Annual Report
2013/14

LSTM
LIVERPOOL SCHOOL
OF TROPICAL MEDICINE

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Vision:

To save lives in resource poor countries through research, education and capacity strengthening

Mission:

To reduce the burden of sickness and mortality in disease endemic countries through the delivery of effective interventions which improve human health and are relevant to the poorest communities

Values:

- Making a difference to health and wellbeing
- Excellence in innovation, leadership and science
- Achieving and delivering through partnership
- An ethical ethos founded on respect, accountability and honesty
- Creating a great place to work and study

Chairman's Foreword

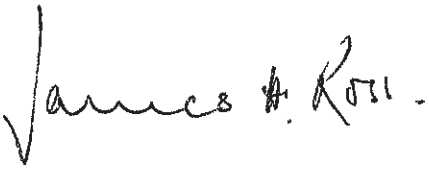
The strength of the Liverpool School of Tropical Medicine lies in its people. They are responsible for its research, the translation of that research into saving lives in resource poor environments and in passing on to the next generations the knowledge and skills garnered over the last twelve decades. The reputation of LSTM is nurtured by all those involved in its outstanding work.

But the visible symbol of that strength lies at its heart in the campus in Liverpool. That campus is fast evolving: first came the opening of the Centre for Tropical and Infectious Diseases in 2008; this was followed by significant modernisation of the original buildings of LSTM. December 2014 will mark the opening of the Wolfson building, which will house the Centre for Maternal and Newborn Health, the Well Travelled Clinic and IVCC. Meanwhile, LSTM is preparing to enter negotiations with a view to participating in the Liverpool Health Campus, together with small and medium sized science and technology enterprises in the region.

> "With the anticipated achievement of Degree Awarding Powers it is intended to greatly expand LSTM's teaching offerings particularly in overseas countries."

As its name implies, LSTM is a centre of teaching excellence. However various constraints have limited the growth of the education portfolio; these are being progressively removed. With the anticipated achievement of Degree Awarding Powers it is intended to greatly expand LSTM's teaching offerings particularly in overseas countries. To this end a new appointment of a Director of International Education will shortly be announced.

As the world watches with alarm the spread of Ebola and the evidence mounts of the resistance to antibiotics, drugs and insecticides relevant to, amongst others, malaria and Neglected Tropical Diseases, the continuing work of LSTM has never been more important.



James Ross OBE

Director's Foreword

This year has seen an unprecedented international focus on infectious tropical diseases with the worst outbreak of Ebola ever seen. LSTM has played a significant part in helping to contain the outbreak in West Africa, with one of our senior staff, Dr Tim O'Dempsey, seconded to Save the Children, to oversee clinical activities in Sierra Leone and others advising on the appropriate UK response nationally and internationally. While not downplaying the importance of this outbreak, it is still dwarfed by the numbers affected by malaria, HIV, TB and Neglected Tropical Diseases (NTDs) every year.

LSTM has always had major strengths in NTDs and in the coming year these will be given greater visibility with the appointment of Professor Lorenzo Savioli, the former WHO Director of NTDs, to head the LSTM NTD cross-cutting theme. Lorenzo's appointment also coincides with the launch of a new Global Alliance for Schistosomiasis control which he will lead and which will initially be underwritten by Merck to ramp up international efforts to reduce the global burden of this disease. Alongside our efforts in schistosomiasis, technology for tsetse control developed at LSTM will be scaled up in a major effort to eliminate Human African Trypanosomiasis from Central Africa, funded by the Bill and Melinda Gates Foundation and others.

In June 2014, I represented LSTM at the launch of The State of the Tropics report with Nobel laureate Aung San Suu Kyi, in Myanmar. This collaborative effort, between 12 institutions with a major interest in the tropics detailed the extraordinary change and progress that has occurred in the tropics in environmental, health, economic and social indicators. The tropics are already home to 55% of the world's children under five years old and by 2050, some 60% of children are expected to reside there. LSTM's continued commitment to improving health in the tropics has never been more relevant, whether that is responding to disease outbreaks, reducing the burden of disease or promoting safer motherhood.

Janet Hemingway CBE

Treasurer's Report

In times of austerity, a typical business strategy is to batten down the hatches and wait for better days to return but, during the recent difficult economic conditions, LSTM has taken a much bolder line, investing heavily in people and facilities. The process has, however, been conservatively managed with much consideration given to balancing and mitigating the risks, particularly the financial aspects.

As will be seen by the achievements detailed elsewhere in this report, LSTM has taken big strategic strides in the past year and the designation as a Higher Education Institution is a key step. Inevitably, this process has resulted in initial costs being incurred as independent systems are put in place and there will be further realignment costs in the current year. It is highly encouraging, therefore, that despite these outgoings, we are able to report yet another record year in terms of both income and retained surplus.

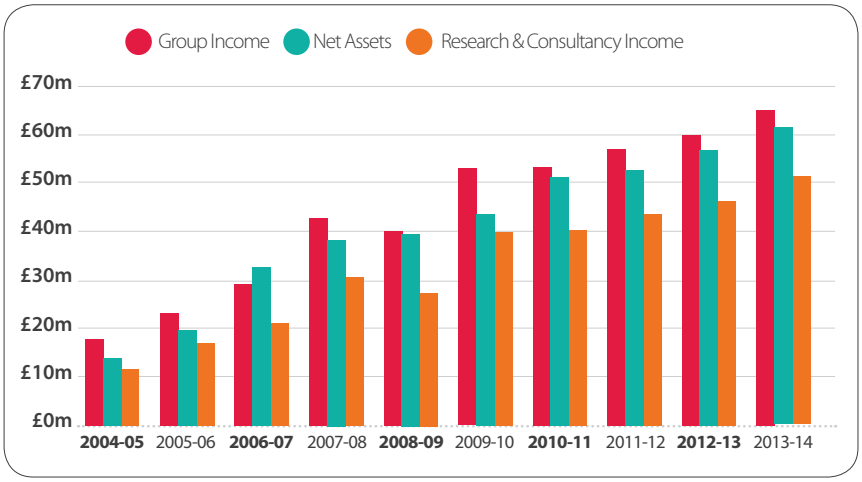
During the year ended 31st July 2014, Group income increased by 9% to £65.4M, and an operating surplus of £2.2M was achieved, slightly up on the prior year's record. This has further strengthened the Balance Sheet and at the end of the financial year net assets stood at £61.5M, of which the property estate amounted to £42.5M.

A notable milestone has been reached in respect of Research and Consultancy income which has exceeded £50M for the first time.

Independent HEI status is helping significantly in the development and reinvigoration of the Teaching offering and it is good to report that our HEFCE funding and tuition fees has exceeded £10M for the first time.

Our travel clinics operating in the name of Well Travelled Clinics Ltd, made good progress during the year and achieved a small operating profit on sales of £885k. After several years of losses this is welcome news.

Overall the business is in very good shape and, looking back over the last decade, we have seen a remarkable performance from many points of view. As Treasurer, focusing on the accounting objectives, it is particularly satisfying to see the various strands of our work translating into a very solid financial performance. To build up such a high level of resources without, at any time, incurring debt or exposing ourselves to any significant risk has been a major achievement and the 10-year trend graph tells its own story.



Ian Jones

Introduction to the Feature Articles

LSTM remains at the forefront of research into infectious, debilitating and disabling diseases as it has done since 1898. Its research continues to improve the health of the world's poorest people, with a research portfolio currently over £210 million and projects and partnerships active in more than 70 countries.

LSTM's worldwide reputation and the calibre of its research outputs has secured funding to lead 12 international consortia and product development partnerships aimed at reducing or eliminating the impact of diseases on a global scale.

This Annual Report highlights LSTM's unique position in the world of biomedical and global health research where we work with others to define, evaluate and support the implementation of effective interventions across a broad range of disease areas. Four feature articles highlight LSTM's approach and achievements in the areas of Neglected Tropical Diseases (NTDs), Malaria TB & Respiratory diseases and Maternal and Newborn Health over the past academic year 2013 – 2014.

In addition, the specific role of the Centre of Applied Health Research & Delivery (CAHRD), which embarked on a major global consultation in June 2014, is highlighted. Effective, innovative, and affordable policies and practices are essential for improving global health. CAHRD focuses on the development and successful implementation of such policies and practices to scale for the benefit of the health of poor populations. In doing so CAHRD has a major role in ensuring LSTM delivers its vision and mission.

Professor Steve Ward, deputy director LSTM

FEATURE ARTICLE:

Neglected Tropical Diseases

New strategy

Neglected Tropical Diseases (NTDs) are generally chronic infections that indiscriminately afflict the poorest, with least access to rudimentary health care services especially in rural areas. It is estimated that over one billion people from the world's most disadvantaged communities suffer from at least one NTD, which can significantly impact upon their physical and emotional wellbeing. Typically this is combined with economic hardship as affected individuals are prevented from working and receiving education, thereby perpetuating the cycle of poverty.

As LSTM Director Professor Janet Hemingway mentioned in her foreword, by 2050 close to 60% of the world's children are expected to reside in the tropics. Whilst progress is being made only 0.6% of UK overseas development assistance for health is allocated to NTDs. The ongoing Ebola outbreak, together with the wider impact of conflict, environmental degradation, climate change and the frequency of natural disasters put the progress made against NTDs under significant threat. Yet NTDs are markers, agents and drivers of poverty. Controlling and eliminating NTDs can make a proportionately greater contribution than any other investment – more health for less money.

LSTM is at the forefront of providing policy makers with the scientific evidence and programmatic success to further articulate relevant science to inform policies and guidelines. Within that process important questions are being asked concerning approaches to the control and elimination of NTDs. While scaling up access to preventive chemotherapy for NTDs is a priority, achieving effective treatment coverage alone is not enough to achieve the 2020 NTD targets as laid down in the London Declaration in 2012 and further emphasised in Paris in 2014.

LSTM is working to identify and overcome critical bottlenecks by designing programmes to adopt a more flexible approach whilst evaluating alternative and integrated strategies to overcome the existing barriers to control and elimination. In addition to preventive chemotherapy, the WHO recommends complementary strategies to accelerate transmission interruption, including vector control, the provision of sanitation and hygiene, health awareness and capacity building.

LSTM has reorganised itself by focussing on a multidisciplinary approach and establishing a cross cutting theme in NTDs, building on the particular strengths of the Parasitology and Vector Biology Departments. This draws together a broad range of existing projects but will also encompass a raft of new programmes.

Professor Lorenzo Savioli (left) and Professor David Molyneux

Overseeing and leading on this is LSTM's recently appointed Senior Professorial Fellow, Professor Lorenzo Savioli. The former WHO Director of the Department of Control of Neglected Tropical Diseases will work alongside LSTM's Emeritus Professor David Molyneux, and will advocate for a better understanding of the debilitating impact of NTDs and for effective sustainable elimination and control programmes.

"I am delighted to welcome Professor Savioli in our midst", said LSTM Director Professor Janet Hemingway in October 2014. "His wealth of knowledge and his global network is second to none and will enable him to act as a global advocate on NTDs, complementing our wide and impressive range of research in this field."

> "It is such an honour to have joined an institution which is really committed to rethink its approach towards Neglected Tropical Diseases"
>
> *– Dr Lorenzo Savioli, Senior Professorial Fellow LSTM*

World Health Organization

The 17 Neglected Tropical Diseases and LSTM involvement

The neglected tropical diseases result from four different causative pathogens:

- **Virus**

Dengue
Rabies

- **Protozoa**

Chagas
Human African Trypanosomiasis
Leishmaniasis

- **Helminth**

Cysticercosis/Taeniasis
Dracunculiasis (guinea-worm disease)
Echinococcosis
Foodborne trematodiases
Lymphatic filariasis
Onchocerciasis (river blindness)
Schistosomiasis
Soil-transmitted helminthiases

- **Bacteria**

Buruli ulcer
Leprosy (Hansen disease)
Trachoma
Yaws

in addition to the 17 NTDs above, the WHO also lists:

- **Other neglected conditions**

Chronic suppurative otitis media (CSOM)
Mycetoma
Nodding Syndrome (NS)
Podoconiosis
Scabies
Snakebite
Strongyloidiasis

Source: World Health Organization

Lymphatic filariasis


Community drug distribution


Lymphatic filariasis patient

Over the past academic year LSTM's work in fighting NTDs, most notably its work on the elimination of lymphatic filariasis (LF) which affects around 150 million people globally, exceeded a number of targets. LSTM's Centre for Neglected Tropical Diseases (CNTD), funded by DFID and supported by GlaxoSmithKline (GSK), managed to exceed its target of 10% of the global milestone of averting 10 million new cases of LF. The mass drug administration (MDA) roll-out is now in place for 10 out of the 12 targeted countries. However, there were setbacks as the programmes in Guinea and Liberia which had scheduled MDA roll-outs have been delayed due to the ongoing Ebola outbreak.

A team from LSTM's Capacity Research Unit (CRU) visited NTD laboratories in Malawi and Sri Lanka. These visits are part of the team's capacity strengthening assessment and monitoring role in CNTD's LF programme.

One of the primary objectives was to monitor the indicators for strengthening laboratory capacity, which were identified during a needs assessment of the laboratory systems carried out in 2012 with support from WHO. Another was to update the laboratories' strategic plans to include additional activities required by the laboratory systems to support NTD elimination within their own country and adjacent regions. The follow-up visits included meetings with the directors and laboratory staff from NTD research laboratories and national NTD control programmes operating within the Ministry of Health in each country, to updated strategic plans for strengthening laboratory capacity.

These individualised strategic plans were agreed by all stakeholders and will act to guide the laboratories as they become autonomous, leading research and regional reference laboratories in the field of NTDs.

In addition, 15 PhD studies have been either successfully completed or are ongoing and 5 Masters and 2 Diploma and Certificate students have successfully finished their training.

The overall LF programme is already planning for the scale-down phase in 6 countries. After the MDA execution phase the programme needs to focus on morbidity management as an integrated part of treatment of those who continue to suffer from LF disease. LSTM is working closely with Professor Charles MacKenzie of Michigan State University who has experience of working on morbidity management linking closely with WHO. His background is the pathogenesis of onchocerciasis and LF, combining laboratory studies with field work and MDA programmes in many endemic countries from the Americas, Africa and the Middle East. Another new addition to the team is Sian Freer as Chief Operating Officer for CNTD.

Schistosomiasis

In addition to the LF implementation activities, LSTM works with the Schistosomiasis Control Initiative as part of ICOSA (Integrated Control Of Schistosomiasis in Africa) which focuses on the distribution of praziquantel, the donated drug for schistosomiasis control and albendazole for control of soil transmitted helminthiasis in three countries: Liberia, Mozambique and Zambia.

Fishermen are susceptible to schistosomiasis and can become infected by free-swimming larvae penetrating the skin

LSTM is also heavily involved in seminal work optimising the performance of praziquantel in treatment of children with intestinal schistosomiasis. Blood samples taken from Ugandan children have been analysed with liquid chromatography – mass spectrometry (LCMS) determining the profiles of both drug enantiomers. A detailed population pharmacokinetic analysis has been shown that current dosing (40mg/kg) needs to be raised to ensure better anti-parasitic performance. In so doing, this builds a stronger evidence-base for more rational use of praziquantel in young children.

Diagnostics

Within the LSTM based Research Centre for Drugs and Diagnostics (RCDD), the A·WOL consortium is focussed on new drugs to treat LF and onchocerciasis (river blindness). These diseases affect more than 150 million people globally and the international community agrees that they should and could be eliminated. There are ongoing MDA campaigns underway to achieve this goal. However, in the absence of a drug that can kill adult parasites, current programmes require many years of annual (or more frequent) rounds of drug administration to large populations in the rural communities blighted by these diseases.

A·WOL scientists within the RCDD have demonstrated that adult worms can be killed by eliminating an essential symbiotic bacterium called Wolbachia. This approach has the potential to significantly reduce the timescale of elimination programmes, to provide alternatives to current drugs and to deliver tools that can be used in areas where current approaches are failing or cannot be deployed.

> “LSTM has a long standing history of industry engagement in translational medicine, it is our objective that the new Research Centre for Drugs and Diagnostics will facilitate and catalyse future partnerships with SMEs and larger organisations towards the development of better novel therapies and diagnostics for global health”
>
> *– Professor Giancarlo Biagini, LSTM*

Professor Giancarlo Biagini

Mapping

Ethiopia and DRC are expected to commence their MDA programmes in 2014-2015 following an integrated mapping strategy. In Ethiopia this also included the mapping of podoconiosis, a condition known as ‘mossy foot’, caused by exposure to volcanic soils but which mimics filariasis clinically. Based on the mapping strategy the number of people in Ethiopia targeted for treatment is 12 million.

Operational research, led by Dr Louise Kelly-Hope, is involved in the development of a micro-stratification overlap mapping

(MOM) strategy. It produces high resolution maps for areas where Loa loa is co-endemic with LF and onchocerciasis, such as Nigeria, DR Congo and Angola. This new strategy has been well received by the NTD community and LSTM is working with WHO to develop this approach further to inform potential alternative implementation strategies.

Professor Russ Stothard, supported by The END Fund, conducted a major mapping exercise in Namibia targeting 600 schools in the Northern provinces of the country. Similar exercises in DRC and Ethiopia also receive support from The End Fund. The outcome of which will lead to improved uptake of rapid diagnostic tests for schistosomiasis and soil transmitted helminths and cheaper, more efficiently run treatment plans. Treatment can easily be scaled up by the relevant Ministries of Health using drugs donated by the pharmaceutical company Merck KGaA following its commitment made during the London Declaration on NTDs in 2012. A mapping study using a similar methodology and protocol is underway in Angola. It is also hoped that the collated evidence will be used to update WHO mapping guidelines.

Implementation research to enhance scale-up of NTD programmes

A major new programme of implementation research for NTDs has been funded by DFID. The COUNTDOWN consortium led by Professor Russ Stothard with Dr Sally Theobald and Professor Mark Taylor brings together an innovative and multidisciplinary UK (LSTM, Pamoja Communications), USA (FHI 360) and sub-Saharan Africa (SSA) partnership (Ministries of Health and research partners in Cameroon, Ghana, Liberia and Nigeria) of high profile NTD researchers, key NTD policy makers and practitioners and specialists in implementation research and research uptake. COUNTDOWN will contribute to reducing the morbidity, mortality, and poverty associated with NTDs through increasing knowledge and evidence for cost effective scale-up and sustainable control and elimination of NTDs as a public health problem in line with the WHO 2020 NTD Roadmap.

Guinea Worm gone from Nigeria

Professor Molyneux has been heavily involved with the Global Guinea Worm Eradication programme and as a member of the International Commission of the WHO presented data to the Commission. Nigeria was declared free of transmission by the WHO Director General in December 2013.

