

MRC

Unit
The Gambia

Annual Report 2017

Leading health research in West Africa to save lives and improve health across the world.



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Foreword



Professor Umberto D'Alessandro
Unit Director

This year, we celebrated the 70th anniversary of The Unit with a 3-day scientific symposium, in November 27-29, which was attended by more than 300 people. The programme touched upon several research areas in which The Unit is significantly active, e.g. malaria, tuberculosis, nutrition, and vaccines, and in others we would like to further develop such as non-communicable diseases. We were extremely pleased to welcome many former colleagues and collaborators who had worked in The Unit and who are now holding key positions in several academic or public health organizations. It is also worth mentioning the presence of Prof Peter Piot, Director of the London School of Hygiene and Tropical Medicine. We also had our colleagues of the University of The Gambia and of the Ministry of Health and Social Welfare who participated to the symposium. Additionally, the meeting was honoured by the presence of the Minister of Health and Social Welfare, Mrs Saffie Lowe Ceesay, by a representative of His Excellency the President of the Republic of The Gambia, and by the MRC UK Chief Executive Prof Sir John Savill. Photos of the event are included in this annual report.

We have continued to implement our quinquennial plan and to secure externally-funded research projects. Some examples are presented in the research theme sections. With 163 peer-reviewed papers published in 2017, there is no doubt The Unit's scientific output has been substantial; this is our highest number of publication within the last 15 years.

This annual report highlights also the cross-cutting theme of Maternal and Neonatal Health, with three currently on-going research projects, one for each research theme. These are only a few highlights as the work done on maternal and neonatal health by The Unit is more extensive and will increase as the burden of maternal and neonatal mortality in West Africa is particularly high; this is the region in the world with the highest number of maternal and neonatal deaths. Therefore, our goal is to strengthen and broaden our research activity in this area with the aim of identifying interventions to decrease such a high burden. This will be done, among others, through the West Africa Global Health Alliance (WAGHA) which was launched in Dakar on April 7th, 2017. Such Alliance that includes the University Cheikh Anta Diop and the Institut de Recherche en Santé de Surveillance Épidémiologique et de Formation focuses on creating a regional pole for research and training in which joint research projects, training activities and staff exchanges will be done. We have already been able to secure several capacity building projects, e.g. the West African Network of Excellence for Tuberculosis (TB), AIDS and Malaria (WANETAM) II project funded by the European and Developing Countries Clinical Trials Partnership (EDCTP), and we have provided seed funding to scientists within WAGHA to collect baseline data allowing them to submit larger grant proposals.

We continue to invest substantial efforts and funds into training and capacity building. In 2017, we supported 168 trainees, the large majority were Gambian nationals. Their profile is highlighted across this report as most of them are attached to on-going research projects. In addition, more than 250 individuals have benefited from our internship program; again, most beneficiaries are Gambian nationals but we have also had interns from other African countries, Europe and North America.

We have also hosted international courses/workshops: a bioinformatics workshop in March and an international immunology course in December.

The Unit is able to rapidly respond to outbreaks of infectious diseases in the West African region. In 2016, members of our team lead by Prof Martin Antonio investigated a meningitis outbreak in Ghana; in 2017, the same team was called by the World Health Organization to investigate a meningitis outbreak in Northern Nigeria. This allowed the identification of the responsible pathogen and thus the implementation of a mass vaccination campaign to curb the outbreak.

The Gambian Government, and more specifically the Ministry of Health and Social Welfare, is an essential partner for The Unit. We contribute, with our expertise to several technical committees at the Ministry of Health and Social Welfare and also provide health care services in selected health facilities where our research projects are implemented.

We are now at the end of the second year of our quinquennial plan and activities have been implemented according to schedule, thanks to the commitment and dedication of all our staff. We have continued to establish collaborations with new research partners and have been successful in securing research funds from a variety of donors. The perspective for 2018 looks bright and we will continue to develop our collaborative links with West African research institutions and other international partners with the objective of contributing and achieving some of the Sustainable Development Goals.

UD'Y

MRCG 70th Anniversary Symposium 2017



Who We Are

Over
1200
Staff



including **52** Post Docs
and **320** laboratory staff
based in The Gambia

£20 Million
Budget



ISO 15189:2012
accreditation maintained
by The Unit, this has been
confirmed by KENAS.

Our laboratories at Fajara, Basse and
Keneba are certified to analyze samples
for clinical trials as prescribed by good
clinical laboratories practices (GCLP).

Clinical Trials Support Office
has supported investigators with the
successful conduct of

9 clinical trials **5** clinical trials in
start-up stage **8** clinical trials
monitored **88** Research
Projects

180 Staff
Trained





TB Case Contact Platform developed a pan-African 4-marker Polymerase Chain Reaction (PCR) test for risk of TB disease progression (patented)

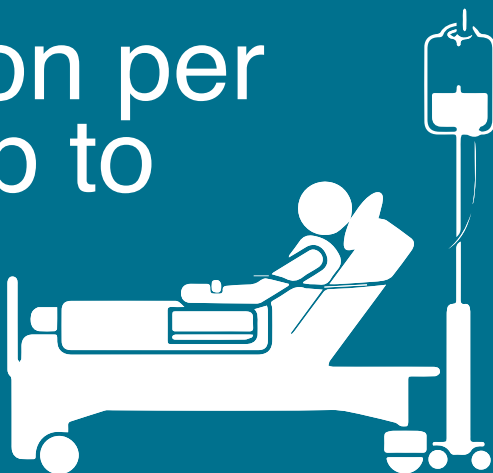
Our Collaborators in Africa



WHO Collaborating Centre
for New Vaccines Surveillance

We have been nominated to be
a World Health Organisation
Centre for New Diseases in
West Africa

Admission per
month up to
154
Patients



Gate Clinic
30,000
Patients

Out Patients
24,000 Patients

Keneba Out Patients
27,000 Patients



Strategy





Strategy

We have now completed the second year of our quinquennial funding cycle, following the plan approved by MRC UK in 2016. Our plan is based on the ambition of contributing significantly to the post-2015 sustainable development agenda by producing the evidence base to improve health in West Africa and beyond. Therefore, our research activities focus on health issues that already are or will probably become in the next decade a considerable burden for the local population, specifically infectious diseases, maternal and neonatal health, nutrition-related diseases, and non-communicable diseases. The Unit has continued to secure new research grants from a variety of donors thanks to an enabling environment that includes highly performing research platform, e.g. genomic platform, and highly trained staff. These, combined with our proximity to the field and the strong relationship we have built with the local populations, provide the necessary conditions to compete internationally for research funds. Besides infectious and nutrition-related diseases, we have been able to start some activities in non-communicable diseases.

Our ambition to become a regional hub for research and training has translated in the official launching of the West Africa Global Health Alliance (WAGHA) that includes the University Cheikh Anta Diop and the Institut de Recherche en Santé de Surveillance Épidémiologique et de Formation. This is a privileged partnership with two Senegalese institutions which will result in the exchange of staff, common grant proposals and shared research platforms. Some scientists have been provided with seed funding to collect baseline data for the formulation of larger grant proposals.

We have continued to invest in training and career development of young scientists and defined the career path for the different categories of scientific staff. This is essential for creating the necessary critical mass for The Unit to remain internationally competitive.

Our collaboration with The Gambian Government is essential to carry out our research activities. Members of The Gambian Government, and more specifically of the Ministry of Health and Social Welfare, are active collaborators in our research projects. We continue to have The Gambian Government/MRCG Joint Committee Meetings where we can have an open dialogue and discuss any issues that may arise during the implementation of research activities. The Unit contributes significantly in terms of expertise to several technical committees at the Ministry of Health and Social Welfare.



MRCG Festival - DCE Theme Stand



MRCG Festival - Nutrition Theme Stands

Overall, we are on track in the implementation of our quinquennial plan. There have been some instances where we have had to adapt to the rapidly changing conditions, however our ability to respond to a changing environment has been key to The Unit's continuous success.

Leadership Board



Prof. Umberto D'Alessandro
Unit Director
& Theme Leader DCE



Joan Vives Tomas
Director of Operations



Dr. Assan Jaye
Head of Research Training
& Career Development



Dr. Anna Roca
Deputy Theme Leader DCE



Karen Forrest
Head of Clinical Services



Dr. Jonas Lexow
Research Governance &
Support Services Manager



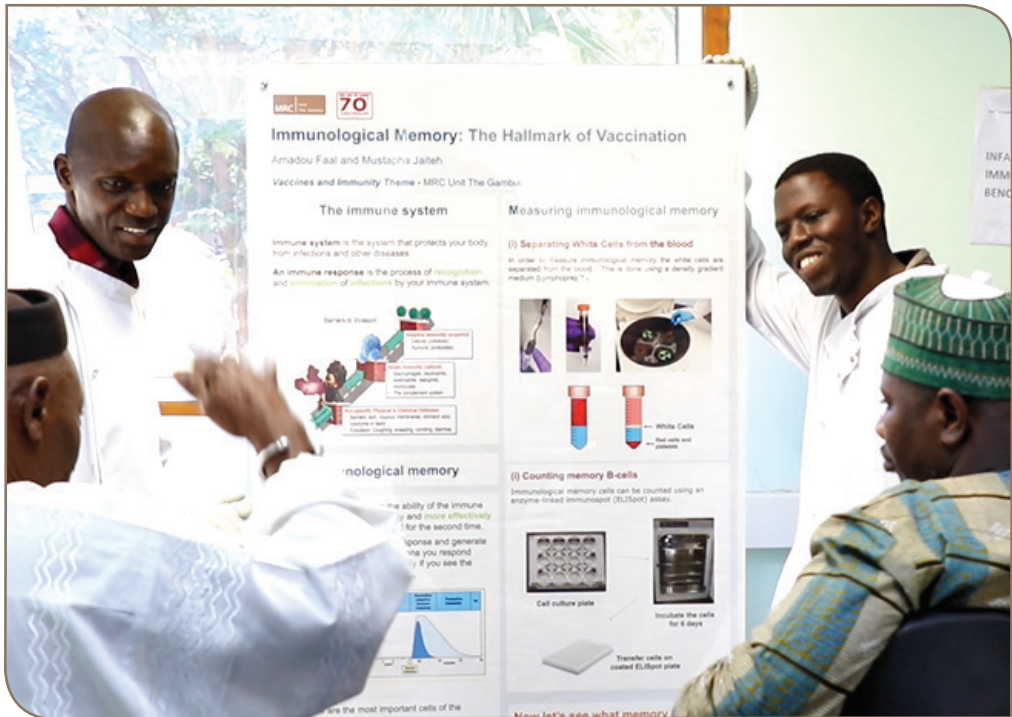
Dr. Davis Nwakanma
Head of Laboratory Services



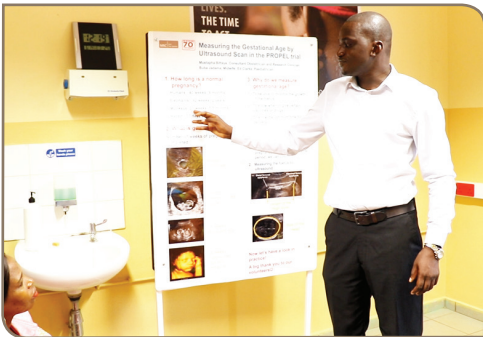
Prof. Beate Kampmann
Theme Leader VIT



Prof. Andrew Prentice
Theme Leader Nutrition



MRCG Festival - Vaccine & Immunity Theme Stand



MRCG Festival - Vaccine & Immunity Theme Stand



MRCG Festival - DCE Theme Stand

Year In Review



Year in Review

January

Our study shows that Oral Azithromycin when given during labour decreases bacterial carriage in the mothers and their offspring



Neonatal deaths, estimated at 4 million annually, account for almost 40% of under-five mortality. Bacterial sepsis is a leading cause of neonatal deaths with *Staphylococcus* and *Streptococcus* species

being highly prevalent associated aetiologies in the African continent. Principal Investigator, Dr Anna Roca. Grant Provider, The trial was funded by the Medical Research Council (MRC) UK and the UK Department for International Development (DfID) under the MRC/DfID concordat agreement, in collaboration with the European & Developing Countries Clinical Trials Partnership (EDCTP2) programme, supported by the European Union.

