

Annual Report 2020/2021



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Cover image: Larval sampling in Kasungu district, central Malawi, by field workers Kennedy Zembere, Blessings Phiri and Geoffrey Chaundwa. Photo: Michelle Stanton

Opposite page: Community Health Worker Gracien deploys Tiny Targets at 50 metre intervals along the river Kwa, to provide tsetse fly control in an area endemic for trypanosomiasis ('sleeping sickness') in the Democratic Republic of Congo. Photo: Sophie Dunkley.



Vision

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

Mission

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

Values

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

Chair's Foreword

It is a privilege to write my first foreword as Chair of the Liverpool School of Tropical Medicine. It has been a challenging time to take over as Chair and understanding this complex organisation has taken some time but I have been impressed with LSTM's achievements and all of the staff that I have met.



Whilst the COVID-19 pandemic continues to have a major impact on the way we all conduct our lives, I want to pay tribute to our staff, students and the wider LSTM family who have contributed so much over the course of the last twelve months in difficult and challenging circumstances.

I would also like to thank my fellow Trustees for their continued commitment and support. This has been especially important as I have settled into my new role; the Trustees play a critical and often unseen role in the governance of LSTM. I would like to pay special tribute to Sue Russell for the period in which she acted as interim Chair. She helped to steer the organisation through a very difficult time, has made my induction into the organisation particularly easy and continues to be a great source of strength and wise counsel.

The Board of Trustees is ultimately responsible for the governance of LSTM and last year saw the introduction of the new Higher Education Code of Governance. We therefore took the opportunity during 2021 to conduct a thorough review of our Governance arrangements supported by external consultants. The process was extremely useful in thinking through some major issues and will help us achieve our objective of continually strengthening the way that LSTM is governed and run to the benefit of all of our stakeholders.

LSTM is no ordinary organisation. It has considerable experience of working in challenging environments and it has been able to draw on these skills to adapt and make a considerable contribution in response to COVID-19. This has included developing and trialling diagnostic tests, vaccines and therapeutics. Much of this has been done with partners both in the UK and overseas. Liverpool is of course only one of the centres in which we conduct our work. Our teams and partner organisations across the globe continue to make a major contribution to the health and well-being of the communities in which they work: COVID has again demonstrated how critical this contribution is.

The education portfolio is important in both achieving our mission and providing resilience to the vagaries of research funding and I have been pleased to see the entrepreneurial and imaginative way that we deliver our Teaching and Educational modules. Whilst the last year has restricted much face to face teaching, our team(s) responded quickly and delivered a range of online programmes to students across the world. It has been a joy in the last couple of months to

see students return and we look forward to growing the portfolio of courses that we offer.

One of my major aims as Chair is the expansion of fundraising income. The highly successful 'Bump it Forward' campaign has raised over £250,000 in a very short period of time, supporting the purchase of much needed PPE equipment for a number of African countries. It was a wonderful example of the team and its supporters rallying to the needs of colleagues who were short of vital equipment and supplies of oxygen. It also demonstrated the considerable potential for fundraising and I am sure that the planned work on raising LSTM's external profile will help considerably with this, as will the new campaign related to the 125th anniversary. This anniversary in 2023 will provide us with an opportunity to celebrate and highlight the work that we do and to set a course for the next period of LSTM's history.

As we move towards our 125th Anniversary, we remain firmly committed to improving the health and lives of disadvantaged individuals and communities across the world. The last eighteen months has demonstrated that the work that we do has never been more relevant; wherever you live, disease and viruses show little respect for geographical boundaries.

I look forward to working with my colleagues and friends to help LSTM deliver sustainable improvements to the lives of those most in need.

Jim McKenna

'I want to pay tribute to our staff, students and the wider LSTM family who have contributed so much over the course of the last twelve months in difficult and challenging circumstances.'

Director's Foreword

The COVID pandemic has continued to dominate many of LSTM's activities over the last twelve months, in common with much of the world. However, although the last year has undoubtedly been a very challenging one for LSTM staff and partners and the communities in which we work, LSTM has managed to thrive in these difficult circumstances.



There have undoubtedly been many compromises in what we have been able to do, with restrictions on project activity, funding cuts and real challenges to travel and visiting projects, but it is a tribute to all involved that LSTM's activities remain highly relevant and impactful for the populations that it works with.