Molyneux and his team visited 17 states and the Federal Capital Territory, 16 local government areas, 136 villages and also interviewed 16,030 people. He stressed the need for continued health sensitisation, cross-border coordination as well as awareness. He urged the Federal Government to improve rural water supplies in order to sustain the health of the people, advising residents in areas where there was no clean water to boil their water before drinking. He also attended a meeting hosted by the Bill and Melinda Gates Foundation to discuss the end game strategies in the remaining four endemic countries.

In December 2013 Professor Molyneux gave the prestigious Manson Lecture of the Royal Society of Tropical Medicine and Hygiene, entitled "Neglected Tropical Diseases: now more than just the other disease - the post 2015 agenda" following the award of the Society's Manson Medal at their AGM in September. Professor Molyneux was also elected as Honorary International Fellow of the American Society of Tropical Medicine and Hygiene.

Fabric with Guinea Worm health messages

Department of Parasitology

Professor Mark Taylor - Head of Parasitology

Drugs & Diagnostics

This year saw the launch of our Research Centre for Drugs and Diagnostics. Joint initiatives have sprung from this venture including the evaluation of Epistem's Genedrive in Nigeria and South Africa and funding secured from MRC Confidence in Concept and Epistem to further develop novel cartridges for HIV and malaria. The launch was linked to the British Society for Parasitology's autumn symposium on 'Advances in Diagnostics for Infectious Diseases', organised by LSTM's Dr Emily Adams and Professor Russ Stothard. Over 150 parasitologists attended the event, including our Masters students in 'Molecular Biology/ Control of Parasites and Disease Vectors'. MSc students were able to talk with researchers, PhD students and international leaders from industry and academia, providing greater understanding of careers in research. Incorporating this symposium directly into the student timetable provided a unique educational opportunity that fits with LSTM's drive to enhance student experience through providing a blend of learning approaches. A new website, www.rcdd.co.uk, shows the breadth of drug and diagnostic research at LSTM.

LSTM
RESEARCH CENTRE FOR DRUGS & DIAGNOSTICS

Professor Steve Ward heads another new initiative: The Liverpool-Guangdong Drug Discovery Consortium, in collaboration with University of Liverpool and Guangdong University of Technology (GDUT), China. The consortium is focussed on the development of new drug therapies for the treatment of tuberculosis (TB), malaria, Neglected Tropical Diseases (NTDs) and other infectious diseases. The collaboration will not only bring results in terms of research, but will also provide some of the students involved from GDUT the opportunity to study in Liverpool.

A team led by Professor Giancarlo Biagini secured a Wellcome Trust's Biomedical Resource & Multi-User Equipment £0.6 million award for a flow cytometry/sorting and cell imaging platform for the analysis of Hazard Group 3 pathogens (e.g. TB, malaria, HIV, Dengue). The HG3-imaging facility, set in one of LSTM's 22 HG3-containment laboratories, will be the first dedicated facility of its type in the North West and will further expand LSTM's technology platforms for drug discovery and fundamental biological research.

Funded by a Bill and Melinda Gates Foundation Grand Challenges Exploration grant, Dr Joe Turner and Professor Mark Taylor, in collaboration with Professor Samuel Wanji's laboratory in Cameroon, have developed a macrofilaricide drug screen for onchocerciasis. The model has been validated as a scalable pre-clinical system to test novel drug cures against onchocerciasis. The team has secured phase II funding of $1million to continue to refine the model and extend the approach to provide a complementary model for loiasis.

A pair of male *Onchocerca ochengi*

Dr Joe Turner was also awarded an MRC New Investigator Award to address cellular and molecular mechanisms of filarial lymphedema and onchocercal keratitis. This research will dissect a novel disease pathway, inflammatory angiogenesis, and determine its causal relationship with filarial pathology of the eye, lymphatics and skin and develop pre-clinical models to screen for new therapies. Dr Britta Urban has continued her studies on the mechanisms of immunity to malaria. The Plasmodium falciparum erythrocyte membrane protein 1 (pfEMP1) is the major surface protein expressed on infected red blood cells and is associated with the pathology of severe malaria. Dr Urban's laboratory investigated whether immune responses to this protein are associated with protection and showed that children with PfEMP1-specific 'helper' T cells producing IL-4 remained free from malaria for longer.

Vector Parasitology

Dr Alvaro Acosta-Serrano's laboratory was part of the consortium that sequenced and annotated the Tsetse fly (Glossina morsitans) genome, a vector for human sleeping sickness and animal trypanosomiasis in Africa. They also published a satellite paper on the protein composition of the tsetse peritrophic matrix. Collectively, it is expected that the knowledge gained from the tsetse fly genome could help us identifying suitable candidates to develop a transmission blocking vaccine against African trypanosomiasis.

NTDs

Further expansion of our NTD activities this year include two new senior appointments: We welcome Professor Lorenzo Savioli as a Senior Professorial Fellow. The former WHO Director for the Department of Control of Neglected Tropical Diseases (NTDs) will head LSTM's cross-cutting theme of NTDs pulling together a broad range of existing and new programmes to act as a global advocate on NTDs and mentor for the next generation of NTD researchers at LSTM. Professor Charles Mackenzie also joins our CNTD-LF team to head the DFID lymphatic filariasis morbidity management programme.

Centre of Neglected Tropical Diseases (CNTD)

While retaining our focus on our primary goal to support the 12 CNTD project countries in their efforts to eliminate LF by 2020 we were able to demonstrate through diverse collaborative activities the value of cross-sector and integrated approaches to NTD control and elimination.

Learning & Teaching Parasitology

The Department contributes to learning and teaching on BSc, MSc and DTM&H courses. The 2013-14 academic year welcomed 25 students to the LSTM Masters programmes in *'Molecular Biology/Control of Parasites & Disease Vectors.'*

Alistair Reid Venom Research Unit

The Alistair Reid Venom Research Unit, led by Dr Rob Harrison, has expanded over the past year with new staff and snakes.

Dr. Nick Casewell was appointed as a Lecturer on the LSTM tenure track at the same time as his research on the first snake genome was published in PNAS. These projects, on the non-venomous Burmese python and the venomous king cobra, focused on the evolution of the venom system. The unit extended work by demonstrating that a complex combination of genetic and non-genetic factors result in major medically-important differences in snake venom composition - even between very similar snake species. This is a timely research output as the unit embarks upon a 4 year MRC-funded project to utilise novel immuno-proteomic strategies to develop a single polyspecific, non-cold chain liquid snake antivenom with unparalleled sub-Saharan African efficacy. This exciting project has the potential to greatly reduce the mortality (~32,000 annual deaths) and morbidity (~95,000 surviving victims suffering permanent disability) of snakebite in sub-Saharan Africa. It also required the importation of hundreds of new snakes into our Herpetarium, which now houses 650 specimens of 56 species of venomous snakes – the most diverse academic collection in Europe.

The unit has also been involved in the Liverpool World Museum 'Sssnakes Alive' exhibition which will broadcast the medical importance of tropical snakebite, and LSTM's role in reducing snakebite deaths and disabilities, to an estimated 400,000 visitors.

FEATURE ARTICLE:

Malaria

Between 2000 and 2012 malaria mortality fell by 45%. Ten countries within Africa are now on track to reduce malaria hospital admission rates by 50% or more by 2015. These successes, due in part to the widespread availability of improved diagnostics, effective chemotherapeutics and anti-mosquito interventions, have stimulated the malaria research and control community to think a little bit bigger. Whilst formerly intervention efforts were aimed at reducing malaria morbidity and mortality, now strategies are actively being developed for the elimination of malaria. Much of LSTM's malaria research is increasingly directed towards the development of innovative approaches that foster malaria elimination. To increase external visibility of these efforts in 2014 LSTM established the cross departmental Malaria Transmission Reduction and Elimination Centre (MalTREC).

The work of MalTREC can be broadly grouped into:

- Improved deployment of existing interventions by maximising coverage, targeting hard to reach sections of the community and developing the innovative implementation and monitoring approaches that scale-up demands.
- Studying the changing epidemiology of malaria to understand how we can progress from successful control to elimination of transmission.
- Repurposing existing technologies and developing the novel diagnostic, surveillance and vector control tools that elimination will require.

Improved deployment of existing interventions by maximising coverage, targeting hard to reach sections of the community and developing the innovative implementation and monitoring approaches that scale-up demands.

Innovative ways of assessing disease burden

Dr Anja Terlouw, based at the Malawi-Liverpool-Wellcome Trust Clinical Research Programme (MLW), has joined a consortium that is implementing a five-year malaria control programme around the Majete Wildlife Reserve in Southern Malawi. Dr Terlouw and her team will apply the Easy Access Group (EAG) and continuous Malaria Indicator Survey (MIS) tools they have been pioneering in the region. Malaria elimination requires cheap and accurate assessment of community disease burden and the team have been investigating whether groups of the population that can be readily accessed by the health service are a sensitive group for rapidly monitoring the impact of malaria control. The two major groups under study thus far are children coming for child clinic visits and pregnant women who attend antenatal care. It is hoped that the Majete malaria control project will showcase how development and conservation interest groups can facilitate malaria control. In neighbouring Zambia, Dr Gerry Killeen has collaborated with the National Malaria Control Centre to support the development of community-based surveillance systems. Working alongside Dr Killeen, PhD students Mr Busiku Hamainza and Mr Chadwick Sikaala have assessed how malaria in humans and malaria vector populations respond to changes in intervention choice and coverage.

The insecticide quantification kit

One of the major problems facing malaria vector control programmes is to guarantee that the insecticides used for control are being applied at the right concentration, in the right place and at the right time. Dr Mark Paine from the Vector Biology Department has been collaborating with LSTM honorary fellow Dr Luc Djogbenou (Institut Régional de Santé Publique de Ouidah, Benin) to start a field trial in Benin of a new assay that will ensure that Indoor Residual Spraying (IRS) using an organophosphate insecticide is being carried out effectively. Dr Paine's team have developed a new diagnostic kit that is a simpler and more affordable alternative to the established methods of ensuring adequate dosing. If successful, this new assay will become part of a suite of insecticide quantification kits (IQK) developed to quality assure IRS using different kinds of insecticides in Africa and Asia. The kits have been developed with colleagues internationally and the IVCC product development partnership.

Harnessing the power of genomics to understand vector responses to insecticide selection

Working with genome analysis specialists from the Wellcome Trust Sanger Institute and field entomologists in Ghana, PhD student Chris Clarkson and colleagues sequenced the genomes of individual wild mosquitoes of each species from southern Ghana. The results reveal that transfer of a major insecticide resistance mutation (kdr) resulted in replacement of over 3 million surrounding DNA bases (1.5% of the genome) of Anopheles coluzzii, with that of Anopheles gambiae s.s. This is especially significant because the two species are very closely related and the region replaced is one of relatively few areas of their genomes that are substantially different. Surprisingly, this apparently huge genomic disruption has had no detectable impact on reproductive isolation, with hybridisation rates between the species in Ghana remaining low and stable despite a dramatic rise in frequency of the kdr mutation in A. coluzzii. This research highlights the extreme adaptability of Anopheles mosquitoes and the innovate methods they deploy to overcome our interventions.

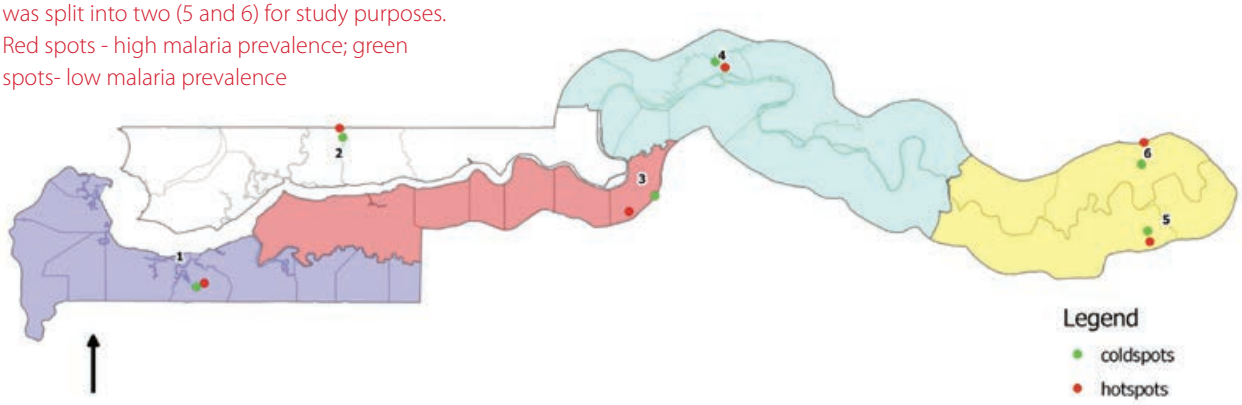
Studying the changing epidemiology of malaria to understand how we can progress from successful control to elimination of transmission.

As malaria prevalence falls over much of sub-Saharan Africa, new public health problems emerge. Falls in malaria are not uniform, resulting in recalcitrant hotspots that appear resistant to intervention efforts. What causes these hot-spots is the subject of Medical Research Council (MRC) PhD student Kevin Opondo's empirical work in The Gambia and Dr Gerry Killeen's more theoretical studies.

Identifying entomological drivers of malaria hotspots in The Gambia.

The National Malaria Control Programme (NMCP) of The Gambia has recorded falling malaria endemicity since 2004. However, hotspots of ongoing malaria transmission have been observed which could act as source of malaria transmission to other areas. In The Gambia, as in most of West Africa, more than one species of Anopheles mosquito, often with very different vectorial ability, can be found living in sympatry. Kevin Opondo and colleagues are investigating malaria vector composition in low and high malaria prevalence settings (figure 1). They are characterizing their preferred vertebrate host; their ability to withstand the effect of insecticides and how these traits possibly contribute to the observed differences in the malaria prevalence.

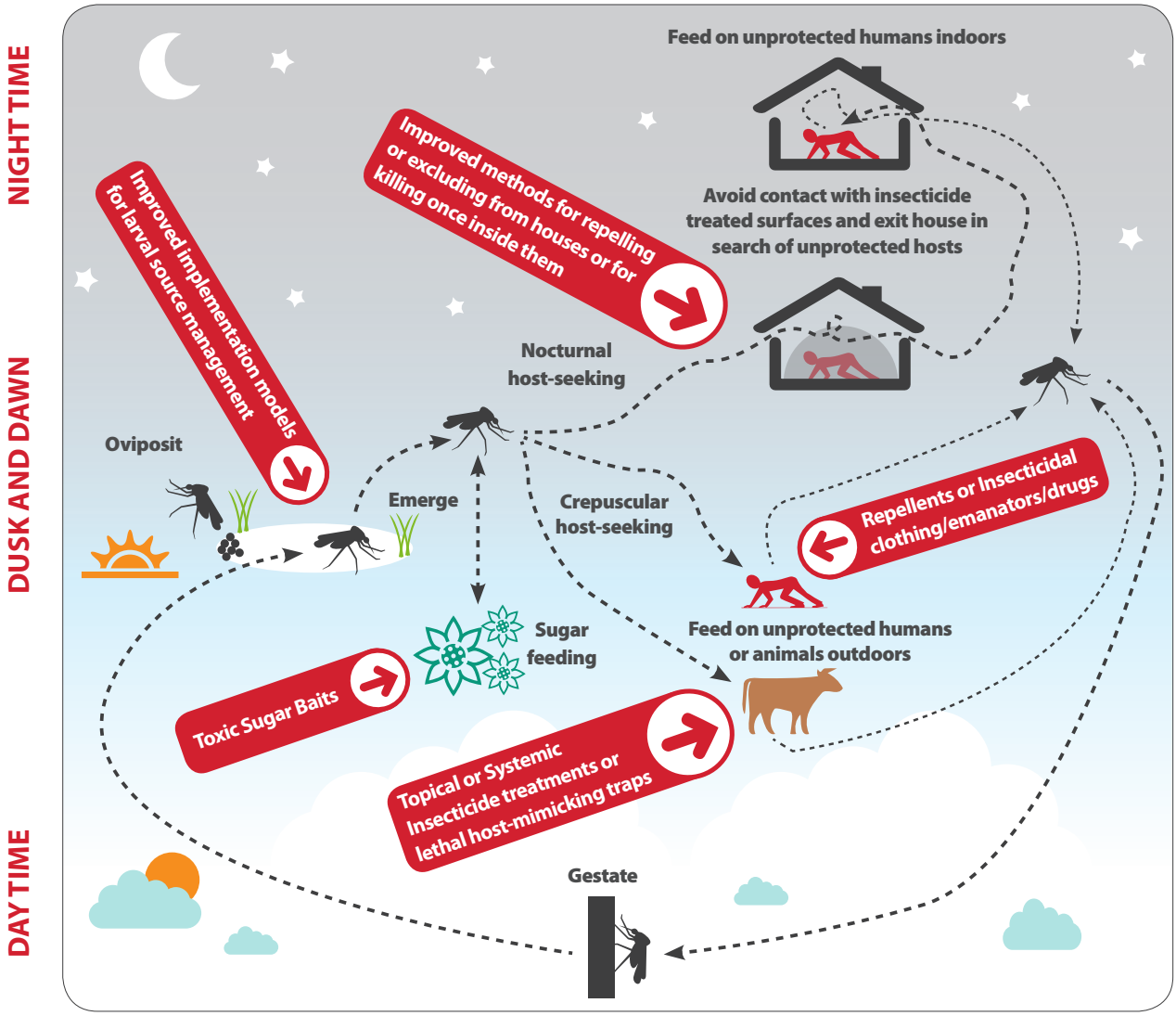
Figure 1: Map showing study villages in the 5 administrative regions of the Gambia. Region 5 was split into two (5 and 6) for study purposes. Red spots - high malaria prevalence; green spots- low malaria prevalence



LSTM PhD student Nelson Grisales collecting mosquitoes in Burkina Faso

Tackling residual transmission by behaviourally evasive vectors

It is unsurprising that mosquitoes which predominantly feed on people are by far the best studied. The majority of the most potent, human-adapted vectors of malaria prefer to feed in the middle of the night when humans are typically asleep. Feeding indoors at night is the behaviour targeted by using LLINs to protect sleeping humans. In many settings, however, there are vectors whose behaviours render them of secondary importance for malaria transmission, but which could sustain low levels of transmission that will prevent total elimination. Dr Gerry Killeen and colleagues at the Ifakara Health Institute in Tanzania in particular have developed a conceptual framework for targeting these increasingly important vectors (Figure 2). His work defines "target product profiles" for new interventions that he and other groups within LSTM are developing to address this Achilles heel of malaria elimination strategies.



Development of the novel tools that elimination requires.

Professor Feiko ter Kuile and Dr Penny Phillips-Howard are setting up a new collaboration in Kisumu, western Kenya to investigate the role played by asymptomatic, malaria-infected people. It is estimated in high transmission areas, that >50% of individuals may be asymptomatic and that they are largely responsible for maintaining transmission within their communities. In western Kenya, the prevalence of malaria in <5 year olds has fallen from 70% in 1997 to 40% in 2008, where it has now stagnated. They are pursuing research that aims to reduce the number of these infectious, asymptomatic carriers, and to target the mosquitoes that conventional insecticidal control may not be reaching. Studies involve two current PhD students, examining clinical and health economics components, with a further four to be registered this year.