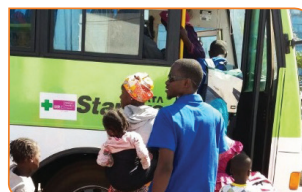
New study confirmed a plausible cellular mechanism by which anaemia protects African children against falciparum malaria



Malaria increases the burden of anaemia in low-income countries, where, according to 2012 data from the World Health Organisation, 40% of children are anaemic. Multiple studies have raised the concern

that iron supplementation in malaria-endemic areas may put people at increased risk of acquiring malaria.

MRCG status of operations and support provided during the post-election events



The MRC Unit The Gambia continued its support and contribution to The Gambian health services during the political events. Following an agreement with The Gambia Red Cross Society, the MRCG Clinical Services were ready to function as a referral centre for patients while our Clinical Laboratory facilities were ready to conduct rapidly cross-match whole blood. Several MRCG staff, including international staff, volunteered to work in the 42-bed ward should the need arise.

February

UK Secretary of State for Foreign and Commonwealth Affairs Hon Boris Johnson MP visits MRC Unit The Gambia



On 14th February 2017, MRC Unit The Gambia was visited by Hon Boris Johnson MP, the United Kingdom Secretary of State for Foreign and Commonwealth Affairs. The visit also coincides with

MRCG's 70th anniversary and was the first time a UK Secretary of State for Foreign and Commonwealth Affairs visited The Unit. Mr Johnson was impressed by the quality of science The Unit produces and its impact on global health.

Dr Abdullahi Ahmad awarded a 4 year PhD MARCAD Fellowship



conduct his research on 'Understanding the Role of Asymptomatic *Plasmodium falciparum* Infections and Gametocyte Carriage in Maintaining Malaria Transmission.

The MARCAD consortium which seeks to train African scientists toward building a critical mass for the control and the elimination of malaria, has awarded Dr Abdullahi Ahmad with a 4 year PhD Fellowship to

Dr Kevin Opondo awarded a 3 year Post-doctoral MARCAD Fellowship



Resistance on Malaria Vector Longevity and Transmission Potential in the Wild'. Dr Opondo's research focuses on measuring the transmission potential of resistant malaria vectors in the wild and later use the empirical data to update malaria transmission models specific to The Gambia.

Malaria Research Capacity Development in West and Central Africa (MARCAD) awarded Dr Opondo with a Post-doctoral Fellowship to conduct his research on the Impact of Insecticide

Tackling child malnutrition is key to achieving the third Sustainable Development Goal of good health and wellbeing for all

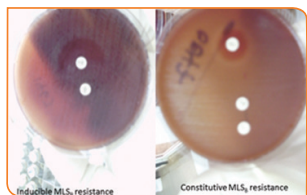


been achieved in overall mortality from acute childhood illnesses such as malaria, diarrhoea, and pneumonia. However, children with impaired growth are still at elevated risk of death from these common infections and are limited in their neurodevelopmental potential. Principal Investigator, Dr Helen Nabwera. Grant Provider, UK Medical Research Council and the UK Department for International Development.

Dr Helen Nabwera and colleagues describe how child growth in a rural African setting has changed during four decades of public health interventions. During the past 15 years, improvements have

March

The emergence of antibiotic resistance in The Gambia



MRC Unit The Gambia's recent study on Incidence of macrolide-lincosamide-streptogramin B resistance amongst beta-haemolytic streptococci in The Gambia shows that Beta-haemolytic streptococci,

predominantly Group A streptococci (GAS) are associated with a wide range of infections in The Gambia. Penicillin is the recommended first line of treatment for streptococcal infections. Grant Provider, MRCG.

MRC Unit The Gambia launches Electronic Medical Records System



On 28 March 2017, MRC Unit The Gambia launched the newly developed EMRS for the Clinical Services Department (CSD). The development of EMRS for MRCG is a major milestone to improving quality

care, patient safety and reduce costs. The implementation process of EMRS, which is a digital version of a paper chart that contains all patient's medical history, started in March 2015.

April

The visit of Professor Sir John Savill



Professor Sir John Savill, Chief Executive of the Medical Research Council United Kingdom, visited MRC Unit The Gambia, from the 3 – 7 April, 2017. As part of his visit, Sir John Savill paid a

courtesy call to the President of the Republic of The Gambia, his Excellency Adama Barrow and also visited our West Africa Global Health Alliance (WAGHA) partners in Senegal.

MRC Unit The Gambia Commemorates World Malaria Day in partnership with the National Malaria Control Programme



Since 2000, malaria prevention has played an important role in reducing cases and deaths, primarily through the scale up of insecticide-treated nets and indoor residual spraying with insecticides. According to the

latest estimates from World Health Organisation (WHO), many countries with ongoing malaria transmission have reduced their disease burden significantly. On a global scale, new malaria cases fell by 21% between 2010 and 2015. Malaria death rates fell by 29% in the same 5-year period.

Identifying children with tuberculosis among household contacts in The Gambia



Our recent study which sought to identify co-prevalent tuberculosis (TB) among child contacts of adults with smear-positive TB in the greater Banjul area of The Gambia showed that in our

community setting, if contact tracing is restricted to symptom screening and immediate households only, nearly half of all co-prevalent TB disease in child contacts would be missed. Grant Provider, Dr Uzochukwu Egere, Clinician and Coordinator of childhood TB Program, Vaccines & Immunity Theme. Grant Provider, TB Reach Initiative and the MRC Programme Grant of Prof Beate Kampmann.

Boosting momentum in Public Health Research in West Africa with WAGHA



The logo for the West Africa Global Health Alliance (WAGHA), to boost scientific research in public health, was launched on 7th April 2017 at the Faculty of Medicine and Dentistry at the University

Cheikh Anta Diop (UCAD) in Dakar. The goal of the alliance is to create a research and training hub in West Africa as well as develop exchange visits amongst the three entities from the member institutions.

May

Meningitis outbreak kills thousands in Northern Nigeria as the MRC Unit The Gambia leads effort to save lives and improve case management across Northern Nigeria



The first case of this meningococcal meningitis outbreak epidemic was reported on 16 December 2016 in Zamfara State, Northern Nigeria. Nigeria is known to be within the African meningitis

belt; 26 of its 36 states lie within the belt. The states most affected by this epidemic outbreak are; Zamfara, Sokoto, Katsina, Kebbi, Yobe, Borno, Niger, Nassarawa and Plateau with over 14,280 suspected cases and 1145 deaths reported in this epidemic as of 24th May 2017. Principal Investigator, Professor Martin Antonio. Grant Provider, WHO.

June

MRC Unit The Gambia held Open Day at Serekunda General Hospital



MRC Unit The Gambia held an open day at Serekunda General Hospital on Thursday 29th June 2017. The Open Day was an exciting opportunity to engage and sensitise the Serekunda community about the Neolnnate and EPIC HIPC Projects.

The 2017 MRC Unit The Gambia Festival



As MRC Unit The Gambia celebrates its 70th anniversary this year, our interactive MRCG Festival is a great opportunity to explore The Unit's large research portfolio, learn more about our research priorities

and ask questions about the work we do. The event was an excellent opportunity to showcase the achievements of our young scientists and offer the opportunity to transfer knowledge.

Impact of the introduction of a pneumococcal conjugate vaccine on pneumonia



The Gambia Government, through the Ministry of Health and Social Welfare, and the MRC Unit The Gambia have worked together to determine the impact of the introduction of pneumococcal conjugate vaccines (PCV) on pneumonia. The pneumococcal vaccine impact study enrolled 18,833 patients and showed that the use of PCV in The Gambia reduced X-ray proven pneumonia in children by 24%, pneumococcal pneumonia by 63%, and very severe pneumonia by 61%. Principal Investigator, Dr Grant Mackenzie. Grant Provider, Global Alliance for Vaccines and Immunisation's Pneumococcal Vaccines Accelerated Development and Introduction Programme, the Bill & Melinda Gates Foundation, and the Medical Research Council, UK.

Vaccine Wastage Study Workshop



MRC Unit The Gambia hosted a workshop on the 15th June 2017 at the Bray Lecture Theatre in Fajara main site. The workshop aimed to share the results of the Vaccine Wastage Study and the Knowledge, Attitude and Practice (KAP) cross sectional survey with all the stakeholders involved. This included the Expanded Programme on Immunisation (EPI) unit in The Gambia and other stakeholders involved in vaccine service delivery.

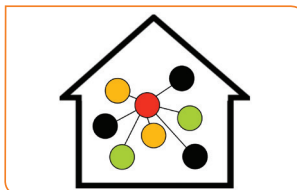
WHO highlight the true burden of Hepatitis B virus (HBV) prevalence in Africa with the pioneering work of the MRC Unit The Gambia



Research into Hepatitis B infection has been ongoing in The Gambia for over three decades, thanks to the collaborative partnership between the International Agency for Research on Cancer Lyon, Imperial College London, MRCG, The Gambia Government through Ministry of Health and Social Welfare, and the National Public Health Laboratories. Grant Provider, WHO.

July

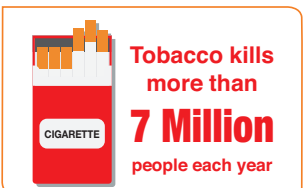
MRCG's Tuberculosis Case Contact (TBCC) platform identifies new TB cases through household contact studies



Each year, it is estimated that 10.4 million people develop active TB disease, but 4.3 million of these individuals are missed each year by health systems and do not get the TB care they need and deserve.

Without proper treatment, up to two-thirds of people ill with TB will die. In addition, people who are ill with TB can infect up to 10 to 15 people with whom they are in close contact in a single year. Principal Investigator, Dr Jayne Sutherland. Grant Provider, MRCG.

MRCG to Undertake Tobacco Research Following Grant Award



MRC Unit The Gambia will conduct research into tobacco control as part of one of the most ambitious international research programmes ever created. £225 Million has been invested

across 37 interdisciplinary projects to address challenges in fields such as health, humanitarian crises, conflict, the environment, the economy, domestic violence, society, and technology by the Global Challenges Research Fund (GCRF) Research Councils UK Collective Fund.