Funding cuts, predominantly related to the sudden reduction in UK government Overseas Development Assistance, have been of major concern in the aid sector. Many of our programmes have been affected and I would like to thank all of the staff who worked hard alongside partners to ensure that critical research activity could continue despite substantially reduced budgets. In partnership with other universities, LSTM has undertaken a number of initiatives to try to influence the Global Health funding agenda, particularly working to try to ensure that the Government understands the UK's leading role in Global Health research and appreciates LSTM's contribution to a major area of UK strength which has considerable impact on populations overseas and the country's reputation.

Despite these restrictions in funding, the financial situation of LSTM remains healthy and the prospects for the coming year look good, particularly if some of the funding constraints ease a little. The expansion of our research activity into multiple areas of COVID research, and the consequent enhancement of LSTM's reputation nationally, will help to expand the range of future potential research funding opportunities.

One of the unexpected outcomes of the pandemic has been the closer links between LSTM and the city, through work in the communities, local clinical trials and support of the public health response. The new city-led Pandemic Institute, in which LSTM is a major partner, reflects those close relationships and we are optimistic that the alternative sources of funding through the Pandemic Institute will allow us to address important pandemic related research questions in the UK and abroad. Our overseas units have also continued to play an important role in supporting national clinical and public health responses to COVID, strengthening ties with communities and governments.

Despite the challenges of remote working and on-line teaching, our education delivery has continued to evolve. Investment in re-developing Pembroke House offers opportunities to both increase the numbers of students that we teach and to create new educational offerings aimed at

developing the local, national, and international workforce. The highly successful iiCON initiative, which brings together academics and local industrial partners to work on infection problems, will help ensure that we can deliver appropriate training for local industrial trainees and encourage careers in science. The investment of £8 million in the construction of the CREATOR building at MLW in Malawi will enable a considerable increase in research capacity but will also allow opportunities for substantially enhanced postgraduate specialist medical education within Malawi itself.

All of these activities are important but as ever, success depends ultimately upon the staff of LSTM. Work continues on developing career pathways and training for colleagues to ensure that we both retain and attract the best scientists and professional services staff. We are also recommending the initiative to expand our overseas partnerships which are so important for LSTM to be effective. It is critical for the future of LSTM that it remains flexible and responsive to the rapidly changing environment in which it works.

Looking forward to the next year, the start of our process to refresh LSTM strategy offers an opportunity to reflect on what we do currently and how we might need to change that for the future. This review will involve all parts of the organisation and will be key to enabling our continued success in the run-up to our 125th anniversary in 2023 and beyond.

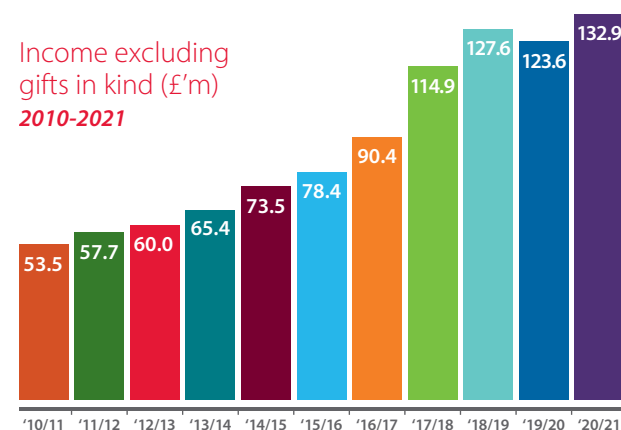
Professor David Laloo

'It is a tribute to all involved that LSTM's activities remain highly relevant and impactful for the populations that it works with.'

Treasurer's Report

LSTM has continued along its growth trajectory in 2021 after a COVID-effected slowdown in activity last year and into the current year. Although fieldwork delays occurred, reducing some research spend, the COVID pandemic has provided opportunities as well as challenges, and research activity has recovered in many areas in addition to the benefits of COVID related research projects this year. There was an underlying Group operating surplus of £4.4m and Group net assets of £55m at 31st July remain healthy.