Drugs to reduce asymptomatic malaria carriage
Strategies that specifically address the asymptomatic population, such as mass screen and treat (MSaT) and mass drug administrations (MDA) are becoming popular. ACTs are used in these interventions, but do not kill all the mosquito-infective stages of the malaria parasite, the gametocyte. Primaquine is a drug that is effective against the gametocytes which the mosquito takes up in her blood meal. However, primaquine can cause haemolytic anaemia in G6PD deficient individuals and it is therefore not widely deployed. In October 2012, the WHO recommended low-dose primaquine for non-pregnant persons aged >1 year for use in areas approaching elimination or threatened with artemisinin resistance, without the need for prior G6PD testing. The Kenyan team are conducting an outpatient study to determine the lowest maximally efficacious dose of primaquine in co-administration with an ACT, and an inpatient study of G6PD deficient malaria-infected children to determine the safe maximally efficacious dosing range of primaquine. Both these studies will crucial to the Kenya Malaria Control Programmes efforts to reduce malaria transmission.

Drugs that target the vector
Alongside these antimalarial drug safety and efficacy studies, the Kenya team are trialling the use of ivermectin. This drug has been used for many decades in over 1.3 billion people for the control of onchocerciasis and lymphatic filariasis, and is thus known to be very well tolerated. Ivermectin can kill blood sucking insects when they feed on a person who has recently been treated with this drug. Recent research has shown Ivermectin has a potent, but short-lived effect (for 6-11 days) on mosquito survival, egg-laying, and parasite sporogony. To prolong transmission blocking, higher or repeat doses of drug are required. The group in Kenya are conducting dose finding studies to evaluate the transmission blocking effect of higher doses of ivermectin to define the optimal dose for its future use in combination with ACT for MDA and
case-management.

These case studies illustrate how MalTREC and partners are both ensuring the prolonged success of extant interventions and developing new approaches that will have substantial impact upon malaria control. The breadth of our approach ensures that we will continue to guide control programs in malaria endemic countries and inform WHO guidelines in the next decades.

A rooftop sign at a private health clinic in Uganda promotes malaria prevention through the use of insecticide-treated mosquito bednets ITNs

Department of Vector Biology

The Department of Vector Biology delivers research that is responsive to challenges in controlling insect borne diseases. This ranges from laboratory based discovery to implementation research with the eventual aim of improving the deployment and targeting of vector control interventions.

Professor Hilary Ranson - Head of Vector Biology

Utilising the power of genomics

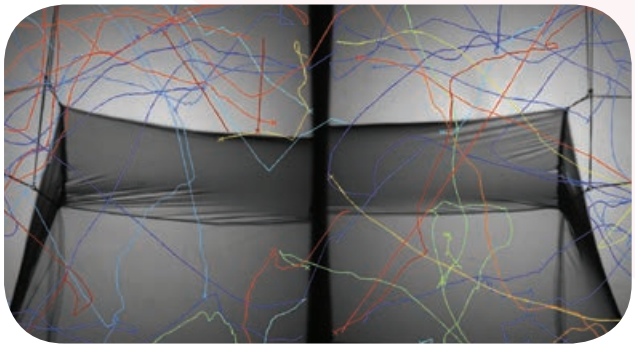
The ability to sequence the entire genomes of individual organisms has caused a paradigm shift in the biological sciences. LSTM has stayed at the forefront of this burgeoning movement with participation and leadership of major consortia using genomics to advance research into diseases affecting the developing world. An ambitious project with leadership from LSTM is the Anopheles gambiae 1000 Genomes Project. Malaria mosquitoes have been collected from across Africa and submitted to the Wellcome Trust Sanger Institute, where thousands of genomes have been sequenced. Our scientists are analyzing these data to explore fundamental phenomena such as the evolution of insecticide resistance. Apart from Anopheles gambiae, there is a dearth of genomic resources available for other important malaria vectors. The Anopheles 16 Genomes Project seeks to remedy this via 16 new reference genomes. LSTM has been involved in the gene annotation and analysis of these genomes, and data will soon be publicly available.

Testing lead compounds against insecticide resistant mosquitoes by the Liverpool Insect Testing Establishment

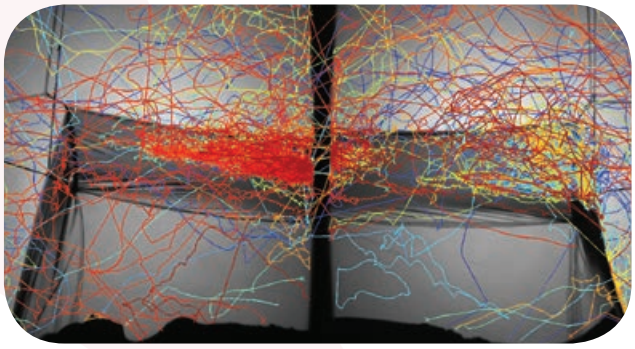
Accelerating the development of new public health insecticides

New insecticides are urgently needed to combat the spread of insecticide resistance in vectors of malaria, dengue and leishmaniasis. Liverpool Insect Testing Establishment (LITE) provides an efficient service to industrial partners to screen new chemicals against insecticide resistant colonies using a variety of biological and chemical assays. Dr Mark Paine's group has developed new chemical probes that can predict insecticide resistance mechanisms in field populations of mosquitoes. They have also produced a panel of insecticide-metabolising enzymes that can be used in the primary screening of new insecticide candidates to test for potential cross resistance. Several groups in the department are deciphering the molecular mechanisms of resistance and Dr Wondji's work on Anopheles funestus yielded the first molecular diagnostic for metabolic resistance in malaria vectors. In the field, the AvecNet consortium is evaluating new products to combat insecticide resistant populations in both experimental hut trials and large-scale clinical trials. In addition, staff members continue to play a leading role in advocating for a global response to the resistance crisis via presentations to national governments and donors and via leadership roles in WHO working groups.

Developing new vector control strategies to enable elimination of transmission Many of the most potent, human-adapted vectors of malaria prefer to feed in the middle of the night when typically, most humans are asleep, immobile and vulnerable to attack, and rest indoors after feeding while the blood meal is digested and eggs are developed. Use of long-lasting insecticidal bednets (LLINs) targets vector mosquitoes when they try to feed indoors while indoor residual spraying (IRS) targets them when they rest inside houses. However, Dr Gerry Killeen has recently demonstrated that many malaria vector species can maintain robust transmission, despite high coverage of LLINs/IRS, because they exhibit one or more behaviours that allow them to avoid fatal contact with these existing interventions but can be also targeted with new or improved vector control strategies to finally enable elimination of malaria transmission.



Mosquito tracks around an empty untreated bet net. Flight is exploratory, with little net contact



Mosquito flight tracks around untreated net, baited with a human volunteer. Focussed net attack, high activity.

A major breakthrough in the development and optimisation of new vector control tools is the development of a tracking system for investigating the behaviour of individual mosquitoes under natural conditions. This work, led by Dr Philip McCall, is yielding long awaited fundamental information on the movement and resting behaviour of malaria vectors inside African homes. This insight will be essential if we are to develop innovative new approaches to targeting vector control interventions for diseases such as malaria and dengue.

Implementation and evaluation of large scale vector control programmes

Building on the success of the tiny targets for control of Gambian sleeping sickness in Uganda, this programme, led by Professor Stephen Torr and Professor Mike Lehane is now being scaled up across Central Africa with renewed funding from the Bill & Melinda Gates Foundation. A new project to reduce Rhodesian sleeping sickness by understanding the dynamics of transmission in wilderness areas was initiated in Tanzania this year, arising from extensive previous work identifying risk factors for this disease.

In India, Dr Mike Coleman is working in Bihar State to introduce data management systems to assess the efficacy of the visceral leishmaniasis (VL) elimination programme. Indoor residual spraying with insecticides is the primary intervention to control this sandfly-transmitted disease and quality control of the programme is utilising the insecticide quantification kits developed by LSTM.

Tsetse fly trap

FEATURE ARTICLE:

Pneumonia, TB and Chronic Respiratory Diseases

Respiratory research at LSTM works to understand, prevent and treat respiratory diseases in both low-middle income countries (LMIC) and the UK. The origins of adult lung disease are in early life; infection and environmental pollution in the growth years both lead to chronic lung disease which in turn leads to further cycles of infection.

Household Air Pollution (HAP)

Household Air Pollution (HAP) is the number one environmental cause of death in the world. HAP is associated with childhood pneumonia, adult chronic lung disease and cancer. In low income countries, one third of the world's population, predominantly living in Less Economically Developed Countries (LEDC), is exposed to toxic fumes from the incomplete combustion of solid fuel in cooking and heating. In middle income countries HAP is a product of side-stream cigarette smoke, traffic and industrial pollution, radon and coal smoke.

In 2014, LSTM staff led the Lancet Respiratory Medicine Commission into the respiratory effects of HAP in low-middle income countries. In addition, the BREATHE consortium was funded as a Medical Research Council Partnership to link the LSTM Cookstove and Pneumonia Study (CAPS) with other HAP initiatives worldwide.

The full Commission is free online on **www.thelancet.com/commissions/household-air-pollution**

THE LANCET

Advanced Cookstove

CAPS has so far recruited over 10,000 children across 150 villages and is the largest study of its kind ever conducted. Homes are randomised to traditional cooking or high-efficiency wood stoves with an over 80% reduction in smoke emissions. CAPS monitors stove adoption, HAP and child pneumonia – the study will report in 2017.

Tuberculosis (TB)

Fifty years after the development of anti-tuberculosis chemotherapy, there are still 8 million new cases and 1.3 million deaths from TB each year. Research on TB at LSTM covers the entire spectrum from developing novel drug targets through to robust evaluation of targeted or spectrum interventions and translation into policy implementation. Members of the Department of Clinical Sciences collaborate throughout the world on projects at high burden sites including Nigeria, Sudan, Malawi, Ethiopia and Vietnam.

In Nigeria, LSTM collaborates with the National TB Programme to evaluate new diagnostics for tuberculosis, including nucleic acid amplification tests (Genedrive, Flurotype), automated smear microscopy platforms (TBDx), potential markers of TB and treatment response (Mycolic acids, cytokine responses) and rapid screening tests. In Ethiopia, LSTM doubled the number of TB cases detected by expanding our community-based approach to reach a population of 7 million residing in remote rural areas. The project was presented at the World Health Assembly in New York, was awarded the STOP-TB Kochon Prize and received visits from WHO, the Global Fund and MPs from Canada and the UK. The approach will likely be expanded by the National TB Control Programme to four further regions of Ethiopia by 2015.

> "To stop TB, we must bring quality TB care to poor and marginalized communities. This project has shown that we can capitalize on two of the world's greatest resources - people and communities - to ensure that no one gets left behind. I am particularly pleased to see that this project has served as a pathfinder, encouraging further investment and scale up from the Ethiopian government and the Global Fund."
>
> *- Dr Lucica Ditiu, Executive Secretary of the Stop TB Partnership*

LSTM's work in Malawi has shown that pharmacodynamic modelling of bacterial biomarkers may improve design of Phase II treatment trials, and has developed fluorescence microscopy techniques for the identification of persister organisms. These approaches are vital to improve understanding of bacillary persistence in tuberculosis disease and to the development of shorter TB treatment regimens.

Pneumonia prevention and human challenge studies

Pneumonia kills more children under five than any other illness in the world. Reducing the pneumonia burden is therefore a global priority and prevention by vaccination is the most effective way to achieve this. Current pneumococcal vaccines confer poor levels of protection against pneumonia and only cover 13 of the 90+ pneumococcal types.

New vaccines need to be tested in large clinical trials on tens of thousands of patients with an outcome of reduction in disease; this is a lengthy and costly process. The respiratory team at LSTM, in collaboration with the Royal Liverpool University Hospital (RLUH), has developed an Experimental Human Pneumococcal Carriage (EHPC) model that provides an ethical way of measuring vaccine efficacy in which prevention of colonisation acts as a surrogate for prevention of disease.

Last year, the EHPC study team, led by Prof Stephen Gordon and Dr Daniela Ferreira, proved the concept of vaccine testing using this model in a trial involving only 100 volunteers over 9 months and at a fraction of the cost of a Phase 3 trial. The study showed that 78% vaccine protection was afforded against carriage and that bacterial density was also reduced, supporting a role for vaccine induced reduction in transmission. This vaccine testing platform is already being used to test the effect of new pneumococcal vaccines on carriage. A Phase 1b trial that will test GEN004, a protein-based vaccine candidate from Genocea Biosciences (Cambridge, USA), started in September.

Pneumonia treatment

Research into treatments for pneumonia has also been an area of focus at LSTM. Dr Steve Aston has been examining outcomes of adult pneumonia in Blantyre, Malawi, which showed the critical importance of hypoxia in determining outcome. Dr Dan Wootton studied a large cohort of pneumonia patients in Liverpool and demonstrated the under-appreciated importance of co-morbid illness in a UK setting. Dr Andrea Collins has built a translational intervention study based on the link between co-morbid illness, infection and prolonged hospital stay by developing a supported early discharge scheme (HomeFIRST).

Chronic Respiratory Diseases

The burden of asthma and Chronic Obstructive Pulmonary Disease (COPD) is unknown in much of Africa. Following from the success of the Blantyre Health Survey in developing high quality spirometry in Malawi, Kevin Mortimer is leading the Adult Lung Health Study in Malawi. This study will not only map the prevalence of asthma and COPD, but will link with cookstove interventions to determine the protection from chronic disease afforded by these interventions.

Asthma and COPD are relatively well understood in the UK, and the experience obtained can be used to develop regionally appropriate management strategies for developing situations. Working in Liverpool, Ecuador and in Malawi, Dr John Blakey is building on UK experience of examining risk evaluation tools in order to improve asthma care in places where asthma is common but hospital re-admission are an issue, and where care is rudimentary and in need of strategic planning.

LSTM researcher counting pneumococcus colonies

Department of Clinical Sciences

The department's vision is to be a vibrant, cohesive and collaborative department within LSTM, providing an excellent platform for translational research from concept through discovery and clinical trials to evidence synthesis, teaching, policy change and eventual health impact. The outputs are products (drugs, diagnostics and vaccines), policies for health, skilled people in key positions and maintained places where excellent work can be conducted.

Professor Stephen Gordon - Head of Clincial Sciences

The tropical Clinical Trials Unit (tCTU)

The tCTU is officially operational and is now managing several large trials, including the Cookstove and Pneumonia Study (CAPS). The tCTU is receiving wide support from both within LSTM and from collaborating institutions such as the University of Liverpool, the Liverpool Women's Hospital and local NHS Trusts. Head of tCTU Professor Brian Faragher and his expanding team assist researchers to convert good research ideas into fieldwork through clinics on grant proposals, data management, statistical analysis and report writing. Through the set-up of a Steering Group the necessary links with existing expertise in Finance, Governance, Monitoring and Evaluation of safeguarded.

Cookstove in Malawi

Collaboration and networking

The Medical Research Council-funded BREATHE consortium, led by Professor Stephen Gordon, played an active role in the CAHRD consultation in June, and produced a Lancet Respiratory Medicine Commission in September. The Commission sets a research agenda for household air pollution (HAP) studies in low-middle income countries. HAP is the number one environmental cause of death in the world.

Departmental expansion

The department is experiencing a period of rapid growth. It welcomed Professor Stephen Allen to a Chair in Paediatrics jointly with Alder Hey Children's Hospital. Professor Allen is the current International Officer for the Royal College of Paediatrics and Child Health. He will develop the local Global Child Health network to provide opportunities in research, teaching and clinical practice.

Professor Duolao Wang joined LSTM from LSHTM in March 2014 to further our medical statistics capacity. Professor Wang will develop methodological research with a focus on statistical issues in translational research.

Professor Niessen joined LSTM in October 2013, to lead and develop health economics research and teaching in relation to infectious and chronic diseases. Previously, he was Professor of Public Health Economics at the University of East Anglia and he was the Founding Director of the NIH-funded Centre for Chronic Diseases at the International Centre for Diarrhoeal Disease Research, Bangladesh.

In other strategic appointments, Dr Derek Sloan and Dr

Maxine Caws joined the department to bring forward clinical laboratory studies in tuberculosis, Dr Nick Feasey, whose research focuses on the causes and outcomes of Salmonella infection, and Dr Deirdre Hollingsworth (jointly with University of Warwick) who will develop mathematical models within the CAHRD initiative.

Evidence Synthesis

The Evidence Synthesis for Global Health Group builds on LSTM's reputation as a global leader in high quality research synthesis methods. Its remit is to help LSTM retain and develop this reputation, ensure LSTM staff know how to access information in best practice to guide their own work, their students work, and their teaching.