MRC Unit The Gambia Plants Trees to Preserve the Future



MRCG held a tree planting ceremony on the 22nd of July on the grounds of the main site in Fajara. The event was well attended and all the participants were invited to plant a tree as part of the programme. Each tree was numbered and matched to an individual and it is envisioned that in time all the trees planted will bear the name of the person who planted them.

Fostering Collaboration in Nanoro, Burkina Faso



A team from MRC Unit The Gambia visited collaborators at the Institute de Recherche en Sciences de la Santé in Burkina Faso as part of the PregnAnZI-2 project from July 23rd to 27th. The visit aimed

to discuss logistical and scientific aspects of the implementation of the large-multi country trial in Burkina Faso. The trial will evaluate the effect of administering an antibiotic, Azithromycin, during labour to reduce neonatal mortality with potential widespread impacts on maternal and neonatal infections.

Closing the malaria gap with RoopFs intervention study



The recent reduction in malaria has been largely achieved by a massive scale-up of vector control, with long-lasting insecticidal nets and indoor residual spraying. The future success of these interventions, however, is threatened by the growing problem of insecticide-resistant mosquitoes, especially in West Africa and also elsewhere. There is thus an urgent need to develop more interventions that do not rely on insecticides. The RoopFs intervention study aims at investigating the effect of improved housing on malaria risk. Principal Investigator, Prof Steve Lindsay (Durham University), Dr Margaret Pinder. Grant Provider, MRC-DfID-Wellcome Trust.

August

Equipping the Childhood TB Clinic at Serekunda General Hospital



On 11th August, MRC Unit The Gambia, through the childhood TB program grant (Reach4Kids program) led by Professor Beate Kampmann, donated equipment for the childhood TB clinic at the Serekunda General Hospital in Kanifing.

Working Together to Understand the Consequences of TB for Patients and Communities- the TB Sequel Project



What happens once patients diagnosed with tuberculosis (TB) receive treatment and what the long term consequences are for the health of their lungs but also the welfare of their families is not well understood. The TB Sequel team will explore these issues in an international collaborative research project funded by the German Government and The Gambia. MRC Unit The Gambia was chosen as the only project partner site in West Africa. Principal Investigator, Prof Beate Kampmann and Dr Jayne Sutherland. Grant Provider, BMBF funded (Ministry of Higher Education, Research, Science and Technology).

The Immunogenicity of Fractional Intradermal doses of the Inactivated Poliovirus Vaccine is Associated with the Size of the Intradermal Fluid Bleb



The global effort to eradicate polio is in its final stages. Research findings published in Clinical Infectious Diseases, Oxford Academic, shows that the immunogenicity of fractional (1/5th, 0.1mL) intradermal doses of the inactivated poliovirus vaccine (ID fIPV) is positively correlated with the size of the intradermal fluid bleb. Principal Investigator, Dr Ed Clarke. Grant Provider, WHO.

Evaluation of the impact of an investigational vaccine against nasopharyngeal carriage by *S. pneumoniae*



A recent study conducted by the MRC Unit The Gambia research team showed that the protein components of an investigational pneumococcal protein-plus-conjugate vaccine candidate could not provide protection against pneumococcal nasopharyngeal carriage (NPC) beyond that already provided by the conjugate vaccine, Synflorix. Two doses of the investigational vaccine were assessed in a 2+1 or 3+0 vaccination schedule. Principal Investigator, Dr Aderonke Odotola. Grant Provider, GlaxoSmithKline Biologicals SA.

MRC Unit The Gambia Contributes to Creating a Roadmap for Program Development on Maternal Immunisation Safety Monitoring in Low and Middle-Income Countries



Improving maternal, newborn and child health by lowering the frequency of infections through immunisations has served as a foundation of public health. Such infections kill more than 900,000 under 5-year-old children annually. In low and middle-income countries (LMICs) where there is the greatest burden of vaccine-preventable disease and the most limited access to basic health services, maternal immunisation will reduce morbidity and mortality among pregnant women and infants. Principal Investigator, Professor Beate Kampmann. Grant Provider, Pfizer.

Chest X-ray findings in clinically diagnosed childhood pneumonia cases from PERCH study



Chest radiographs (CXRs) are frequently used to assess pneumonia cases. Variations in CXR appearances between epidemiological settings and their correlation with clinical signs are not well documented.

A study on Pneumonia Etiology Research for Child Health (PERCH) multi-country, standardized, case-control study of the causes and risk factors of childhood pneumonia was published in the Clinical Infectious Diseases, Oxford Academic. Principal Investigator, Dr Akram Zaman. Grant Provider, Bill & Melinda Gates Foundation to the International Vaccine Access Center, Department of International Health, Johns Hopkins Bloomberg School of Public Health.

September

Preventing Child Pneumonia Deaths with Novel Oxygen Solutions Study



Deaths from pneumonia and other severe childhood illnesses can be prevented with oxygen, but supply in most healthcare facilities in low resource settings is not reliable. Oxygen cylinders are expensive and logistically challenging, while oxygen concentrators, though typically more cost-efficient, require reliable power, which is absent in many low-resource countries. The goal of this project was to develop an oxygen delivery system for use in resource-limited settings that will operate 24/7 for five years with little or no maintenance and limited or absent mains power. Principal Investigator, Dr Akram Zaman. Grant Provider, MRC Developmental Pathway Funding Scheme (DPFS).

Kangaroo Mother Care Training of Trainers



Reduction of neonatal deaths is a major global public-health priority, especially for preterm newborns which is the most common cause of childhood death, resulting in 1 million deaths per year. As part of a collaboration between The Gambian Government, UNICEF and a Wellcome trust funded / MRC Unit The Gambia research project (eKMC), 25 health care workers were trained in the recognition and hospital management of preterm/low birth weight newborns and the theory and practices of providing Kangaroo Mother Care (KMC). Principal Investigator, Dr Helen Brotherton. Grant Provider, Wellcome Trust.

The Fight to Eliminate Malaria with Dr Joseph Okebe



Dr Joseph Okebe is a Clinical Epidemiologist with a strong interest in infectious diseases in childhood and a professional background in paediatrics. He completed his PhD from the University of Antwerp, Belgium

and his thesis focused on the impact of interventions to reduce residual malaria transmission in The Gambia in the context of malaria elimination.

OCTOBER

High prevalence of high blood pressure found in a rural Gambian district



With over 6,000 individuals included in this study, this represents to our knowledge the largest dataset on blood pressure across a healthy rural sub-Saharan population covering all ages above 5

years. Hypertension is the term used for pathologically raised blood pressure. It constitutes a major health issue because it can lead to heart attack, cerebrovascular accidents, chronic kidney disease and other complications.

NOVEMBER

Celebrating Quality at MRC Unit The Gambia



The Quality Department of MRC Unit The Gambia launched 2017's World Quality Month (WQM) under the theme: Teamwork Makes the Vision Work. November was the month chosen to

celebrate Quality. The purpose of World Quality Month is to promote the use of quality tools in businesses and communities.

Dr Assan Jaye receives OIC Science and Technology Achievement Award



On the occasion of the first Organisation of Islamic Cooperation (OIC) Summit on Science & Technology (S&T), held in Astana, Kazakhstan, MRC Unit The Gambia's

Dr Assan Jaye, was presented with the OIC S&T Achievement Award. Dr Jaye, Senior Manager, Research Training and Careers, was honoured with this award in recognition of his outstanding contribution to the field of viral immunology and health research training.

Kangaroo Mother Care (KMC) Unit Officially Opened at the Edward Francis Small Teaching Hospital (EFSTH)



The first Gambian Kangaroo Mother Care unit was opened at EFSTH by the first Lady of The Gambia, Fatoumatta Barrow. The unit is for the management of preterm/low birth weight babies. The project

is a partnership between EFSTH, The Gambia Government Ministry of Health and Social Welfare (MOHSW), MRCG, United Nations Children's Fund (UNICEF), and London School of Hygiene and Tropical Medicine (LSHTM).

Training for Medical Laboratory Professionals held at MRCG Fajara

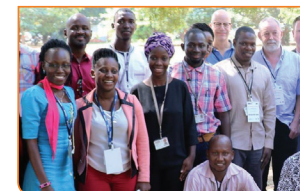


routine medical laboratory practice.

A weekend training programme was held at MRCG Fajara. The training was aimed at helping MRCG laboratory workers understand ISO15189 and how it can be mainstreamed into

DECEMBER

Immunology Training in The Gambia



From December 4th to 9th a training workshop on basic and malaria immunology was conducted by Stephen Cose and John Raynes from the London School of Hygiene & Tropical Medicine. During the first 3 days of the session, participants were taught the basic facts of immunology.

MRCG 70th Anniversary Celebrations



MRC Unit The Gambia has been in existence in The Gambia for the past 70 years. This is a major achievement which calls for recognition internationally and celebrations at home. As part of activities marking the event, a symposium took place bringing together world leaders in global health, including some who have previously worked at The Unit. This has offered the opportunity to reflect on past successes and future challenges, with a specific focus on global, local and regional health.

PRECISE Network Team Visits MRCG



A group from the PRECISE Network visited MRCG in preparation for a new project on maternal and neonatal health. It is estimated that about 46,000 women and two-and-a-half million babies die annually during the puerperal and neonatal period, and half of them die in Africa. In addition, about 50 million women and babies will have their short and long-term health altered because of pregnancy and/or delivery complications.

Some of our PhDs and Post Doc

PhD student



Dr Abdullahi Ahmad has been awarded a 4 year PhD Malaria Research Capacity Development in West and Central Africa (MARCAD) Fellowship. His research is entitled: Understanding the Role of Asymptomatic Plasmodium falciparum Infections and Gametocyte Carriage in Maintaining Malaria Transmission. Dr Ahmad holds a medical degree, a diploma in tropical medicine and public health and an MSc in tropical medicine and disease control.

PhD student



Dr Helen Brotherton (MBChB, MRCPCH) is a Wellcome Trust Research Training Fellow, undertaking her PhD studies at London School of Hygiene & Tropical Medicine. As a Consultant Paediatrician with Diplomas in Tropical Medicine and Paediatric Infectious Disease, her work focuses on improving hospital care of preterm neonates through investigating the clinical effects of early kangaroo mother care (KMC) for unstable hospitalised newborns and exploring potential underlying mechanisms for clinical effect.

Post Doc



Dr Kevin Opondo is a Post-doc fellow funded by the Wellcome Trust through the DELTAs Program under Malaria Research Capacity Development (MARCAD) programme for 3 years. His project aims to determine how long resistant mosquitoes live in the wild and whether they are also as fit to transmit malaria like their susceptible counterparts. Kevin will be using gene expression studies to look for genes whose expression either increase or decrease as mosquitoes' age. A model that uses gene expression patterns to predict age will then be built and used to predict ages of wild mosquitoes caught in villages based on their gene expression levels.

