LSTM
LIVERPOOL SCHOOL
OF TROPICAL MEDICINE

ANNUAL REPORT
2011/12

Contents

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.

Chairman's Foreword

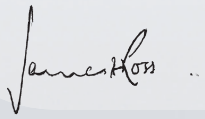
The award to the Director, Professor Janet Hemingway, of the CBE in the Queen's Birthday Honours list is another very significant mark of the personal contribution she has made to her chosen field of endeavour. It also signals the continued raising of the School's profile in a competitive and overcrowded world.

We will look back on this year as one in which LSTM began to change gear and map out its direction for the next phase of its development. The raison d'être of the organisation is neatly summarised as "researching and educating to save lives", but LSTM does not try to be all things to all people. Instead it focuses on three complementary areas: Product Discovery and Development; Translation of Knowledge into Policy and Practice and thirdly, Capacity Strengthening.

This strategy, which is in the public domain, spells out these three focus areas in greater detail; describes the challenges which the organisation faces and indicates how progress will be monitored.

Meanwhile, steps are being taken to ensure that the strategy can successfully be put into practice. Thus, we are pushing ahead to have the ability to award our own degrees; we are in the process of applying to become a Higher Education Institution in our own right. Both of these steps will strengthen our ability to shape our own future.

And as I write, we are in the market to maintain and strengthen the lifeblood of LSTM, its people. Together with the University of Warwick and in our own right, we are recruiting at several different levels, outstanding individuals to put flesh on the bones of the Centre for Applied Health Research and Delivery, and to appoint a Director of Communications. The future of LSTM continues to be safeguarded.



James Ross OBE

We will look back on this year as one in which LSTM began to change gear.

Director's Foreword

In the midst of difficult headlines for the Eurozone and the United Kingdom and with slow economic growth and serious financial constraints, it is pleasing to note that LSTM continues to thrive and grow.

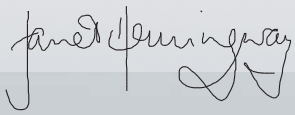
Completed four years ago, the CTID building is operating close to capacity and we are expanding our estate to house new staff in the knowledge translation area. A new learning and training centre, largely funded by The Wellcome Trust, has also been completed in Malawi to house the expansion of activities with The College of Medicine in Blantyre.

The coming year will be a defining one for the School. The increasingly regulated environment in which we operate and the visibility gained from league tables of research excellence within the higher education sector, mean that it is essential that the School is recognised as a Higher Education Institute (HEI) in its own right. The case for recognition is currently being considered by The Department for Business Innovation and Skills (BIS).

We trust that becoming a HEI will have a positive outcome in other areas of the School: allowing us to continue to innovate in capacity strengthening; translational and operational research activities and improve health worldwide. It would send out very strange messages to our major donors if, after recognising the School by the award of a new MRC/TSB bio catalyst grant in 2012, BIS were not supportive.

Grant income and awards continue to grow, with four major funders: The Bill and Melinda Gates Foundation; The Department for International Development; The Wellcome Trust and European Union all providing increased funding. Support from these and a range of other funding agencies increased the value of grants held to a figure in excess of £250 million for the first time since the School opened.

From this strong academic and financial base we are moving forward with a clear strategic vision for the future and a dedicated cohort of staff, who will ensure that LSTM, for the foreseeable future, makes a positive contribution to improving health in the tropics.



Janet Hemingway CBE

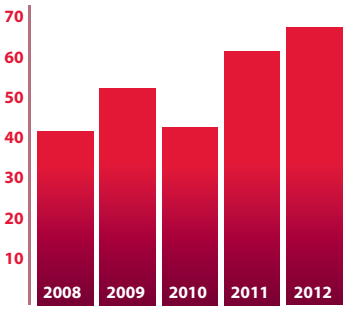
Treasurer's Report

Against the backdrop of continuing economic instability that has created problems across the globe, it is pleasing to report that LSTM has delivered another solid performance in the financial year to 31 July 2012 and the institution remains well placed for the future.

The extensive capital investment programme of the past few years has provided state-of-the-art facilities, which, coupled with the recruitment of senior academics, have helped LSTM win competitive tenders for grant funding and fulfil major research programmes. The resultant momentum has positively benefited the Income and Expenditure Account and added to the strength of the Balance Sheet, which is in a very healthy state.

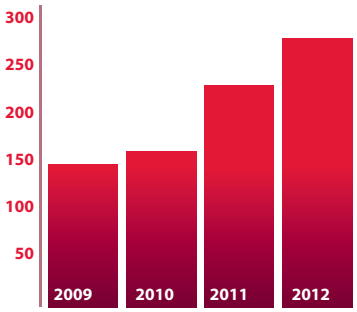
During the year ended 31 July 2012, LSTM and its subsidiary companies generated income of £57.7M, an increase of £4.2M (7.8%) on the previous year. This growth in activity contributed to a healthy surplus for the year of £2.07M, increasing Group Net Assets to £52.9M. LSTM is in the healthy position of having no external borrowings and has acceptable liquidity.

The Research grants and contracts, across the Group, produced a record £43.8M of income, an increase of 6.2% on the prior year, and this level is confidently expected to grow year on year based on existing contracts and a fairly prudent expectation of new awards.



Number of New Awards

During the year, 69 new research grants were awarded to the Group, the highest number of new awards in a single year. A total of £39.4M new active research was added to the research portfolio. These new awards created 85 new jobs.



Active Research £M

The total value of active research now exceeds £276M (inclusive of LATH). The Group was successful with 83% of funding applications during 2011/12.

Whilst research continues to perform strongly, teaching is more challenging, particularly because of external factors such as the changes to education funding in the UK and the turbulent international economic conditions. Nevertheless, in 2012 LSTM's teaching activities fully covered their costs and are expected to continue to do so in the current year.

As has been reported in previous years, LSTM's travel clinic business, Well Travelled Clinic (WTC), has encountered severe difficulties, mainly because of a sharp reduction in international business travel, and steps have been taken to reduce overheads and maximise opportunities. Whilst there are signs that the situation has been stabilised and losses stemmed, a decision has been taken to adopt a prudent approach in respect of the Annual Financial statement and a bad debt provision has been made for LSTM's total investment of £1,234k in this business. This investment included the cost of WTC's Manchester clinic which has now been closed and Liverpool and Chester will now be better placed to drive forward.

Another subsidiary undertaking, Liverpool Associates in Tropical Health (LATH), has been re-positioned and aligned more closely with LSTM, which has resulted in cost reductions and will hopefully increase business opportunities in the future. LATH achieved a positive contribution of £109k in 2012.

In summary, LSTM is in a financially healthy position and has the capacity to grow without overstretching its resources. Continuing success in winning new business is more than likely to create a need for increasing physical and human resources and LSTM is already planning for the next phase of its growth, always with one eye on fiscal prudence.

Ian Jones

Vice Presidents' Profiles

Lord David Owen

My former role as Chancellor of Liverpool University provided the connecting link to my association with LSTM and I am delighted to have continued as a Vice-President of LSTM.

During the 16 years of association with LSTM, it has developed into a centre of world excellence in medical research. There are very few such centres in the UK and we must therefore treasure and sustain those that we have. The funding LSTM receives to sustain its research in dollars and euros exceed that of pounds sterling: this is an extraordinary achievement.

As Chancellor of the University of Liverpool, I took a special interest in the work of LSTM and there was a lot of discussion as to how best build on the School's strengths. Recent linkages established with the University of Warwick are indicative of the way that the School must be free to establish partnerships with other Universities.

I am very confident of the future at LSTM because the combination of pure and applied scientific research is grounded in the countries associated with tropical diseases.

Baroness Caroline Cox

I am a nurse and a social scientist by intention – and a Baroness by astonishment. Not active in politics, I was the first Baroness I had ever met, using the privilege of a seat in the House of Lords to be 'a voice for the voiceless.'

I am honoured and thrilled to be associated with LSTM and I'm deeply inspired by the impressive combination of professionalism, academic rigour and compassion of the staff. I have seen the expansion of the School's work in many countries including its work in meeting key Millennium Development Goals in Maternal and Child Health in countries with high maternal and infant mortality rates. LSTM has also been able to provide clinical advice for my non-governmental organisation, Humanitarian Aids Relief Trust (HART).

The strong professional and academic foundation of LSTM has developed and its well-renowned international reputation is going from strength to strength. I cherish the opportunity to share with this highly esteemed School, our respective endeavours to bring healing, health and hope to people in the most challenging parts of our world.

Mr Nicholas Barber CBE

In a sense my involvement with LSTM goes back to its origins in 1898 when Alfred Jones of Elder Dempster Lines and Alfred Holt of Ocean/Blue Funnel Line founded the School. These great shipping companies merged in 1965 and continued to support the School financially through the PH Holt Foundation. I became Ocean's Chief Executive in 1986 and soon after was appointed a Vice-President of LSTM.

Long before becoming a VP, I had seen the impact of tropical diseases first hand, having travelled extensively in the tropics, particularly South East Asia and West Africa.

As a VP for 25 years, I have been excited to see the School's transformation, led by Director, Janet Hemingway. The opening of the new CTID building in 2008 was a great moment for Liverpool as well as LSTM itself. The School had slipped from its world class ranking but in recent years has more than recovered its proper place, leading the way on a worldwide basis.

I continue to be a donor for what I regard as a cause hugely worth supporting.

Forging Our Way Ahead

LSTM's New Structure

A major re-structuring of LSTM has occurred during the last year. The old structure has been in place for over a decade, during which LSTM has undergone a period of unprecedented growth. The new structure is aligned with this growth, promoting senior staff into positions of greater responsibility and establishing the springboard for the next phase of LSTM's expansion and growth.

Cross-cutting Themes

Overlaid on this new structure are five cross-cutting themes, which draw on expertise from across LSTM. These themes are: Capacity Development; The Centre for Applied Health Research and Delivery (CAHRD); Evidence–based Medicine; Neglected Tropical Diseases (NTDs) and The Centre for Health in the Eastern Mediterranean (CHEM). These represent the significant areas of strength in LSTM. In NTDs, for example, LSTM already has the most extensive coverage of any UK institution, with major programmes in filariasis, trypanosomiasis and schistosomiasis. As with malaria, LSTM covers the full spectrum of NTDs from basic biology to development of products for disease prevention and treatment and it also conducts operational research to support country control programmes. CHEM builds on our expanding portfolio of taught courses and research in the region, providing a focal point for future initiatives.

New Staff

As LSTM expands, it has been hiring staff to support each of the five thematic areas. The greatest concentration of new staff has been brought in to support the CAHRD initiative, with 14 new posts, from professorial to lecturer level. These posts are advertised jointly with the University of Warwick, and are primarily designed to develop and strengthen mathematical, epidemiology and economic approaches to inform programmes on the prevention and treatment of infectious diseases. New staff in NTDs at lecturer and senior lecturer level, have also joined LSTM, re-invigorating our interest in leishmaniasis and strengthening the interface between the Parasitology and Vector Biology Departments. A number of articles within this Annual Report expand on the expected output of these themes.

The line management of LSTM will operate through four academic departments: Clinical Sciences, Parasitology, International Public Health and Vector Biology. These will report

The next phase

The new Departments capture the basic areas of strength within the School.

through two academic Deans: Professor David Lalloo and Professor Alister Craig, who will oversee the clinical and non-clinical wings of LSTM respectively. The new departments capture the basic areas of strength within the School.

Vector Biology

LSTM has the greatest concentration of medical entomologists worldwide. This team has major strengths in population genetics; insecticide resistance; malaria and trypanosomiasis control and mosquito transgenics. The Vector Biology Department, headed by Professor Hilary Ranson, continues to expand with major overseas programmes in Tanzania, Cameroon and Malawi and projects in Cambodia, India and Sri Lanka.

Parasitology

The Parasitology Department is also thriving under the leadership of Professor Mark Taylor. Malaria and filariasis are the subjects of significant laboratory-based drug discovery programmes. These have already successfully seeded a TB drug development initiative, expanding the links between the Parasitology and Vector Biology Departments. Taking advantage of our state-of-the-art insectary and laboratory facilities will also allow LSTM to extend its basic biology and product development activities in the near future.

Clinical Sciences

The Clinical Sciences Department is headed by Professor Stephen Gordon. Stephen first joined LSTM as a Wellcome Trust Clinical Research fellow, based in Blantyre, Malawi. His return to the UK has allowed us to expand the respiratory theme in LSTM. This activity, highlighted in last year's Report, has received further support with local NHS trusts providing funding for new clinical research staff in areas of mutual interest.

International Public Health

The Clinical Sciences Department blends seamlessly into International Public Health and is temporarily led by Professor Imelda Bates, who also leads the Capacity Development theme. LSTM is looking to make a senior external appointment to lead and strengthen the International Public Health Department. These two departments currently have major programmes in human resources; health systems; HIV; evidence synthesis and TB treatment in resource poor settings. Many of the new CAHRD appointments will also operate from here and will also draw on significant resources from the other three departments.