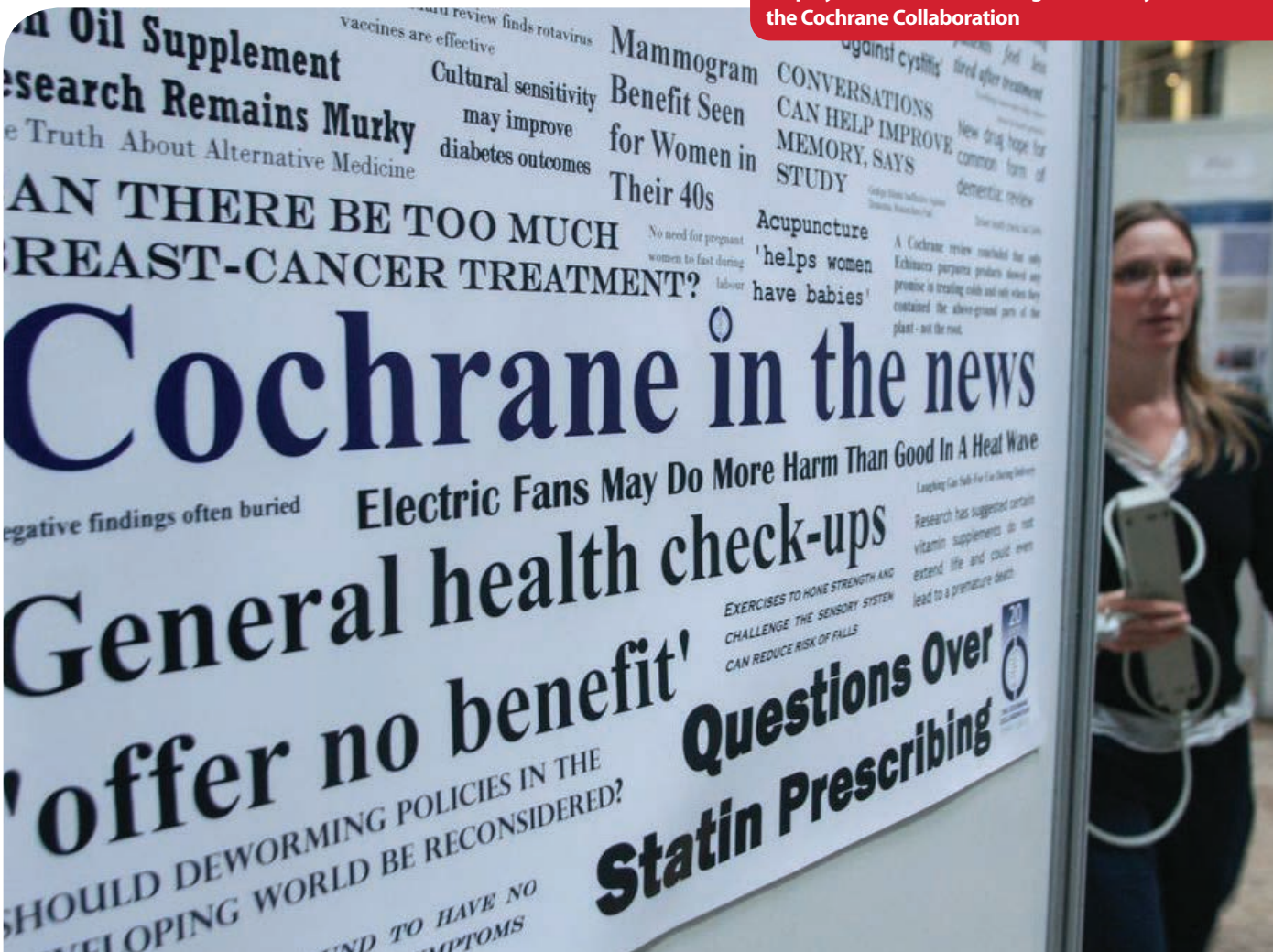
The Group help set up the Cochrane Collaboration, and remain major contributors, mainly through the Cochrane Infectious Diseases Group An international network of over 500 authors and 17 editors, managed by Anne Marie Stephani, with oversight from Dr David Sinclair and Professor Paul Garner. In July 2014 the WHO re-designated LSTM as a WHO Collaborating Centre for Evidence Synthesis for Infectious and Tropical Diseases. The Group has organised workshops and seminars in carrying out a systematic review, interpreting systematic reviews, and is now expanding as part of the Staff Development Programme on how to write a paper and issues around authorship. The Group provide placements for UK Public Health Trainees who contribute to Cochrane reviews, global guideline development and research integrity projects.

Learning and Teaching

The department has created an Innovative Teaching Think Tank. This forum aims to be a crucible for new ideas, testing the feasibility and level of interest for projects as diverse as gaming and regionally delivered ultrasound training.

Communications

The department hosted communications workshops to train staff in social media usage, sent video teams to Malawi, produced podcasts, interviews and films this year. The DoCS Newssheet launched as a means of keeping in touch both in Liverpool and with staff members abroad.



Display with news headlines generated by the Cochrane Collaboration

FEATURE ARTICLE:

Maternal and Newborn Health

Considerable progress has been made in the past academic year in further establishing LSTM's Centre of Maternal and Newborn Health (CMNH) as a global centre of excellence in maternal and newborn health research and its programme implementation. With a research portfolio of over £30 million, a growing team of over one hundred members of staff in Liverpool and in-country continue to work towards CMNH's mission of achieving global equality in maternal and newborn health.

Striving for equality

Maternal conditions remain the second most common cause of death in women of reproductive age in low and middle income countries. In contrast, maternal death does not feature in the 10 most common causes of death in high income countries. CMNH aims to close that gap, striving for global equality in the availability and quality of maternal and newborn health services.

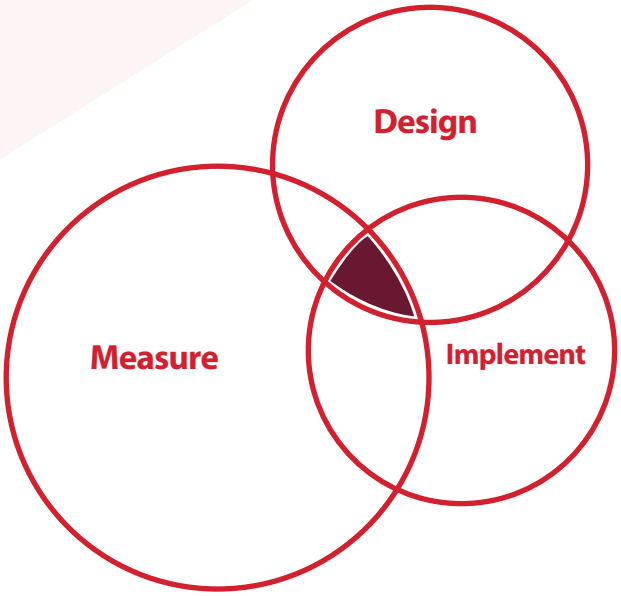
"I am very proud of the achievements of CMNH over the last year. With the support of our External Advisory Group and a passionate team of staff, we look forward to consolidate our current position and continue to lead in research, teaching and technical assistance in Maternal and Newborn Health."

– Professor Nynke van den Broek, Head of CMNH

Throughout the past academic year CMNH has focused on a number of practical applications, based on research that might have an impact on the post 2015 Millennium Development Goals within the sphere of global maternal and newborn health. These range from the development and testing of a standard assessment tool for capturing maternal morbidity at community and primary health care levels; mapping of Sexual & Reproductive Health and Maternal Newborn Child Health data collection in humanitarian emergencies; the provision of Leadership and Management Technical Assistance (TA) for those facilities and organisations with whom CMNH partner; and evaluation work, such as the national 'Health Transition Fund' in Zimbabwe and the 'Improving the health of pregnant women and children' programme in Malawi. A recent innovative area of work for the Centre is a move to electronic data capturing.

These examples are an expression of the Centre's vision of aiming to 'improve the availability and quality of healthcare for mothers and babies, contributing to the global reduction in maternal and new born mortality and morbidity and improvement in quality of life.'

The Centre's work falls into three categories: **design, implementation and evaluation**



Baroness Helene Hayman GBE, Chair of CMNH External Advisory Group, described the Centre's business model: 'Through partnership with governments and global agencies, CMNH is designing and implementing innovative, evidence-based healthcare packages and new frameworks for the evaluation of effectiveness in Sub-Saharan Africa and South Asia. It is facilitating the sharing of knowledge and expertise, encouraging lessons-learned to be shared across national boundaries.'

In April 2014 the work and achievements of the Centre were recognised by WHO, designating CMNH as a WHO Collaborating Centre for Research and Training in Maternal and Newborn Health.

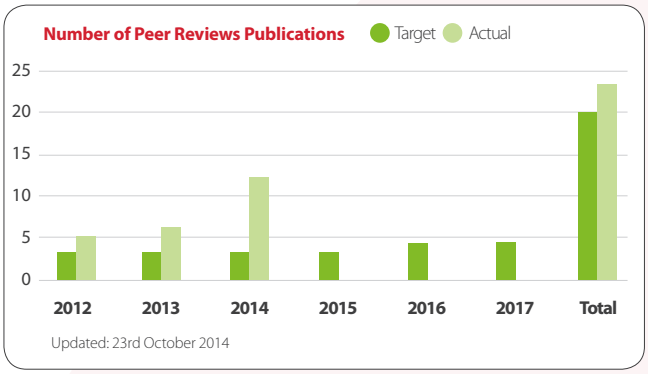
> In everything we do, WHO relies on the expertise of formal WHO Collaborating Centres, in your countries, and thousands of the best brains in science, medicine and public health, in your countries. They give us their time freely and it is my strong impression that they do so with pride.
>
> *– Dr Margaret Chan, Director-General WHO*

Working in Partnerships

CMNH works in partnership with many organisations, companies and institutions around the world. These partnerships are essential to transfer capabilities and expand research capacity in the many countries CMNH is operating in to further improve the availability and quality of care. Maternal and Newborn Health is also one of the four selected areas of the LSTM-led Collaboration of Applied Health Research and Delivery (CAHRD) and CMNH played a leading role in the launch event in June 2014 which brought together many representatives of northern and southern institutions.

Research outputs

CMNH exceeded in the past academic year its own target of peer reviewed publications. Topics varied from 'Factors associated with preterm, early preterm and late preterm birth in Malawi' in PLoS ONE to 'changing the role of traditional birth attendant in Somaliland' in the International Journal of Gynaecology and Obstetrics.



A particular one that stands out is the supplement to the British Journal of Obstetrics & Gynaecology (BJOG) entitled 'International Reviews: Quality of Care', published in September 2014.

The supplement, edited by Professor van den Broek along with Professor Matthews Mathai (WHO) and Professor Gwyneth Lewis (UCL), includes review articles, country studies and commentaries focusing on the vital issue of providing and being able to accurately assess the quality of care for maternal and newborn health. The supplement highlights experiences from across the globe with regards to introducing and implementing different audit methods to improve quality of care and highlights examples of good practice.

> Even with all of the achievements of the last few years, looking forward to a post Millennium Development Goals landscape, that quality of care is essential if we are to make vital progress and continue to reduce maternal and child mortality.
>
> *– Sarah Brown, member of the External Advisory Group for CMNH and Global Patron of the White Ribbon Alliance for Safe Motherhood*

In addition to peer reviewed articles CMNH also developed numerous manuals, guidelines and protocols, such as the Emergency Obstetric & Newborn Care Training package; Making it Happen with Data; Quality Improvement package; On the Job Training Manual (Sierra Leone); expanded EmONC Training Manual (Kenya) and Skills Lab for RMNCH+ A Services Training Manual (India)

In addition to coverage of CMNH's activities in local, regional and national media, Professor Nynke van den Broek participated in a panel debate on BBC Radio 4 Woman's Hour to discuss the 'Every Newborn Action Plan'. CMNH was also invited to contribute to the Lancet Global Health blog with an article on 'reducing neonatal mortality through skilled birth attendance'. The blog highlighted some of the challenges of improving global coverage of skilled birth attendance and suggested ways for improvement. Lastly, the work on CMNH was being referred to twice in the House of Lords Grand Committee during a debate on Women in developing countries.

Education

Liverpool School of Tropical Medicine has an excellent reputation and success record in training graduate students who go on to further research, consultancy and capacity development throughout the world. During the past academic year CMNH had 9 PHD students researching the following topics:

- Assessing non-severe morbidity
- Assessment of causes of and factors associated with stillbirth in Low and Middle Income Countries
- Exploring responsibilities and workload of midwives in low income countries
- Evaluating the benefits of training non-physician clinicians for Maternal & Newborn Care
- Health systems governance for facilities designated to provide comprehensive emergency obstetric and newborn care in Kenya
- Measuring social impact of EmONC training in sub-Saharan Africa
- Linking communities with facility-based healthcare workers
- Maternal Mortality in Mangochi district, Malawi – a RAMOS Study
- The effectiveness of EmONC training in Kenya

Making it Happen

Making It Happen (MiH) is currently the largest programme delivered by CMNH. At £15.8 million, it is also the largest programme dedicated to Maternal and Newborn Health funded by the UK's Department for International Development (DFID).

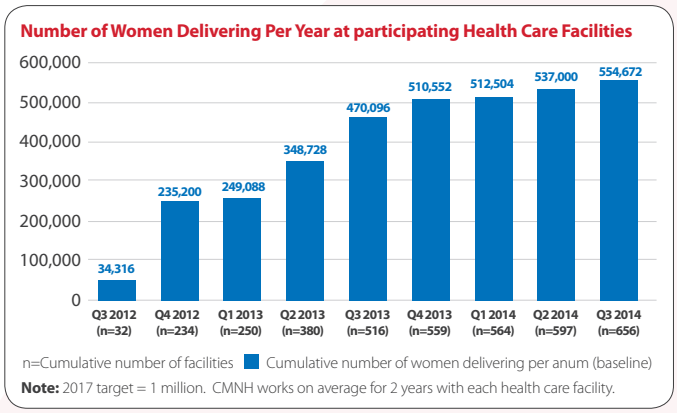
The aim of MiH is to reduce maternal and newborn mortality and morbidity (MDG 4 and MDG 5) by increasing the availability and quality of Skilled Birth Attendance (SBA) and Emergency Obstetric Care and Newborn Care (EOC&NC). This is being achieved by delivering a country-adapted competency based training package in Emergency Obstetric Care and Early Newborn Care (EOC & NC); strengthening of data collection and its use and the introduction of quality improvement methodology.

Before MIH intervention, 80% of the almost 700 health care facilities participating were not able to provide the full care package (bundle of care) called Emergency Obstetric & Newborn Care; 6 months following the intervention 39.5% of these facilities had increased the care available and after 12 months 63.6% of facilities had increased the availability of care.

To deliver this programme CMNH works in partnership with national governments, professional associations, LSTM offices overseas and delivery partners in country. In May 2014 one of the key funders of the programme, UK's Department for International Development (DFID), awarded CMNH a new £9.3 million grant to continue their work in Kenya. The extension will extend the programme from the initial 15 counties to all 47 counties nationwide.

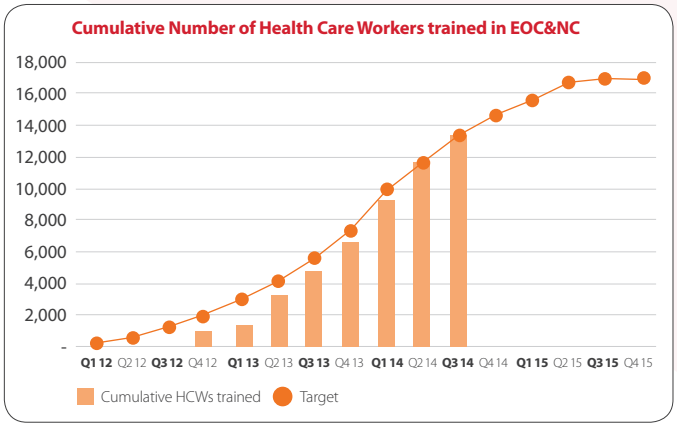
> "Partner governments are pleased with the success and speed of implementation of the programme to date and are placing pressure on the project to continue to proceed rapidly with further scale up and expansion already agreed and funding identified in Kenya and the Republic of South Africa."
>
> *– Gillian Mann, Senior Health Adviser, DFID*

The Making it Happen programme currently operates in 11 countries across sub-Saharan Africa and South Asia, and runs from 2012-2015.



Key Performance Indicators

Over the past academic year CMNH has established a system of quarterly reporting on its KPIs, as a management tool for its large multi-year contract with DFID and to provide stakeholders with the assurances on CMNH direction and Value for Money agenda.



The example of the number of Health Care Workers trained is merely one of many examples of, the Making it Happen programme being either on or above target when it comes to achieving its 5 outputs, which are

- Increased health care provider capacity to provide Emergency Obstetric and Newborn Care (EmONC)
- Increased availability of EmONC for mothers and babies
- Strengthened accountability for results with increased transparency
- Strengthened Capacity to sustain improvements in MNH service delivery
- Evidence generated by programme disseminated in order to inform national, regional and global agenda.

International Conference on Maternal & Newborn Health

In June 2014, CMNH hosted its International Conference on Maternal and Newborn Health. This three day event was attended by over 150 delegates from 18 different countries. Each day examined a different theme in relation to maternal and newborn health: the availability of care; the quality of care and measuring the effectiveness of care alongside future needs.

> "Across the 3 days there was a real 'buzz', acknowledgement of the benefits of real life data collection and qualitative, quantitative research not only as a means of improving healthcare and outcomes at the point of care, but also as a powerful driver for change politically."
>
> *– Professor Richard Lilford, University of Warwick.*

The conference was a great success, with partners travelling from across Africa and Asia to attend the event and share their interim country results for the Making it Happen (MiH) Programme.

Sixteen posters highlighting some of the research being carried out by CMNH staff were displayed throughout the conference and an award was made to Dr Helen Owolabi, who has been researching new methods to record the causes of maternal death in Malawi. Helen's work, along with all of the work highlighted in the posters, will have a real life impact in the field of global maternal and newborn health.

CMNH staff, partners and stakeholders at the concluding conference dinner

During her concluding remarks Rt Hon Baroness Hayman GBE, Chair of CMNH's External Advisory Group, talked about CMNH's future, calling for a renewed emphasis on skilled attendance at birth being the most effective way to challenge the statistics on maternal and early infant deaths.

> "Making it Happen is making a real difference and saving lives. We are delighted that we have recently been awarded the status of a WHO Collaborating Centre, recognising the expertise that CMNH brings to the field of maternal and newborn health on a global stage."
>
> *– Baroness Hayman GBE, Chair of CMNH External Advisory Group*

Department of International Public Health

Professor Imelda Bates - Head of International Public Health

The department brings together people from diverse professional backgrounds to support a range of research models from individual fellowships and project grants to large, multi-partner consortia. They focus particularly on health systems research and its use in guiding policy and programming.

EU-funded projects have become firmly established this year. PERFORM has been evaluating how action research can support district health management teams in Ghana, Tanzania and Uganda to improve performance. The project has completed a 12-month intervention, and is now assessing its impact. Early findings were presented at the Health Systems Global Symposium in Cape Town in September 2014. Meanwhile, the REACHOUT consortium is working with some of the most respected close-to-community services in Bangladesh, Ethiopia, Indonesia, Kenya, Malawi and Mozambique. In the past year, the team has concluded comprehensive context analyses and designed quality improvement cycles. The implementation of the first cycle is currently underway. Research uptake has been particularly successful in this early stage, with all eight partners presenting at the Cape Town symposium.

Youth participatory HIV education in Malawi

REACHOUT has also been instrumental in the creation of a thematic working group on 'Supporting and Strengthening the Role of Community Health Workers in Health System Development'. The group underwent an external scientific review in which its progress, project management and coordination were praised both on an individual and an institutional level.

IntHEC is developing evidence-based strategies to increase equity, integration and effectiveness of reproductive health services for poor communities in sub-Saharan Africa.

T-REC continues to build research capacity for blood transfusion services in Africa (see box).

ReBUILD, funded by the Department for International Development (DFID), seeks to expand the evidence base on building pro-poor health systems in fragile and conflict-affected states. This year, it has published and presented findings from Sierra Leone and Uganda on how health workers have maintained services during and after conflict.

ReBUILD also presented at the Cape Town symposium, and led on the theme of health systems in fragile states, highlighting the importance of addressing their needs in response to the Ebola outbreak in West Africa.

ReBUILD partners at their annual workshop

The Centre for Maternal and Newborn Health continues to deliver its strategic objectives as a WHO Collaborating Centre for research. The Centre currently manages a portfolio of over £30million with 100 staff in 12 countries.