PhD student



Majidah Hamid-Adiamoh has been awarded For Women in Science PhD Fellowship from L'Oreal-UNESCO. She was selected to receive a L'Oreal-UNESCO Fellowship For Women in Science to enable her to undertake her PhD project entitled Investigation into intra-species indoor and outdoor biting and resting behaviour in malaria vectors, to investigate the role of host factors in gametocyte density during asymptomatic malaria infection at the University of Lagos, Nigeria. The laboratory analyses will be done at MRC Unit The Gambia.

Research Themes

We are structured into three themes which allows for inter-theme collaboration.

Disease Control & Elimination

Overview

Disease Control and Elimination (DCE) scientific strategy focuses on investigating the interactions between hosts, pathogens and vectors; and evaluating interventions aimed at interrupting transmission and/or reducing the disease burden. Each component can inform the other and provide new opportunities for understanding the dynamics of transmission and identifying new targets for interventions. The multidisciplinary DCE approach comprises large epidemiological studies combined with strong laboratory (mainly diagnosis) support.

The core component of epidemiology and laboratory sciences is complemented, whenever possible, by social sciences investigating the human factors influencing the disease transmission and the uptake/coverage of interventions. Adding health system and health economic research components to some of the projects ensures that the interventions evaluated, when successful, are promptly translated into practice.

As the objective of the DCE Theme is to control and eliminate disease, it does not target only the disease itself but also asymptomatic or subclinical infections as these are key components for maintaining transmission at community level.

The DCE theme currently has a large heterogeneous but coherent research portfolio that includes diseases of public health importance in West Africa at different stages of control or elimination. The theme combines both well-established with more innovative research lines; and internally- (malaria, bacterial and viral diseases) with externally-led research (hepatitis B). The research activities span from large epidemiological studies assessing burden of disease to clinical trials (individual or cluster randomized) testing or assessing the effectiveness of new public health interventions.

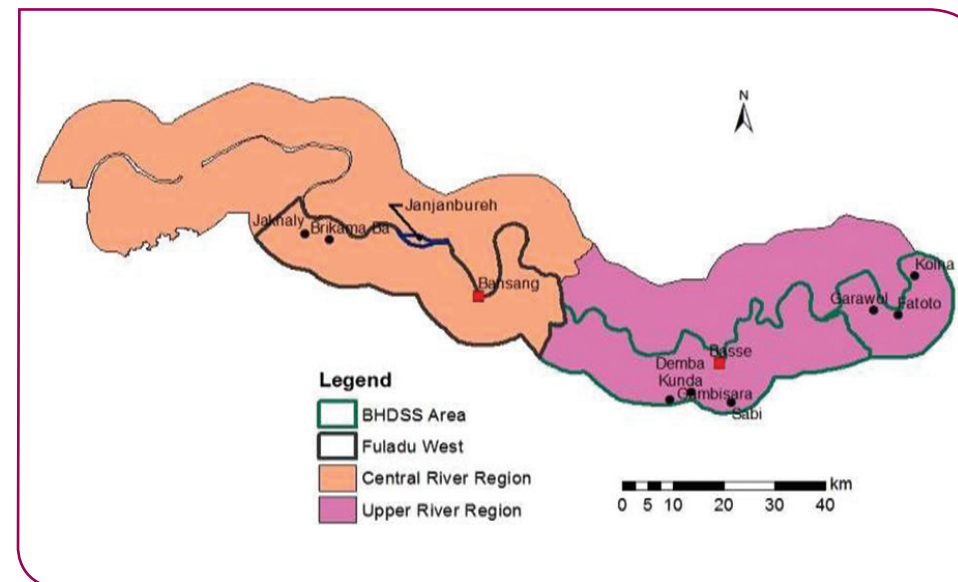


Prof. Umberto D'Alessandro
Unit Director
& Theme Leader DCE



Dr. Anna Roca
Deputy Theme Leader DCE

Highlights



Map of eastern Gambia showing the PVS trial area, the Basse (green outline in Upper River Region) and Fuladu West (black outline in Central River Region) demographic surveillance areas

Pneumococcal Vaccine Schedules

Despite pneumococcus causing more child deaths than any other single pathogen, global control of pneumococcal disease is hampered by the cost of Pneumococcal Conjugate Vaccine (PCV). In addition to the relatively high cost of new vaccines now being introduced in low-income countries, immunisation programmes face the additional challenge of schedules with increasing numbers of doses. Reducing the cost and complexity of immunisation schedules would improve the flexibility, acceptability and sustainability of immunisation programmes. The Gambia introduced PCV in 2009 using the standard schedule of three doses early in infancy

without any later booster dose. The immunization programme has been effective in controlling pneumococcal disease. The Pneumococcal Vaccine Schedules study (PVS) aims to test whether an alternative schedule, using one early dose and one later booster dose will have the same impact as the standard schedule. PVS will begin in 2018 and enrol approximately 40,000 infants over 4 years. PVS will be based in rural Gambia, around the towns of Basse and Bansang. PVS is a collaborative study with the Gambian Ministry of Health. The study will provide evidence required by WHO to review their recommendations for the scheduling of PCV.



Genetic interactions between human populations and malaria parasites in different environmental settings across Africa

The Pan-African Malaria Genetic Epidemiology Network (PAMGEN) of Scientist within and outside Africa in collaboration with leading researchers around the world, will use the latest genetics and genomics science to contribute towards malaria elimination in Africa. PAMGEN will create sustainable, innovative strategies and methods to collect, manage, share and analyse standardized data on human and parasite genetic variation, gene-disease associations, and gene-environment interactions. The network will also nurture African leadership by identifying and training the next generation of African researchers through advanced degree programmes in genetics and genomics; large-scale data analysis; and bioethics. Human, parasite and vector population and functional genomics research are used to drive the development of new tools to support malaria elimination programmes across Africa. Data will be generated and shared from the 3 genomes in malaria – human, parasite and mosquito. We focus on human genetic variation at red blood cell surface receptors involved in invasion and associated with disease severity. PAMGEN will build on the experience of existing genomics research in Africa, furthering the goals of H3Africa, and provide a foundation for future studies on other pathogens in Africa.



Mass Drug Administration of Ivermectin and Dihydroartemisinin-piperaquine as an additional intervention for Malaria Elimination (MASSI)

This is a community-based cluster-randomized trial in which a novel approach to interrupt residual malaria transmission by Mass Drug Administration (MDA) with Ivermectin (IVM) combined with Dihydroartemisinin-piperaquine (DP) will be tested. This cluster-randomized trial will involve 32 villages in the Upper River Region of The Gambia that will be randomized to MDA with IVM and DP or to standard of care in a ratio 1:1. The trial aims at establishing whether MDA with IVM and DP can reduce or interrupt malaria transmission in medium to low transmission settings by reducing vector survival and the human reservoir of infection. MDA with IVM and DP will be implemented in the intervention villages and all human settlements in an area of about 3 Kms around the intervention villages, with the aim of minimizing spillover effects. Control clusters will receive standard malaria control interventions as implemented by the National Malaria Control Program (NMCP). The primary outcomes will be the prevalence of malaria infection determined by molecular methods in all age groups at the peak of the second transmission season (November-December 2019) and the vector's parous rate 7-14 days after MDA.



Personalised Risk assessment in Febrile illness to Optimise Real-life Management (PERFORM)

Distinguishing between serious bacterial infections and trivial viral infections is a daunting task for clinicians, consequently leading to a high burden of invasive investigations, unnecessary hospitalisations and over use of antibiotics. The main aim of the Personalised Risk assessment in Febrile illness to Optimise Real-life Management (PERFORM) consortium is to improve the diagnosis and management of febrile illness in children. The study will assess the management of febrile illness, and identify markers of bacterial and viral infection and inflammatory diseases using a combination of clinical phenotypic and host genetic markers derived from the application of transcriptomic, proteomic, and bioinformatics approaches. The performance of novel biomarkers that distinguish bacterial infection from viral infection would be evaluated. The consortium is a multisite collaborative project that started recruitment in the Gambia, the only African site in December 2016. In our site, 500 children between the ages one month and 18 years would be recruited. PERFORM is sponsored by the Imperial College London.

Nutrition

Overview

Good nutrition is important throughout life and in all sectors of the population, but until quite recently there has been an understandable tendency for researchers in Low and Middle-Income Countries (LMIC) to focus on the nutrition of expectant mothers and their babies. Many of the Nutrition Theme's outputs in the past year have emphasised the need to think and work beyond these boundaries.

Our epigenetic research continues to throw new light on the profound importance of the mothers' (and likely fathers') nutritional status before and around the time of conception. The remarkable seasonal experiment of nature in rural Gambia has yielded these insights in combination with our strategy of studying genomic regions where we can be certain that methylation patterns are established in the very early embryo. We have learnt that there are specific genomic locations that appear to be designed to sense environmental (nutritional) conditions, to record the information and then to adapt the baby's metabolic settings to be best adapted to the world in which it will be born.

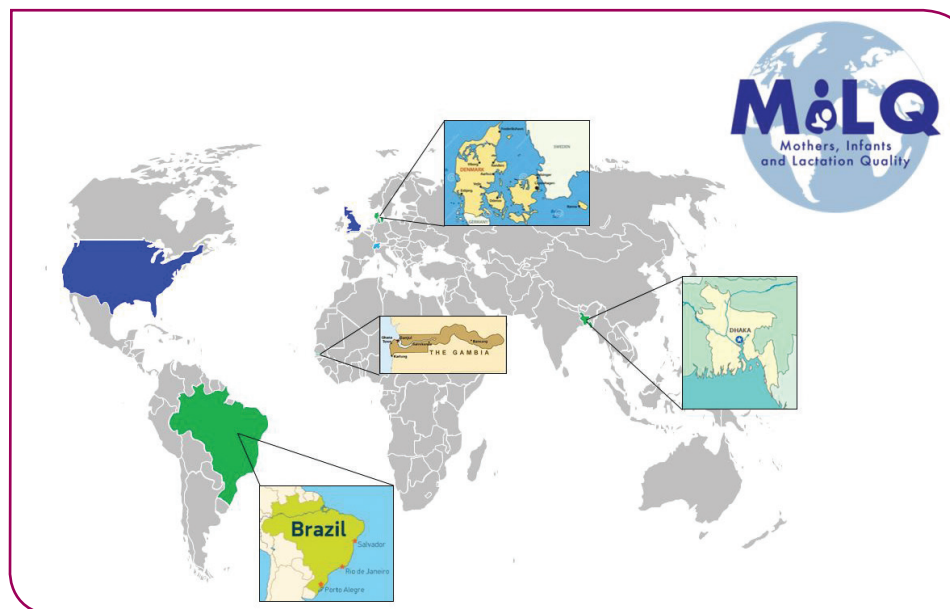
In the accompanying highlights we describe a study that confirms that the nutritional conditions that parents experienced in their own fetal life can affect the growth of their children. These inter-generational influences limit the speed with which nutritional interventions can rectify low birthweight and stunting in LMICs and again concentrate our minds on the importance of taking a life course approach.

The nutrition of adolescents is a key element of the life course approach and in preparing young people for parenthood. In the past year we have published the outputs of strategic reviews on adolescent nutrition and have obtained Global Challenges Research Funds (GCRF) to expand our research in this domain.