Did you know?

LSTM has the greatest concentration of medical entomologists worldwide.

LSTM already has the most extensive coverage of any UK institution, with major programmes in filariasis, trypanosomiasis and schistosomiasis.

Excellence in Teaching and Support Services

Major growth also requires strengthening of our teaching and support services. Our learning and teaching activities overseas are expected to expand over the next decade. To prepare for this expansion and continue to support excellence in teaching at our UK base, LSTM has established a formal agreement with the University of Liverpool, to devolve responsibility for the Masters and Diploma courses that LSTM offers, which attract University of Liverpool awards. This is the first step towards LSTM obtaining degree awarding powers in its own right by 2014.

Support services have been strengthened in line with our growing portfolio of activities. Sian Freer in the Business Development and Research Support Office has taken on further responsibilities, as has Chris Brooks who is now the Director of Finance. Both these sections have been restructured and strengthened with new staff to ensure that we are able to deliver and support our broad spectrum of activities to exacting professional standards.

The new LSTM structure allows us to provide senior staff with increased management experience, ensuring the future long term viability of the organisation by providing a greater depth of coherent senior management with a similar shared vision of LSTM's purpose and trajectory.

4 Academic Departments

- Vector Biology
- Clinical Sciences
- Parasitology
- International Public Health

5 Cross-cutting Themes

- Capacity Development
- Centre for Applied Health Research and Delivery (CAHRD)
- Evidence based Medicine
- Neglected Tropical Diseases (NTDs)
- Centre for Health in the Eastern Mediterranean (CHEM)

Investing in Neglected Tropical Diseases

What are Neglected Tropical Diseases?

The 'Neglected Tropical Diseases' (NTD) represent a group of mostly parasitic diseases that are well represented across LSTM's research portfolio. These include important tropical parasites such as those responsible for onchocerciasis, lymphatic filariasis, schistosomiasis, soil-transmitted helminths and the trypanosomes as well as snake bites. The term 'neglected' reflects the lower priority for funding these diseases attract compared to malaria, HIV and TB. Grouping these diseases together seeks to re-dress this imbalance.

NTD: a cross cutting theme at LSTM

LSTM has a long history of NTD research and more recently having recognised their strategic importance, LSTM decided to invest in recruiting a team of global experts in each of the major groups. Our activities range from cutting-edge fundamental research on NTD parasites and their vectors, through large translational programmes such as A·WOL, which are discovering and developing new drugs for onchocerciasis and lymphatic filariasis, to our Centre for NTD, CNTD, playing an important role in the implementation and technical assistance to global elimination programmes.

Cross cutting themes impact on future NTD research

A more integrated structure allows us to deliver a path for the translation of our research outputs from the laboratory into operational research in the field, and work together to maintain NTDs on the global health agenda. This will enhance our NTD profile to attract funding and maintain LSTM's international recognition as a global leader in NTD research.
We also know that NTDs have a major impact on other co-infections including malaria, HIV and TB. For example, schistosome worms have been linked with HIV pathogenesis and bladder cancer. Eliminating these diseases can thus play an important role in the successful treatment and control of other diseases and increase the effectiveness of vaccination – and so NTD will impact across a broad range of LSTM's activities.

Challenges facing NTD research

We are currently facing a very dynamic situation with a great deal of effort being placed on trying to achieve the ambitious goals for the global elimination of some of the NTD by 2020.

One of the major challenges involves informing the funding and international health agencies of the critical importance of maintaining our research activities to deliver the knowledge required to produce better ways to treat and control these diseases.

Not relying solely on existing tools, is hopefully a lesson we have learnt from malaria and TB global control failures in the past.

A further challenge is to recognise that most people will be infected with several NTD at the same time; we need to understand how this polyparasitism affects the way in which we integrate their treatment and control. Funding remains a critical issue, NTDs barely register 0.6% of the international development funding compared to 37% for HIV/AIDS.

LSTM's key activities in NTD research

There is good reason to be proud of the impact LSTM has made in NTD research, as we are now one of the world's leading global institutes in NTD. Our success is evident from the early 1900s, when the black fly vectors for onchocerciasis were discovered to more recent breakthroughs, when the same worms were shown to host a bacterial symbiont, *Wolbachia*, opening up the use of antibiotics as a new treatment, curing patients of river blindness and elephantiasis.

The important impact CNTD has had on the delivery and implementation of mass drug administration for the Global Programme for the Elimination of Lymphatic Filariasis is clear, and it is now turning its attention to the most challenging endemic areas – hard-to-reach or in post-conflict countries.

Recently, Professor Moses Bockarie's CNTD team has uncovered the impact of vector efficiency in maintaining parasite transmission, even at very low levels after a 'successful' MDA programme. At the other end of the spectrum, state-of-the-art bio-imaging techniques are being used by Dr Joe Turner to uncover the complex factors that contribute to the pathogenesis of elephantiasis.

For African sleeping sickness, Dr Alvaro Acosta-Serrano is studying the importance of sugars in the survival of trypanosomes within the insect vector, with Professor Mike Lehane's team having made simple, yet highly effective improvements to new traps for the tsetse fly vectors, which hold particular promise to extend the range of vector control strategies.

Professor Phil Cooper's studies in Ecuador on a large cohort of children will determine the impact of early exposures to gut worm infections on the development of vaccine immunity and allergy. Work in Africa, conducted by Professor Russ Stothard, will pave the way to expand control programmes for schistosomiasis in pre-school children.

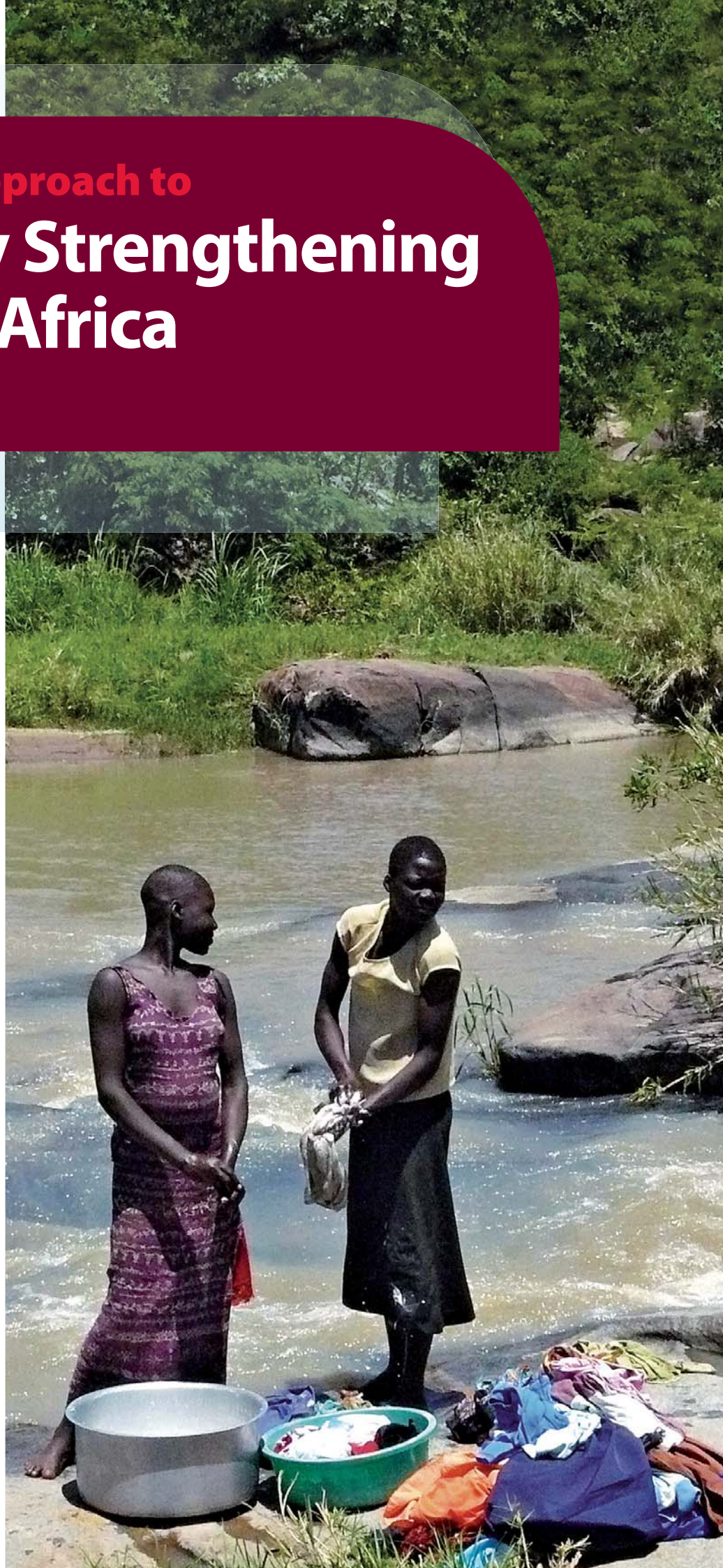
The recent strategic investment in NTD as a LSTM cross-cutting theme will ensure that NTD research continues to make important impacts at the forefront of global health research.

Professor Mark Taylor,
Head of Parasitology Department

Did you know?

We are now one of the world's leading global institutes in NTD.

A Smarter Approach to Capacity Strengthening in Africa



Using research to guide better approaches to strengthening the capacity of health systems in Africa.

Many important research outputs fail to make a difference to the health of individuals in low-income countries because there is limited capacity in the health system to use research results to influence decisions about policy and practice. In recognition of the need to address this bottleneck, the attention of the international development community is shifting towards strengthening the capacity of weak health systems to utilise research results. This focus on translation of research into action closely matches the goal of LSTM, to use high quality research to improve the health of those living in some of the world's poorest countries.

Establishing a New Unit

Much of the research and consultancy work carried out by LSTM involves capacity strengthening in one way or another. We have taken the opportunity to consolidate and build on this extensive experience by establishing the Capacity Strengthening Implementation Research unit (CSIR). The unit is a focal point for attracting expertise from within and beyond the School; it creates synergies that enable us to rapidly respond to the growing demand for evidence about how to do effective and sustainable capacity strengthening. CSIR's projects

Building research capacity in Africa's blood transfusion services: www.t-rec.eu/

Through an exciting and innovative blend of creativity and scientific approaches, the CSIR unit is making a significant international contribution.

range from helping five African universities to develop, implement and monitor workplans to enhance their PhD programmes, to working with laboratory teams in several Nigerian states to set up systems that, for the first time, brought diagnostic tests for malaria and anaemia to hard-to-reach communities. Current work also includes a project with the Centre for Neglected Tropical Diseases, helping to identify and fill capacity gaps in their network of partner laboratories in endemic countries.

Many funding agencies expect researchers to undertake some capacity development as part of their project, but tools and methods they should use to measure performance is not clear.

Each project setting presents unique challenges such as how to document progress in capacity strengthening and how to demonstrate to funders that they are getting value for money.

Within partnerships, the CSIR applies rigorous academic principles and evidence to develop an innovative, logical approach to designing capacity strengthening programmes. Our approach enables us to produce tangible evidence of progress and builds in measures to promote sustainability from the outset of the project. Our measurable indicators provide information about not only 'how much' the capacity has been enhanced but also about 'how and why'.

Building on Experiences

The CSIR unit has been very active over the last year sharing its experiences and methods with policy makers and groups of research funders in the UK and globally, and learning from others who are also working to improve the effectiveness of investments in capacity strengthening. For example, we contributed to the 'Measuring Impact of Higher Education for Development' meeting in London in March 2012, co-hosted by the Association of Commonwealth Universities and the London International Development Centre, as well as a meeting of the UK Collaborative on Development Sciences, which includes representatives from the UK Research Councils, the UK Department for International Development, learned societies such as The Royal Society and academic networks such as the Association of Commonwealth Universities. These meetings gave us an opportunity to discuss some of our successful capacity strengthening programmes, such as the 10 year old Diploma in Project Design and Management programme based in Kumasi, Ghana. This programme is a hands-on, practical research skills training programme which is led by a Ghanaian team who have been our capacity strengthening partners for over 20 years, and who have recently expanded the course to other sites in Ghana and to Harare in Zimbabwe.

Globally, expertise that combines academic and practical aspects of capacity strengthening is very scarce so the CSIR has formed a productive collaboration with The University of Toronto's Dalla Lana School of Public Health. Their Global Health team shares our ethos and vision for forming equitable and trusting partnerships with colleagues in Africa for capacity strengthening with the ultimate goal of achieving sustainability. A fascinating project has emerged from this Canadian-LSTM collaboration which, in partnership with the influential ESSENCE group of global research funders, has enabled us to access a huge diversity of funders' reports and documents and use them to learn lessons about what does and does not work for capacity strengthening.