In Uganda, the Monitoring, Evaluation, Technical Assistance, and Research team (METRe) continues to support the government in improving access to and quality of HIV/AIDS and TB services, using DfID impact evaluation of performance-based financing policy. In India, it is fostering sustainability of a system to monitor and evaluate the malaria control programme by certifying trainers and data collectors. In South Sudan, analysis of monitoring and evaluation data is providing an independent assessment of how well agencies are implementing research findings.

Each unit is led by highly experienced academics and effectively supported by managerial and administrative staff. DIPH's contribution of tutors and leaders to LSTM's teaching programme continues to be highly valued by students, who recognise that DIPH's contribution to LSTM's teaching programme is strongly research-driven and of practical benefit to students.

Capacity Research Unit (CRU)

Undertaking high-quality research and translating its findings into policy and practice requires effective development of the capacity of people, institutions and systems. CRU aids the design and evaluation of such initiatives by generating evidence-based processes and indicators which can indicate that capacity building is likely to be sustainable, and can be adapted to suit a variety of health and non-health contexts.

CRU currently co-ordinates and supports training and networks for blood transfusion research through T-REC. PhD candidates and in-service professionals were able to present their findings alongside our team at a conference in August to stakeholders who can influence national and regional policies.

With the Royal Society and DFID, collaborative consortia between African universities and UK partners are producing sustainable research networks to enable the development, implementation, and monitoring of locally-owned strategies for improving doctoral programmes.

Supporting the Centre for Neglected Tropical Diseases on the design, monitoring and evaluation of capacity development initiatives, CRU is helping laboratories worldwide become regional centres of excellence for lymphatic filariasis.

FEATURE ARTICLE:

Collaboration for Applied Health Research & Delivery (CAHRD)

The inaugural consultation of the Collaboration for Applied Health Research and Delivery (CAHRD) took place across two days in June 2014 and was attended by almost 170 participants. It was the culmination of months of work and preparation focusing on establishing creative dialogue and productive joint working between a range of developing country contexts, health topics, and disciplines united by CAHRD's mission to transform health systems to improve the health of low and middle income populations.

A unique consultative process

The consultation process started by selecting four areas of work where LSTM already has productive global collaborations with coordinating centres in all of its research departments, including both those you would expect to have a large portfolio of applied health research and delivery work (the departments of International Public Health and Clinical Sciences) and those more naturally associated with bench science (the departments of Vector Biology and Parasitology). The four workstreams chosen were lung health, maternal and newborn health, neglected tropical diseases, and health systems. Each workstream was tasked with writing a discussion paper about the three issues that they consider to be the major health challenges over the next 10 to 20 years, along with some initial ideas on pathways towards solutions for these challenges. The 12 discussion papers were then shared between the workstreams and thereby subjected to a range of internal and external peer-review. This process started the dialogue within LSTM and also within existing networks.

Question from the audience

The next stage was to invite a range of external panelists to help us to set a strategic direction, by using the papers as a starting point for substantive discussion with as many of our colleagues from developing countries as possible. The papers were circulated in advance and then a range of different discussion formats were set up over a one and a half day meeting in Liverpool. On day 1 there were plenary presentations open to all, followed by discussion in small, closed groups followed by the prestigious Leverhulme Lecture given by World Bank Director for Health, Nutrition and Population, Tim Evans, in Liverpool Town Hall.

Day 2 started with a debate in the Question Time format, chaired by Peter Sissons—one of the UK's most experienced broadcast journalists and LSTM vice-president. This gave us the chance to mix some more junior researchers with experienced colleagues on the panel, and allowed for in-depth debate around five questions which we selected from around 60 submitted in advance from across the collaborative networks. The consultation ended with feedback from the group work in open plenary, with additional discussion on conclusions and next steps.

Applied Health Question Time session moderated by LSTM Vice-President Peter Sissons

> "CAHRD is an excellent example of developing policy and research in collaboration between the Global North and the Global South"
>
> *- Mwele Malecela, Director of the National Institute for Medical Research (NIMR), Tanzania*

Dr Tim Evans of the World Bank delivering LSTM's Leverhulme lecture

This unique consultation process was widely considered a success with lively energetic discussion that generated new ideas and directions. Mwele Malecela, Director of the National Institute for Medical Research (NIMR) in Tanzania, volunteered to host the third consultation in 2018. Himanshu Bhushan, Deputy Commissioner, Maternal Health in Charge, Government of India, echoed Malecela and added that CAHRD might be a way to further efforts in developing countries to "reach the unreached with quality services". Amuda Baba, representing Institut Panafricain de Santé Communautaire et Medecine Tropicale (IPASC) from the fragile Ituri region of Democratic Republic of Congo, said that the consultation had reminded us all to think about "whose health system is it that we are talking about" and called for local engagement and investment. Jeremiah Chakaya from the Kenya Medical Research Institute (KEMRI) and Ireen Namakhoma from REACH Trust, Malawi, picked up this call and both look forward to the day when developing countries seriously invest in, and use, applied health research, matching resources generated from developed countries.

Next steps: strategic direction and network building

A CAHRD website has been created which has conference resources including conference documents, presentations and a full recording of Tim Evans' Leverhulme Lecture (www.cahrd-network.org/consultation/). The conference proceedings have been submitted for publication.

A selection of actions which have been identified by the four workstreams are as follows: for Lung Health, the BREATHE Consortium has added a specific theme on influencing policy to their partnership themes. Maternal & Newborn Health are furthering the depth of their thinking on quality of care as well as further developing methods through operational, implementation, and applied health research to improve this. For Neglected Tropical Diseases there will be a focus on bringing together existing diagnostic tools and developing multiplex diagnostic approaches. For Health Systems, a priority is the development of methods and approaches for intersectoral action to reduce catastrophic health expenditure, for example through social protection mechanisms. This should include better understanding of enablers at local level for intersectoral action, including roles for close-to-community providers.

CAHRD

COLLABORATION FOR APPLIED HEALTH RESEARCH AND DELIVERY

Two themes emerged as priorities for more than one workstream. One was the development of capacity and systems for collecting, handling, managing large datasets as well as harmonising approaches to data management, analysis and synthesis for applied health research. The second was the need for continued and increased collaboration across the CAHRD workstreams and disciplines.

A number of discrete applications for applied health projects are now in process, and some of the papers have begun to appear in the peer-reviewed literature. Funding is being applied for to build the CAHRD network internationally and to promote its ability to develop approaches for improved intervention delivery. In this way CAHRD will continue to contribute actively to LSTM's vision of saving lives in resource poor settings.

> "While the numbers in the middle classes in developing countries will clearly grow —gross national income (GNI) in developing countries is set to double in the next 10 years— the numbers of skilled health providers is set to expand more slowly. By the laws of supply and demand, these providers will be pulled away from providing quality health care for the poorest"
>
> *- Chris Witty, DFID Chief Scientific Adviser*

The collaboration has set off to an enthusiastic start and the next challenge is to ensure that it capitalises on the emerging energy and ideas. As it keeps it sights firmly on the medium-to long-term future, CAHRD's key priority is to keep its focus on poorer populations. CAHRD will play its role to promote effective collaboration to transform the future of health systems that serve those in greatest need.

LSTM's Clinical Partnerships

In delivering clinical research, health services and training, LSTM creates and adds value to partnerships across all sectors and international boundaries and helps to improve the health of the UK's NHS patients and the world's poorest communities.

Health Protection

Public Health England (PHE) is the UK government's agency responsible for protecting and improving the nation's health and wellbeing and reducing health inequalities. LSTM clinicians support PHE in a number of activities spanning a wide spectrum of diseases.

The Imported Fever Service (IFS) is a clinical advisory and specialist diagnostic service for medical professionals managing travellers who have returned to the UK with fever. The IFS is a partnership between PHE, the Hospital for Tropical Diseases in London and the LSTM supported Tropical and Infectious Diseases Unit (TIDU) based at the Royal Liverpool Hospital. Clinical lead at TIDU is LSTM Senior Clinical Lecturer Dr Nick Beeching, an Honorary Consultant with PHE. Dr Beeching has been providing expert advice to the IFS concerning the latest outbreak of Ebola virus disease.

Senior Clinical Lecturer Dr Nick Beeching

IFS and LSTM published guidance and advice in the British Medical Journal (BMJ) to help medical professionals understand the procedures and advice available to counteract the small risk of a traveller with Ebola or another viral haemorrhagic fever arriving in the UK. Dr Beeching and LSTM Wellcome Trust training fellow, Dr Tom Fletcher, worked on the editorial with Dr Timothy Brooks from PHE.

PHE also hosts the UK Advisory Committee on Malaria Prevention, which produces guidelines for malaria prevention and treatment that are used in a number of countries around the world. The committee is chaired by Professor David Lalloo and also relies on entomological advice from Professor Hilary Ranson.

The National Travel Health Network and Centre (NaTHNaC) is commissioned by PHE to provide advice for UK travellers. Two members of staff are based in Liverpool where they also help to provide advice to LSTM staff and students. Dr Beeching and Professor Lalloo are members of the NaTHNaC Strategic Advisory Group.

LSTM is also heavily involved in the provision and surveillance of tuberculosis (TB) services within the region. Professor Bertie Squire leads a small team based at LSTM and funded by PHE that reviews the diagnosis and outcome of all patients with TB within the North West.

Health Protection Research Unit (HPRU)

The National Institute for Health Research (NIHR) Health Protection Research Unit (HPRU) in Emerging and Zoonotic Infections opened in April 2014. The HPRU supports PHE in its role protecting England from emerging infections and zoonoses. It brings together internationally leading researchers from the University of Liverpool, LSTM and PHE, exploiting the synergy, world-class facilities, and breadth and depth of relevant research between these institutions. LSTM's Professor Hilary Ranson is a Deputy Director helping to predict future health threats, train a cadre of scientists in the necessary disciplines, maintain a 'Rapid Response Team' to readily tackle emerging requirements and generate sufficient external funding to support the HPRU going forwards.

Clinical management

The Tropical and Infectious Disease Unit (TIDU) provides treatment to NHS patients with TB, HIV, malaria and a host of other tropical diseases. Commenting recently on developments at TIDU, Dr Beeching said: "We are delighted that LSTM staff will continue to provide clinical and training expertise, working with the other consultants of the TIDU, when the unit moves into a dedicated 19 bed ward in the new Royal Liverpool University Hospital which opens in 2017."

During the summer of 2014, LSTM and TIDU clinicians Dr Tim O'Dempsey and Dr Tom Fletcher took a secondment from teaching students and treating NHS patients to work with the WHO in Kenema, Sierra Leone treating Ebola patients at a Ministry of Health facility. While at Kenema, Dr O'Dempsey encountered two of his former students from LSTM's Diploma in Tropical Medicine & Hygiene: Dr Takuya Adachi (DTM&H 2006) and Dr Catherine Houlihan (DTM&H 2007.

> "I felt very honoured to be working alongside such excellent LSTM graduates"
>
> *– LSTM Senior Clinical Lecturer Dr Tim O'Dempsey in Sierra Leone during the Ebola outbreak*

Dr O'Dempsey also visited the MSF Ebola centre in Kailahun where he met Anja Wolz, a 2013 graduate of LSTM's Diploma in Humanitarian Assistance, who was coordinating the MSF response. Dr O'Dempsey is advising DFID and Save the Children regarding the Ebola outbreak in West Africa and returned to Sierra Leone in October 2014.

Advice and representation

LSTM Dean of Clinical Sciences and International Public Health, Professor David Lalloo, represents LSTM across a number of clinical health networks. Liverpool Health Partners (LHP) is the city's strategic partnership bringing healthcare delivery, research and clinical education together. LHP facilitates NHS-based research undertaken by LSTM and showcases research to funders, industry and academic institutions to encourage further collaboration. According to Professor Lalloo: "There is a close relationship between improving treatment in the tropics and looking after patients with infective diseases in the UK. This reciprocal relationship is made possible by the unique cross-disciplinary environment promoted by LSTM and utilised by PHE."

Professor David Lalloo

LSTM's support to PHE and the Department of Health has increased in 2014 to assist the West African countries affected by the Ebola outbreak. Led by Professor Lalloo, this role includes advising the Chief Medical Officer and DfID on the UK response.

Respiratory health research

Liverpool is building its standing as a global centre of excellence for health related research and clinical trials. New diagnostics and treatments for respiratory medicine are being developed through partnerships between NHS Trusts and LSTM's Department of Clinical Sciences, led by Professor Stephen Gordon.

LSTM's respiratory health research team

The department's respiratory health research group works closely with several Merseyside NHS Trusts, including the Royal Liverpool University Hospital (RLUH), Aintree University Hospital (AUH), Liverpool Heart and Chest Hospital (LHCH) and others. LSTM hosts two joint-funded appointments with AUH; Dr Kevin Mortimer and Dr John Blakey are Senior Lecturers at LSTM and consultant respiratory physicians at Aintree and are both involved in projects to improve asthma treatments.

The Royal Liverpool Clinical Research Unit (CRU), based at (RLUH), supports high quality clinical research, including several clinical trials led by LSTM. The respiratory team at LSTM in collaboration with the CRU at RLUH has developed an Experimental Human Pneumococcal Carriage model that provides an ethical way of measuring pneumonia vaccine efficacy in which prevention of colonisation acts as a surrogate for prevention of pneumonia. The Carriage model also allows testing for the interaction of different infections, such as influenza and pneumococcus, the common cause of pneumonia.

The Royal Liverpool Clinical Research Unit (CRU), based at RLUH, supports high quality clinical research, including several clinical trials led by LSTM. The respiratory team at LSTM in collaboration with the CRU have led the development of research bronchoscopy and are about to host a study of drug effect in the lungs of patients with lung fibrosis. This study is particularly innovative as it will be the first where bronchoscopy is carried out on the CRU itself, and the first to use disposable bronchoscopes. The LSTM team were awarded this study following their publication of bronchoscopy methods in the video-based Journal of Visual Experiments.

NHS and LSTM researchers are also working on innovative treatments for patients with the most severe sepsis and pneumonia. This work is focused in the Intensive Care Units (ICU) of RLUH and AUH. Outcomes for ICU patients with sepsis and pneumonia are still poor, even with optimal antibiotics and supportive therapy. LSTM are leading a collaboration with the University of Liverpool and Centres for Disease Control (CDC) to stimulate lung defence cells to improve early outcome in the most severely ill patients. LSTM researchers are also working with RLUH and AUH physicians to determine best practice in early assisted discharge for pneumonia patients. This work, called HomeFIRST, is sponsored by Liverpool Health Partners.

LIVERPOOL HEALTH PARTNERS

Liverpool has been recognised as an important regional hub for translational research by the location of the NIHR Local Clinical Research Network, for the UK's North West Coast, at RLUH. Professor Gordon is the Division Lead for respiratory medicine, infections, gastroenterology, ITU and surgical specialities. This role provides a catalyst function to enable further networked research across related specialities and between Trusts.

Clinical Diagnostic Parasitology Laboratory (CDPL)

The CDPL at LSTM offers a referral service for the identification of a wide range of human parasites from clinical specimens, relating to malaria, filariasis, schistosomiasis, strongyloides, Hydatid, and African trypanosomiasis. The laboratory receives over 4,000 samples each year, referred from NHS trusts and private clinics throughout the UK and Europe.

Dr Jayne Jones now leads the CDPL following Wendi Bailey's retirement and CDPL has just successfully maintained its Clinical Pathology Accreditation (CPA). It was first accredited in 2013 and is one of the few non NHS diagnostic laboratories to have this status, which is the industry standard.

Improving diagnosis and treatment through technology

Dr John Blakey, Senior Clinical Lecturer at LSTM, is part of a discipline-bridging collaboration that investigates how medical care can be improved through technology-enabled innovation. The collaboration focuses on capturing and leveraging fine grain activity data, including indoor positioning. One example of this work investigated if changing from standard NHS pagers to mobile technology improved the response times of junior doctors to urgent out-of-hours calls. The study, published in QJM in December 2013, demonstrated that the introduction of a wireless task-flow system reduced the time taken for a medical response to a high Early Warning Score (EWS). This saved the equivalent of over 1600 hours of doctor time per year in the hospital. Dr Blakey said: "every healthcare system is confronting a significant and widening gap between demand and human resources. Robustly tested newer technologies are essential for improving efficiency and reducing reliance on an individual's decision-making."

New TB diagnostic evaluated for EDCTP study

During April 2014 LSTM researchers travelled to Abuja, Nigeria to train staff for an evaluation of Genedrive, a new machine for the diagnosis of tuberculosis (TB). Genedrive is a molecular test aiming to speed up the diagnosis of TB and the identification of drug resistant TB. This is the first evaluation in Africa and the study has already recruited close to 400 patients. The study, led by LSTM's Professor Luis Cuevas, will assess the performance of the test in a laboratory setting and further planned studies will explore whether the tests could be used at health post level, which would greatly increase its reach for diagnosis. This evaluation is part of a European and Developing Countries Clinical Trials Partnership (EDCTP) project, which aims to improve the capacity of countries to conduct clinical trials.

LAMP Malaria

A recent advance in malaria diagnostics has been the development of loop-mediated isothermal reaction (LAMP), which amplifies large amounts of DNA within 40 minutes. This is the first time the LAMP has been tested on pregnant women, who are particularly susceptible to contracting malaria. LSTM's Dr Emily Adams is leading the evaluation of a LAMP tool for the diagnostic detection of malaria in pregnancy in collaboration with Professor Feiko ter Kuile from the Malaria Epidemiology Unit and LSTM alumnus Dr Rukhsana Ahmed of the Eijkman Institute in Indonesia, with collaborators at the Foundation for Innovative New Diagnostics (FIND) in Switzerland.

A new treatment for atopic asthma

A national trial is assessing a new treatment device for patients with allergic asthma attacks. Dr Mortimer and the respiratory team at Aintree University Hospital, have established a Liverpool patient recruitment site.

LASER (Laminar Airflow in Severe asthma for Exacerbation Reduction Trial) uses Temperature-controlled Laminar Airflow (TLA), an evidence-based, non-pharmaceutical treatment for atopic asthma. TLA treatment works by stopping body convection and creating an area of essentially allergen free air in the patient's breathing zone overnight. TLA treatment drastically reduces the level of allergens inhaled during night-time sleep and gives the asthmatic patient's hyperactive immune system long and regular periods of essential recovery. The Liverpool trial began in May 2014 and involves 50 volunteers over a 12 month period. It is hoped that asthma attacks can be reduced and that other improvements will be noticed by participants.