Prof. Andrew Prentice
Theme Leader

Highlights

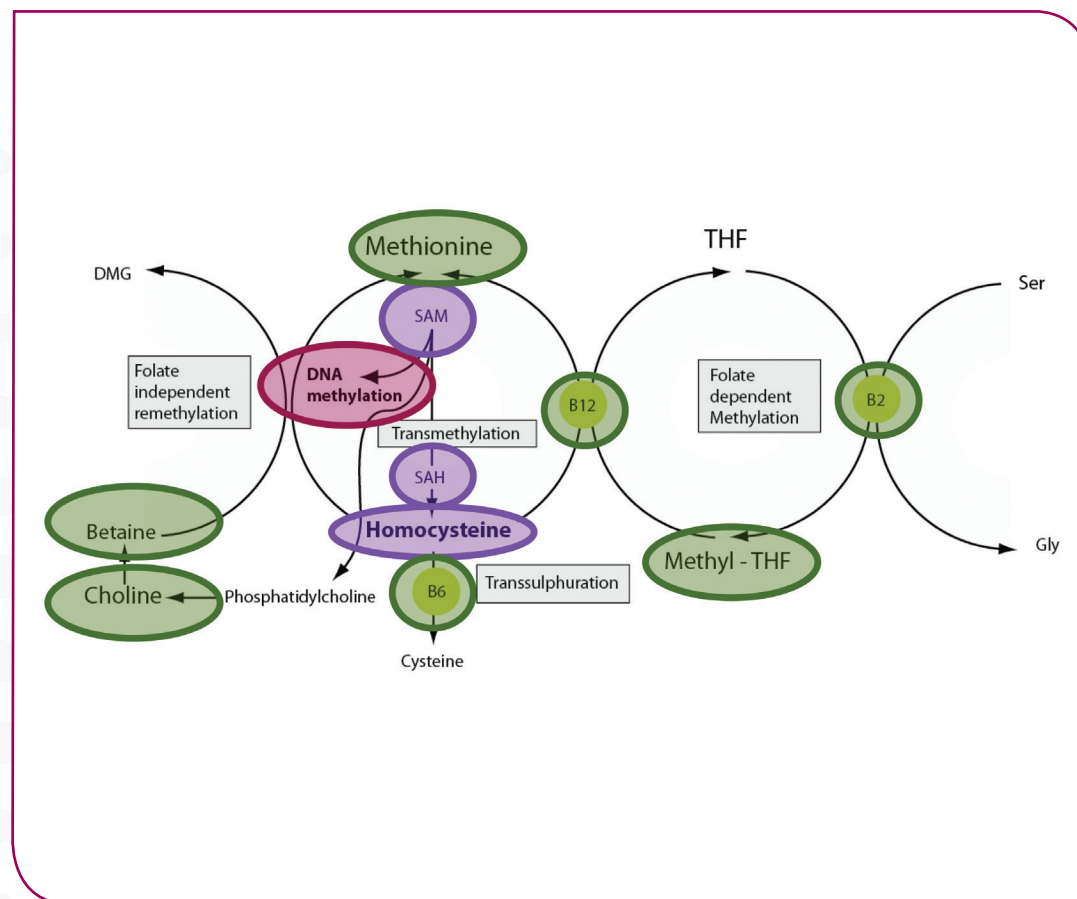


Mothers, Infants and Lactation Quality, (MILQ) Graph

The World Health Organization recommends exclusive breastfeeding (EBF) for the first six months of an infant's life. In a paper published in 2017, the Nutrition Theme assessed the benefit to growth of EBF to six months in a large sample of rural Gambian infants at high risk of under nutrition (Eriksen et al. 2017). Very high rates of EBF were observed (mean duration of EBF was 5.2 months) but, when compared to infants who were not EBF to six months, little benefit of EBF to six months on growth was observed.

This finding has renewed our interest in the quality of breastmilk with respect to micronutrient content and the need for detailed data on normative values.

In response to this need, and with funding from the Bill & Melinda Gates Foundation, MRCG is part of a multi-centre study following mothers and infants from four settings (Bangladesh, Brazil, Denmark, and Gambia) to generate Reference Values (RVs) for breast milk micronutrients. The Mothers, Infants and Lactation Quality (MILQ) study will follow a cohort of healthy, well-nourished urban Gambian mother-infant pairs from pregnancy through to when the infants reach 9 months of age. These RVs will be used to support the accurate evaluation of breast milk composition and, where necessary, support nutrition interventions in the future.



Nutrient inputs to metabolic pathways involved in DNA methylation

An individual's prenatal environment can have a long-lasting effect on their health. Evidence from animals suggests that these effects can be passed on to later generations, but there is little data on the intergenerational transmission of environmentally induced phenotypes in humans.

Rural Gambians experience significant differences in diet in the rainy and dry seasons. We used this natural experimental setting to investigate the association of parental exposure to energy and nutrient restriction in utero on their children's growth. We found that maternal

exposure to seasonal energy restriction in utero was associated with reduced offspring size at birth. Paternal birth season predicted offspring size at 2 years of age, but had no discernible impact at birth.

These results indicate that periods of nutritional restriction in a parent's fetal life can have intergenerational consequences in human populations. The finding that a father's prenatal environment might influence his child's

growth is noteworthy, since it suggests the presence of a 'molecular memory' that is passed through the male germline. Our group has previously shown that the season in which an individual is conceived leaves a lasting mark on their epigenome, providing a plausible mechanism for mediating these intergenerational effects.

Intergenerational effects of parental energy and nutrient restriction in utero on offspring growth in rural Gambia



Mother's SoB affects BW & BL
Father's SoB has no impact

Father's SoB affects HAZ
Mother's SoB has no impact

SoB = season of birth

Both a mother's and a father's nutrition in their own fetal life can affect their offspring, but in different ways.

Vaccines & Immunity

Overview

There is no doubt that vaccines remain amongst the most powerful and cost-effective interventions to prevent morbidity and mortality. Our aims in the Vaccines & Immunity Theme are to further optimise the use of existing vaccines, to provide safety, immunogenicity and -where possible- efficacy data for novel vaccines, and to learn more about the impact of vaccines on innate and acquired immunity by applying the new tools of systems biology.

Examples from our research activities In the past year are the clinical trial of safety and immunogenicity of a completely novel conjugated pneumococcal vaccine and the conduct of our first maternal immunisation trial. We believe that the administration of safe and immunogenic vaccines to women in pregnancy can make an important contribution to the survival of infants: antigen-specific transplacental antibody can be enhanced by maternal vaccination and subsequently protect infants against specific infections in the first few months of life.

Our systems vaccinology studies are beginning to dissect the underlying mechanisms and provide unprecedented insights into pathways induced by vaccination and immune maturation.

In areas of interest to the theme where novel vaccines have yet to be developed, for example against TB, we have conducted cutting edge immunology studies, which contributed to the identification of correlates of protection and risk, essential for the evidence-based development of the next generation TB vaccines. Furthermore, we have identified diagnostic biomarkers for TB in adults and children, which will assist in providing early diagnosis and treatment, once validated in our international cohort studies. Research in our theme additionally benefits from social science studies and our engagement with the national programs for immunisation and tuberculosis.



Prof. Beate Kampmann
Theme Leader

Highlights



The Gambia WHO Regional Reference Laboratory (WHO RRL) team in Ghana.

The Molecular Biology facilities and team under the leadership of Professor Martin Antonio were nominated to become a World Health Organization Collaborating Centre for New Vaccines Surveillance to fight against Epidemic Meningitis and Vaccine-Preventable Diseases in West Africa. The team also played

a pivotal role in two recent outbreaks of meningitis in Ghana and Nigeria and spent time in the outbreak settings to assist the Nigerian Center for Disease Control (CDC) in set up of labs, quality control and overall outbreak management.



Kick-off investigator meeting for Reach4Kids Africa in Bamako, Mali, May 2017

The Childhood TB program extends to other African partners

The childhood TB team led by Professor Kampmann was successful in obtaining a prestigious Global Challenged Research Foundation award from the MRC (UK), which has allowed us to extend our research program to other partners and countries in Africa. We are studying novel diagnostics and community interventions for children affected by TB with our research partners in Bamako (Mali), Jos (Nigeria), Mbeya (Tanzania) and their respective National TB Programs - our MRC Unit The Gambia research program called Reach4Kids has become Reach4Kids Africa.

Long term consequences of TB - TB Sequel project kick off

In addition to identifying cases of Tuberculosis (TB) and their household contacts, the TB Case Contact platform has taken on a new challenge to understand the long-term implications of TB for lung health and the overall socio-economic impact of this serious infectious disease. Led by Dr Jayne Sutherland, we are partnering with investigators in Tanzania, South Africa, Mozambique and Germany under the TB Sequel project.



The MRC Unit The Gambia and Imperial College London investigators in maternal immunisation join forces at the 4th International Neonatal and Maternal Immunisation Symposium (INMIS) in Brussels, September 2017

Protecting vulnerable infants through Maternal and Neonatal Immunisation

Our studies of vaccines in pregnancy were well represented at the International Maternal and Neonatal Immunisation Symposium (INMIS) in Brussels: Prof Kampmann and Dr Clarke were amongst the organisers; Dr Bittaye, Dr Roetynck and Ms Johm presented aspects of our laboratory, clinical and social clinical science to the interested audience and linked up with our colleagues from Prof Kampmann's lab at Imperial College, working on complimentary aspects in London.

Systems Vaccinology - the EPIC-HIPC study

A major award from the National Institutes of Health (NIH) has brought us new opportunities for systems vaccinology studies and advanced bioinformatics to explore the ontogeny of the human immune system in the neonatal period in unprecedented detail. Expanded Program on Immunization Consortium - Human Immunology Project Consortium (EPIC-HIPC) study in The Gambia is led by Professor Kampmann, Dr Idoko and Dr Darboe in field and lab and links us to novel technologies in metabolomics, transcriptomic, in vitro models and cutting-edge analytical bioinformatics tools at Harvard University and the University of Vancouver.



Recruitment of over 2000 participants for Pneumasil at Brikama

Landmark Clinical Trial of Novel Pneumococcal Vaccine

Building on our longstanding track record in vaccine research to combat pneumococcal disease, our theme continues to make leading contributions towards effective, affordable and available conjugated pneumococcal vaccines. Funded by PATH, Dr Ed Clarke is leading the Pneumasil Trial, a Phase 3 randomised, double-blind controlled trial of a novel 10-Valent Pneumococcal Conjugate Vaccine produced by the Serum Institute of India, currently enrolling over 2000 infants in Brikama, one of our community sites, which was also refurbished for this trial.

Some of our PhDs and Post Doc

PhD student



Dr Uduak Okomo MD PhD completed her PhD in identifying the aetiology of neonatal infections at the Edward Francis Small Teaching Hospital in Banjul, and understanding transmission dynamics in hospital and community. Her PhD was jointly supervised by Prof Joy Lawn from the LSHTM and Prof Kampmann.