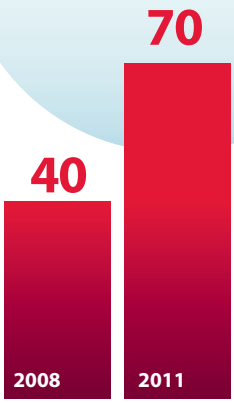
Sustaining Development

Capacity strengthening is a long-term, complex process that needs to take into account interactions between individuals, organisations, and national and international systems, as well as cultural values and political processes. Through an exciting and innovative blend of creativity and scientific approaches, the CSIR unit is making a significant international contribution to knowledge about effective capacity strengthening. Generating timely and robust evidence to feed into policy debates about capacity strengthening and promoting more robust and transparent methods for measuring changes in capacity, will be key activities for the CSIR in the coming year.

Professor Imelda Bates
Head of the Capacity Strengthening Implementation Research Unit

Malawi-Liverpool Wellcome Trust Clinical Research Programme

In the last year, MLW's excellence in research has been demonstrated by an outstanding publication record.



Peer-reviewed high quality papers

The Malawi-Liverpool-Wellcome Trust Clinical Research Programme (MLW) continues to excel as an internationally recognised centre for research and research training, strongly supported by LSTM and the University of Liverpool.

Increasingly integrated within the University of Malawi College of Medicine (www.mlw.medcol.mw), MLW's translational research portfolio links a state-of-the-art laboratory research base to strong hospital and community-based research teams, focusing on high disease burden health problems in Africa.

In the last year, MLW's excellence in research has been demonstrated by an outstanding publication record, increasing from under 40 peer-reviewed high quality papers in 2008 to over 70 in 2011.

This is underpinned by a large research grant portfolio from the Wellcome Trust and other funders, these include: the National Institutes of Health, the Bill & Melinda Gates Foundation, the EU, EDCTP and the Medical Research Council.

Over the past year, MLW has greatly strengthened strategic management; financial control; human resources; facilities and research governance. We have implemented novel electronic clinical (SPINE) and laboratory (LIMS) information management systems; and completed a new Adult Emergency & Trauma Centre and Learning & Training Centre. To ensure the success of the MLW training programme, we have secured additional support from the Wellcome Trust, Commonwealth Studentship Scheme, and the Bill & Melinda Gates Foundation. The Centre is part of a new joint PhD scheme between the University of Malawi and Liverpool and we have hosted several Wellcome Trust Advanced Courses.

Active engagement with policy makers has become a critical component of our work. In partnership with the College of Medicine, MLW researchers have participated in Malawi Ministry of Health (MoH) advisory and technical working groups, and have contributed to the

> An episode of pneumonia makes a patient weaker and more susceptible to diarrhoea and vice versa. So examining whether if you vaccinate against both you have a greater effect on child health is fascinating and is of great public health importance.
>
> **Professor Rob Heyderman**

MLW centre

development of the National Health Research Capacity Strengthening Initiative and the National Research Agenda.

MLW research is focused on 4 main research themes:

Malaria

Malaria has a substantive disease burden in Malawi and sub-Saharan Africa generally; studies improving our understanding of severe malaria and the assessment of the impact of community-based interventions (including bed net use, residual insecticide spraying, and new anti-malarial treatments) remain an important focus.

TB and HIV

Similarly, the dual epidemic of HIV and TB is high on our research agenda as researchers frequently look at each disease separately but we have a large trial which is investigating whether by tackling both diseases together, you can have a big impact on TB.

The HIV & TB research theme is also testing novel ways of HIV testing using a home-based saliva test rather than a blood test; new treatment packages to reduce the high death rate soon after the initiation of antiretroviral therapy (ART), and ways to improve access to healthcare.

Non-Communicable Diseases

There is an epidemic of diabetes, high blood pressure and heart disease in Malawi which is linked to rural-urban transition. It is important to highlight that Malawi is nowhere near as urbanized as South Africa for example, yet we are still seeing a large burden of disease.

To address the unprecedented double burden of an epidemic of communicable and non-communicable diseases (NCDs) across Africa, MLW has embarked on a series of studies to better understand the interactions between these conditions. As part of these studies we are interested to understand how HIV influences the NCD epidemic.

Microbes, Immunity and Vaccines

In addition to a large programme of basic microbiology, epidemiology and immunology and clinical science focused on pneumonia, meningitis and sepsis, MLW, in collaboration with the MoH, is documenting the effectiveness of Malawi's introduction of the pneumococcal vaccine to prevent pneumonia and meningitis, and whether the subsequent introduction of rotavirus vaccine will have an additive effect.

An episode of pneumonia makes a patient weaker and more susceptible to diarrhoea and vice versa. So examining whether if you vaccinate against both you have a greater effect on child health is fascinating and is of great public health importance.

MLW is now approaching its five year core grant renewal which will take the programme to the next level.

Professor Rob Heyderman,
Director of the Malawi-Liverpool Wellcome Trust Centre

Public Engagement in Malawi

www.mlw.medcol.mw

Engaging the community

Many people have questioned the effectiveness of bringing modern health practices to disease endemic countries when the general public often do not understand the diseases themselves; the medical research that underpins new interventions or even why it is needed. Public Engagement has therefore become a major focus for the Wellcome Trust, which funds Public Engagement at the Malawi Liverpool Wellcome Trust Clinical Research Programme (MLW), in the hope that it will improve the attitude towards medical research being conducted in Malawi.

Tamara Chipasula is the Science Communication Officer at MLW. Even as far back as childhood, Public Engagement has always been a part of her life; she would engage with the communities around her, and in secondary school she was one of two students given the chance to have lunch with parliamentarians, where she then spoke about her experience with the school community. "Joining MLW gave me a whole new interpretation of what Public Engagement should be: interactive, educational, two way and fun too." Now more than ever, Tamara recognises the importance of Public Engagement; but with up to 70% of the population in Malawi being illiterate, sustaining peoples' understanding becomes a big challenge.

The MLW addresses this issue by breaking Public Engagement into four key areas:

Community Engagement

This area focuses on improving communication and co-ordination. It is designed to help the community gain a better understanding of MLW activities, its value and contribution to society. This is achieved through activities such as community advisory groups and science cafés.

MLW was also awarded an International Public Engagement Award by the Wellcome Trust to establish a test exhibition, which they intend to implement fully.

Press/Media Relations

The press are the most important channels available to MLW: from holding regular press briefings with local media to exploring ways of making MLW's activities more appealing, the centre aims to improve science journalism across Malawi through capacity building workshops. One exciting project which just got launched in August this year is a new radio programme, designed to bring together researchers, the public and the media to engage in discussion over medical research issues.

Staff Engagement

The science communication department has introduced staff forums and staff intranet to encourage information sharing among staff, especially scientists and non-scientists.

Stakeholder/Policy Engagement

MLW co-operates with the College of Medicine (COM) to help stimulate dialogue between researchers, policy makers and other key stakeholders. Together with the COM, MLW and other stakeholders, they have organised a number of National Health Events; including World AIDS Day, World TB Day and networking workshops with other local Public Engagement groups.

"I like to put a human face to Public Engagement and as such tend to compare it with the human heart. There are different components to public health just like there are so many parts to the human body. Each part is dependent on the other and the heart is one of the crucial parts that links all the other body parts in one way or the other. Public Engagement is just that: the heart of public health." – Tamara Chipasula.

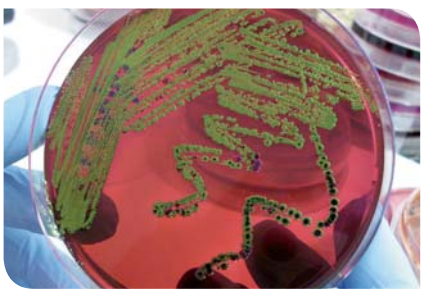
Improving Health in Ecuador

Consulting rooms in Quininde, Ecuador

Our research in Ecuador is looking at how early infections with parasites affects the development of the immune response, how this response is regulated and how this may affect the development of allergy.

A cohort of 2,400 children has been recruited from birth in a rural district in the coastal province of Esmeraldas, to assist our research. The recruitment stage took us four years and we have now been following the first children born into the cohort for seven years.

In order for our study to succeed, we have set up a study facility in the town of Quininde with a laboratory for doing parasitological analyses and immune studies. Additionally, we have also built a paediatric clinic based at their public hospital. These are used to evaluate the cohort children when they are ill and also to conduct routine evaluations to monitor the children's growth and health status.



E. coli colonies from a stool sample

Tracing Families

Much of our work is based in the rural areas where, the population being very mobile, we spend a lot of time tracking down the families as they move from place to place in the district in search of temporary work. Despite the frequent movements of study families, we have been able to keep track of more than 90% of the cohort, a high rate of follow-up that is essential for the ultimate success of the study, and where at eight years of age we plan to do more direct measures of respiratory function in the children. This will include spirometry and the measurement of exhaled nitric oxide, a marker of inflammation in the airways.

Our work will also include checking the children for parasite infections that can cause asthma-like symptoms and lung inflammation by looking for antibodies against *Toxocara*, a parasite of dogs and cats.

De-worming puppies for *Toxocara*

Supporting Research Networks

Our research will contribute to the understanding of the causes of the allergy epidemic particularly asthma, that has already reached alarming levels in many regions of Latin America. The work we do is supported by the Wellcome Trust and has been scientifically highly productive this year, leading to new grant support from the European Union, and the training of young Ecuadorians at Masters and PhD levels at Universities in Ecuador, Brazil, US and the UK.

A new formal link associated with the Catholic University in Quito has led to the establishment of a new molecular lab based at the University that will provide new training and collaborative opportunities between LSTM and Ecuador. This is an important initial step in the School's plans to develop a significant presence in Latin America.

Professor Phil Cooper,
Professor of Parasitology

Making the Grade Worldwide

LSTM warmly welcomed another set of high calibre students over the past year. Our diverse education and training portfolio includes postgraduate programmes that lead to University of Liverpool PhD and MSc awards, together with a variety of LSTM-certified professional Diplomas and short courses.

The Masters programmes go from strength to strength, attracting record numbers of students on the laboratory-based programmes and on the MSc International Public Health. An asset of the LSTM Masters is the support given to students in their choices for a research project, which 90% of students choose to do overseas.

With support from LSTM faculty, international partners and alumni, over 160 projects were unveiled at the Masters Project Fair in October. The range and diversity of the projects illustrate the worldwide impact of LSTM research. Projects in the area of maternal and neonatal health ranged from the integration of family planning with immunisation services in Nepal, to the infant feeding practices of women of ethnic minority in the North-West of England. Other studies focused on infectious diseases, including the epidemiology of rotavirus diarrhoea in Brazil and the management of schistosomiasis in pre-school children in Malawi. For students following one of the humanitarian Masters programmes, projects included the psychological effects of imprisonment of minors in the Philippines, health care provision in Columbia and urban agriculture in Cuba.

For most Masters students, the research project is the highlight of the LSTM experience and the outcomes of many projects are published in high quality research journals.

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Dr Sue Assinder
Director of Education

Emily Hufton

Liverpool-based student, Emily, aged 30, is originally from Manchester. She is currently working on her Master's dissertation project in International Public Health. Emily describes the overwhelming experience here at LSTM and how inspirational the course has been.

While studying at LSTM I often felt deeply moved about the current and future state of the world's health, and hugely motivated to contribute to this cause in my future career.

Prior to studying for the MSc, I spent the year working in public health in rural India and South Africa. It was this experience at community level which made me determined to move forward with a career in public health and spurred me to apply to LSTM.

LSTM offered the chance to focus on the 'developing world' aspect of public health as a post graduate study; with diverse modules such as epidemiology and disease surveillance, global climate change and healthcare of displaced populations.

For my dissertation, I explored the infant feeding practices of women seeking asylum in the North-West of England. I spent time talking to these mothers, listening to their experiences and attending their support groups. This gave me an invaluable understanding of their situation. The course has given me the skills and opportunity to carry out qualitative research with greater confidence.

In five years time I hope to be leading a health care community programme in a forgotten corner of the world with my husband and family in tow.

I truly wish to empower local people, to improve their community's health, in the same way as I have felt empowered to do my bit to improve the world from my experiences this year.

The impact of this year at LSTM has been huge; academically, socially and personally. To be surrounded by inspiring lecturers and colleagues from around the world on a daily basis has been a humbling experience; one which will stay with me forever.

The module choice for LSTM MSc students has also been enhanced this year with the addition of three new modules, namely Quality Improvements in Maternal and Newborn Health, Key Topics in Snakebite: Biology, Epidemiology, Pathology and Treatment and Applied Bioinformatics.

All of these modules reflect the unique attributes of LSTM and help to bring its research strengths to the learning and teaching arena.

