Research, University of Ghana, Legon Accra and the Kumasi Center for Collaborative Research in Tropical Medicine KCCR.

APPENDIX A: PROGRAM OF EVENTS

Day 1

TIME	ACTIVITY	CONTENT
8.00	Registration starts	Collection of Conference Packs Check -ins
9.30	Seating	
		OPENING CEREMONY
10.00	Welcome Address	Chairman, LOC
10.05	Opening Remarks	Commissioner for Health Lagos
10.15	Welcome Addresses Dakar Declaration explained	• GET • WATER
10.30	Addresses	• Minister's Speech • Office of the NSA • Canadian Ambassador • Governor's Speech
11.00	End of Opening ceremony	**Tea**
11.30	**Plenary 1.** Emerging Infections	**Science of Ebola and other emerging communicable diseases** • Factors fueling Emerging Infectious Diseases • Factors fueling the spread of EID the Ebola Model • Surveillance for Pandemic Flu
12.30	**Plenary 2:** Vaccine	• The Ebola model. Guinea ring vaccination trial • GAVI. investments in Ebola vaccine • Ebola vaccine: Overview of EBOVAC and EBODAV projects
13.30		LUNCH and Poster Viewing
14.30	**Plenary 3:** Profile of an EID Public Health Crises. The West Africa Ebola Outbreak.	**2014 West African Ebola Outbreak: Situation Analysis** • Guinea, Liberia and SL Ebola and preparedness for future outbreaks Survivor Testimonies • Sierra Leone • Liberia
15:30	**Plenary 4**: Public Learning & Understanding of Science). Strategies to combat EID	• STISA 2024: Science Communication Policy and Program Development in Africa • Science Communication developments: Global trends, Latin America and EID's
16.30	**Plenary 5:** Biosecurity: 'Global Health Security'	**Biosecurity Session** • Global Health Security Agenda (GHSA) • BWC/1540 • OIE • Interpol • Global Partnership Program (GPP)
17:30	**Tea Break**	
17:30	**Plenary 6**: Biosecurity and Biobanking	• Strengthening biosecurity; • Strengthening biobanking; • Strengthening bioethics
19.00	Special events	• Chairs of the Faculties to Outline Day 2 activities

TIME	ACTIVITY	CONTENT
Dinner Evening Event and entertainment. By Invitation or tickets.		• West African College of Physicians (WACP) • Royal College of Pathologists • AMR Project • SAA and presentation of the Harare Declaration to the Commissioner of Health. • African EID Book Project • Ebola Movie Project

Day 2

8.15 – 15:30	**Thematic discussions**	**Parallel breakaway Group Presentation and Consultation meeting**
		BREAKOUT ROOM 1
8.15 – 15:30	**Emerging Infectious Diseases**	• Emerging deadly epidemics in Africa: some overarching paramedical issues and considerations • Psychosocial impact of Ebola virus disease (EVD) outbreak among survivors, contacts and non-affected persons in Lagos, Nigeria • Knowledge of Ebola Virus Disease Prevention and its Intra-Epidemic Practice Amongst Health Workers of a Tertiary Health Care Facility in North-Western Nigeria • Clinical features of 452 Ebola Survivors who presented at the 34 Military Hospital, Survivors Clinic • A medical care referral model for research participants in a resource-limited setting: a step by step guide to the Prevail III Referral Scheme • In silico modelling of biological, genetic and environmental factors that enhance epidemic outbreaks of RNA virus diseases • Isolation and sequence analysis of novel reassortant H14N3 from Pakistan: an evidence of reemergence of rare Influenza Virus subtypes in Asia • Critical pitfalls and considerations for the viability of a stem cell cure for AIDS in Africa and throughout the world • Socioeconomic Impact of Ebola epidemic in Guinea and Neighboring Countries • The Role of Mathematics in The Era of Emerging Infectious Diseases • Mental Health in Emergency Response: Lessons from Ebola Response • The Engagement of the German Partnership Program