LSTM's Strategic Partnerships

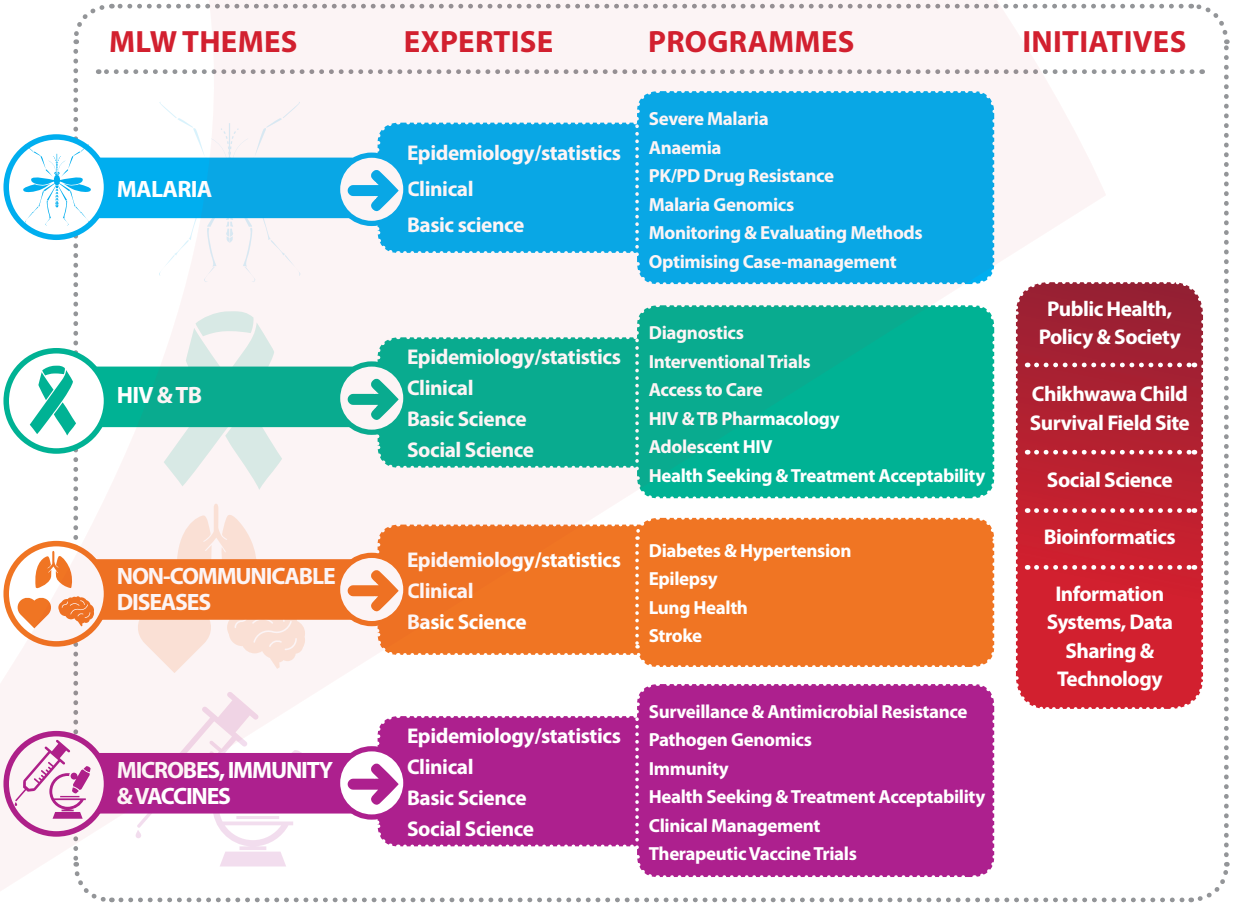
The Malawi-Liverpool Wellcome (MLW) Programme

MLW is an internationally leading health research institution led by Malawian and international scientists, pursuing scientific excellence and improving the health of people in sub-Saharan Africa. To achieve this MLW works in partnership with LSTM, the University of Liverpool and the University of Malawi's College of Medicine, with major support from the Wellcome Trust.

These partners have now been joined by the University of Glasgow Centre for Molecular Parasitology and National Institute for Mental Health & Neurosciences (NIMHANS) in Bangalore India, to form the Wellcome Trust Liverpool Glasgow Centre for Global Health Research (WTCGHR). WTCGHR supports researchers across four continents, conducting international research in a wide range of specialist areas, with a particular focus on MLW. The Centre is one of five Wellcome Trust Centres for Global Health Research and also delivers the Wellcome Trust Clinical PhD Programme, a flagship scheme supporting the most promising medically qualified clinicians wanting to undertake rigorous research training.

Professor David Lalloo, LSTM Dean of Clinical Sciences and International Public Health and WTCGHR Director, opened the WTCGHR 2014 Annual Scientific Meeting (ASM) which took place in Chester, UK. Attracting over 140 delegates, including researchers from MLW, talks and posters were given in themed sessions related to bacterial infections, parasitology, virology, inflammation & immunology and non-communicable diseases.

In addition to core malaria, HIV and tuberculosis research and control programmes, MLW is partnering with LSTM on an investigation into whether the use of advanced cooking stoves can help reduce cases of pneumonia. CAPS has now recruited over 2000 children under five to the study is now the largest trial of the effects of an advanced cookstove intervention on health outcomes conducted anywhere in the world.



Approaching its 20th anniversary, MLW is continuing to expand its activities. Planning is now underway for the construction of a new clinical trials research facility in Chikhwawa, a region in southern Malawi, supported by a grant from the Wellcome Trust.

Evidence Synthesis for Global Health

Based in the Department of International Public Health, the newly formed Evidence Synthesis for Global Health Group (ESGHG) is building LSTM's reputation as a global leader in high quality research synthesis methods.

LSTM, through the Effective Healthcare Research Consortium and Cochrane Infectious Diseases Group (CIDG), is a major contributor to the Cochrane Collaboration, an independent, non-profit, non-governmental organisation consisting of a group of more than 31,000 volunteers in more than 120 countries. Within the collaboration is a number of groups, including CIDG, an international network of over 500 authors co-ordinated from LSTM. The ESGHG is advising LSTM staff with best practice in research synthesis advice prior to them embarking on a systematic review.

The team of the Cochrane Infectious Disease Group

LSTM researchers work in partnership with international researchers to support WHO in developing recommendations for health care policy; developing guidelines for the management of infectious diseases; organising training in research methods and assisting in the communication of research results to policy makers, clinicians, teachers and the public in developing countries.

> "We are delighted at the re-designation as a WHO Collaborating Centre. It acknowledges the excellent work already carried out in providing top quality health evidence to assist delivery of programmes and health interventions in low and middle income countries, and underlines WHO's confidence in our ability to continue our contribution in the post Millennium Development Goals environment."
>
> *– LSTM Professor and CIDG Coordinating Editor Paul Garner*

In July 2014, WHO re-designated LSTM as a WHO Collaborating Centre for Evidence Synthesis for Infectious and Tropical Diseases. The designation, which originally came in 2010, builds on the extensive work and valuable contribution of the CIDG.

LSTM collaboration with KEMRI/CDC in western Kenya

This year, LSTM has been significantly expanding their collaboration with the 30-year partnership between the Kenya Medical Research Institute (KEMRI) and the US Centers for Disease Control and Prevention (CDC) in Kisumu, western Kenya, to conduct research related to malaria transmission reduction and elimination, girls' adolescent health and schooling, and antenatal care and control of malaria in pregnancy.

LSTM on-site technical expertise is currently provided by Department of Clinical Sciences (DoCs) staff, headed by Professor Feiko ter Kuile who leads the malaria research collaboration and Dr Penny Phillips-Howard conducting the adolescent health research, and two research assistants Dr Menno Smit (malaria) and Nicole Yan (antenatal care studies) with administrative and financial support from Liverpool. The aim of the malaria related activities is to find sustainable methods to interrupt malaria transmission in western Kenya, traditionally one of the highest transmission areas in Kenya. The KEMRI-CDC-LSTM led research work is conducted in close collaboration the Ministry of Health and with PATH, a large international non-profit organisation headquartered in Seattle with offices in Kenya. The work is co-funded by PATH and CDC and also supported the US Presidents Malaria initiative (PMI).

The first year of this collaboration has focused on establishing the field-infrastructure including the geo-mapping of the entire study area with a population of approximately 900,000 people, and establishing the surveillance infrastructure to be able to track future malaria transmission reduction dynamics once the large scale population based intervention are rolled out. This will include a combination of scaling-up for impact of existing interventions such as early detection and prompt treatment with effective antimalarials; enhanced vector control; combing high coverage of insecticide treated nets and indoor

residual spraying (each using a different classes of insecticides) with new interventions aimed to get the parasite out of people using mass drug administration with long-acting antimalarials.

The collaboration provides significant training opportunities for Kenyan scientists from KEMRI and the Ministry of Health. The first three students are registered for off-site Phd training at LSTM, with a further three research students expected to be registered this coming year.

To allow for future growth of this exiting, potentially long-term collaboration, LSTM and PATH are providing support to KEMRI for a new research building on the campus dedicated to malaria elimination activities. Construction is expected to be completed by October 2015 and will house approximately 40 staff and students.

The Global Alliance to Eliminate Lymphatic Filariasis (GAELF)

Formed in 2000, the role of GAELF is to bring together partners to reach the goal of eliminating lymphatic filariasis by 2020.

In advance of its 7th biennial meeting in November 2012 the GAELF Representative Contact Group (RCG) met to discuss its future structure and role. The RCG is constituted of country representatives from each of the regions and representatives from pharmaceutical industry, academic and research institutions, donors, non-governmental organizations, WHO and the World Bank. At the next meeting it will be proposed that the Executive Group of the GAELF be reconstituted as the Steering Group, giving it broader membership and remit to independently develop and drive activities.

A further development over the past year which will have a significant impact in Africa for GAELF is the transition of the African Programme for Onchocerciasis Control (APOC) to the Programme for the Elimination of Neglected Diseases in Africa (PENDA) as it adds lymphatic filariasis to its portfolio. A Transition Task Force (TTF) constituted of lymphatic filariasis and onchocerciasis representatives has been established to ensure that the evolution will be smooth and functional. CNTD Director, Professor Moses Bockarie is a member of the GAELF Executive Group and a member of the TTF.

LSTM and University of Warwick

The strategic academic partnership between LSTM and the University of Warwick (UoW) Medical School and Life Sciences continues to grow with existing joint programmes coming to fruition and new collaborations emerging. The partnership brings together LSTM's expertise in infectious disease control and international health alongside UoW's strengths in non-communicable diseases, health economics and statistics. The main areas of collaboration are: diagnostics; evidence synthesis, mathematics/bioinformatics and neglected tropical diseases. A partnership catalysed by a number of strategic appointments in agreed subject areas based at LSTM and Warwick.

Collaboration for Applied Health Research and Delivery (CAHRD)

CAHRD is a virtual network of organisations co-ordinated by LSTM dedicated to transforming health systems to improve the health of low and middle income populations. Working across LSTM's research departments, CAHRD incorporates eight international consortia and a partner centre in Warwick CAHRD.

ICAHRD Director and Professor of Clinical Tropical Medicine at LSTM, Bertie Squire was joined by the Director of Warwick CAHRD, Professor Peter Winstanley, at the inaugural CAHRD Collaboration consultation event held in Liverpool during June 2014. The event brought together almost 200 existing and potential collaborators to identify cross-cutting themes for the continued development of novel, integrated ways to deliver health services.

Professor Bertie Squire

Diagnostics

Joint activities to develop new diagnostics to improve health systems continue to emerge, in relation to Human African Trypanosomiasis (HAT), visceral leishmaniasis VL) and tuberculosis (TB).

Joint appointment Dr Deirdre Hollingsworth has become head of the Neglected Tropical Disease Modelling Consortium, which brings together modelling groups from around the world. Two other joint appointments and experts in VL, Professor Steve Torr and Dr Emily Adams, are developing transmission models for those diseases alongside LSTM's Dr Lisa Reimer, who is focussed on modelling for Lymphatic Filariasis.

Dr Adams is also working with Dr James Covington (UoW) on the development of an e:nose diagnostic tool for detecting tuberculosis from patient samples including human breath. This novel technology exploits the pattern of organic volatile compounds excreted during disease.

Bioinformatics

LSTM's Bioinformatics Unit (BU) and UoW's Warwick Systems Biology Centre (WSB) undertake joint research activity that is centres around three joint PhD students who are now in their final year. The students and other bioinformaticians in WSB have been working closely with LSTM's BU to develop new resources for clustering metabolomic and gene expression data. The skills and resources developed will form the basis of several new research papers that will underpin future grant applications and provide a platform for further collaboration.

Research committee: Key achievements in academic year 2013- 2014

Dr Sally Theobald - Chair of LSTM's Research Committee

LSTM's Research Committee is responsible for developing the detailed strategic plans for research development linked to LSTM's overall strategic plan. It recommends to LSTM's management the deployment of resources to enhance LSTM's research effort.

In addition it makes operational recommendations to Management Committee on key post opportunities and tenure track appointments and is responsible for disbursement and administration of internal research funding sources.

Research Excellence Framework (REF)

Professor Alister Craig

Under the leadership of Professor Alister Craig, LSTM successfully submitted two independent HEI REF returns with the University of Warwick (Public Health) and the University of Liverpool (Clinical Medicine). Impact case studies were a key feature in the submission showcasing LSTM's diverse research portfolio. These included:

1. Improving the Impact of Malaria Prevention Activities
2. Development of an Effective Cure and tools for onchocerciasis and lymphatic filariasis
3. The Epidemiology and Control of Malaria in Pregnancy
4. Enduring Impact on WHO Guidelines for Malaria Treatment
5. Improving Access to Tuberculosis Care for the Poor in Developing Countries
6. Building and implementing a replicable model for HIV Testing and Counselling

Support to multidisciplinary workstreams

LSTM's Research Committee supported the successful launch of the CAHRD initiative in June 2014. This event brought together a network of collaborating institutions to discuss maternal health, Neglected Tropical Diseases and lung health, with an overall common goal to transform health systems and improve health in low and middle income countries. The Research Committee also supported multidisciplinary networking through two sets of very well evaluated cross departmental 'speed dating' events to facilitate the exchange of ideas.

PhD programmes

Additional funding for PhD programmes has been secured, which now include the LSTM studentship scheme, with funding secured from Key Travel, the Science without Borders, the Brazilian Government scholarship programme and self-funding opportunities.

The Research Management System

This now has additional reporting capabilities, allowing for a more flexible review of LSTM's research portfolio. Reports are being generated to fulfil the requirements of corporate key performance indicators as well as senior management, committees and departmental reporting.

Science without Borders / Ciência sem Fronteiras

The Science without Borders scheme is a Brazilian Government scholarship programme which aims to support 101,000 Brazilian students at undergraduate and postgraduate level at top universities around the world. In April 2014, Dr Daniela Ferreira travelled to Brazil to promote LSTM as a centre of excellence in research and teaching and to promote increased collaboration with research groups in Brazil. As a result LSTM is now an eligible institution for this initiative and has proposed 15 potential PhD projects.

Department of Education & Training


Dr Sue Assinder - Director of Education

This year, the department focussed on preparing for independent delivery of the LSTM teaching portfolio. In addition to preparing for our application for Degree Awarding Powers, the department is also installing new software systems to manage online applications, the student life cycle and enhancing the overall learning experience.

We have been working with Cloud Symphony to build a bespoke student information system using the Salesforce.com platform. The on-line application system has already been launched and will be followed over the next year with processes for managing student registration and assessment, programme approval and generation of management reports for monitoring of key performance indicators. Being implemented in parallel is an integrated learning platform (Desire2Learn, D2L) to deliver a personalised learning experience for every LSTM student. This software enables both face to face and online delivery and promotes learning and communication inside or outside the classroom. LSTM is the first UK institution to join D2L's European cloud server. D2L was chosen because of the focus on the user, whether that is the lecturer creating pedagogically sound learning materials or the student organising their own learning. The plan is to integrate all student software systems under an umbrella student portal ('MyLSTM') to give LSTM students a seamless learning experience, wherever they are in the world.

Developments in MSc teaching

The department launched two new modules for MSc students. Both modules, 'HIV in Resource Limited Settings' and 'Medical Bacteriology', were developed in response to student feedback indicating a need for increased choice of clinical modules. "HIV in Resource Limited Settings" gives students a comprehensive knowledge of HIV prevention and control. The use of videoconferencing enabled students to interact with experts in Malawi and Mozambique, and the use of clinical simulations and role play. 'Medical Bacteriology' used a case study approach to help a mixed group of 26 clinical and biology MSc students engage with the subject matter.

Developments in Professional Courses

In its second year of operation, the Professional Courses Unit welcomed over 320 students to professional diplomas, an increase of nearly 20% on the previous year. Over 250 students from 56 different countries followed short courses, an increase of 22%.

The Diploma in Tropical Medicine & Hygiene started in 1904 and is our oldest programme, with 180 students coming through our door each year. The programme's alumni are important stakeholders in the programme and we surveyed them as part of a review, which has been really helpful in ensuring the programme remains relevant to the changing world. The feedback was fantastic and as a result, the provision of TB and HIV teaching was enlarged from 5 to 8 days to cover the topics in more detail.

> "Fantastic course, found it absolutely vital for work abroad and was interested to find that most of the doctors I met abroad had been through the Liverpool School at some point!"
>
> *– DTMH Alumni Survey 2014*

Short Course students have helped shape discussions in classes with MSc students and provided hitherto unknown peer learning opportunities. This is especially true within humanitarian classes where NGO workers have attended courses with military medical personnel. Currently, there is a blurring of lines between humanitarian and military actors in disaster responses, which may compromise neutrality and independence, restricting humanitarian access and increasing security risks. This provided some lively debates in a neutral forum with all parties learning from each other way beyond the learning outcomes of the programme.

> The group work and mode of teaching really worked for me, working with real life problems and scenarios prepares you for what you encounter once you are out in the field.
>
> *– Course Evaluation Survey, Development of a Disease Control Programme, 2014*

A new programme for this year was the Professional Diploma in Lot Quality Assurance Sampling (LQAS), which is a survey methodology adapted from industry to health in the 1980s. LSTM's Professor Joseph Valadez is a pioneer in this adaptation. The technique has gained popularity in recent years and is now used by many national governments, NGOs and international agencies (UN and bilateral) the world over. The methodology requires students to undergo a highly standardized one week training course to collect data and analyse it. Whilst this training existed previously within the Department of International Public Health, it did not lead to a recognised award. The programme ran very successfully for the first time in India and is available on a bespoke basis for Ministries of Health and other organisations.

LSTM is expanding its support to the training schemes of two of the UK's leading aid agencies: Médecins Sans Frontières/ Doctors Without Borders (MSF) and Save the Children. LSTM's expertise will enhance and recognise the Continuous Professional Development (CPD) of both agencies leading to further professionalisation of their frontline staff and improved staff retention rates.

Under the new partnership with MSF, LSTM will facilitate entry by MSF staff onto its MSc Humanitarian Health Programme Management. LSTM will recognise courses in MSF's internal operational training scheme as equivalent to MSc modules and will allow field experience to be evidenced allowing credit allocation to be used to secure an exemption route within the Masters. The Humanitarian Health Programme Management programme aims to strengthen links between academic institutions and operational humanitarian organisations. The skills, knowledge and understanding of humanitarian issues gained during the programme equip graduates to manage humanitarian health programmes for NGOs, ministries and international organisations at a senior level.