Running for its second year, the Diploma in Tropical Nursing (DTN) was very well attended with a 62% rise in the number of students, many of them applying on the recommendation of DTN alumni. This short course, which is accredited by the Royal College of Nursing, again achieved excellent student evaluations. Other LSTM short courses continued to show good growth in the past year and have allowed the educational efforts of the School to reach previously untapped markets, such as Cambodia and Nepal. The School aims to build on this progress and grow its brand identity worldwide through a combination of in-country provision by LSTM staff, franchising of LSTM-certified courses for delivery by local providers and LSTM-endorsement of courses delivered by other providers.

The range and diversity of the projects illustrate the worldwide impact of LSTM research.

Ravi Jaipaul

Ravi, a 26 year old international student from Canada, recently completed his Diploma in Tropical Nursing. He talks about his time working overseas and how LSTM continues to exceed all expectations.

The Diploma in Tropical Nursing was a course that I dreamed of taking since I entered the health profession. Even with the highest of expectations, LSTM continually provided an educational experience that I have never experienced before.

The like-minded, active and engaged student base, coupled with the most experienced developing country practitioners set the stage for an incredible energetic learning environment.

LSTM is one of the very few institutes in the world to offer the Diploma and they make the course enjoyable and relevant whilst involving students in ideas and ways to improve the course for the future. We are supported by a cohort of some of the world's best teachers in Tropical Medicine and open communication is actively encouraged between students and teachers. My suggestions have always been taken into account, which is empowering to see.

They are genuinely interested in what we thought of the course, and their persistent provision of feedback is incredibly detailed and provides a range of different perspectives, and other ways to view the situation.

I have been involved in many overseas projects, the two most recent being the most crucial to the field I am in.

In Pisco, Peru, I was part of an infrastructure development group following an earthquake which devastated the town; from health assessments to sanitation improvements, we liaised with the community and developed lists of projects that our group of volunteers could engage in.

Most recently, I spent half a year at the Kigali Health Institute in Rwanda, teaching nursing and developing a curriculum. We were training the first degree granted to nursing students since the genocide of 1994. Despite financial and logistical constraints, we managed to graduate highly trained nurses, which are an integral part of health improvements in the country.

Studying internationally at LSTM makes me far more qualified for the positions that I want in my career. I feel extremely honoured to have had the opportunity to study here in Liverpool.

Targeted marketing activities in the North American market are starting to be reflected in student numbers. Marketing efforts such as exhibiting at the Annual General Meeting of American Society of Tropical Medicine & Hygiene saw North American traffic to the LSTM website increase dramatically and a 46% increase on last year for attracting students from this region.

To maintain the high quality of LSTM's education portfolio, staff need to engage with best practice in the delivery of teaching. A new training course was introduced to the School this year, aimed at staff with limited teaching experience. The course, 'Professional Certificate in Supporting Learning' is externally recognised by the Staff and Educational Development Association.

Not only is this course being offered to LSTM staff in Liverpool, it will also be available for institutions working in partnership with LSTM on educational activities overseas. This exemplifies the ethos of the School in provision of training in-country, not only delivering courses but also building the capacity of local tutors to deliver future training. This novel dual approach enhances the sustainability and long-term impact of LSTM's in-country education activities.

LSTM attracts students who are committed not only to their personal interests but also to the mission of LSTM.

Many of our students take up significant roles within government agencies and non-governmental organisations following graduation, making an impact on global health worldwide.

Paola Gaddi

Paola, aged 33 years old, worked as a doctor in Italy, until she decided that studying respiratory disease medicine and consultancy was an essential step forward and an unmissable opportunity.

I chose LSTM for my studies due to people telling me that it was one of the best teaching institutions. After working as a respiratory doctor in Italy, I ventured out to a rural area in South Sudan for two years to a hospital that was facing many difficulties as a result of a lack of doctors. This experience made me realise that if I want to be a part of developing the world, I needed to improve my knowledge of tropical diseases and LSTM was the right place to study.

Studying at LSTM has at times been difficult but very interesting and enriching. The Italian teaching system is very different to here, as we could choose our own study times and when to sit our exams; completing a written examination also proved a new challenge to me.

The experience has been very enjoyable, in particular working with people from diverse backgrounds and the opportunity to share our different knowledge. Our theory lessons are very valuable and I am certainly learning a lot from them; it is up to the individual student whether or not they wish to apply what they have learnt.

Our lecturers are great "communicators". Being an expert in a topic is one thing, but to be a good teacher, communicating your knowledge to others whilst maintaining attention and interest is another. This is exactly what LSTM lecturers have achieved.

Working on a qualitative project on capacity building in Malawi, my aim is to conduct a needs assessment on the local people. Talking to important stakeholders of the medical and paramedical institutions has been the first step to achieving this. I am also in the process of talking to nurses and clinical officers to understand their needs within the working environment. This is very important as a result of their focal involvement in the health system. It is crucial to develop any functioning plan to improve the overall service delivery.

In the future I would like to work in the field of health education in the developing world. Building capabilities within those countries remain one of the most effective things to do if the main target is to help them.

Evidence for Impact

How the Cochrane Infectious Diseases Group is helping people make better decisions.

If you give people food with their TB treatment do they get better quicker? Are iron supplements harmful when given to children in malaria areas? Do school programmes for de-worming actually mean children do better at school? These are some of the questions we at the Cochrane Infectious Diseases Group are tackling. Through our high level of expertise in research synthesis, the science of carrying out reliable and independent reviews, we aim to vastly improve policy making. Sometimes the reviews support global policies; sometimes they challenge them. Whatever they do, our main concern is to ensure that the science behind the reviews uses the latest advances, is done critically, and is utterly rigorous. The Cochrane Infectious Diseases Group is co-ordinated at LSTM, and is one of the 52 Editorial Groups and over 28,000 contributors that make up The Cochrane Collaboration.

The Cochrane Infectious Diseases Group focus on malaria, tropical diseases, diarrhoea and TB, and comprises over 450 authors and 16 editors with over 100 published reviews.

Each Cochrane Review generally takes a few years to complete, although they can be done much quicker. The record is held by a GP from Liverpool, who completed a review of 50 trials of artemisinin-combination treatment regimens in a breath-taking nine months, ready for the World Health Organization (WHO) Global Malaria Treatment Guidelines Panel to adjust its recommendations. Author teams are from all over the world, and comprise specialists in research synthesis and meta-analysis, as well as specialists in the topic area. Surprisingly, topic experts often don't make the best authors, particularly if they are conducting trials in their discipline; they are often too opinionated, but their experience can be invaluable in providing advice.

Cochrane Reviews are brought up-to-date periodically and this is a unique feature.

With a Cochrane Review, additional trials can be added and the summary results brought up-to-date. No other journal does this.

When reviews don't confirm what everyone believes, they can be controversial. For example, a recent update of school de-worming programmes showed very little evidence of impacts on nutrition, haemoglobin, or school attendance. These "belief disconfirming evidence" reviews are the most controversial and yet the most needed. They challenge dogma with

reliable summaries of the evidence that are critically appraised – challenging policy makers and others to make sure they have actually got the evidence right.

It's the science of reviewing that The Cochrane Collaboration know well, and it's a bit of a no-brainer that anyone wanting to carry out field research, particularly a trial, should systematically summarise all the available research on the topic to ensure the question is still valid before spending money – and experimenting further on people.

Believe it or not – a review that goes against the specialists

WHO: De-worming boosts the prospects of school-aged children earning their way out of poverty (2005).

Cochrane 2012: "it is probably misleading to justify contemporary de-worming programmes based on evidence of consistent benefit on nutrition, haemoglobin, school attendance, or school performance."

On publication, the review sparked a lively debate on the 'Speaking of Medicine' PLoS Medicine Community Blog about the pros and cons of mass de-worming programmes in low- and middle-income countries under the heading of 'Should de-worming Policies in the Developing World be Reconsidered?'

We take on unusual topics too. In the last year or two we have looked at whether, in areas of conflict and war, foreign governments should invest in health services of the countries they are occupying to increase political stability. Currently, we are examining whether it is worthwhile weighing children, and plotting their weight on a scale every time they visit a maternal and child health clinic in low- and middle-income countries; and whether subsidies for drugs given to the private sector boost access.

Team approach

The Effective Health Care Research Consortium (funded by the Department for International Development) and which includes the Cochrane Infectious Diseases Group, includes partners in India and South Africa, and a smaller group in China, each of which co-ordinate regional networks. The South Asian Cochrane Centre in Vellore opened in 2009, and the Centre for Evidence-Based Health Care opened in Stellenbosch in 2010.

The team go beyond infectious diseases, with work in non-communicable diseases, nutrition and health services now part of the core portfolio.

The whole Consortium aims to get reviews used in decision making. The India and South Africa Centres are recognised as leaders internationally and regionally. In South Africa, staff advise the government on nutrition and TB polices, and in India the Centre is training government staff and organising a range of think tanks and dissemination seminars around evidence-based practice. The Cochrane Infectious Diseases Group is a WHO Collaborating Centre, providing advice and analysis on a weekly basis to guideline groups in the organisation.

Our award winning team

In October 2011, Sarah Donegan, a statistician in Liverpool, was awarded the Bill Silverman Award at the 19th Cochrane Colloquium. William (Bill) Silverman (1924-2004) was a highly honoured founder of American neonatal medicine. Often regarded as a troublemaker, Bill was in the habit of questioning the scientific basis and ethics of his colleagues' practices.

The prize is awarded for high quality work that provides constructive suggestions for improving relevant aspects of the work of The Cochrane Collaboration.

Professor Paul Garner,
Co-ordinating Editor, Cochrane Infectious Diseases Group

In Partnership with the University of Warwick

Infectious diseases remain a major cause of mortality and morbidity in the tropics. As countries develop economically, other non-communicable diseases, such as diabetes and coronary heart disease start to become more important, while the burden of infectious diseases remains.

Warwick laboratory

Medical Teaching Centre

> I am delighted to facilitate the extension of the very productive research partnerships I have had with LSTM, bringing together the areas of research strength in both organisations to tackle major medical research questions that neither organisation alone could address.
>
> **Professor Peter Winstanley**

To maximise the impact of its activities, LSTM needs to be able to work with partners across this spectrum of activity. The development and successful implementation of evidence-based policy and practice is driven not only by medical science, but by disciplines such as economics. Therefore, multi-disciplinary teams are a pre-requisite for tackling some of the major health issues in disease endemic countries.

Recognising the importance of multi-disciplinary teams to address the operational and implementation research agenda of the major infectious diseases, LSTM has already created the Centre for Applied Health Research and Delivery. This virtual Centre brings together expertise from across the School in a format that will drive the next phase of the organisation's development. LSTM strives to not only improve internal collaborations, but aims to interact with other centres of excellence to continue in its success.

As LSTM enters the next exciting phase of its development, ensuring that appropriate technologies and policies are actually implemented to improve health, it is essential that it forms strategic partnerships in both the UK and internationally. From an internal audit of our own capabilities and an assessment of external stakeholder requirements for large scale programme monitoring, evaluation and implementation, it was evident that LSTM would benefit from working with an organisation with strengths in mathematics, modelling, health economics, non-communicable diseases and manufacturing. The University of Warwick has internationally recognised expertise in this area. It also has a relatively young medical school that is starting to develop a research portfolio in infectious diseases to complement its current activities in non-communicable diseases.

The excellent fit of expertise and common research agendas of LSTM and Warwick, which both benefit from a 'can do' ethos, allowed us to formally establish a strategic partnership.

Joint research programmes in excess of £5M have already been generated from collaborations between staff from both organisations. The partnership is now moving into its next phase with up to 14 new joint appointments advertised in areas of common interest. These posts, which are funded by both organisations, will cement the growing relationship and allow us to expand our abilities to successfully deliver large scale research programmes.

Interaction with Industry

The link will also increase our interaction with industry, with both organisations bringing a complementary cohort of industrial collaborators to the partnership. For example, GE Healthcare has a significant collaboration with the University of Warwick, but is looking to expand its activities in Maternal and Child Health in countries such as Malawi and so has extended these links to LSTM. Similarly, Bayer has major programmes in place with LSTM and is now looking to investigate the economics of a number of their strategic interventions by tapping into the expertise at Warwick.

Professor Peter Winstanley

The collaboration in Warwick is fostered by Professor Peter Winstanley, the Dean of Warwick Medical School, who has stimulated the interest in this partnership across the University. As the former UK director of the Liverpool-based Wellcome Trust Tropical Centre, Peter is no stranger to the infectious diseases research agenda. He is a long standing collaborator with Professor Steve Ward on the malaria drug discovery programme.

"I am delighted to facilitate the extension of the very productive research partnerships I have had with LSTM, bringing together the areas of research strength in both organisations to tackle major medical research questions that neither organisation alone could address." – Professor Peter Winstanley

We look forward to a long-term productive partnership, which will allow our stakeholders to benefit from seamless access to the expertise in both organisations in a competitive format.