		for Excellence in Biological and Health Security in the context of the recent Ebola Outbreak • Balancing the Scale of Preference in National, Sub-Regional and International Response to VHF Outbreaks in West Africa: Moving from Ebola to Lassa fever • Spatial-Temporal and Case-Outcome Analysis of the 2015/2016 Outbreak of Lassa Fever in Nigeria
		BREAK-OUT ROOM 2
8.15 – 15:30	**Biosecurity and Biobanking**	Biosecurity and Biobanking: • Challenges for biosecurity and biobanking • Liberia Bio-bank Development Plan • Opportunities for strengthening biosecurity and biobanking ○ Strengthening infrastructure ○ Strengthening informatics ○ Strengthening mechanisms; and ○ Strengthening human resources • Identifying solutions: opportunities for practical actions to strengthen biosecurity and biobanking • Group presentations and communiqué recommendations from the 4 sub Faculties starts to all participants
		Group Presentation Preparation
		BREAKOUT ROOM 3
8.15 – 15:30	**Public Learning and Understanding of Science (PLUS) and Science Communication (SC)**	• Science Communication & PLUS in Africa: Policy Development Challenges and Opportunities • Good Practice program and projects implementation – African Models for Science Communication and PLUS as a containment strategy for EID • Strengthen evidence base through sharing of research, information and capacity-building • Discussions, drafting and consensus on the PLUS Faculty Communique and Call for Action document
		BREAKOUT ROOM 4
8.15 – 15:30	**Vaccine strategy - Group Dialogues**	**The need for a Vaccine strategy for the Ebola belt of Africa**

		• The vaccine component of the Dakar Declaration • Vaccine R&D regulatory challenges in Africa • The Ebola vaccine Deployment, Acceptance and Compliance (EBODAC) Project • Immunogenicity & safety of Ad26.ZEBOV/MVA-BN®-Filo heterologous prime-boost Ebola vaccine (EBOVAC) • The Sierra Leone Trial to Introduce a Vaccine Against Ebola (STRIVE) • PREVAIL I EVD Vaccine Clinical Trial: Liberia • Small group work (exercise and feedback plenary)
15.30	**Tea and presentation of Group Resolutions to entire conference.**	Group presentations and communiqué recommendations from the 4 sub Faculties starts to all participants in the Main hall as resolutions to strengthen the Dakar Declaration
17.00		**Free Evening with option to attend workshops**
18:.30	**Training workshops**	• Biosecurity and Bio-threat Reduction training workshop • Vaccine workshop • PLUS workshop • Biobanking workshop

Day 3

21.00		Dakar Declaration Revision Team
07:00-08:00	Morning Workshops	• Stem Cell Biology and EID • Role of Journalism in emergency states: Challenges of Nigerian Health Journalists in covering 2014 EVD Outbreak
08.00	Plenary 7:	**Biosecurity in Action:** • Sierra Leone Biosecurity project
09.15	Plenary 8: Biosecurity	**Biosecurity in Practice** • Health Security: A perspective from Mali • Biosecurity & law enforcement in Nigeria • The German Partnership Program for Excellence in Biological and Health Security • The Global Partnership Initiated Biosecurity Academia for Controlling Health Threats
10.00	Plenary 9: Ethics	**Ethical Considerations:** • In disease outbreak and management • In treatment and research during a deadly infectious epidemic like Ebola • Ethics During Epidemics: Liberia
10.30		TEA BREAK and Viewing of Posters
11.00	Plenary 10: PLUS	PLUS Sub Faculty Science Communication & PLUS in the 'Africa We Want' – Continental, International and National Perspectives
12.00	Plenary 11. Vaccine	Vaccine sub Faculty • The Sierra Leone Trial to Introduce a Vaccine Against Ebola (STRIVE) • WHO Ebola guidelines (GEVIT)

		• PREVAIL I EVD Vaccine Clinical Trial: Liberia
13.00		Lunch and Viewing of Posters
14.00	Plenary 12.	Best of the Oral Abstracts
15.00	Plenary 13.	• EID Aiming for an HIV cure. • Aedes aegypti: the Highly adaptive and very resilient super vector.
16.00	**Tea**	
16.30	Plenary 14	• Doing Development Differently • Closing ceremony
18.30 Dinner and Awards. Revised Dakar declaration. GET AGM	Closing Ceremony and Awards	• Dakar Declaration • Nomination of the Country to host the 3rd African Conference on EID and secure pledges • GET announcement of its activities and vision • After non GET delegates leave then GET will have its AGM and that will mark the end of the conference.