In a two year partnership with Save the Children, LSTM will conduct a rigorous quality assurance of the organisation's Humanitarian Health and Nutrition training, leading to a recognised LSTM professional diploma at the end of the 6 month on-the-job course. The partnership aims to ensure that Save the Children training programmes are associated with rigour and quality.

> We are deeply committed towards the professionalisation of the humanitarian sector, and it is partnerships like this that help to create CPD pathways for frontline staff, increase retention and technical knowhow – and as a consequence, improving the quality of humanitarian responses and the lives of children in the countries where we operate.
>
> *– Jeremy Stoner, Director of the Humanitarian Leadership Academy, hosted by Save the Children*

Student representation

LSTM remains committed to listening to and involving students in shaping the learning experience and we continue to work to improve opportunities for student engagement. Both Taught Postgraduate students and Postgraduate Research Students are represented at the appropriate Boards of Studies and also sit on the LSTM Programmes Board.

MSc student representatives hold regular student-led focus groups which not only provide opportunities for students to comment on both module-specific and more general issues, but promote student inclusion, develop supportive student networks and help to build research skills. Student focus groups have also played a key role in assisting with the development of LSTM's new Student Charter.

> I found the responsiveness of the teaching staff remarkable - I've never been in any institution which takes "consumers" views so seriously
>
> *– MSc Student Representative, 2013-14*

LSTM's approach to student involvement via focus groups formed part of the Higher Education Academy's (HEA) Annual Student Survey conference in June 2014 where LSTM's Student Experience Officer delivered a well-received presentation on LSTM's approach to student engagement. Delegates commented especially on the value of student-led focus groups in supporting development of skills to support research.

Communication with students has been further enhanced through the establishment of a student-experience focussed monthly e-newsletter, which provides feedback to students from meetings, gives updates on LSTM events, news on student achievements, career-/research-related articles from graduates and extra-curricular activities.

In 2014 LSTM's students participated in the HEA's pilot UK Engagement Survey which resulted in a response rate above the national average and produced strong results in the categories of 'Thinking and Understanding'; 'Reflective Learning' and 'Engaging with Research' all of which reflect the academic rigour of LSTM's Masters programmes and the excellent quality of teaching at LSTM.

Well Travelled Clinics Ltd

Well Travelled Clinics improvement in trading continued with patient numbers and income up by over 6% on the previous year across the two branches.

Its success has been to further develop the services available, with increasing emphasis on aligning travel and occupational health services to meet the needs of our corporate clients who deploy staff overseas

WTC started working with the DFID-funded UK-Med to deploy staff at short notice to international humanitarian emergency situations in Philippines, Gaza, Jordan, India, Timor and Malawi. In addition, and in close conjunction with DfID and UK-Med, WTC is working with teams travelling to the Ebola outbreak in West Africa, providing occupational health screenings, vaccinations, travel advice, anti-malarials and staff training.

In 2013/14 WTC saw a rise in regular travel clients. WTC was involved in a number of publicity events leading up to the 2014 World Cup and had around 100 football fans come to the clinic for travel advice before they travelled to the tournament in Brazil.

A number of vaccine shortages across the UK also led to increased demand for yellow fever and typhoid vaccines. Staff worked hard to maintain stocks and were able to meet the increased demand. These shortages had a huge effect on the administration systems, with phone calls rising by 18% and visits to the WTC website by 29% over the year.

The Chester branch has continued to perform strongly. It carried out a three month trial of opening an extra day a week during the summer of 2014. The branch plans to extend this opening an extra day for 6 months in 2014/15 and for the whole year in 2015/16.

WTC 2013/14 at a glance

Saw **11,251** patients

Answered **26,421** phone calls

Had **38,997** website visitors

Gave **12,120** vaccines

Dispensed **88,216** malaria tablets

Sold **2836** bottles of DEET repellent.

Estates

Wolfson Building

In recognition of The Wolfson Foundation's support to the development of LSTM's research and teaching facilities, the LSTM's latest estates expansion has been named the Wolfson Building. Additional support has also been received from the European Regional Development Fund Programme 2007-2013 and the Regional Growth Fund.

Wolfson Building

Construction work began in December 2013 and practical completion is foreseen for December 2014. Located opposite LSTM's existing campus on Pembroke Place, the building has been repurposed. It includes a new facade and completely remodelled internal spaces, utilising natural daylight and ventilation and maximising opportunities to provide thermal improvements and environmental controls.

The £7.3m building will house approximately 180 staff and will host LSTM's Centre for Maternal and Newborn Health and the Centre for Neglected Tropical Diseases (LF). In addition, IVCC will relocate its administrative and management team to the Wolfson Building.

Malawi-Liverpool-Wellcome Trust Clinical Research Programme

LSTM's estates team are working with Malawi-Liverpool-Wellcome Trust Clinical Research Programme (MLW) to support the development of several facilities. In Blantyre, southern Malawi, LSTM is overseeing the construction of a new two-storey Stores Building, to support a growing portfolio of research projects, at the existing facilities. Work on the building commenced in May 2014 and will complete in early 2015, providing storage for laboratory and field work equipment and consumables. With support from LSTM's estates team the refurbishment of MLW's Laboratory Building and upgrade of the site infrastructure began in May 2014 and will be completed early 2015.

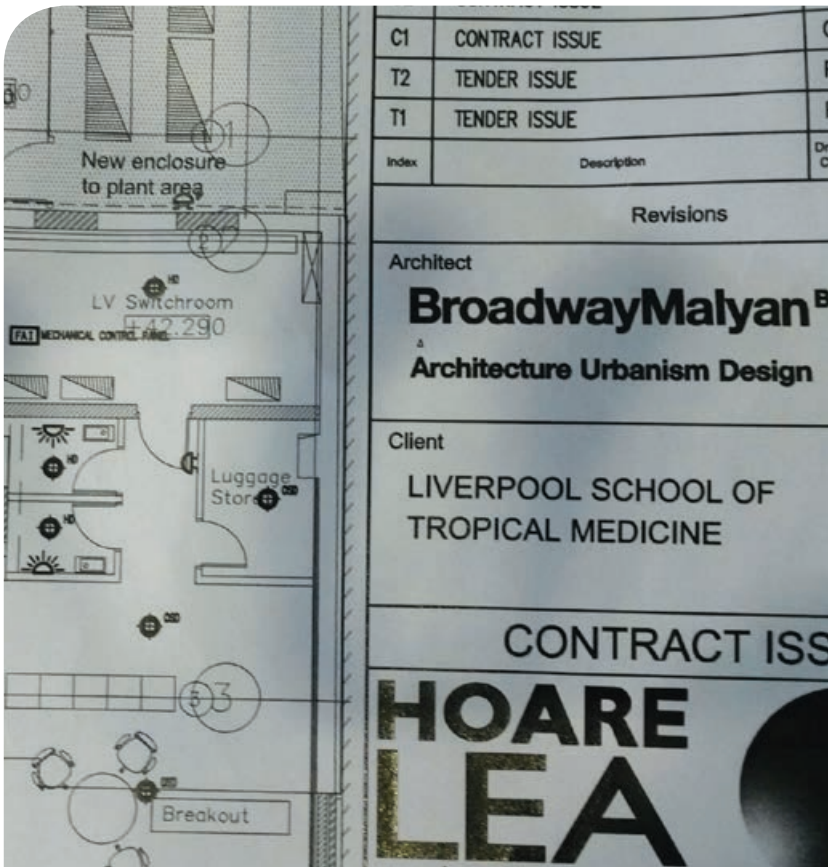
Kenya Medical Research Institute (KEMRI)

LSTM's collaborates with the Kenya Medical Research Institute (KEMRI) and the US Centers for Disease Control and Prevention (CDC) in Kisumu, in western Kenya. As a result LSTM's estates team advises on the development of a new research building. This building will increase the capacity of the collaboration to conduct research related to malaria transmission reduction and elimination, girls' adolescent health and schooling, and antenatal care and control of malaria in pregnancy. Construction is expected to be complete by October 2015 and will house 40 staff and students.

Improving facilities for students and staff

LSTM facilities and IT Services teams installed a new state-of-the-art audio visual system, within the Nuffield Lecture Theatre at LSTM. The system will allow lectures given in Liverpool to be broadcast to students at partner institutions across the world. 2015 will see a complete refurbishment of the lecture theatre, to meet the evolving needs of our students.

LSTM's Green Team are working on improvements to the campus to achieve the Carbon Trust Standard. This standard publicly recognises an organisation's efforts in reducing carbon emissions.



Social mission

Christine Greenway - Director of Human Resources

LSTM continues to work to save lives in resource poor countries by providing high quality, scientifically robust and relevant research evidence, education and capacity strengthening. Our aim is to reduce the burden of sickness and mortality in disease endemic countries through the delivery of effective interventions which improve human health and are relevant to the poorest countries. For LSTM to achieve its mission, it needs to have the right people, with the right skills working together to achieve the organisational goals and continually strive to bring quality human resourcing to the global need.

LSTM values underpin the core behaviours for LSTM staff and support us in achieving its mission. These values are:

- **Making a difference to health and wellbeing**
- **Excellence in innovation, leadership and science**
- **Achieving and delivering through partnership**
- **An ethical ethos founded on respect, accountability and honesty**
- **Creating a great place to work and study.**

As LSTM continues to grow, the Human Resources team has been working hard to ensure that staff embed these values, recognising the importance of developing not just the organisation but its people. In 2013 LSTM was notified of the renewal of its Investors in People (IIP) Standard, an accreditation that it is proud to have maintained. The findings from the IIP review showed that people at LSTM enjoy their roles and that LSTM continues to encourage a diverse and talented workforce willing to share ideas and promote an inclusive learning culture. This has been reinforced in surveys and consultations throughout 2014.

INVESTORS IN PEOPLE

Christine Greenway, Director of Human Resources said: "This has been a year of forward propulsion for staff working in diverse professional and academic areas. The determination and commitment of LSTM staff has continued to bring resolutions to people worldwide and growth in organisational terms. Staff are proud of these achievements and it shows in the delivery of programmes and the new work LSTM has won, which in turn offers opportunity for individual staff development".

Having achieved HEI status, LSTM is now using more modern systems of data collection to enhance management information leading to efficient and high level decision making.

Staff has undertaken coaching programmes and intend to link Performance Management with Learning & Development frameworks to constantly improve staff performance and bring individual staff satisfaction.

Athena SWAN Bronze Award

In May 2014, LSTM achieved an institutional Athena Swan Bronze Award. Athena Swan is a charter that recognises the institutional commitment to advance women's careers in science. The Charter is managed by the Equality Challenge Unit (ECU) and is funded by ECU, the Royal Society, the Biochemical Society and the Department of Health.

It is in recognition of LSTM's success in developing institutional employment practices to further and support the careers of women in science, technology, engineering, maths and medicine (STEMM) departments in academia.

LSTM has a very strong research programme in gender and equity and many of the outputs of this group can be used to inform LSTM's own activities. Hence institutional support within LSTM for the principals and ideals of Athena Swan charter is very strong throughout the organisation's management.

LSTM adheres to a full range of policies and procedures to ensure family-friendly working and transparent recruitment and promotion procedures. 'The award, valid until April 2017, was granted by a panel of experts with a professional background in STEMM and equality and diversity.

Governance

Since LSTM was designated as a Higher Education Institution (HEI) by the Secretary of State in July 2013, continued growth in LSTM's research grant base and extended global reach confirms the organisations prominence in world-class research, education and capacity strengthening activities. The Board of Trustees are collectively responsible for overseeing this activity, determining LSTM's future direction, and fostering an environment in which the institutional mission is achieved and the potential of students and staff is fully realised.

Trustees also ensure compliance with the statutes, ordinances and provisions regulating LSTM and its framework of governance. As a consequence of the new funding relationship with the Higher Education Funding Council for England (HEFCE), it is recognised that funding is provided explicitly to the Board as LSTM's ultimate authority. HEFCE's memorandum of assurance and accountability sets out the formal relationship, in the terms and conditions made under section 65 of the Further and Higher Education Act 1992, between HEFCE, LSTM Board and accountable officer. It reflects HEFCE's responsibility to provide annual assurances to Parliament that:

- **risk management, control and governance in the higher education sector are effective**
- **funds provided to LSTM are being used for the purposes for which they were given**
- **value for money is being achieved**

The vital role that the Trustees provide in guiding senior management emanates from a Board with specialist backgrounds and international representation. Trustees are recognised for the generous support and guidance extended to LSTM and do so without remuneration. Trustees at LSTM have an extensive track record of driving continual progression and innovation through their collective approach in challenging and empowering senior managers. The impact of the Trustees' participation has enabled progression that has delivered exceptional results. Their role in strategic planning, effectiveness and performance, finance, audit, estate management and health and safety is vital to ensure our smooth transition as an independent HEI.

In addition, Trustees also take account of the interests of their students. This year, LSTM has appointed to the Board of Trustees the first student representative in the organisation's 115-year history: Aduragbemi Banke-Thomas. Adura is a medical doctor, with specialist postgraduate training in public health; health policy and programme management. He will be officially recognised as a Trustee at LSTM's Annual General Meeting in November 2014. He will serve in that position for the next two years and will be succeeded by another member of the LSTM student body.

LSTM also acknowledges the enhanced membership role that Vice Presidents fulfil. We currently have 23 Vice Presidents who provide advisory support to LSTM with multinational business leaders, community proponents and notable political policy makers. This year LSTM thanked The Rt. Hon The Lord Owen CH for his sixteen years of support and recognised new appointments of Dame Lorna Muirhead DBE, Mr Peter Sissons LLB and Sir Mark Walport FRS, FMedSci.

Officers 2013/14

PATRON

Her Royal Highness The Princess Royal GCVO

PRESIDENT

Sir Richard Evans CBE

CHAIRMAN

James Ross OBE

DIRECTOR

Professor Janet Hemingway CBE FRS DSc PhD BSc FMedSci FRCP FRES (Hon) FAAM Foreign associated National Academy of Sciences USA

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Professor The Lord Alton of Liverpool

Nicholas Barber CBE

Nicholas Baring CBE LLD

Jenny Borden OBE

Sir Arnold Burgen FRCP FRS

Baroness Cox of Queensbury

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Professor Sir David Weatherall DL MD FRCP FRCPE FRS

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Ian M Jones ACIB

Deputy Hon Treasurer

Jonathan Schofield BA

Director

Professor Janet Hemingway CBE FRS DSc PhD BSc FMedSci FRCP FRES (Hon) FAAM Foreign associated National Academy of Sciences USA

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Mr Jonathan Brown LLB (Hons) SOL (Hons)

Mr Nick Earlam

Dr Trevor Francis BSc

Dr Ann Hoskins MB BAO BCH MCommH FFPH

Professor Malcolm Jackson BSc PhD MRCPath FRCPath

Rt Hon Stephen O'Brien MP

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Mr André CM Winter MCSI MIoD MA Oxon

Observer

Dr Nick Banatvala MBBS MSc MD FFPH FRCP

Secretary & Clerk to the Board of Trustees

R. Einion Holland FCCA MBA

LSTM in the media

LSTM gained much media coverage over the past 12 months, providing interviews and editorials across regional, national, international and specialist media. This has ranged from Professor Hilary Ranson offering advice on vector-borne disease to BBC online to Professor Bertie Squire discussing tuberculosis (TB) with Aljazeera English, and from Professor Nynke van den Broek editing a special supplement on Quality of Care for BJOG, and International Journal of Obstetrics and Gynaecology, to Dr James LaCourse offering advice to those considering STEM careers in an educational supplement in the Sunday Telegraph.

The FIFA World Cup in Brazil generated much media interest over the summer. Philippa Tubb, Managing Director of the Well Travelled Clinics, and Professor David Lalloo provided interviews to ensure that people travelling to Brazil were aware of the potential risks of mosquito borne disease, including yellow fever. The interviews gave an insight not only into LSTM's expertise, but also its history, highlighting the fact that LSTM's first overseas laboratory was set up in Manaus to study yellow fever over 100 years ago.

In May, Head of LSTM's Centre for Maternal and Newborn Health, Professor Nynke van den Broek, appeared as part of a panel on BBC Radio 4's Woman's Hour. As a world respected expert in her field Professor van den Broek was asked for her opinion following the release of UNICEF's Every Newborn Action plan. She spoke about the state of care for mothers and babies in some of the world's poorer countries, and the lack of skilled care available at the time of birth, particularly in rural settings.

In June, LSTM Director, Professor Janet Hemingway, was a guest on BBC Radio 4's flag ship science interview programme The Life Scientific. She was interviewed by theoretical physicist Professor Jim Al-Kalili, talking about her love of animals driving her towards her career as a ground-breaking vector biologist, and how the academic and scientific landscape has changed since she became the UK's youngest female professor. The programme was promoted by BBC Radio 4 to the station's weekly audience of over 10 million people.

Since April, LSTM clinicians Dr Nick Beeching, Dr Tim O'Dempsey and Professor David Lalloo have been advising on the Ebola outbreak in West Africa. This included editorials and videos advising UK doctors via the British Medical Journal, podcasts broadcast by BBC World Service in Africa advising those with symptoms, and reassurance about the UK's level of preparedness on the BBC News Channel and BBC Breakfast. Dr O'Dempsey did a number of interviews after returning from treating patients in Sierra Leone and took part in a panel discussion at London's prestigious Frontline Club.

In September, a Commission looking at Household Air Pollution led by Professor Stephen Gordon was published in the journal Lancet Respiratory Medicine. The Commission provided a comprehensive review of the evidence for the effect on ill health and premature death of household air pollution, examining interventions currently available, as well as promising future developments, such as the LSTM led Cooking and Pneumonia study (CAPs) currently underway in Malawi. The Commission received nearly 200 mentions in the media within a few days, with details printed and reproduced across the world on various media platforms as well as on social networks, with a combined reach of over 1 billion people.

Across the year LSTM generated 17 press releases and over 170 news stories. Over 100 interviews have been facilitated with various publications, broadcast and online platforms resulting in over 1000 mentions around the world and a substantial increase in LSTM's social media followers.

Filming in Malawi

LSTM Seminar Series

The LSTM Seminar Series gives LSTM staff and speakers from other universities or institutions an opportunity to present their work in progress. The series sees a wide variety of presenters from institutions all over the world, talk on a wide range of relevant topics. Usually taking place during a lunch hour the series is open to all LSTM staff and others from partner organisations that might want to attend and lean about current breaking research, as well as an opportunity to network with some of the leaders in their field of interest.