Working with the NHS

Both dedicated to saving lives, the Liverpool School of Tropical Medicine was founded in 1898 and the NHS in 1954. LSTM has grown and changed, learning to interact with the evolving NHS in order for patients with tropical diseases in the UK to be treated by experts.

LSTM
LIVERPOOL SCHOOL
OF TROPICAL MEDICINE

NHS

At LSTM, doctors are taught Tropical Medicine in the widest sense by physicians who treat and study the relevant diseases and their underlying causes on a daily basis. Further important questions about new diagnostic tests, treatments and preventive measures are answered in joint research projects with the very recently formed National Institute for Health Research (NIHR).

LSTM doctors working in the NHS

Since 1898, doctors in LSTM have medically served the population of Merseyside. This tradition has been most evident in Infectious Diseases but has been enthusiastically adopted more recently by other specialties including Respiratory Medicine. Working side-by-side, NHS physicians help to develop LSTM staff working in NHS service and in turn LSTM staff bring NHS expertise back to LSTM teaching and joint projects. This interaction in Respiratory Medicine has catalysed projects on pneumonia treatment and vaccines, tuberculosis and the adverse health effects of tobacco, environmental and household smoke.

NHS physicians teaching in LSTM

LSTM provides a national and international focus for teaching of tropical medicine in the UK, particularly in the Diploma in Tropical Medicine and Hygiene, enrolling 170 students per year. NHS specialists in Respiratory Medicine, Gastroenterology, Public Health, Orthopaedics, Anaesthetics and Paediatrics now join the traditional Infectious Disease experts on the teaching faculty. Additionally, we teach 50 students a year in Research Methods courses.

LSTM and NHS together in research

The newest and most exciting LSTM/NHS linkage is in research. The NIHR mission of "improving the health and wealth of the nation through research" can be easily understood in LSTM, as poverty and disease are closely linked throughout the world. Our contemporary challenge is to identify areas of synergism where added value accrues from working on LSTM projects in NHS settings or vice versa.

Respiratory research group

A nun learning spirometry

In particular:

- We have synergistic projects in pneumonia and pneumococcal disease in Aintree University Hospital (NIHR Fellowship), Royal Liverpool University Hospital (Bill & Melinda Gates Foundation) and Queen Elizabeth Central Hospital, Blantyre (Wellcome Trust).
- Dr Kevin Mortimer has been appointed Clinical Senior Lecturer (CSL) in Respiratory Medicine at LSTM and Consultant at Aintree University Hospital. This joint appointment has facilitated projects in Chronic Obstructive Pulmonary Disease and asthma in Malawi (GlaxoSmithKline), asthma in Aintree (NIHR Health Technology Assessment award) and clean cook stove technology to prevent pneumonia in Malawi (Department for International Development/Medical Research Council/Wellcome Trust Joint Global Health Trials grant).
- Bronchoscopy-based research in Malawi and Liverpool is conducted to the same standards, using the same guidelines. This allows basic science discovery in innate immunity (WT International Fellowship); vaccine responses (Gates); and HIV treatment (Wellcome Trust) both in NHS Trust premises and overseas sites.
- There are future opportunities to study the process of pulmonary diagnosis (spirometry and radiology), care in pneumonia, provision of oxygen and ventilation jointly between UK and Africa.

LSTM and the future NHS

There are immediate opportunities at LSTM for further building our group of clinical academics who share a passion for working in the NHS. At LSTM we benefit from links with NHS organisations that take a global perspective and provide the freedom and flexibility needed for clinical academics to succeed. In the next 50 to 100 years, both LSTM and the NIHR will rely on commercial investment to bring new diagnostic tests, treatments and vaccines to the people that need them world-wide. By capitalising on opportunities provided by working in the NHS we are in a strong position to deliver translational research, as well as education and clinical impact both at home and overseas.

Inhaled vaccine project

LSTM provides a national and international focus for teaching of tropical medicine in the UK.

New Tools for Vector Control

Prevention of malaria is best achieved by vector control which, today relies almost entirely on the use of long lasting insecticides inside the home.

Wide scale implementation of tools such as indoor residual spraying (IRS) and long lasting insecticide treated bednets (LLINs) has led to impressive decreases in malaria cases in many countries. Despite their proven efficacy, malaria elimination or even sustained control will not be achieved with these tools alone. This is in part due to the ever growing threat imposed by the increasing levels of resistance to insecticides that is developing in many malaria mosquitoes. Even without the threat of insecticide resistance the current tools are not appropriate in all settings. In particular, neither LLINs or IRS are effective at preventing mosquito transmission outside the home. Two recently funded projects at LSTM are seeking to fill this gap by developing new vector control tools that specifically target outdoor transmission.

We aim to develop new vector control tools which can help tackle the changing dynamics of malaria transmission.

AvecNet

The first of these projects is the African Vector Control New Tools consortium (AvecNet), which is a European Union Framework 7 project, led by Professor Hilary Ranson at LSTM, involving 16 partners in Europe and Africa. This project, which runs for five years, aims to both ensure the sustainability of existing interventions by investing in new insecticides and understanding insecticide resistance, and also to develop new vector control tools which can help tackle the changing dynamics of malaria transmission in Africa. In some parts of the continent, high coverage with bednets and/or indoor spraying has had a dramatic impact on the amount of malaria transmission occurring inside the house and, as a result, outdoor transmission is proving to be an increasingly greater risk. Dr Gerry Killeen, and his team of entomologists, working at the Ifakara Health Institute in Tanzania, have been quantifying this risk and piloting new interventions to target outdoor biting mosquitoes.

Tools such as odour baited traps, insecticide treatment of cattle and use of repellents are all being evaluated in central Tanzania, where the primary vector is now *Anopheles arabiensis*, a mosquito species that is often found both feeding and resting outdoors. One tool showing particular promise is sisal strips treated with the volatile pyrethroid, transfluthrin. Preliminary results indicate that these strips allow slow release of the insecticide and reduce bites of *Anopheles arabiensis* mosquitoes by more than 90%, with efficacy sustained over six months. Sisal is easily available and easy to treat, hence a potential delivery format for spatial repellents outdoors.

2013 will see the start of phase II in this project: one or more new tools will be tested in large scale clinical trials to evaluate their potential to reduce the number of malaria cases.

TRAC

The second project is funded by the UK Department for International Development. The aim is to develop a unified response to the artemisinin drug resistance that has emerged in malaria parasites in South-East Asia. The Tracking Resistance to Artemisinins Collaboration (TRAC) objectives include the use of vector control to reduce transmission of these drug resistant parasites. Unlike Africa, the major malaria vectors in South East Asia feed predominately outside, often early in the evening, before householders are in bed. Hence LLINs have limited effect. Another important difference is that whilst in Africa, children and pregnant women are most at risk of malaria, in Asia much of the malaria transmission is associated with forest workers. This project, being led by Professor Janet Hemingway, involves the evaluation of a variety of different methods to provide personal protection to those most at risk. These include clothing treated with insecticide and/or repellents and portable emanators that contain a slow release volatile pyrethroid insecticide, which acts as a spatial repellent in much the same way as the sisal mats. The efficacy of these tools is currently been tested by Dr Derek Charlwood in field trials in Cambodia. The clothing or emanators are intended to be used by those at most risk of malaria and carried with them as they go about their daily routine, providing better round the clock protection. Hence, studies on the community acceptance of these tools are an important part of this study.

Both of these studies aim to substantially improve the effectiveness of vector control by providing vitally needed supplementary methods to ensure that the impressive gains in malaria control in recent years are sustained.

Collecting mosquitoes

Spatial repellents show particular promise for tackling outdoor transmission of malaria.

A mosquito collector prepares for the testing of the novel spatial repellent metafluthrin

Malaria Immunology

An Alternative Look

The malaria immunology group at LSTM is led by Dr Britta Urban who holds a Wellcome Trust Senior Fellowship in Basic Biomedical Science. She was based for four years at the KEMRI-Wellcome Trust Research Programme in Kilifi, Kenya before returning to the UK in 2011. Her research team is based now both in Kenya and at LSTM. The group is investigating how people develop immune responses to malaria and HIV and how these responses differ between people who develop severe disease compared to those that experience only mild clinical or no symptoms. The work is predominantly funded through Fellowships awarded by the Wellcome Trust. The group is also a member of the European Virtual Institute of Malaria Research, funded by the European Commission's Seventh Frame Work programme.

The group has a long-standing interest in evasion of immune responses by the malaria parasite. Parasites evade antibody responses that protect from disease by constantly changing their surface. The team is now investigating alternative ways to induce rapid antibody responses to different variants of parasite surface proteins.

This ground breaking research aims to produce a vaccine more equipped to combat severe disease and ultimately save lives.

Britta Urban group in Kilifi, Kenya

The science behind the research

Plasmodium falciparum infected erythrocytes express parasite-derived variant surface proteins (PfEMP1) that mediate adhesion of infected erythrocytes to cells lining the blood vessels. Cytoadhesion is associated with severe pathology of malaria; through the blocking of blood vessels, the structural alteration of blood vessel lining and modulation of cells of the immune system. Immune responses that block cytoadhesion are therefore an effective way to reduce severity of malaria but the parasite escapes these by changing the PfEMP1 that they express. Many groups have shown that children make antibody responses to a specific variant during a malaria infection. However, antibodies to PfEMP1 are specific for a given variant and children have to suffer repeated malaria episodes before they acquire a wide range of PfEMP1-specific antibodies necessary for protection from severe malarial disease.

We are investigating basic aspects of immune responses to PfEMP1, and exploring alternative ways to enhance the rapid induction of antibody responses to a wide range of PfEMP1 variants. Recent work by the group, both at LSTM and in close partnership with the KEMRI-Wellcome Trust Research Programme in Kilifi, Kenya, showed that CD4+T cell responses, unlike antibody responses, appear to reside within semi-conserved areas of PfEMP1 that are shared between many variants. Therefore, cross-reactive CD4+ T cell responses to PfEMP1 may be induced after only one or two infections. The team is now aiming to define the targets of protective CD4+ T cell responses to PfEMP1 and investigate whether they will provide help to B cells specific for a wide range of PfEMP1 variants, as long as T and B cell epitopes reside on the same molecule. In addition, the team hopes to define the phenotype of protective CD4+ T cells in children, mounting a successful immune response to pathology-associated PfEMP1. The answers to these questions may allow the design of a PfEMP1-based vaccine that induces strong, cross-reactive T cell responses to PfEMP1 and reduces mortality.

Anthropozoonotic Schistosomiasis

With his team in the UK and Uganda, Professor Russell Stothard is shedding new light on more cryptic aspects of the epidemiology of schistosomiasis in Lake Victoria.

In sub-Saharan Africa four species of schistosome commonly infect people with *Schistosoma mansoni* dominant. LSTM is actively supporting the distribution of praziquantel to millions of school-aged children; and alongside these efforts is on-the-ground disease surveillance, which is highlighting the 'plastic' epidemiological potential of this schistosome species.

Unfortunate Chimpanzees

In Uganda, with a growing bush-meat trade and progressive habitat encroachment, conservation of several non-human primate species is increasingly threatened, especially chimpanzees. The Ngamba Island Chimpanzee Sanctuary (NICS) in Lake Victoria acts as a regional conservation station. Despite detailed annual veterinary health checks, it only recently came to light that many animals, and sanctuary staff, were suffering from intestinal schistosomiasis, locally acquired from the island's shoreline in a presumed anthropozoonotic cycle (i.e. *'human-to-snail'* then *'snail-to-chimpanzee'* transmission).

This novel finding arose from increased disease surveillance within hard-to-reach fishing communities located on adjacent offshore islands. Many of these largely itinerant communities have now been formally recorded and provided with praziquantel; during this time it was noted that NICS was set within a sector of the lake where *S. mansoni* is now considered hyper-endemic. Preliminary investigations on NICS first established that the parasite's intermediate snail host, *Biomphalaria*, was locally abundant. It therefore remained an open question whether chimpanzees themselves would be infected.

Measuring local transmission

Assessing if chimpanzees were naturally infected with schistosomes required a multi-disciplinary effort that brought together both molecular and field-based epidemiological investigations and a new collaboration with the Chimpanzee Sanctuary and Wildlife Conservation Trust (see www.ngambaisland.com).

Parasitological inspection of the chimpanzees first confirmed that more than 90% were sero-positive for schistosomiasis, with over a quarter actively excreting schistosome eggs in their stool. Sequence analysis of mitochondrial DNA obtained from schistosome eggs, retrieved from the chimpanzees and associated NICS staff, pointed towards the establishment of a local zoonotic transmission cycle being maintained independently from people (i.e. *'chimpanzee-to-snail'* then *'snail-to-chimpanzee'*). This was illustrative of the schistosome's capacity to switch and adapt to alternative definitive hosts.