APPENDIX B: THE ORIGINAL DECLARATION OF DAKAR

On the 19th and 20th of January 2015, a meeting was held at the King Fahd Hotel in Dakar (Senegal) to evaluate potential Ebola Virus Disease (EVD) treatment options and vaccine candidates for deployment in West Africa. The meeting was attended by:

- The Minister of Health of Senegal, the Commissioner for Health, Lagos State, Nigeria and representatives of health ministries of Guinea,Liberia, Sierra Leone; and Mauritania.
- Representatives of the New Partnership for Africa's Development (NEPAD Agency) and the West African Health Organisation (WAHO); and
- The World Health Organization (WHO) and other bilateral and multilateral international partners.

Recognising that:

- EVD continues to be a major cause of morbidity and mortality in West Africa, mainly affecting Liberia, Sierra Leone and Guinea. As of January 7, 2015, there have been a total of 21,121 cases of Ebola including 8,304 deaths.
- Considerable efforts in time, finances and kind have been made by national governments, ECOWAS, and African Union; supported by a variety of development partners to reduce the rate at which the disease is spreading. Yet, serious challenges remain.
- In August 2014, a WHO consultation unanimously agreed that, given the highly exceptional nature of the situation and the lack of established immunisation and drug treatment options, it was ethical to *offer unproven interventions with as yet unknown efficacy and adverse effects, as potential treatment or prevention*.
- A variety of vaccines and treatment modalities, including convalescent plasma and antivirals, are currently undergoing clinical trials in the affected countries.
- Equitable access to novel effective EVD vaccines and treatment options currently poses a challenge and need to be addressed in the future,
- Challenging circumstances such as deficiency of regulatory mechanism, infrastructure and human resource capacity for the proper planning and conduct of clinical trials in West Africa.
- Currently, there is very limited capacity for the fractionation of Immune globulin in Africa

As a result of this Dakar meeting, the participants recommend to:

- Accelerate the evaluation of promising treatment options and vaccine candidates against EVD and other emerging and re-emerging highly infectious pathogens.

- Facilitate the evaluation of use of EBV survivors' plasma as therapeutic option.
- Strengthen the existing Biosafety Level Containment Facilities (BSL 3/4) laboratory and biobanking infrastructure in Africa for effective response.
- Promote the capacity of African scientists to conduct research and to design interventions that address the challenges associated with outbreaks of EVD and similar health threats. Suggested measures include, but are not limited to:
    - Creating improved platforms for knowledge exchange and peer review.
    - Improving the flow of scientific and medical communication within the African medical and scientific community and beyond.
    - Facilitating the exchange of peers among participating scientific organisations and institutions to foster active knowledge and skills transfer.
- Reach and engage communities, potential donors and stakeholders to promote a stigma-free environment that supports and promotes the rights of EVD survivors, and furthers the appreciation of health care workers involved.
- Africa needs to generate a capability to collect plasma and develop the biotechnological capacity to fractionate plasma for domestic use. However, given the current emergency situation there is a need to develop policy for contract fractionation under license and material transfer agreement as an interim measure.
- There is a need for the import/exportation of blood products from affected countries to developed countries. It is crucial to take the opportunity created by the current epidemic to develop policies and regulatory aspects that will ensure immune globulin production for the benefit of African patients.
- Involvement of the policy makers, African scientists, and the community in addressing the current epidemic is crucial to ensure the proper representation of a regional voice in discussions, policy formulation, and research and treatment interventions in response to the epidemic.
- In parallel there is a need to develop capacity in the region for local production of immune globulin for EVD and future emerging pathogens; including but not limited to infrastructure and human resources development.
- The availability of EVD hyper immune globulin will ensure regional preparedness and readiness for the current and future similar health threats

LAGOS DECLARATION:

APPENDIX C: LIST OF PARTICIPANTS AT THE 2ND CONFERENCE ON EMERGING INFECTIOUS DISEASES

S/N	NAME	E-MAIL ADDRESS	COMPANY/AFFILIATION
	GENERAL LIST:		
1	TINA ADESINA (UMB)	tadesina@mgic.umaryland.edu	University of Maryland
2	ASIOZI MOSES (UMB)	masiozi@mgic.umaryland.edu	University of Maryland
3	P. CALDERWOOD (CANADA HIGH COMMISSION)	Perry.Calderwood.gc.ca	CANADA HIGH COMMISSION
4	PROF. DIRAN MAKINDE	diran.makinde@gmail.com	
5	EDEH CHIDI	chidi4christ85@yahoo.com	
6	MAUREEN	maureen @virginia.edu	
7	CHINEDU OKOLI	chinedu.okoli.gtbank.com	
8	STEPHEN YEBOAH	ysteve28@hotmail.com	GET/GHANA
9	JOAO COSSA	joao.cossa@netestp.gov.nz (*)	
10	STEFAN KLOTH	kloths@rki.de	Robert Koch Institute
11	PETER ADEYEYE	adeyeyepeter@gmail.com	
12	PHARM. IDIA ANIBILOWO (NHIS)	ianibilowo@yahoo.co.uk	NHIS
13	DR. KANU EBERECHI C.	eberechi.kanu@gmail.com	NHIS
14	ENGR. JIDE OLEPARA	jideolepara@gmail.com (*)	JEQIT SOLUTION/UNILAG UX CENTER
15	DR. ROSE MACAULEY	macauleyr@gmail.com	Liberia/Ethnic Community
16	DR. JONATHAN ODIA	jonathan.odia@deuxproject.com	DEUX Project LTD
17	HAKEEM KAE KAZIM	hakeemkae@hotmail.com	
18	TITILOPE AKOSA	titiakosa@gmail.com	GET
19	PHILLIP STARLING	pstarling@crdfglobal.org	CRDF Global
20	JOHN B. DOGBA	dogba484@gmail.com	
21	DR. MARK W.S.KIEL	mkiel51@gmail.com	
22	GLORIA MASON	gigimason23@yahoo.com (*)	
23	KOKULO FRANKLIN	k_frank1980@yahoo.com	
24	DR. BABAJIDE KESHINRO	bkeshinro@wrp-n.org	
25	ZIPPORAH KPAMOR	zkpamor@msh.org	MSH
26	FATORMA BOLAY	director.lelor@gmail.com	PREVAIL/LIBERIA
27	HAFIJU M. KANJA	hmkanja@gmail.com	GET/SIERRA LEONE
28	Dr. Olubukunola Fabunmi Oshinor	bukky fabunmi78@yahoo.com	
29	BRIAN CONTON	bconton@gmail.com	
30	JOSEPHUS J ELLIE	josephusellie@yahoo.com	
31	Abiola Ogunbanwo	abteky2005@yahoo.com	Abteky Nigeria LTD
32	Sholape Iyoho		AHEAF
33	Dr.Olakunle Oladehin	olakunle.o.oladehin@gsk.com	GSK House
34	Tomisin Akinseye	tomisin.akinseye@yahoo.com	Instant Global Health Solution
35	Omenazu Ngozi	programmes@livewellng.com	LiveWellInitiative