Speakers during 2013 / 2014 have come from a from across the UK as well as further afield including senior professors from the Faculty of Tropical Medicine, Mahidol University in Thailand, the Butantan Institute in Brazil, the Menzies Centre for Health Policy at the University of Sydney and the Center for the Genomics and Systems Biology, New York University. Visitors were not limited to those working with Universities, guest speakers also came from the World Health Organization (WHO), the Natural History Museum and the Porton Down Research at Public Health England (PHE).

Visiting speakers are normally invited by members of LSTM and the range of subjects that have been covered over the 12 months has been diverse. Dr Lesong Conteh from Imperial College London presented on "The market for community Health Workers" while Dr René Feyereisen from INRA in France discussed the function of the cytochrome P450 enzymes in insects. Dr Miles Carroll, from PHE talked about research and development in vaccine discovery, Professor Glyn Vale from the University of Greenwich described his search for unifying behaviour of the tsetse fly and Dr Daniel Argaw Dagne from WHO looked at the topic of Leishmaniasis control. A presentation from Dr Steve Le Comber at Queen Mary University London, described how the team had used geographic profiling, usually used in fighting crime, had been successfully adapted to find the source of disease outbreaks.

LSTM
SEMINAR SERIES

Public engagement to inform, inspire and involve

Science communication workshops

Researchers from across LSTM participated in a series of science communication workshops facilitated by the British Science Association. The workshops focused on how LSTM research may impact upon society and how research can be communicated in a more accessible manner. Researchers worked in small groups to develop and practice presentation and public speaking skills.

Creepy Crawly weekends

Now a regular feature at Liverpool's World Museum, the Creepy Crawly weekends attract audiences keen learn about mosquitoes and tsetse flies. As part of National Insect Week in June, LSTM researchers brought live insects into the museum Bug House. Designed to take entomological science out of the lab and into the community, the events involved interactive displays, tools and games that were created to explain the behaviour of mosquitoes and tsetse flies. Travel health advice was also offered to visitors courtesy of LSTM affiliated Well Travelled Clinics.

Sssnakes Alive!

Visitors to World Museum's Sssnakes Alive! exhibition discovered the secret life of snakes. Developed in collaboration with LSTM's Alistair Reid Venom Research Unit, the exhibition introduced the importance of conservation and the challenges people face in countries where encounters with deadly snakes are a daily occurrence. LSTM houses one of the largest collections of venomous snakes of any European research institution and is at the forefront of anti-venom research to reduce the 125,000 deaths that result from snakebite each year.

Respiratory Medicine Open Day

Through the Liverpool Health Partnership, LSTM's Respiratory Infection Group has access to the Clinical Research Unit (CRU) at the Royal Liverpool Hospital, to conduct clinical trials in collaboration with the NHS. The latest project to work with the CRU is HomeFIRST, a pilot study of early supported discharge in patients with lower respiratory tract infection. Showcased at the 2014 Respiratory Medicine Open Day, the HomeFIRST team invited the public to come into the facility and see for themselves the ground-breaking research that LSTM and the NHS are undertaking and how the public can become involved as volunteers.

Podcasts

In March 2014 LSTM launched its Podcast Series, an innovative method of disseminating research findings to as broad an audience as possible. Each podcast contains two interviews with an LSTM researcher or scientist and have so far explored sleeping sickness, dengue fever, the genetic mutations of mosquitoes, gender and health, and systematic reviews. The podcasts are produced, edited and presented by LSTM PhD students.

Far-East POW talks

LSTM's relationship with Far-East Prisoners of War (ex-FEPOW) spans seven decades and has produced a fascinating history. More than 2,000 ex-FEPOW have received medical treatment by LSTM clinicians since 1946. LSTM Research Fellow and co-founder of the Researching FEPOW History Group, Meg Parkes, has been giving community-based talks about her work, following the completion of a FEPOW education resource project. Professor Geoff Gill has treated dozens of ex-FEPOW for the parasitic infection strongyloidiasis and is organising the Researching FEPOW History conference, hosted by LSTM in June 2015, where ex-FEPOW community groups will share their research.

Talks, presentations and interviews

Throughout the past academic year, LSTM staff have given talks at primary and secondary schools; presentations to interest groups, conferences and gatherings; volunteered their time at science festivals and local education initiatives such as Liverpool's Toxteth Leadership Academy.

Skeleton of a Burmese python as on display at Sssnakes Alive - *copyright Blue Tokay*

Fundraising

LSTM would like to thank all the individuals, charitable trusts, businesses, organisations and governments that have contributed support to our expanding portfolio of projects.

The Wolfson Building opens in December 2014 and will house several international consortia, including the Centre for Maternal and Child Health. Major funders include the Wolfson Foundation, the European Regional Development Fund and the Regional Growth Fund.

Regional Growth Fund

EUROPEAN UNION
Investing in Your Future
European Regional Development Fund 2007-13

THE WOLFSON FOUNDATION

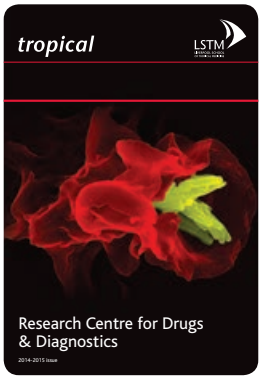
In support of the Malawi-Liverpool-Wellcome Clinical Research Programme's (MLW) capital projects, LSTM is overseeing the construction of a new two-storey Stores Building, to support a growing portfolio of research projects, at the existing facilities in Blantyre. Several other capital projects are planned in Malawi and LSTM is seeking additional funding to deliver improved facilities required to produce future generations of African researchers.

Training the health leaders of tomorrow and providing today's health professionals with the skills and knowledge to have an immediate impact in resource poor countries, requires the provision of scholarship funding. During 2013 – 2014 LSTM supporters have provided over £50,000 of scholarship funding for students from developing countries. Donations of any amount can contribute to an LSTM scholarship.

During 2014 two editions of a new annual fundraising e-newsletter have been sent to the 4,414 (as per February 2014) registered alumni, supporters and stakeholders of LSTM. The newsletter has been well received and has resulted in attracting new donors.

To join the mailing list for the fundraising e-newsletter, or to receive more information on supporting LSTM please contact Development Officer Billy Dean Email: **billy.dean@lstmed.ac.uk** Tel: **+44 (0)151 705 3272** or visit **www.lstmed.ac.uk/fundraising** for more information with regards to legacy giving; corporate support; student support and other fundraising appeals.

Further fundraising updates can also be found in LSTM's publication Tropical and via the LSTM accounts on social media.



A full list of donors during this reporting period can be found in LSTM's Financial Statements 2013 – 2014

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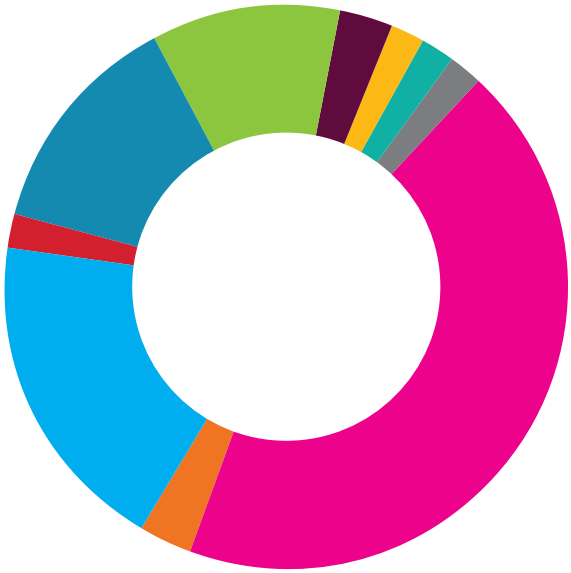
Subscribe to the LSTM LinkedIn Groups

Students and Courses

Student numbers	HEU (UK & EU)	Overseas	Total
Research students			
Research students 2013 - 2014	28	56	84
Taught students			
Masters			
MSc in Tropical & Infectious Diseases	6	7	13
MSc in Tropical Paediatrics	4	5	9
MSc in Biology & Control of Parasites & Disease Vectors	10	4	14
MSc in Molecular Biology of Parasites & Disease Vectors	8	3	11
MSc in International Public Health	4	12	16
MSc in Humanitarian Studies	18	0	18
Professional Diplomas			
Diploma in Humanitarian Assistance	9	4	13
Diploma in Reproductive Health	3	21	24
Diploma in Tropical Nursing	50	56	106
Diploma in Tropical Medicine & Hygiene	149	29	178
Short Courses	166	55	221
Total taught students 2013 – 2014:	**427**	**196**	**623**

LSTM Funding Bodies

Funding Bodies 2012-2013



Bill & Melinda Gates Foundation	**19%**
European & Developing Countries Clinical Trials Partnership (Netherlands)	**2%**
European Commission	**13%**
Medical Research Council	**11%**
PSI	**3%**
Royal Society (Charitable)	**2%**
St. George's University of London	**2%**
UNICEF (Zimbabwe)	**2%**
Wellcome Trust	**44%**
World Health Organization (Switzerland)	**3%**

Funding Bodies 2013-2014

Bill & Melinda Gates Foundation	**14%**
Biotechnology and Biological Sciences Research Council	**2%**
Department for International Development	**29%**
Global Health Innovative Technology Fund	**2%**
Medical Research Council	**11%**
National Institutes of Health	**3%**
Swiss Agency for Development and Co-operation	**7%**
UNICEF (Freetown)	**4%**
USAID	**17%**
Wellcome Trust	**11%**

Staff overview

UK	397
DR Congo	1
Ecuador	2
India	1
Kenya	6
Malawi	19
Tanzania	2
Uganda	3
Greece	1
South Sudan	1

Current number of staff on LSTM contract working overseas

35

a further

396

are based at LSTM and one offsite in the UK

(as of 1 September 2014)

LIVERPOOL SCHOOL OF TROPICAL MEDICINE

MEMOIR V. PART I

FIRST PROGRESS REPORT

OF THE

CAMPAIGN AGAINST MOSQUITOES

IN SIERRA LEONE

BY

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LIVERPOOL SCHOOL OF TROPICAL MEDICINE

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Publications

One of LSTM's main objectives is:

"Conducting first class research and disseminating the results of that research."

LSTM's Online Archive helps to ensure the accessibility of our published research outputs worldwide

It is a digital archive of research output produced by LSTM staff which can be downloaded using various search criteria.

The Online Archive can be accessed via: **http://archive.lstmed.ac.uk**

Awards and Honours

- LSTM has been granted an institutional Bronze Award to join the Athena SWAN Charter. The Charter encourages universities and research institutes to address the attrition of women working in science, technology, engineering, medicine and mathematics (STEMM) academia.

- LSTM Deputy Director Professor Stephen Ward was awarded the 2013 Sornchai Looareesuwan Medal, awarded by Mahidol University in Thailand to a researcher whose efforts have been specifically devoted to the advancement of research to tackle malaria.

- Research Fellow and alumnus Dr Tom Fletcher, has been awarded a Wellcome Trust Post-Doctoral Training Fellowship. The Fellowship is awarded to clinicians to obtain high-quality postdoctoral training that will lay the foundations for a successful independent research career.

- LSTM's Post-Doctoral Research Assistant, Dr Hanafy M. Ismail, has won the 2014 Royal Society of Chemistry (RSC) Book Poster Prize at the New Perspectives in DMPK: Informing Drug Discovery.

- In October 2013 LSTM awarded student Uwe Dubbelde, the Matthew Lukwiya Prize for the highest marked Masters in Tropical Paediatrics dissertation. LSTM alumnus Dr Lukwiya, was the first physician to die of the Ebola virus, during an outbreak in 2000.

- LSTM Chairman James Ross and Director, Professor Janet Hemingway, awarded the Leverhulme Lecture Medal to World Bank Director of Health, Nutrition and Population, Dr Tim Evans in June. Dr Evans delivered the 2014 LSTM Leverhulme Lecture on 'Delivering research in Global Health', at Liverpool's Town Hall.

- LSTM Emeritus Professor David Molyneux, has been elected as a 2014 Honorary International Fellow by the American Society of Tropical Medicine and Hygiene.

- Following the awarding of the Manson Medal, by the Royal Society of Tropical Medicine & Hygiene in September 2013, LSTM Emeritus Professor David Molyneux was invited to give the 2014 Christmas Lecture, entitled "Neglected Tropical Diseases: now more than just the "other disease-the post 2015 agenda".

- Two LSTM students, Sarah Martindale and Emma Smith presented their MSc projects on 'assessing lymphatic filariasis morbidity in Malawi' to an international audience at the Royal Society of Tropical Medicine & Hygiene 'Research in Progress' meeting in London. Both presentations were well received with Sarah taking the prestigious first prize.

- LSTM PhD student Clair Rose has won the 2014 Best Student Talk Award from the British Society for Parasitology. Clair's research at LSTM involves sequencing the genome of the tsetse fly, responsible for transmitting sleeping sickness.

- LSTM PHD student Waleed Al Salem was one of six students chosen from the UK to give an oral presentation at the House of Commons in September 2014. Waleed was also recognised by the Saudi Embassy as one of the top 5 PhD students from Saudi Arabia (out of ~13,500) currently doing a PhD in the UK.

List of honorary appointments 2013 – 2014

Name	Title	Department
Dr P Jeacocke	Honorary Research Fellow	International Public Health
Professor Peter Winstanley	Honorary Research Fellow	International Public Health & Clinical Sciences
Dr Audery Lenhart	Honorary Research Fellow	Vector Biology
Dr Vittoria Lutje	Honorary Research Fellow	Clinical Sciences
Dr Oliver Hassall	Honorary Research Fellow	International Public Health
Melissa Gladstone	Honorary Research Fellow	International Public Health
Dr Poliaro	Honorary Research Fellow	International Public Health
Professor Wang Yang	Honorary Fellow	International Public Health
Dr Theresa Allain	Honorary Research Fellow	International Public Health & Clinical Sciences
Dr Donna Gray	Honorary Research Fellow	Parasitology
Dr Lisa Stone	Honorary Research Fellow	Parasitology
Dr M Beadsworth	Honorary Research Fellow	International Public Health & Clinical Sciences
Professor P Cooper	Honorary Fellow	Clinical Sciences
Chris Moxon	Honorary Research Fellow	
Professor David Hornby	Honorary Research Fellow	Parasitology
Christopher Parry	Honorary Research Fellow	International Public Health
Emily Adams	Honorary Research Fellow	Parasitology
Margaret Parkes	Honorary Fellow	Clinical Sciences
Jesus Salcedo-Sora	Honorary Research Fellow	Parasitology
Rachel Isba	Honorary Research Fellow	Clinical Sciences
Robert Parker	Honorary Research Fellow	International Public Health & Clinical Sciences
Karen Steingart	Honorary Research Fellow	International Public Health
Stephane Paulus	Honorary Research Fellow	Education
Thomas Edward Fletcher	Honorary Research Fellow	International Public Health & Clinical Sciences
Andrew Riordan	Honorary Research Fellow	Education
Jason Janish Madan	Honorary Research Fellow	Parasitology
Dr Jamie Rylance	Honorary Research Fellow	Clinical Sciences
Dr Helen Smith	Honorary Research Fellow	Clinical Sciences
Dr MacPherson	Honorary Research Fellow	Clinical Sciences
Dr Wendi Bailey	Honorary Research Fellow	Clinical Sciences

Research consortia hosted by LSTM

AVECNET
AVECNET aims to develop and evaluate new tools for malaria control in Africa.
Funded by: European Union
www.avecnet.eu

A·WOL
A·WOL's academic and industrial partners aim to develop new drugs against onchocerciasis (river blindness) and lymphatic filariasis (elephantiasis).
Funded by: Bill and Melinda Gates Foundation
www.a-wol.net

CENTRE FOR NEGLECTED TROPICAL DISEASES

CNTD LF
CNTD LF supports national NTD programmes; provides technical assistance; strengthens the evidence base to inform policy makers and identifies and prioritises interventions that will eliminate lymphatic filariasis and reduce the burden of other neglected tropical diseases.
Funded by: UK Department for International Development and GlaxoSmithKline
www.cntd.org

EHCRC
The Effective Health Care Research Consortium (EHCRC) focuses on reliable, relevant evidence in malaria and tuberculosis, child health, maternal health and health systems. It prepares and updates Cochrane Reviews about the effects of health care relevant to low-income and middle-income countries. LSTM hosts the Cochrane Infectious Disease Group.
Funded by: UK Department for International Development
www.evidence4health.org and www.cidg.cochrane.org

IntHEC
IntHEC develops evidence-based strategies to increase equity, integration and effectiveness of reproductive health services for poor communities in sub-Saharan Africa.
Funded by: European Union
www.inthec.org

MiP
The Malaria in Pregnancy (MiP) consortium improves the control of malaria in pregnancy in Africa, Asia and Latin America by researching malaria treatment, prevention and public health impact.
Funded by: Bill and Melinda Gates Foundation, European Union and the European and Developing Countries Clinical Trials Partnership
www.mip-consortium.org

PERFORM
The PERFORM consortium uses an action research approach to support decentralised management to improve health workforce performance in Sub-Saharan Africa.
Funded by: European Union
www.performconsortium.com

REACHOUT
The REACHOUT consortium supports and strengthens the vital work of close-to-community providers of healthcare in Africa and Asia.
Funded by: European Union
www.reachoutconsortium.org

ReBUILD
The ReBUILD consortium explores different approaches to health system development in countries that have been affected by social and political conflict / crisis in Africa and Asia.
Funded by: UK Department for International Development
www.rebuildconsortium.com

T-REC
T-REC is a consortium of academics and health practitioners who want to improve blood transfusion services across Africa.
Funded by: European Union
www.t-rec.eu

The statue on the front cover is part of the Sir Alfred Jones Memorial on Liverpool's waterfront. The figure represents Research and is assumed to be based on Mary Kingsley (1862 – 1900), a personal friend of LSTM founder and ship magnate Sir Alfred Jones.

Kingsley, pictured on this page, set sail for West Africa from Liverpool in 1893. She was largely self-educated and had strong views on social and political issues of the time and an interest in science. Shortly after she published Travels in West Africa (1897), which was an immediate best-seller, and West African Studies (1899).

Through her experiences, she acquired a detailed knowledge of African society and politics and was regarded as an expert in government circles. She was a personal friend of LSTM founders Sir Alfred Lewis Jones and John Holt, with the latter acknowledging her role in "getting us to think on the right lines and to work for the good of the African peoples." She demanded a wider understanding of African social and legal systems and how they should be reflected in colonial commerce. It lead to the formation of the Fair Commerce Party, The Congo Reform Association and the African Society. Kingsley died in South Africa in 1900, aged just 38.

LSTM instituted the Mary Kingsley medal in 1903. It is presented for outstanding achievements in the field of Tropical Medicine. The full list of medal recipients, including Robert Koch and Sir Patrick Manson, can be found on the LSTM website and on the big wooden displays in the old School building.

Editorial team: Billy Dean, Kim West and Diderik van Halsema (coordination)

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Athena SWAN Bronze Award

INVESTORS IN PEOPLE