In a novel attempt to quantify levels of host morbidity, several chimpanzees have also been examined using portable ultrasonography. Progressive liver fibrosis, indicative of chronic hepatosplenic disease, was documented in selected animals. To safeguard the animals' welfare, a long-term disease management strategy is being developed with the NICS senior management team. The disease management plan will feature stepped-up annual dosing of each animal with praziquantel (60mg/kg) whilst under general anaesthesia, as it is administered by oral gavage. Alongside this, all NICS staff and associated workers are to be given praziquantel prophylactically on a biannual basis.

Future outlook

The setting on Ngamba serves as a persuasive reminder of the epidemiological potential of schistosomes to switch hosts and that this island could serve as a 'model system' assessing future disease control. Elimination of schistosomiasis will pose a significant future challenge requiring a balanced effort between local public health interventions and increased veterinary care.

Ngamba Island

Well Travelled Clinics

Well Travelled Clinics Ltd is the specialist travel health subsidiary company of the Liverpool School of Tropical Medicine. Its mission is to provide a range of pre and post travel health services to leisure and business travellers and to provide specialist occupational vaccination services to UK based companies.

Over the past year, Well Travelled Clinics Ltd has operated three travel clinics in Liverpool, Chester and Manchester. Business at the Liverpool clinic has remained stable during the year, with steady growth during the last quarter.

WTC Chester has had an excellent year, with strong growth in income; through increased business travel, patient numbers and a new training contract with NHS Wirral to deliver vaccination and immunisation training to practice nurses. The existing clinic in Chester will be relocated to a row-level property directly beneath its current location, which will offer greater commercial visibility and it is hoped will lead to continued growth at this clinic.

Unfortunately, due to poor trading, the WTC Board of Directors decided to shut down the Manchester branch in April 2012. The branch was closed to reduce loss and allow us to concentrate on the other two clinics.

The new website design has made the site more relevant to our business and occupational health clients. We have also started using Twitter and Facebook to broadcast our services. This has led to an increase in visitors to the website and greater demand for some of our business services.

WTC continues to host its annual Travel Health and Expedition Medicine Course. We also had a number of clinical nursing placements during the year who gained experience in Travel Health as well as learning from our clinical practice.

At the end of the financial year, we carried out a cross-organisational audit of occupational health requirements amongst all employees, with a view to future provision of occupational health services to LSTM. Occupational health is one of our growth areas, with demand for occupational travel advice and visa medicals steadily growing. We have made links with a number of external

diagnostic laboratories to support us in the delivery of these services, so that we can act as a 'one-stop-shop' for business travellers.

In the winter of 2012 we are due to take part in another vaccine research trial, as well as a new six-part Tropical Diseases documentary featuring LSTM, Well Travelled Clinics and the Royal Liverpool University Hospital, commissioned by the Discovery Channel.

We anticipate that business development will remain challenging in the year ahead as both the national and international commercial climate remain difficult. The clinic continues to look at ways to maximise its existing service provision and develop complementary income streams to support its existing clinical services.

Nurturing Growth

This project has a strong strategic fit with LSTM's new structure and long term plan. During the development of the Centre for Tropical and Infectious Diseases (CTID), a comprehensive study showed that close proximity of buildings was fundamental to LSTM's success and that the adjacencies and interaction between staff created added value.

LSTM's Maternal and Child Health Centre is currently located in Anson House and the development of property in Anson Court with its proximity to CTID became a sensible step in LSTM's campus growth. This Centre of Excellence will define and advance the current research agenda, ensuring that evidence-based interventions are delivered worldwide; reducing maternal and under five child mortality and provide appropriate capacity development training to support this.

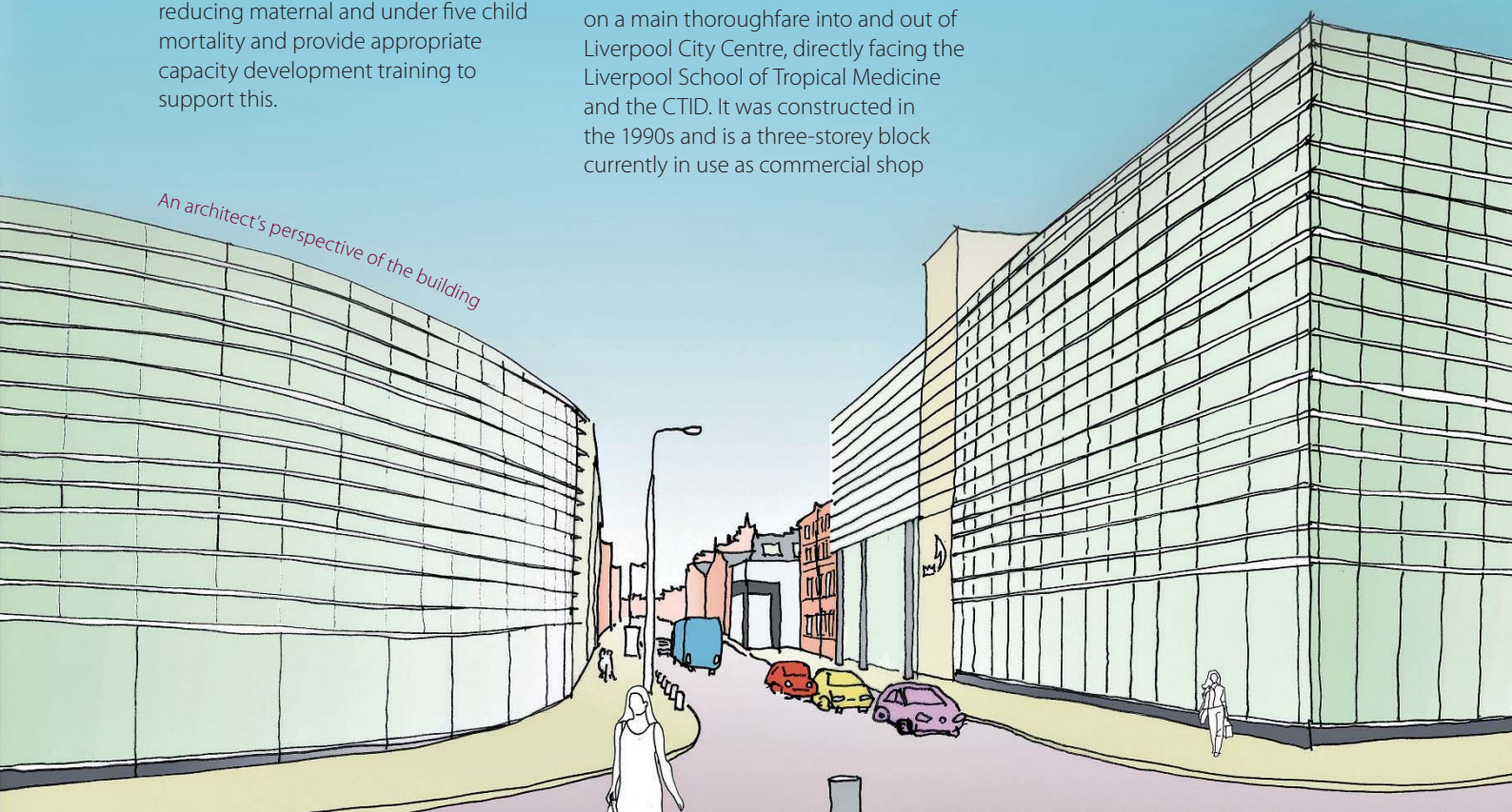
The new Centre for Maternal and Child Health at LSTM will co-locate the different groups working in these areas. This will allow us to expand the present clinical team; develop multi-disciplinary programmes that can oversee the delivery of these activities into multiple resource poor settings, and help drive evidence-based policy and practice in this area. As LSTM is already operating at maximum capacity, expansion of LSTM's estate is vital if we are to achieve the value added in jobs, programme coherence and funding from the expansion of this activity.

Project description and location

Anson Court is located at the junction of Anson Street and Pembroke Place on a main thoroughfare into and out of Liverpool City Centre, directly facing the Liverpool School of Tropical Medicine and the CTID. It was constructed in the 1990s and is a three-storey block currently in use as commercial shop units. The property consists of rented shop spaces, on the ground floor, and one room accommodation, on the first and second floors. The intention is to create offices and meeting rooms on the upper floors with a significant refurbishment which will also address the external facia and provide for a light and flexible working space. Current plans are to continue with the shop premises although we would be looking for businesses that are a closer match to LSTM's activities. An application has been submitted for a Regional Growth Fund grant to support the funding of these changes which will be in the region of £1.5million. It is anticipated that the work will be completed in the next eighteen months, subject to the grant application being successful.

The project will provide new research, development and innovation (RD&I) space to accommodate the new Centre for Maternal and Child Health.

The Centre will provide office-style space suitable for the 'soft' RD&I activities that will take place and extensive work will be required to refurbish the upper floors to develop offices and meeting rooms.



An architect's perspective of the building

Clinical Sciences Department

This new Department in LSTM brings together staff working across the spectrum of clinical science: experimental medicine, evidence synthesis, clinical trials, implementation and evaluation, teaching and clinical practice. These themes all focus on improving the management of important diseases in the tropics.

The Department of Clinical Sciences underlying strategy is translational research – that is, the careful use of basic scientific discovery to develop applications for patient benefit; rigorous clinical trials of these discoveries and the subsequent evaluation of their appropriate implementation by trained practitioners.

Experimental medicine studies in the Department are carried out in collaboration with basic scientists and hospital facilities (NHS when in UK). Healthy volunteers are recruited to studies that test promising applications of recent scientific advances. Current examples include challenge with *pneumococcus* as a means of developing new vaccines (Gates) and bronchoscopy-based work to allow translation from pre-clinical to clinical studies in the development of new treatments for sepsis (collaboration with CDC, Atlanta). We have worked for 10 years on the relationship between inhaled smoke and chronic lung disease.

Evidence synthesis by rigorous methods of systematic review is critical in defining priorities in clinical research, developing appropriate research questions, clinical trials, and informing policy and practice. The Department hosts the Cochrane Infectious Diseases Group. Recent reviews have included research priorities in tuberculosis and a systematic review of the effect of steroids in the treatment of adult tuberculosis patients. We have also completed reviews of chronic obstructive pulmonary disease and asthma in sub-Saharan Africa.

The development and running of clinical trials is a major activity of our Department. The portfolio of clinical trials has expanded considerably over the last two years, covering traditional tropical diseases such as malaria, HIV and TB in addition to global problems such as chronic lung disease. Funding has come from a wide variety of sources including the Bill & Melinda Gates Foundation, the Wellcome Trust, the Department for International Development and the Medical Research Council. The spectrum of clinical trials is expanding with plans for phase one trials currently being developed and an increasing interest in pragmatic and complex intervention studies. Along with this, there has been development of LSTM's ability to support clinical trials with an expansion in data handling and statistical capacity within the group and development of sophisticated systems for monitoring and analysing adverse events.

In the field of applied health research, the Department has maintained a strong focus on providing knowledge about practical health system interventions that promote access to malaria, TB and HIV services by the poor and vulnerable. This has involved evaluating new approaches, such as pragmatic implementation studies on new diagnostic tests for malaria and TB, and looking at new approaches to policy decision-making in the uptake of new interventions. Other studies have evaluated novel approaches to financing TB diagnosis and treatment which demonstrated increased TB case detection and surveys of Multi-drug resistant TB, drawing on LSTM's cross-cutting expertise in laboratory support and capacity development.

The Department links research strategy with capacity development by innovative teaching and by clinical practice (see Working with the NHS p.28). For example, in addition to the DTM&H, we also teach Methods in Epidemiologic, Clinical and Operational Research to active physicians in Africa, and host the LSTM Diploma in Humanitarian Assistance.

Professor Stephen Gordon
Head of Clinical Sciences

Parasitology
Department

Malaria and TB

This year we have seen some of our younger members of staff making good progress in establishing themselves as future leaders in malaria research. Further funding was given to Dr Giancarlo Biagini's studies on novel targets in the electron transport chain of the malaria parasite, by the Medicines for Malaria Venture (MMV). The funding will allow us to take the current lead in anti-malarial molecules through to a pre-clinical drug candidate.

The hit-to-lead phase of this work, funded by the Leverhulme Trust and the Wellcome Trust in collaboration with Professor Steve Ward and Professor Paul O'Neill, was recently published in the *Proceedings of the National Academy of Sciences USA*. Further funding was received to elucidate novel drug targets in malaria for Dr Biagini's group by the MMV and the GSK Open-lab Foundation.

Dr Ian Hastings has continued to develop and refine his pharmacological models of malaria drug treatment. Renewed funding from the Bill & Melinda Gates Foundation (BMGF) (to colleagues at the Swiss Tropical and Public Health Institute) and new funding from the MRC, has enabled Dr Hastings to extend the mathematics tracking the underlying pharmacology and consequently to investigate how to optimally deploy anti-malarial drugs under field conditions.