36	Uju Okafor	uokafor@livewellng.org	LiveWellInitiative
37	Dr. Koho Udoh	udohkoko@yahoo.com	AGMPMP
38	Dr.Omoeya Victoria	voa_o@yahoo.com	LUTH
39	Dr.Sylvia Adebafo	sadebajo@popcouncil.org	Population council
40	Jennyfer Ambe	jennyferambe@gmail.com	secretary CAP/GET
	EID FACULTY PARTICIPANTS		
1	HOUETO DAVID	dhoueto@gmail.com	
2	DR JAVIER GABALDON	javier.gabaldon@brussels.hsf.org	MSF
3	GODFREY B TANGWA	gbtangwa@yahoo.com	GET
4	SUZANNE MATE	suzanne.e.mate.mil@mail.mil	
5	OYEWALE TOMORI	oyewaletomori@gmail.com	WHO
6	PROF WILLIAM AMPOFO	wampofo@nogudu.ng.edu.gh (*)	
7	PROF BAH SOW	oumou45@yahoo.com (*)	MOH Guinea
8	NAUDIOU DIAKITE		
9	JOHN AMUASI	amuas001@umn.edu	GET/WATER
10	KLEMENT JAIDZEKA	cjaidzek@hotmail.com	GET Junior Faculty
11	ANGELA CHUKWU	unnachuks2002@yahoo.co.uk	University of Ibadan
12	BARRY ALPHA MAMOUD	alphaguinea@gmail.com	
13	PROF AYOADE ODUOLA	amjoduola@hotmail.com	University of Ibadan
14	KWADO KORAM	kkoram@noguchi.ug.edu.gh	University of Ghana
15	HENRY BERRIAN	berrian.henry@gmail.com	
16	SAHR GEVAO	sahrgevao@gmail.com	University of Sierra Leone/GET
17	OUMOU MAIGA	maiga@bni-hamburg.de	
18	GBEMISOLA AKOSA	titiakosa@gmail.com	
19	Stephen kennedy	sbkennedy4@aol.com	LIBR
20	Kambiz shekdar	kambiz.shekdar@rftca.org	RFTCA
21	Francis Kombe	fkombe@kemri-wellcome.org	KEMRI/GET
22	Kokulo Franklin	k_franklin1980@yahoo.com	
23	Habtamu Tadelle	hbtmtadelle@gmail.com	
24	Osmou Kongso	osbog.sole@gmail.com (*)	
25	Daniel O. Oluwayelu	ogloryus@yahoo.com	University of Ibadan
26	Dr Foday R. Sesay	fodrobert24@gmail.com	GET
27	Adeshola William	as.william.sl@gmail.com	GET
28	Dr. Bowale Abimbola	bimbobowale@yahoo.com	Mainland Hospital, Yaba
29	Dr. S.B. Mustapha	esbeemustapha@gmail.com	
30	Dr. Longe-Peters	peterskemi@yahoo.com	
31	Dr. S.O.A. Adeshola	soaadesola@yahoo.com	Mainland Hospital, Yaba
32	George Curtis	brewervillecitymayor@gmail.com	Liberia
33	Jerald Dennis III	jeraldpdennis@gmail.com	National Ebola Survivors'

			Network
34	Gloria Mason	gigimason23@yahoo.com	Prevail-Liberia
35	Dr. Isibor	isibori@who. (*)	WHO
36	Ogbonnaya N. Ezeichi	sunnystats3n@yahoo.com	Faculty of Science, U.I.
37	Dr. Grace T. Osisanya	toluosis@yahoo.com	LSMOH
38	Dr. Mathew P. Zachariah	zachmathew@yahoo.com	LASUTH
39	Dr. Brian Conton	bconton@gmail.com	GET
40	Dr. Kuyinu Yetunde	yetundekuyinu@yahoo.com	APHPN/LASUTH
41	Dr. Odufuwa Adetola	akoduf@yahoo.com	HSC
42	Dr. Olonire Olorunfemi	olonirefemi@yahoo.com	LASUTH
43	Prof. George Akpede	georgeakpede@yahoo.co.uk	ISTH; AAU Ekpoma, NLFSKN
44	Dr. Akpede Nosa	nosaakpede@yahoo.com	ISTH
45	Dr. M.A. Olaiya	bimpyd@yahoo.com	LSBTS
46	Mrs. Shode M.J.	modupejokotola@yahoo.com	LASUTH
47	Dr. C.O. Adeyemi	toni.adeyemi@gmail.com	LASUTH
48	H.A. Chukwura	hachukwura@yahoo.co.uk	LASUTH
49	Olumodeji Oluwaseyi	oluwaseyi.olumodeji@gmail.com	LASUTH
50	Goodman Olayinka	yinkagoodman@yahoo.com	LASUTH
51	Dr. Naila Siddique	(*)	
52	Dr. Akinbami Akinsogun	ajokeclinic@yahoo.co.uk	LASUTH
53	Dr. Idowu Abiola	abbydeo2001@yahoo.com	LSMOH
54	Dr. Kotey Tolulope	tolukotey@yahoo.com	LUTH
55	Dr. I.A. Abdus-salam	dradeshina@yahoo.com	LSMOH
56	Dr. O.O. Ayeni	olajideayeni17@gmail.com	LSMOH
57	Dr. Tokunbo Oluwole	droluwole2003@yahoo.com	LSHSC
58	Dr. Folayan Waheed	beejaydr@yahoo.com	MOH, Akure
59	Dr. Abiola Alege	alege.abiola@yahoo.com	LUTH
60	Dr. Lara Oyadotun	laraoyadotun@yahoo.com	LUTH
61	Osman Kargbo	osboy.sole@gmail.com	GET
62	Dr. Gobir Abdulrazaq	aagobir@yahoo.co.uk	ABU Zaria
	VACCINE FACULTY		
1	Prof. Charles Wiysonge	charlesw@sun.ac.za	Stellenbosch University
2	Dr. Moussa Doumbia	moisedoum@yahoo.fr	WHO
3	Paul Hodgson	paul.hodgson@usask.ca	VIDO-intervac
4	Wilson Mok	wmok@gavi.org	GAVI
5	Prof. Diran Makinde	diran.makinde@gmail.com	
6	Dr. Omobolanle Johnson	omobojohnson@gmail.com	LSMOH
7	Cynthia Robinson	crobinson@its.jnj.com	Janssen
8	Dr. Ibrahim Ismaila Sani	docismaila@gmail.com	WHO