PhD student



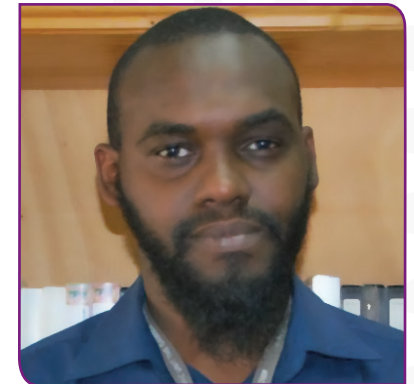
Dr Uzochukwa Egere MD PhD completed his PhD on new strategies for the management of childhood tuberculosis at the University of Munich with the highest marks awarded by the Ludwig Maximilian University within the Global Health Program.

PhD student



Dr Nana Akua Boatema Ofori-Anyinam PhD completed her research entitled Towards improving understanding of *M. tuberculosis* complex strain differences in The Gambia, supervised by Prof Martin Antonio, Dr Florian Gehre and in collaboration with Professor Bouke De Jong at the Institute of Tropical Medicine (ITM), Antwerp.

Post Doc



Dr Alansana Darboe PhD is a recent graduate of the Nutrition Theme and now working as a post-doctoral fellow in VIT on the EPIC HIPC project, which has already opened up post-doctoral training opportunities in North America and Belgium.

Maternal, Neonatal & Child Health

We are expanding in this area which will lead to increased collaborations within the three themes.

Maternal & Neonatal Health

PROPEL



Dr Mustapha Bittaye, trial obstetrician and Mr Buba Jadama, trial midwife, undertaking a gestational ultrasound scan

On 20th February 2018 the PROPEL (PROtecting from Pneumococcus in Early Life) trial part of the Vaccine and Immunity Theme completed recruitment of the 600 expectant women at 28 to 34 weeks gestation where by in the process, 1600 women were sensitized. While follow-up continues until the infant of the final participant reaches 9 months of age this nonetheless represents a major milestone in the trial.

The randomized, controlled, double-blind trial, undertaken at Sukuta and Faji Kunda Heath Centres is investigating new ways to prevent pneumococcal disease in the first 3 or 4 months of life. The effects of giving an expectant mother a dose of the Prevenar13™ vaccine in pregnancy – allowing her to pass protection on passively through the placenta and in breast milk is

being compared with that of giving a newborn the same vaccine at birth or with the routine 2, 3 and 4 month Expanded Programme on Immunization (EPI) schedule already in use in The Gambia.

The introduction of Prevenar13™ into the EPI schedule has led to marked reductions in pneumococcal disease overall. However, the window of susceptibility in newborns remains a concern, particularly in places like The Gambia where pneumococcus is carried at high rates in the back of the nose and thus can be spread to newborn easily.

The trial team have established a new platform for the conduct of maternal vaccination trials and other intervention studies recruiting expectant mothers early in pregnancy. A facility for undertaking gestational ultrasound assessments has been established at MRC Unit The Gambia main site in Fajara. Extensive procedures aiming to maximise the safety of mothers and infants and to ensure all safety data are captured have also been developed and is continually refined.



Antenatal clinic and Faji Kunda Health Centre ultrasound scan

Neonatal Infections



Premature and low-birthweight babies are more susceptible to neonatal infections

The trial team worked closely with The Gambian Government antenatal, delivery and post-natal staff at Sukuta, Faji Kunda and Edward Francis Small Teaching Hospital in Banjul without whose support the trial would not have been possible.

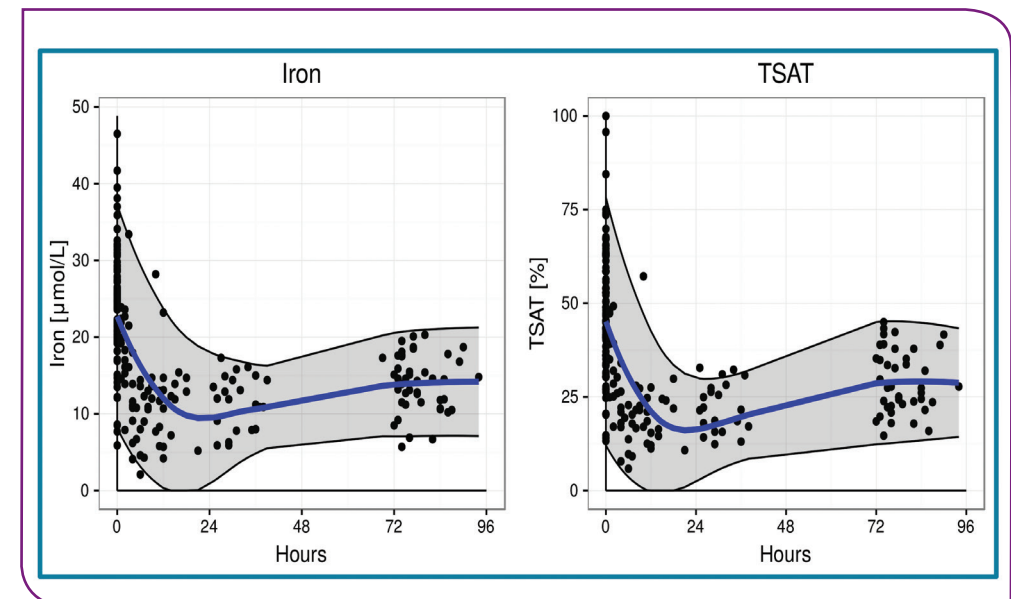
The Principal Investigator (PI), Dr Ed Clarke said, "the trial has required an exceptional level of care and commitment from all those involved. Given the unpredictable timing of

deliveries and the potential risks in both the third trimester of pregnancy and in the early newborn period, the field team including doctors, midwives, nurses and field workers have been available 24/7 for close to 2 years. In the same way laboratory staff have been on hand to receive samples day and night. The effects of the interventions itself should make every member of the team to truly feel proud to have worked so tirelessly to ensure the best possible outcome for every mother and newborn

Neonatal infection is the third largest cause of death in children under five. Each year approximately 3 million babies die within the first month of life. Most die in the first week and about one third of these die from acute infections. Deaths from infection are the most amenable to intervention, but with increasing levels of antibiotic resistance, their incidence will likely rise.

Iron is an essential micronutrient for both microbial pathogens and their human hosts. Nutritional immunity is the process by which

the human innate immune system limits nutrients (especially iron), availability to invading organisms. Variations in iron availability and distribution have significant effects on pathogen virulence. During the dynamic neonatal period, there are significant changes in circulation and oxygenation which impacts iron metabolism.



A rapid post-natal hypoglycemia may be an evolved mechanism to protect babies from bacterial infections (Sarah Prentice, under review).

Our preliminary data show that during the first 24 hours of life, full-term neonates dramatically alter their iron homeostasis.

Members of the MRCG The Nutrition Theme, including PhD student, Mr. James Cross and Dr Ousman Jarju, Professor Andrew Prentice and Dr Carla Cerami are currently conducting an observational study in full-term, preterm and low birth weight neonates born at Serrekunda Hospital in The Gambia. In this study, funded by the Bill and Melinda Gates Foundation, we will fully characterize and quantify nutritional immunity during the early

neonatal period in full term, preterm and low birth weight babies. We hypothesize that iron-limiting nutritional immunity is an evolutionary mechanism designed to protect neonates from infection during the first critical days of life by reducing the pathogenicity and virulence of bacteria. We hypothesize that this protective mechanism may not be activated in preterm and low birth weight neonates; possibly explaining (at least in part) why these babies are at an enhanced risk of neonatal infection.



A child being vaccinated



Antenatal clinic at Sukuta Health Center

PregnAnZI-2 Trial

Neonatal and maternal sepsis are major contributors to the high burden of mortality in sub-Saharan Africa (SSA). As the mother is an important source of infection for the newborn, an intervention able to decrease vertical transmission of pathogenic bacteria (mother to newborn) should substantially decrease neonatal mortality.

We are evaluating the impact of one oral dose of azithromycin (2g) administered to women in labour on neonatal sepsis and mortality, and on puerperal sepsis. In a recently completed proof-of-concept trial, we found out that 2g of azithromycin given to women in labour decreased the prevalence of neonatal nasopharyngeal bacterial carriage (a necessary step towards sepsis) of the three bacteria studied (i.e. *Staphylococcus aureus*, *Streptococcus pneumoniae* and Group B *Streptococcus* – main causes of neonatal

sepsis) by more than 50%. This reduction was maintained for the duration of the neonatal period. We also found that the intervention reduced the prevalence of bacterial carriage in mothers (nasopharynx, breast milk and vaginal tract) during the puerperal period. Although the study was not powered for clinical endpoints, a significant decrease of clinical episodes of bacterial infections in both the mother (puerperal period) and the newborn (neonatal period) in the intervention arm was found. Azithromycin is a low cost, wide spectrum, oral antibiotic that is safe to use in mothers and newborns. It does not require special storage conditions and can be delivered at the most peripheral level of care. An additional advantage of our approach is the possibility of simultaneously protecting mothers and babies with the same intervention.



Field site in The Gambia



The team in The Gambia

Since azithromycin is not widely used in SSA for the treatment of patients, any short-term resistance arising from the intervention would have limited impact on clinical care.

The new study is a phase III, double-blind, placebo-controlled, randomised trial in which 12,500 women in labour will be randomised to receive either a single dose of 2g of oral azithromycin or placebo (ratio 1:1). The trial will take place in The Gambia and Burkina Faso. It is funded by the Joint Global Health Trials scheme, (MRC-UK, Wellcome and DfID). Pregnant women (age ≥ 16 years) are identified during antenatal clinic visits in two health facilities in The Gambia and six health facilities in Burkina Faso where they are

asked to provide written informed consent. Recruitment takes place when these women attend the study health facilities in labour.

The field work of the trial started in 2017 and recruitment will continue until 2020. The primary objective of the trial is to assess the effect of the intervention on neonatal mortality. Several secondary objectives are also considered, including assessing the effect of the intervention on maternal and neonatal sepsis and effect on infant growth. Monitoring antibiotic resistance in both gram positive and gram negative bacteria is part of the trial objectives.

Some of our PhDs and Post Doc

PhD student



Dr Saikou Bah PhD was awarded a Developing Excellence in Leadership Training and Science (DELTAS) post-doctoral career fellowship in bioinformatics, based in Ghana but with ongoing links to the MRC Unit The Gambia and Imperial College London, where he is working on data generated through a National Institutes of Health (NIH) award to validate diagnostic biomarkers for childhood TB.

PhD student



Ms Penda Johm MSc, a social scientist has commenced her PhD investigating preparedness of women and health systems in West Africa to accept vaccination in pregnancy in 2017. For our first West Africa Global Health Alliance (WAGHA) project, we are also enjoying the joint-up work with our colleagues from Institute for Health Research, Epidemiological Surveillance and Training (IRESSEF) and University of Cheikh Anta Diop (UCAD) in Dakar, Senegal.

Post Doc



Dr Madikay Senghore PhD obtained an MRCG Postdoctoral Fellowship working on the evolution of pneumococci and the effect of pneumococcal conjugate vaccines (PCV) on the epidemiology of invasive pneumococcal disease in West Africa.

West African Collaboration

Our partnerships and collaborative projects are being strengthened and widening.