Professor Mark Taylor
Head of Parasitology

This year we also saw the start of two projects on *Mycobacterium tuberculosis*, the bacterium responsible for tuberculosis, 'TB'. The Medical Research Council was the first funding consisting of £1 million to generate novel anti-TB drugs with the second consisting of an EU FP7 project to generate novel tools that will allow the pre-clinical prediction of drug efficacy and dosing regimens.

Bioinformatics Unit

The newly established Bioinformatics Unit, headed by Dr Simon Wagstaff, continues to grow with collaborative grant success from the Leverhulme Trust and NERC, and the establishment of a new strategic alliance with the University of Warwick's Systems Biology Centre. They are providing statistical, bioinformatics and mathematical input into a diverse range of LSTM projects. An important highlight is the development of novel computer based approaches to rationalise the results of high throughput drug screens into chemical killing space. It has already proven its utility and has been integrated into multiple drug discovery and development programmes. The relocation of bioinformatics resources to space adjacent to the state-of-the art 'omics' facilities in CTID now improves access to these resources.

A·WOL

The Anti-*Wolbachia* consortium, funded by the Bill & Melinda Gates Foundation, comes to the end of its successful first five-year programme, discovering and developing new drugs against onchocerciasis and lymphatic filariasis. The next phase of A·WOL's programme will be to look for the best ways to optimise and implement existing regimes into current control programmes through partnership with LSTM's Centre for Neglected Tropical Diseases. Additionally we aim to develop at least one of our 300+ new 'hits' into a treatment, expanding the use of this alternative treatment strategy to National and Global programmes for the elimination of onchocerciasis and lymphatic filariasis.

To celebrate A·WOL's success LSTM hosted a programme review meeting for 70 of the consortium partners together with VIP guests.

Ascaris – the giant roundworm, Ecuador

Taking blood samples from children, Malawi

International Public Health Department

The new International Public Health Department (DIPH) brings together a diverse and highly skilled set of professionals, who are the School's focal point for our activities in international public health.

By specialising in the use of research to guide policies, to strengthen health systems and to improve health care, our Department will play a critical role in ensuring that the School fulfils its goal to improve the health of all people, including those living in some of the world's poorest countries.

The Department hosts a range of research models, from individual fellowships and project grants, to large multi-partner consortia. Our research groups focus on topics such as reproductive health, maternal health, anaemia, blood transfusion and HIV. Within the DIPH there are several multi-disciplinary teams, each led by highly experienced academics and supported by effective managerial and administrative staff. The Department manages several high profile international programmes in areas such as human resource management, gender and equity, and research into policy and capacity strengthening, all of which are essential for supporting improvements in health systems to ensure better outcomes for patients. Our research is funded by a variety of organisations including major international agencies such as the European Commission; UK Department for International Development and the Wellcome Trust.

The diversity of expertise combined with our extensive global collaborations, long term partners in low income countries, and our close working relationships with Ministries of Health across Africa and beyond, means that we are in an ideal position to respond to demands for technical assistance. We are able to rapidly put together flexible teams to produce successful bids and our efficient management systems and the professionalism of our staff means that we have a strong reputation for delivering high quality results to time and within budget.

Within DIPH there is a strong culture of mentoring and professional development support for all staff, whether they wish to pursue research, teaching, consultancy or management careers. Our clinical staff provide a service to local NHS hospitals in specialities such as infectious diseases and haematology, and support clinical aspects of our research portfolio. Members of DIPH also provide a significant input to the School's teaching programme. Because almost all our academic staff have first hand experience in the field, their teaching is highly valued by our students, whether they are undertaking Masters and PhD courses or professional development courses.

Professor Imelda Bates
Head of International Public Health

Our Department will play a critical role in ensuring that the School fulfils its goal to improve the health of all people, including those living in some of the world's poorest countries.

Vector Biology Department

Backpack aspirators to collect mosquitoes

Evaluation of new insecticides by topical application

The Vector Biology Department has had another very productive year, continuing to expand its diverse portfolio from bench to field to implementation.

Killing the vectors of sleeping sickness

Tsetse flies transmit African sleeping sickness. We are currently developing a more cost-effective means of killing these flies through the aid of the Bill and Melinda Gates Foundation, developing small, insecticide-treated cloth and netting targets. These can be simply and cheaply deployed at 50 metre intervals along the water bodies that habitually are infested by these flies.

Deployment of targets at these densities rapidly controls the flies in the area with minimal environmental impact. Large scale trials, each covering 250 km^2, in North West Uganda and the mangrove areas of Guinea are ongoing. By the end of 2012 we will be doubling the area covered in Uganda, and working closely with health economists to provide an accurate cost for the implementation of such programmes. Additionally, we will be assisting the Médecins Sans Frontières in Southern Sudan to implement a real control programme using our technology in the Kajo Keji sleeping sickness focus of South Sudan.

Sequencing individual mosquitoes to develop new diagnostics

A major objective of the Department is to develop DNA diagnostics which can be used by malaria control programmes to determine if, and how mosquito populations become resistant to insecticides.

The Donnelly/Weetman laboratory has focused on the discovery and replication of phenotype:genotype associations; that is identifying DNA mutations (the genotype) that are associated with, and sometimes partially causal of, resistance to insecticides (the phenotype).

Working alongside the Wellcome Trust Sanger Institute (WTSI), investigations are determining how to capitalise on recent advances in DNA sequencing to increase the power of these studies. Next generation sequencing, allows us to sequence the entire genome of individual mosquitoes to identify markers for insecticide resistance.

New Tools to Monitor Insecticides

Indoor residual spraying (IRS), is used extensively to combat insect-borne diseases such as malaria and visceral leishmaniasis. At present, there is no easy way to determine if coverage with IRS is adequate. Lab or bioassay based methods are both expensive and impractical for field use. With support from the Innovative Vector Control Consortium (IVCC), a series of prototype assays that are easy to use in the field, have been developed to monitor the use of the major insecticide classes.

The unique selling point of these insecticide quantification assays is that they allow disease control programmes to rapidly assess their spray teams' performance and respond quickly and appropriately; a paradigm shift in the controlled management of insecticides.

Further refinement and validation under field conditions are needed in order to get these tools into the market. The award of £1 million from the Wellcome Trust to Dr Mark Paine at LSTM and colleagues in India, Crete and Geneva, will ensure that this milestone is met.

The end result will be a low cost, rapid and reliable visual assay for insecticides that can be carried out on-site with minimal training.

Professor Hilary Ranson
Head of Vector Biology

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Staff Profiles

Elena Gospodarevskaya
Health Economist

Elena was born in the USSR and educated in the oldest and most prestigious Moscow State University with a degree in Economics and Mathematics. She also received an additional university qualification in economics after emigrating to Australia. This subsequently landed her in health economics.

In both Australia and the UK, Elena specialised in the assessment of pharmaceuticals and medical procedures. Currently, Elena is responsible for supervising collaborators in African and Asian countries: focusing on collecting, analysing and comparing patient and health systems costs in order to estimate cost-effectiveness of TB diagnosis and treatment options.

Elena was delighted to also be involved in TB research in Russia: "I am fortunate to be able to share my expertise with colleagues in my native country."

Joining LSTM, Elena was excited about working in the area of international health and enjoys the collaborative and supportive attitude of her colleagues.

"There is no universal solution to the difficult choice between cost-effectiveness and equity and fairness and it is especially true for developing nations.

Previously my work has largely involved research in health and treatment of local populations, but working with LSTM, I now have the opportunity to work on a global level."

Regine Unkels
Clinical Lecturer in Maternal and Newborn Health

Regine studied medicine in Germany, during which she developed a strong interest in reproductive and maternal health in low resource settings. Her interest brought her to England, to attend the London School of Hygiene and Tropical Medicine, where she completed a Diploma in Tropical Medicine and Hygiene (DTM&H). In 2004, Regine moved to Tanzania where she became an advisor on HIV control and prevention as well as practising as a gynaecologist/obstetrician.

Regine joined LSTM in April 2012 and her role covers a wide range of activities from operational research and programme planning for the 'Making it Happen' Programme in Africa, to teaching on the DTM&H and Masters in Sexual & Reproductive Health.

"The 'Making it Happen' programme has shown some great results from its first phase and I wanted to be part of its success."

For Regine, it is important that women have access to good quality care during child-birth in developing countries. Regine hopes to contribute to the Maternal & Newborn Health Unit's success.

"I believe that our work can make a difference because it is holistic and engages with so many people, from the Minister of Health to the nurse assistant in a rural dispensary."

Awards and Honours

Professor Janet Hemingway CBE

LSTM is delighted that Professor Janet Hemingway has been awarded the Commander of the British Empire (CBE) for services to the Control of Tropical Disease Vectors. As well as being another outstanding achievement in her ever growing collection of awards and honours, this is also a brilliant recognition of the work that takes place in the School.

During Janet's time at LSTM, the School has seen its estate and staff double in size and what was once a failing institute has become one of the major leaders in the fight against infectious diseases in the tropics and sub-tropics.

Janet has spent decades promoting the importance of vector control in the fight against insect borne diseases in some of the poorest countries. Through global partnerships and her work with governments both in and out of the UK, she has become one of the main driving forces behind research into insecticide resistance. It is because of this work that she has been recognised in the Queen's Birthday Honours.

On the award of the CBE, Janet commented: "You hope this is not just for your work, because there are people who work with me and I see this as recognition of everything that we do."

Professor Mark Taylor

In April 2012, Professor Mark Taylor was awarded the CA Wright Memorial Medal by the British Society for Parasitology (BSP).

The Wright Medal has been given annually since 1985, in honour of outstanding contribution in the discipline of parasitology. Awarded in the memory of Chris Wright, once Director of the Experimental Taxonomy Unit at the Natural History Museum, this is the most prestigious award given by the BSP.

Mark is regularly praised for his innovative approach to filariasis control: from a breakthrough that led to the establishment of the 'Anti-*Wolbachia*' (A·WOL) consortium in 2007 to this latest award, his research at LSTM continues to be recognised and celebrated across the globe.

Mark was presented the award during the BSP 50th Anniversary Meeting in Glasgow, where he also gave a speech on the continued impact of A·WOL. "Tens of thousands of people have already been cured of some of the most devastating and debilitating of NTDs using antibiotic therapy," stated Mark, "My hope is that the outputs from the A·WOL consortium will deliver better drugs to allow us to expand this alternative control strategy to national and global levels and provide the means to improve our chances of meeting the goal of global elimination."

Professor Janet Hemingway CBE

Professor Mark Taylor

Grants and Contracts

Dr Charles Ameh
ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS
Evaluation of Impact of Life Saving Skills – Essential Obstetric Care and Newborn Care Course in FCT Abuja, Nigeria **£36,818**

Professor Imelda Bates
WELLCOME TRUST
Ethical concerns for health professionals, media and the public in promoting adequate and safe blood transfusion services in Africa: a case study of Ghana and Zimbabwe: research expenses for Bernard Appiah **£5,500**

Dr Giancarlo Biagini
EUROPEAN COMMISSION
Model-based preclinical development of anti-tuberculosis drug combinations. Jointly led by GSK and University of Liverpool **£378,626**

WELLCOME TRUST
Michael Prunty subsistence allowance **£1,440**

Professor Moses Bockarie
DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
Integrated Control of Schistosomiasis & Intestinal Helminths in sub-Saharan Africa-ICOSA, led by Imperial College London **£2,195,324**

Ms Margaret Caffrey
FUTURES GROUP EUROPE
Sierra Leone SMP (Margaret Caffrey TA) **£12,100**

Professor Phil Cooper
EUROPEAN COMMISSION
Biomarkers for Enhanced Vaccine Safety (BioVacSafe). Jointly led by Novartis Vaccines and University of Surrey **£347,230**

Professor Alister Craig
WELLCOME TRUST
Retinal Microvasculature in Cerebral Malaria – salary contribution. Led by University of Liverpool **£11,493**

WELLCOME TRUST
MCDC PhD Student Consumables **£10,000**

Professor Luis Cuevas
WORLD HEALTH ORGANIZATION (SWITZERLAND)
A PPP to increase access to quality TB diagnosis & treatment to slum populations of Abuja through active case findings & diagnostic techniques **£357,609**

Dr Nicola Desmond
MENINGITIS RESEARCH FOUNDATION
Action Meningitis (ACMEN) **£27,980**

Dr Martin Donnelly
WORLD HEALTH ORGANIZATION (SWITZERLAND)
Implications of insecticide resistance on malaria vector control **£79,534**

Dr John Dusabe
THE INDIGO TRUST
Development of a community referral system to increase uptake of adolescent reproductive health services in Mwanza Region, Tanzania, East Africa **£14,920**

Dr Brian Faragher
NATIONAL INSTITUTE FOR HEALTH RESEARCH
Understanding and improving the outcome of viral encephalitis **£4,186**