9	Beroit Callendoit	bcallend@its.jnj.com	Janssen
10	Dr. Fatorma K. Bolay	director.libr@gmail.com	LIBR-PREVAIL
11	Dr. Terfa Kene Simon	tkene@wrp-n.org	DOD WRP Nigeria
12	Dr. Babajide Keshinro	bkeshinro@wrp-n.org	DOD WRP Nigeria
13	Dr. Omojole O.A.	dr.omojole@gmail.com	LSMOH
14	Edeh Chidi Paul	chidi4christ85@yahoo.com	Ebonyi State University
15	Oriol Mathieu Valerie	voriolm@its.jnj.com	JANSSEN
16	Mark Kieh	mkieh51@gmail.com	PREVAIL-LIBERIA
17	Dr. Doyin Odubanjo	dodubanjo@nas.org.ng	Nigeria Academy of Science
18	Martin Scott-Tabi	tmartscott@gmail.com	
19	Mary H. Graves	(*)	
20	Dr. M.O. Alex-Okoh	malexokoh@yahoo.com	Fed. Min. of Health
	DEVELOPMENT PARTNERS		
	Dr. Olubunmi Asa	asao@unaids.org	UNAIDS
	Dr.Isibor	isibori@who.int	WHO
	PLUS FACULTY		
1	Dr. Elizabeth Rasekoala	lizrasekoala@hotmail.com	African Gong
2	Dr. Samuel Ujewe	samuel.ujewe@up.ac.za	University of Pretoria
3	Syntia Nchangwi	nchangwisyntia@yahoo.com	University of Cape Town
4	Dr. Mahama Ouedraogo	ouedraogom@africa-union.org	African Union
5	Prof. Andre de Avila Ramos	andre.ramos@ufsc.br	UFSC-Brazil
6	Funmi Tsewinor	ftsewinor@gmail.com	Sun Union Development
7	Pharm. Idia Anibilowo	ianibilowo@yahoo.co.uk	National Health Insurance Scheme
8	Dr. Eberechi Kanu	eberechi.kanu@gmail.com	National Health Insurance Scheme
9	Joao Cossa	joao.cossa@metestp.gov.mz (*)	African Gong
10	Patrick Olowojaiye	polowojaiye@yahoo.co.uk	LSMOH
11	Shonibare Dorcas	dorcasshonibare@gmail.com	LSMOH
12	Zipporah Kpamor	zkpamor@msh.org	Management Sciences for Health
13	Yusif A. Koroma	alfredkoromason@yahoo.com	GET
14	Tolu Osho	tolu_osho@yahoo.com	AHEAF
15	Oke-Kazeem Abiodun Toyosi	abi.okekazeem@yahoo.com	
16	Babatunde Odugbemi	b.odugbemi@yahoo.com	LASUTH
17	Odusolu Yetunde Olufunmilayo	(*)	LUTH
18	Peter Adeyeye	adeyeyepeter@gmail.com	University of Lagos
19	A-Salami Ibipo	ibipoaa2@yahoo.co.uk	LASUTH