West African Collaboration

Overview

The West Africa Global Health Alliance (WAGHA) held its first scientific meeting in April 2017. This culminated in the development of thematic working groups mapping out a joint scientific and programme direction. Five joint collaborative research projects have been submitted in 2017.



Dembo Kanteh
West Africa Research Platform Coordinator

Project Highlights

WANETAM II – The West African Network of Excellence for Tuberculosis (TB), AIDS and Malaria (WANETAM) II project has been launched. This is an extension of WANETAM I capacity building project funded by the European & Developing Countries Clinical Trials Partnership (EDCTP). It is a collaborative programme involving 14 research groups in West Africa with four European partner institutions. The MRC Unit The Gambia is strongly involved as it leads the work packages for malaria, TB and capacity building. The project is coordinated by Professor Souleymane Mboup at Institute for Health Research, Epidemiological Surveillance and Training (IRESSEF) in Dakar. The MRC Unit The Gambia participating scientists are Professor Umberto D'Alessandro, Dr Jane Achan, Dr Martin Antonio, Dr Assan Jaye, Professor Beate Kampmann and Mr Dembo Kanteh.

PneumoWar is a collaboration between the MRCG and WHO/AFRO with the Unit established as Regional Reference Laboratory (RRL). In 2016, the lab continued to provide the required sub regional oversight, clinical-epidemiological technical support, and coordination and data management of the network.

PneumoWar continues its function as a World Health Organization recognised regional reference lab in West Africa. The staff from the Molecular Biology Group are involved in training, surveillance in the region for invasive Bacterial Vaccine-Preventable Diseases (e.g Meningitis and Pneumonia). This work is being led by Dr Martin Antonio.

Acceptability of new vaccines during pregnancy in Senegal – Dr Elhadji Mbaye and Professor Beate Kampmann are collaborating on this social science project that is examining the preparedness for vaccines in pregnancy. The data is expected to provide meaningful

information for future vaccine trials. This proposal is part of a feasibility study on the needs, safety, accessibility and acceptability of introducing new vaccines during pregnancy. It requires the need for knowledge of the local context, necessary for the preliminary preparation of intervention sites.

The Wellcome Trust funded programme of Developing Excellence in Leadership, Training and Science in Africa (DELTAS Africa) has commenced. The Unit is a collaborating Partner in three of the programmes led by Professor Oumar Gaye in Senegal, Dr Abdoulaye Djimde in Mali and Dr Gordon Awandare in Ghana. In addition, the Unit is a collaborating Partner in the World Bank funded centres of excellence programme led by Dr Awandare at the University of Ghana. For all the programmes the Unit is a key training centre with staff and fellows participating in the programme from within and outside the Unit.



Ms Nicole Nkoun, PhD Student conducting a focused group discussion in Koulou, southern Senegal

WAGHA Focused Platform Support

The IT platform set up at the IRESSEF in Senegal, MRC Unit The Gambia provided new exchange servers, complete networking of the building and purchased Microsoft Office 360. This platform is expected to be available to all partners in Senegal. New servers were procured to provide high end IT services for IRESSEF and l'Université Cheikh-Anta-Diop UCAD. For the first time, IRESSEF and UCAD have been provided with their own domain names.

Laboratory Platform Support

The MRC Unit The Gambia provided equipment to support the laboratories at both UCAD and IRESSEF. Adequate systems have been established for the running of a Biobank at IRESSEF. The laboratory facilities are based at Kerr Soce, a UCAD established field site. Activities are part of our mission to improve health and save lives through research. This includes also training and capacity building of sister institutions in the region.



Laboratory materials bought by MRCG being delivered at IRESSEF in Dakar

Training and Capacity Development

Dr Moustapha Mbowe under the supervision of Dr Assan Jaye and Dr Badara Cisse of IRESSEF has been awarded the EDCTP Career Development Fellowship. Moustapha was working under Dr Assan Jaye in the HIV programme and has continued to have him as a mentor.

MRC Unit The Gambia continues to facilitate the participation of Senegalese Partners in training activities organised at the Unit level. In November 2017, the Genomics Training Workshop was attended online by partners from Senegal.

MRC Unit The Gambia supported Dr Moustapha Mbowe and Dr Maggate Ndiaye Post-Doctoral Scientists, from the IRESSEF and UCAD respectively to attend the MRC Scientific Forum in London in January 2018. This programme seeks to support the development of these two in their scientific career.

Dr Martin Antonio who led the TB work package of WANETAM has published the results of the Multi Drug resistance survey conducted in six countries in West Africa showing a higher than expected incidence of MDR TB in West Africa.

Achievements

In August 2017, the WHO Director General designated the MRC Unit The Gambia as a WHO Collaborating Centre for New Vaccine Surveillance (WHOCC NVS). This follows on the eight years of work that Professor Martin Antonio and team have provided in the PneumoWar project. Dr Martin and his team provided oversight training and surveillance to National Public Health Laboratories and Ministries of Health in several West African countries.



Molecular Microbiology Team of MRCG

2018 Outlook

Our future outlook in West Africa is aiming for greater engagement with key stakeholders in the health research sector. Senior Scientists in the Unit will be expected to continue to seek joint collaborative research projects with partners in West Africa. We would also seek to engage policy makers and government to improve the uptake of research findings. In that regard we hope to be nexus to facilitate engagement with a wide array of partners.

On the backdrop of our relative resource and manpower strength, we shall seek to build more collaborative links with partners to provide complementary and supportive tools such as biobanks and health demographic systems which are necessary for collaborative research.

In terms of capacity building, we shall continue to seek synergies with complementary programmes such as DELTAs, AREF, for the development and retention of competent scientists in West Africa.

Research Training & Career Development



Some of our PhDs and Post Doc

PhD student



Dr Modou Jobe, a research Clinician with the Nutrition Theme of MRC Unit The Gambia, is a recipient of the Wellcome Trust Masters Fellow in Public Health and Tropical Medicine. Dr Jobe's research interests focus on the epidemiology and prevention of cardiovascular disease, especially in developing countries. With the world-leading MSc in Epidemiology at the London School of Hygiene & Tropical Medicine will provide Modou with an enviable skill set that will be the platform for a PhD and a future career in academic medicine.

PhD student



Philip James MSc, PhD has commenced his PhD exploring how certain micronutrient deficiencies amongst pregnant women may disrupt epigenetic processes in the developing baby, and whether this can be mitigated through a novel micronutrient supplement.

Post Doc



Dr Ramatoulie Janha BSc, PhD is a Post-Doctoral Scientist working in the Calcium, Vitamin D and Bone Health (CDBH) group of the Nutrition Theme at MRCG Keneba Field Station. She is interested in nutrition research for optimal growth and development.

Research Training & Career Development

Overview

Research Training and Career Development (RTCD) Department has been strengthened to professionally and effectively deliver on the strategic training requirements of the Unit. This allows the delivery of the training strategy through the following key objectives:

- Managing resources for targeted trainings to achieve optimal competencies and capabilities;
- Reviewing and developing training and career policies for the Unit to permit optimal use of resources and the development of individuals' career paths;
- Managing our internship program to create unique opportunity within the array of MRC Unit The Gambia expertise for students' exposure to professional pursuits that stimulate individuals' interests; and
- Supporting researcher leadership development program for PhDs and Post-PhDs.

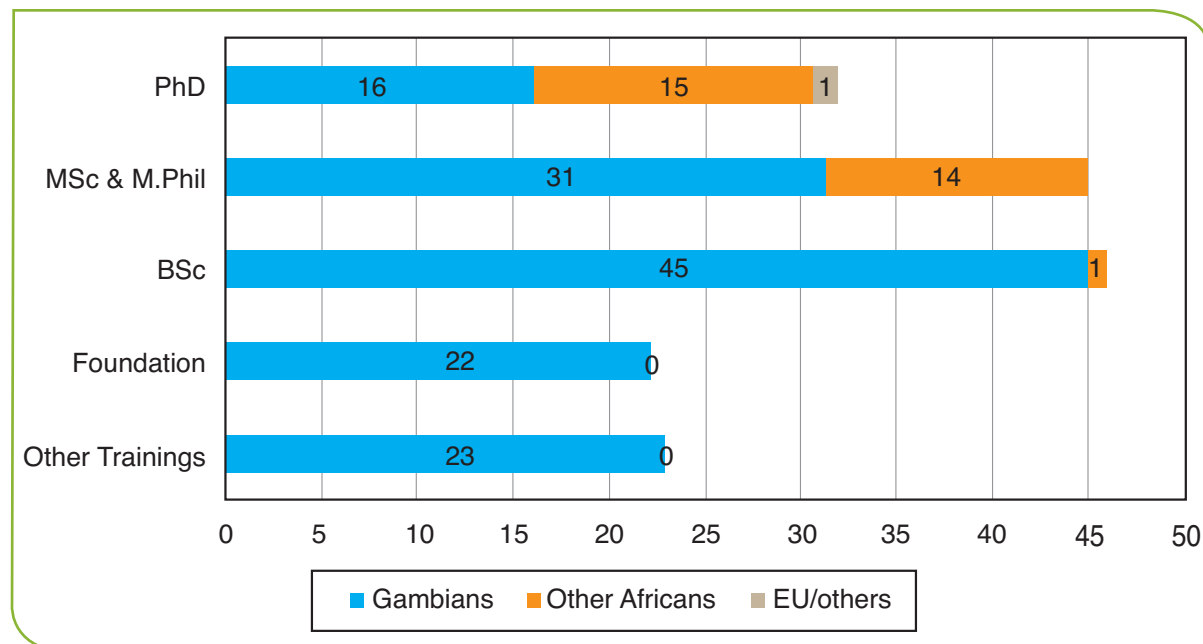
MRCG Training Support Scheme

The annual training support scheme of the MRC Unit The Gambia facilitates the advancement of scientific proficiency as well as technical and research-support competency of MRCG staff and staff of collaborating Institutions in Africa and the World at large. The Unit provided funding support to 168 individuals in 2016-2017 to complete training in PhD (32), MSc/MPhil (45), BSc (46), Foundation Degree (22) and Certificates or Diplomas on other professional short-term courses (23) that include Epidemiology and Statistics, Bioinformatics, Quality Management, Bio-banking, Clinical Trials and Data Management.



Dr. Assan Jaye
Head of Research Training
& Career Development

Highlights



Total Number of Trainees (168) in 2016-17

Out of the 168 trainees, there are 83 MRC Unit The Gambia staff benefitting from current training support; 37% females and 63% males and 78% of the total staff trainees are Gambians. Higher degrees training (PhD and MSc/MPhil) make up nearly half of total current trainees and 2% of these are funded by MRC Unit The Gambia specific research projects or collaborative grants, whilst the rest are supported by the MRC Unit The Gambia training core budget.