GYNUITY HEALTH PROJECTS LLC
MammaMiso: A pilot study of self-administered misoprostol to prevent bleeding after child birth in the community. Led by University of Liverpool **£5,232**

Professor Geoff Gill
WELLCOME TRUST
Medical art behind bamboo – an investigation into British medical art and artists during second World War Far East imprisonment **£4,300**

Professor Stephen Gordon
NATIONAL INSTITUTE FOR HEALTH RESEARCH
CLRN Pneumonia Project **£22,250**

BILL & MELINDA GATES FOUNDATION
Phase II Experimental Human Pneumococcal Carriage for vaccine testing and vaccine discovery **£620,502**

Dr Rob Harrison
NATIONAL CENTRE FOR THE REPLACEMENT, REFINEMENT AND REDUCTION OF ANIMALS IN RESEARCH (NC3Rs)
NC3Rs studentship for Fiona Bolton – Project title: "Refining, Reducing and Replacing *in vivo* WHO standard preclinical assays of snake venom pathology and antivenom" **£90,000**

Dr Amir Hassan
KING SAUD BIN ABDULAZIZ UNIVERSITY FOR HEALTH SCIENCES
Institutional Development of the School of Public Health King Saud bin Abdulaziz University for Health Sciences, in Riyadh: research activities assistance **£78,000**

KING SAUD BIN ABDULAZIZ UNIVERSITY FOR HEALTH SCIENCES
In relation to Institutional Development of the School of Public Health King Saud bin Abdulaziz University for Health Sciences, in Riyadh: additional teaching activities **£56,000**

SUDAN MINISTRY OF HEALTH
Supporting the PHI of the MOH with training, providing tutors, and teaching material for the course entitled "Epidemiology in Action (EIA)" **£168,000**

SUDAN MINISTRY OF HEALTH
Monitoring and Evaluation Capacity Development **£125,000**

Dr Ian Hastings
WORLD HEALTH ORGANIZATION (SWITZERLAND)
To analyse the impact of multiple first line anti-malarial therapies (MFT) in situations of high drug coverage **£8,775**

Professor Janet Hemingway
WELLCOME TRUST
Open Access Publishing Costs for 2011/12 **£30,000**

WELLCOME TRUST
LSTM Maegraith Archive Cataloguing, Preservation and Conservation Scoping Study **£3,584**

Professor Rob Heyderman
NATIONAL INSTITUTES OF HEALTH
Optimal dosing of 1st line antituberculosis and antiretroviral drugs in children. Led by University of Cape Town **£37,883**

WELLCOME TRUST
International Engagement Awards, "Health Research Now" – a radio magazine and talkback programme **£30,000**

WELLCOME TRUST
Engaging Science – 75th Anniversary Awards **£5,000**

WELLCOME TRUST
International Engagement Awards: The Art in Global Health **£38,000**

WELLCOME TRUST
Ethics & Society Postdoctral Research Fellowship for Dr Nicola Desmond – project title "The social impact of HIV self-testing: reconstructing knowledge and re-framing risks associated with HIV prevention" **£442,055**

Dr Jenny Hill
BILL & MELINDA GATES FOUNDATION
Scale-Up of Malaria in Pregnancy – to clarify the issues and problems experienced across countries, including variations by sub-regions **£115,762**

Professor David Lalloo
WELLCOME TRUST
Engaging Science Wellcome Trust 75th Anniversary Awards **£4,950**

Professor Mike Lehane
WELLCOME TRUST
Master's Training Fellowship in Public Health and Tropical Medicine for Mercy Opiyo – Project title: "Age structure of populations of tsetse flies under control pressure" **£52,968**

Dr Tim Martineau

EUROPEAN COMMISSION
Supporting decentralised management to improve health workforce performance in Ghana, Uganda and Tanzania **£2,584,627**

WORLD HEALTH ORGANIZATION (SWITZERLAND)
Supporting community health workers in community case management programmes in Africa: a preliminary investigation (Phase 1: Literature review and study design) **£5,898**

FUTURES GROUP EUROPE
Technical assistance RCH Programme, Sierra Leone **£10,254**

Dr Philip McCall

EUROPEAN COMMISSION
International Research Consortium on Dengue Risk Assessment, Management and Surveillance (IDAMS), led by University of Heidelberg **£343,168**

WELLCOME TRUST
Master's Training Fellowship in Public Health and Tropical Medicine for Ayubo Kampango – Project title: "Host location by exophagic African Malaria vectors" **£85,244**

Dr Penny Phillips-Howard

MEDICAL RESEARCH COUNCIL
Menstrual solutions in adolescent schoolgirls in western Kenya: an acceptability, feasibility and safety study **£716,200**

Professor Richard Pleass

BAXTER BIOSCIENCE GRANTS
Recombinant Heptameric Fc as a replacement for IVIG **£74,653**

Professor Russell Stothard

WELLCOME TRUST
Control of Intestinal Schistosomiasis Ugandan Children **£284,500**

Dr Miriam Taegtmeyer

UNICEF (MALAWI)
Assessment of the Capacity of the Health Sector to respond to Violence Against Women and Children in Malawi **£29,186**

Professor Feiko ter Kuile

MEDICAL RESEARCH COUNCIL
Intermittent screening and treatment or intermittent preventative therapy for control of malaria in pregnancy in Indonesia **£2,103,905**

Dr Rachel Tolhurst

EUROPEAN COMMISSION
Integrating Post-Abortion Family Planning Services into China's existing abortion service in hospital settings (INPAC), Led by University of Ghent **£240,524**

Professor Joseph Valadez

DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
Impact evaluation of a DFID programme to improve access to healthcare in Northern Uganda **£962,004**

UNICEF (New York)
To provide tools, protocols, training & technical assistance to use Lot Quality Assurance Sampling to assess poor performing areas in select countries **£218,929**

UNICEF (New York)
To provide tools, protocols, training & technical assistance to use Lot Quality Assurance Sampling to assess poor performing areas in select countries – supplement for Benin **£30,292**

UNICEF (New York)
To provide tools, protocols, training & technical assistance to use Lot Quality Assurance Sampling to assess poor performing areas in select countries – supplement for Botswana **£30,498**

UNICEF (New York)
To provide tools, protocols, training & technical assistance to use Lot Quality Assurance Sampling to assess poor performing areas in select countries – supplement for Zambia **£45,781**

CHILD FUND INTERNATIONAL
Targeting Community Programs to Address the Burden of Disease Through Using Real Time M&E and Local Management Tools **£224,200**

Professor Nynke van den Broek

THE ICELANDIC INTERNATIONAL DEVELOPMENT AGENCY (MALAWI)
Estimating maternal mortality in rural Malawi **£6,949**

WORLD HEALTH ORGANIZATION (SWITZERLAND)
Measuring Maternal Morbidity **£632,002**

DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
Making it Happen Phase 2: Effectiveness of interventions to increase availability and quality of Emergency Obstetric and Newborn Care **£15,863,730**

DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
Reducing Maternal and Neonatal Deaths in Rural South Africa **£2,043,256**

SIR HALLEY STEWART TRUST
RAMOS study to measure Maternal Mortality in Mangochi District in Malawi **£2,500**

Dr Ralf Weigel

TROPICAL HEALTH AND EDUCATION TRUST
Health Education partnership Start up funding **£5,000**

SHARED GRANTS

Dr Giancarlo Biagini

MEDICAL RESEARCH COUNCIL
Lead series of development & optimisation of a new drug against active and latent Tuberculosis. *Shared with Professor S Ward, Professor P O'Neill, Dr N Berry and Dr N Cammack* **£1,022,084**

Professor Stephen Gordon

GLAXOSMITHKLINE
GSK – A population based prospective cohort study of the Prevalence of Chronic respiratory diseases in an adult sample of the Malawi Blantyre district. *Shared with Dr Kevin Mortimer and Professor Moffatt Nyrinda* **£100,000**

Dr Rob Harrison

LEVERHULME TRUST
Has defence dictated the evolution of venom composition in spitting cobras? *Shared with Dr W Wuster, Bangor University* **£209,171**

Professor Janet Hemingway

MEDICAL CARE DEVELOPMENT INTERNATIONAL
Equitorial Guinea Malaria Control Project Phase 2, Bioko Island: Implementation of the Malaria Decision Support System on Bioko Island. *Shared with Dr M Coleman* **£80,363**

ROLL BACK MALARIA
Insecticide Resistance Management **£31,680**

Dr Jaroslaw Krzywinski

NATIONAL INSTITUTES OF HEALTH
National Institutes of Health subcontract from University of Notre Dame: *Anopheles gambiae* transcriptome. *Shared with Dr M Donnelly* **£213,734**

Professor David Lalloo

WELLCOME TRUST
Wellcome Trust PhD Programme for Clinicians for Dr Stacy Todd – Health Priorities in the Developing World: Project title: "Influenza in Vietnam: Population estimates of transmission and the effects of vaccination strategies". *Shared with Dr J Read (University of Liverpool)* **£380,223**

WELLCOME TRUST
Wellcome Trust PhD Programme for Clinicians for Dr Stephen Aston – Health Priorities in the Developing World: Project title; "Clinical and inflammatory determinants of poor outcome in Malawian adults with severe lower respiratory tract infection" *Shared with Professor S Gordon, Professor R Heyderman and Dr H Mwandumba* **£386,565**

Dr Mark Paine

LEVERHULME TRUST
Molecular Characterisation of *Anopheles gambiae* Heme Oxygenase. *Shared with Dr G Lycett and Dr L Lian* **£205,361**

Dr Sally Theobald

MEDICAL RESEARCH COUNCIL
Exploring the role of structural drivers of HIV on women and men over 50 in Uganda: A gender analysis – supplement. *Shared with Janet Seeley (Uni of East Anglia)* **£2,800**

TB REACH
Wave 1, Year 2 Continuation Funding – Innovative community-based approaches for enhanced tuberculosis case finding and treatment outcome in Southern Ethiopia. *Shared with Dr M Yassin* **£388,917**

Dr Simon Wagstaff

LEVERHULME TRUST
Understanding the presence and prolonged stability of mRNA in snake venoms. *Shared with Dr R Harrison* **£168,967**

Professor Steve Ward

WELLCOME TRUST
Institutional Strategic Support Fund (ISSF). *Shared with Professor J Hemingway and Professor A Craig* **£1,500,000**

MMV MEDICINES FOR MALARIA VENTURE SWITZERLAND
MMV Discovery Project: Development of a Drug Candidate for Uncomplicated Malaria targeting the mitochondrial NADH:quinone oxidoreducatse. *Shared with Dr G Biagini and Professor P O'Neill* **£255,801**

Fundraising

The support of the LSTM Alumni remains crucial to developing new projects and adding further value to existing research and education activity.

LSTM faces many of the challenges being experienced by other international charities, including the reduction in giving from their regular individual donors. Donations, grants and in-kind support, are vital to the ability of LSTM to improve the health of people in less developed countries.

Former staff and students become valued donors, often giving their time as well as money to support LSTM's education and research projects.

Donors to LSTM during 2011/2012 have helped to establish new scholarship funds and expand facilities for world-class research and teaching. To join them, please visit our fundraising web pages to find the best way for you to support the work of LSTM:

www.lstmliverpool.ac.uk/fundraising

LSTM and its Board of Trustees would like to thank all of our donors for their vital support.

A full list of donors for 2011-2012 can be found on the fundraising pages of LSTM's website.

Or alternatively, please contact Development Officer, Billy Dean:

william.dean@liv.ac.uk
+44 (0)151 705 3272

Retirement

In 1987, Jeni joined LSTM, as the Secretary to the Unit for Statistics and Epidemiology, and then went on to work as the Secretary to the Division of Tropical Medicine and finally as Clinical Group Secretary.

"Through my work at LSTM I have met and worked with some amazing people from different walks of life and countries. I would never have had the opportunity to meet these people if I had worked anywhere else."

Jeni Howley

Working for LSTM for 24 years, Jeni has had many enjoyable experiences. Jeni worked in the Director's Office in 1997, organising the Annual Meeting for the Onchocerciasis Control Programme and the African Programme for Onchocerciasis Control. "Particularly memorable was meeting former US President Jimmy Carter, who attended some of the forums and one of the social events organised at the Maritime Museum."

A year later, Jeni had the opportunity to work with Professor Marcel Hommel, organising the European Conference in Tropical Medicine and International Health. Over 1,400 delegates attended the meeting, culminating with a dinner in St George's Hall. "There I was presented a beautiful bouquet as a thank you for my contribution to the conference."

After officially retiring, it is the companionship of her work colleagues and the interaction with students and visitors to the School that Jeni will miss the most.

After 24 years of working at LSTM, Jeni plans to enjoy her retirement as much as possible. "I love walking and caravanning with my husband and we have already been on a few holidays in the UK and have plans for plenty more in the future."

Image credits

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