20	Emina Velly	eminavelly@gmail.com	LUTH
21	Olamiju O. Damilola	dammyron@yahoo.com	LUTH
22	Dr. Lolade Wright	loladewright@yahoo.com	LASUCOM/LUTH
23	Salawu Oluwatoyin	salawutoyin@yahoo.com	LUTH
	BIOSECURITY & BIOBANKING		
1	Stacey Mantha	stacey.mantha@phac-aspc.gc.ca	Public Health Agency Canada
2	Prince Clarke	princedahnyea2015@gmail.com	
3	Habtumu Taddele	hhtmtaddele@gmail.com	Mekelle University Ethopia
4	Igwelo Ugonnaya	ugonnargunlo@gmail.com	Lagos University Teaching Hospital
5	Peter.F. Zaizay	p_zaizay@yahoo.co.uk	
6	Hafiju Kanje	hmkanja@gmail.com	GET sierraleone
7	Josephus .J. Ellie	josephusellie@yahoo.com	GET sierraleone
8	Djibril Sangare	dsamgare@icermali.org	
9	Diakite Mandiou	mandioud@yahoo.fr	universite Conalery FMPOS
10	Prof. Akin Abayomi	abayomi@sun.ac.za	University of Stellenbosch/GET
11	Jim Vaught	JVAUGHT4U@gmail.com	editor biopresentation &biobanking
12	Lincoln Darwin	lincoln.darwin@nhls.ac.za	NHLS-southafrica
13	Pasquale de Blasio	pasquale.deblasio@ISENET.CNR.IT	ISENET-Italy
14	Ida Biunno	ida.biunno@IRGB.CNR.IT	IRGB.CNR.MILAN.ITALY
15	Dr. Mrs E.I. Sanwo-olu	ibijokesanwoolu@yahoo.com	
16	Piers Millet	piers@biosecu.re	BIOSECURE
17	Bola Gobir	bgobir@mgic.umaryland.edu	University of Maryland
18	Gregers Chalker	gregers@afms.bz	AFMS International
19	Dr. Olufemi Taiwo	drfemitaiwo@hotmail.com	Lagos state ministry of health
20	Trevor Smith	trevor.smith@international.gc.ca	Global Affairs Canada
21	John V Rogers	johnvandyrogers@yahoo.com	ONS-sierraleone
22	Francis .L. Keih	flkeih@yahoo.com	ONS-sierraleone
23	Kenneth Ugwu	ken.ugwu@international.gc.ca	Global Affairs Canada
24	David Jones	david.jones@nhls.ac.za	National Health Laboratory Service
25	Oyewale Tomori	oyewaletomori@gmail.com	
26	Manuel Lannaud	MLANNAUD@NEWYORK.MSF.ORG	MSF
27	Julie .R. Sinclair	j.sinclair@oie.int	CDC liasonnto the OIE
28	Heather sheeley	heather.sheeley@phe.gov.uk	PHE
29	Modupe Taylor Peace	modupetp@gmail.com	GET