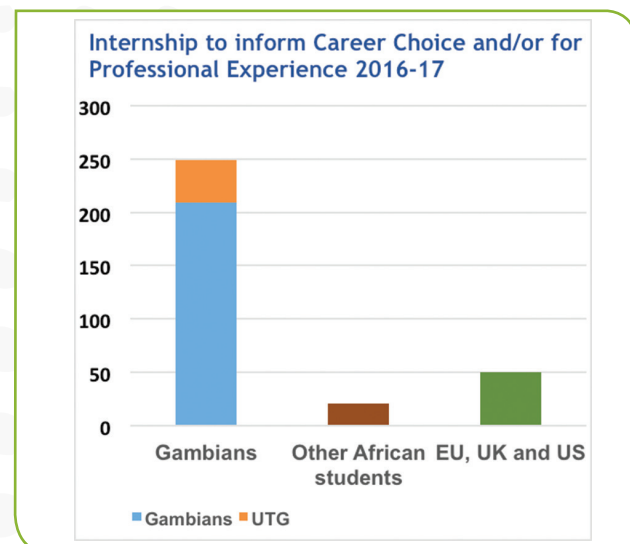
MRC Unit the Gambia internship program is open to any individual who aspires to gain experience in clinical, field or laboratory research; research administration or any other research support operation. In 2016-17, 249

Gambian students, 21 other African nationalities, 50 EU citizens, UK and from other Western Countries underwent internship for a maximum period of 6 months within our various departments. Furthermore, 73 Gambian nurses and 5 medical electives had shorter attachment work experience at our Clinical Service Department located in Fajara, The Gambia. An online internship application process was developed in the course of the year, which now facilitates easier and rapid application and acceptance-making process.

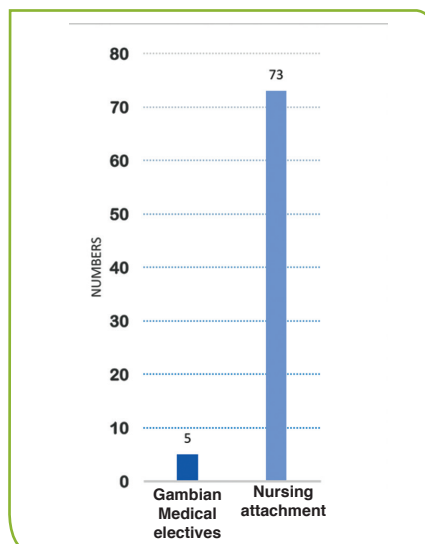
Staff Career Development

A number of policies that outline internal procedures, structures and opportunities for career development of staff have been developed. These include: Laboratory Staff Career Development Policy (technical laboratory support scientist re-designation, career path and positioning with projects and platforms); Management of MPhil and PhD Scholarships (revision of the selection, recruitment, registration and governance in the award of MPhil and PhD

opportunities); Post-Doctoral Research Career Structure (re-designation of post-PhD staff and definition of progression stages in post-PhD career pathway); Post-doctoral funding scheme (provide an opportunity to talented and promising PhD graduate in order to prepare him/her for competitive Post-doc fellow within 2-3 years); and Honorary appointments (to encourage collaborating scientists at various levels to associate with research and mentorship programs of the Unit).



Number of interns and clinical attachments in 2016-17



Researcher Leadership Development Program

The MRC Unit The Gambia Researcher Leadership Development Program supports late PhDs and post-docs to access development support resources, skills development courses, guidance on initiating early mentorship and providing support for personal development plans. Following the development of the Post-PhD career structure and development pathway, MRC Unit The Gambia implemented an early post-doc bridging fund. RTCD also facilitated the participation of post-docs on a structured training course for African Researchers (STARS) organized by Association of

Commonwealth Universities (ACU). Such modular course includes research planning, developing proposals, managing research projects, collaborations, mentorship etc. In addition, a Grant and Manuscript Writing Workshop jointly delivered by MRCG and AREF (African Research Excellence Fund) was conducted. Many of PhD students and Post-docs are registered with the UK vitae Researcher Development Framework to access resources for evaluating personal effectiveness, reflective practice, career management and research excellence.

Skills development in the researcher Leadership Development Program



MRC Cloud Infrastructure for Microbial Bioinformatics

Bioinformatics workshop for Post graduate students (Cloud Infrastructure for microbial bioinformatics, Feb 2017)

Bioinformatics workshop for Post graduate students (Cloud Infrastructure for microbial bioinformatics):



Discussion and Tutoring during the Cloud Bioinformatics Training workshop

MRCG hosted an introduction to bioinformatics, a hands-on workshop for beginners on 8-9th February 2017 with colleagues from Warwick University. The 2-day course engaged student in UNIX (operating system), MRC Cloud Infrastructure for Microbial Bioinformatics (CLIMB) and bacterial genome analysis. The course was facilitated by Profs Martin Antonio (MRCG) and Mark Pallen (Warwick).

**Dr Madikay Senghore**

Bioinformatics research in VIT theme) Early Post-doctoral fellow (PD-1) working on the evolution of pneumococci and the effect of pneumococcal conjugate vaccines (PCV) on the epidemiology of invasive pneumococcal disease in West Africa

**DELGEME-DELTAS Aspiring leader Award:**

Dr Alfred Amambua Ngwa won the Delgeme Aspiring Award, which will avail him more working visit opportunities to collaborative Centers as he prepares to develop his Senior fellowship proposals. Alfred has advanced his research on the genetics and genomics of Malaria during his Career Development Fellowship in MRCG and currently supervises the Deltas-funded PhD students

**Pathway to Independence Program**

Held on 5-7 June 2017 at The Møller Centre, Cambridge, UK and organized for senior post-docs was attended by Dr Effua Yusuf

Medical Research Foundation Trust Fund (MRF) and MRCG supported BSc Courses for Gambians:

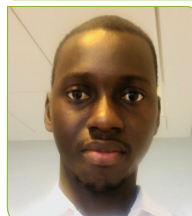
In 2016/17, the MRF- MRC Unit The Gambia funding Program supported 4 Gambians for full time BSc in Biochemistry, Medical Statistics and Radiography making a total of 16 Gambians supported to acquire BSc qualification since 2007.

2016

Gibril Gaye
BSc In Statistics
University of Reading
2017 - 2021

2016

Muhammed Fadera
BSc In Statistics
University of Reading
2017 - 2021

2016

Lamin N. Darboe
BSc In Radiography
University of Salford
& Exeter University
2017 - 2021

2016

Saihou S. Ceesay
BSc In Biochemistry
Millsaps College
2016 - 2020

MRCG is developing Social Science researchers**Fatou Jaiteh, PhD student:**

Designing an innovative malaria elimination strategy based on reactive case detection and community participation: a mixed methods study (DCE Theme). Fatou is registered at ITM (Belgium) and a recently-published work is: Socio-cultural factors influencing pregnant women's adherence to anti-malarial treatment in rural Gambia; Malar J (2016) 15:195

**Penda Johm, PhD student:**

Assessing the acceptability of maternal vaccinations in urban and rural Gambia using an exploratory mixed-methods design. Penda is registered at the LSHTM, UK; and she is undertaking her PhD work within the VI Theme on the Maternal Immunization in West Africa Project (MatImms Africa)

Completion of the Gairdner Scholarship Award (2012-2017): Prof Brian Greenwood, Ex-MRCG Director

Received Canada Gairdner Global Health Award, which he generously donated to MRCG to sponsor staff to hone research skills through online distance learning courses including MSc or short-term study visits to LSHTM. A disbursement of £20,000 per year was managed by RTCD for 5 years and the final sponsorship ended in 2017. A total of 17 MRCG staff benefitted from this scholarship and have pursued courses ranging from Clinical Trials, Pathogen genomic, Epidemiology, Infectious Disease and Public Health. 41% of recipients are Gambians. There were 4 recipients in 2016 and another 4 in 2017:



Sir Brian Mellor Greenwood,
CBE, FRCP, FRS

Ex MRCG Director
1981-1997

2016

Tutty Faal-Jawara
Scientific Officer. 1 Yr.
Infectious Disease
'Omics'

2016

Dr Yekini Ajao Olatunji
Research Clinician.
MSc Clinical Trial

2016

Dr Olubukola Idoko
PhD student
Research Clinician.
2 Wks Advanced
Course on
Epidemiological
Analysis

2016

Alieu Mendy
Infectious Disease
'Omics'

2017



Dr Michael Okoye
Clinical Trial
coordinator.
2 Yrs. MSc in
Epidemiology

2017



Dr Mustapha Bittaye
Clinical Obstetrician.
MSc on Clinical Trial

2017



Elisha Roberts
Scientific Officer.
1Yr Postgraduate
Certificate in Clinical
Trials

2017



**Usman Nurudeen
Ikumapayi**
Lab Manager and
PhD student. 1 Yr.
Infectious

Graduated PhD students 2017



Dr Uzochukwu Egere
Defended in April
2017 at the Ludwig
University of Munich

PhD Research:
Contact tracing and
Isoniazid prophylaxis
for control of child-
hood Tuberculosis in
The Gambia



**Dr Ofori-Anyinam
Boatema Akua Nana**
Defended in October
2017 at University of
Antwerp

PhD Research:
Towards improved
understanding of
transmission
dynamics of
tuberculosis in The
Gambia



Dr Joseph Okebe
Defended in May
2017 at University of
Antwerp

PhD Research:
From control to
elimination:
reducing residual
malaria transmission
in The Gambia



Dr Uduak Okomo
Defended in
November 2017 at
the LSHTM, UK

PhD Research:
Neonatal infections in
the Gambia: aetiology
and influence of
maternal colonisation

Regional capacity building networks

MRC Unit The Gambia continues to support the regional Wellcome Trust-funded DELTAS Program (Developing Excellence in Leadership, Training and Science Initiative) in the effort to build research leadership capacity in the Malaria Research Capacity Building (MARCAD) and on Genetics, Genomics and Immunology of Infectious Diseases West African Center for Cell Biology of Infectious Pathogens (WACCBIP). Furthermore, in December 2017, MRCG participated in the launching of the EDCTP-funded WANETAM-2 grant (The West Africa Network of Excellence for clinical trials in TB, AIDS, and Malaria) consortium in Dakar. The Head of RTCD, Dr Assan Jaye is the Deputy Coordinator of this capacity building initiative that is funded for 3 years; MRCG will coordinate the cross-cutting training package that include MSc Online courses (Data management; clinical trial; Biostatistics; and epidemiology); Professional Development Courses (Clinical Trial Quality Assurance and Clinical Trial Monitoring, Project Management); Professional Development Internship (Financial and Grant Support Management). The other work packages building on institutional capacity and foster collaboration in HIV, TB and Malaria include: Disease Surveillance; Diagnostics; and Clinical Trial Resource Strengthening.



WANETAM Kick-off meeting, 21 June 2017

Research Publications





Publications

1. Safety and Immunogenicity of Malaria Vectored Vaccines Given with Routine Expanded Program on Immunization Vaccines in Gambian Infants and Neonates: A Randomized Controlled Trial. Mensah VA, Roetynck S, Kanteh EK, Bowyer G, Ndaw A, Oko F, Bliss CM, Jagne YJ, Cortese R, Nicosia A, Roberts R, D'Alessio F, Leroy O, Faye B, Kampmann B, Cisse B, Bojang K, Gerry S, Viebig NK, Lawrie AM, Clarke E, Imoukhuede EB, Ewer KJ, Hill AVS, Afolabi MO. *Front Immunol.* Epub 2017
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