30	Kadiatou Dou	kdidao@gmail.com	
31	Dr. Chinonyerem Chisom L.Welle	nonyewelle@yahoo.com	
32	Folasade T. Ogunsola	sade.ogunsola@gmail.com	Coll. Of Medicine University of Lagos
	LAGOS STATE MINISTRY OF HEALTH		
1	Dr. B.A. Odugbemi	b.odugbemi@yahoo.com	Consultant LASUTH
2	Dr. Bolanle.A.		Mainland Hospital
3	Dr. Akinbami A.A.		LASUTH
4	Dr. Zachariah		Consultant LASUTH
5	H.A. Chukwura	hachukwura@yahoo.co.uk	Director LASUTH
6	Dr.Egbokan.O.O	soulpapa2006@yahoo.com	Director/LSMOH
7	Dr.Jacob Nwachukwu	bloodpressurecontrol@gmail.com	
8	Dr Bukola Ayinla	ayinla.bukola@gmail.com	LSMOH
9	Dr. A.A. Dawodu	onikanhc@gmail.com	MD/CEO
10	Dr. Johnson O.J.	omobojohnson@gmail.com	
11	Dr. A.Adeniran	yinkadeniran@yahoo.com	Consultant/LASUCOM
12	Dr. O.E. Idowu	tynest2001@yahoo.com	LASUTH
13	Dr.G.T.O. Osisanya	toluosis@yahoo.com	HSC
14	Dr.Adesina A.M	funkeoyindr@gmail.com	LSMOH
15	Oniyire O.A		LSMOH
16	Dr.O.A.Oni		Randle Gen Hosp
17	Prof. John .O. Obafunwa	joobafunwa@hotmail.com	LASUTH/LASUCOM
18	Adeyemi Elijah	elijahtoluwamiadeyemi@gmail.com	Director/LASUTH
19	Dr. Olowoselu .F.O.		Consultant/LUTH
20	Dr. Ojo. S.B.	yunsi82000@yahoo.co.uk	LUTH
21	Dr.Adeyanju Dayo	beejaydr@yahoo.com	MOH, Akure
22	Salawu Oluwatoyin	salawutoyin@yahoo.com	LUTH
23	Koley Tolulope	tolukotey@yahoo.com	LUTH
24	Adeyemi Oluwatoni	toni.adeyemi@yahoo.com	LASUTH
25	Igwilo Ugonnaya	ugonnaigwilo@gmail.com	LUTH
26	Odusolu Yetunde	malomsky@yahoo.com	REG/LUTH
27	Dr. O.A. Souge-Pereas	peresskemi@yahoo.com	Consultant/LUTH
28	Dr. Kuyiru Yetunde	yetundekuyiru@yahoo.com	Consultant/LASUTH
29	Olumodeji Oluwaseyi	oluwaseyi.olumodeji@gmail.com	LASUTH
30	Dr. Emina V.A.	eminavelley@gmail.com	REG/LUTH
31	Dr. Olamiju O.D.	dammyun@yahoo.com	REG/LUTH
32	Lara Oyadotun	laraoyadotun@yahoo.com	LUTH
33	Abiola Alege	alegeabiola@yahoo.com	SNR REG/LUTH
34	Salisu Zainab	zabsalis@yahoo.co.uk	LUTH

35	Dr. Oyetotan A.S	adeyanjuoyetoyan@gmail.com	LMLGA
36	Dr. Sanni F.O.	sannifaosat@yahoo.com	
37	Dr.O.K. Alli-Balogun	mobsforever@yahoo.com	
38	Dr.(Mrs) M.A. Oyeke	drmonsurat50@gmail.com	comm 1
39	Makinde Olalekan	lekmak@gmail.com	APHPN
40	Dr.Abatan Y.O.	yettyabatan@gmail.com	LUTH
41	Mrs.Shode M.J	modupejokofele@yahoo.com	ADNS
42	Olomojaiye P.A	olomojaiye@yahoo.co.uk	Legal Officer
43	Dr.M.A.Olaiya	bimpyd@yahoo.com	ES
	MEDIA		
1	Ani Emmanuel	aniemma@gmail.com	
2	Oloja Zion	zionafrica@gmail.com	
3	Oligbo Chukwuma	oligboanthony@yahoo.com	
4	Sunday Akilolu	akinlolu04@yahoo.com	
5	Godwin Ugbebor	godwinkemro@yahoo.com	
6	Bashir Abiodun	bakareefe@yahoo.co.uk	
7	Sola Ogundipe	solazed@gmail.com	
8	Jackie Opara	jackieopara@gmail.com	
9	Gabriel Faloye	fatoye4me1@yahoo.com	
10	Yinka Shokunbi	yinks_shok@yahoo.com	
11	Okafor Oge		
12	Oluwatoyin Aboh		
13	Roland Akinbowe		
14	Supo Olosunde	supomediapix@gmail.com	
15	Martina Ogbonna	FRCH@yahoo.com	
16	Temitope Obayendo	pharmanews@yahoo.com	
17	Tayo A. Oredola	tyluv21@gmail.com	
18	Odejayi Samuel	citybrandsinfo@gmail.com	
19	Raji Rasaq	rosaberaji@yahoo.com	
20	Ogunyemi Simisola	simisolaogunyemi@ymail.com	
21	Femi Gabriel	femigabriel678@gmail.com	
22	idore mmegwa	isdore.mmegwa@guardian.ng	
23	Tola Ogunnubi	scott-tourlar01@yahoo.com	
24	Godstime madojemu		
25	victoria Njoku	vicky4evers4@yahoo.com	
26	Geraldine Akutu	geraldchineye@yahoo.co.uk	
27	Dotun Ibiwoye	ibiwoyedot@yahoo.ca	