Group income of £210m (2020: £228m) reflects the significant reduction in 'gifts in kind' from £104m in 2020 to the current year of £77m. The gifts in kind were primarily pharmaceutical drugs relating to a FCDO mass drug administration programme in several African countries. Excluding the gifts in kind, LSTM reported total income of £133m (2020: £123m), representing an 8% increase over the previous year.



Our reported surplus for the year was £6.7m (2020: surplus £9.7m). Following the negative impact of the pandemic on world markets in 2019/20, markets "bounced back" this year resulting in an unrealised gain on investments and endowments of £1.9m. Excluding these items and other non-operational accounting entries we recorded an underlying operational surplus of £4.4m, which includes £3m specialist institution funding from Research England (2020: £0.4m deficit). This is an impressive performance in the current circumstances reflecting the significant efforts of the LSTM team, international partners and the fantastic support of our research funders. LSTM has managed to adapt both its teaching and research activities, and both are proving able to continue activities despite ongoing COVID-19 restrictions and limitations.

Group net assets at the year-end totalled £55m (2020: £49m) and excluding deferred capital grants of £26m, (which are unlikely ever to be repaid), net assets totalled

£81m. Group cash has increased by £6m as a result of strict cashflow monitoring and this, along with tight budgetary control were among a raft of measures brought in by the COVID-19 emergency management team. That team has now been disbanded but impact from and reaction to the ongoing pandemic remains a key organisational risk for senior management. Overall, the financial condition of LSTM, with the support of our research funders, remains healthy despite the pandemic.

That support is illustrated in the strong pipeline of Research projects. The combined LSTM and IVCC portfolio stands at £617m and the application pipeline on 31st July was £105m.

The 2021/22 budget has been built to reflect the challenges presented by the pandemic with a small surplus of <£1m.

Finally, we continue to invest in our estate to accommodate future growth plans in education and global research both in the UK and overseas. That investment in the facilities and infrastructure maintains our world class leadership in global health service, particularly global pandemics and is essential to support our excellent and dedicated teams who illustrate daily LSTM's specialist expertise.

John O'Brien

John O'Brien Bcomm FCA

This is an impressive performance in the current circumstances reflecting the significant efforts of the LSTM team, international partners and the fantastic support of our research funders.



John O'Brien Bcomm FCA

LSTM's Response to the COVID-19 Pandemic

LSTM has continued to play a unique role as the COVID-19 pandemic progressed. With research covering the whole transitional research cycle, along with patient advocacy and working closely with industry, LSTM has continued to have a significant impact on the response to the pandemic regionally, nationally and internationally.

AGILE Clinical Trial Platform

The agile clinical trial platform was a new type of study designed for pandemic drug testing, capable of testing multiple potential treatments in parallel. Launched specifically to test new drugs for COVID-19, it represents a partnership between LSTM, University of Liverpool, The Royal Liverpool University Hospital Foundation Trust along with the University of Southampton. Over the last 12 months it has led to very strong collaboration, particularly within Liverpool, with the first drug being selected within the platform, Molnupiravir, undergoing phase I and dose escalation and being selected by the antiviral task force for later stage evaluation.



Following a successful trial in Liverpool involving healthy volunteers, LSTM is now leading AGILE's trial in South Africa, looking at the effects of treating COVID-19 with antiparasitic drug nitazoxanide. A clinically approved and affordable to manufacture antiparasitic drug, Nitazoxanide, has previously shown broad-spectrum antiviral activity against coronaviruses and was identified as a promising candidate for repurposing at a higher dose.

Following successful preclinical and Phase I testing in healthy participants in Liverpool AGILE has opened its first international site at the Desmond Tutu Health Foundation at the University of Cape Town in South Africa for trials in people who have tested positive for COVID-19 with mild to moderate symptoms in the community.

Air Sampling

Following on from environmental sampling conducted by PHE early in the pandemic and aiming to assess the potential increased risk in terms of transmission, particularly among health care workers, of aerosol generating procedures (AGPs), such as intubation (which could plausibly increase aerosol generation), researchers from LSTM carried out the COVID Air Study. More than 250 samples have been collected from across Aintree and the Royal Liverpool University hospitals, initial results showing that there is no lower observed frequency of detection of Ribonucleic acid (RNA) around patients on room

air or using oxygen via nasal cannulae or masks than there is around AGPs. This concurs with the findings from an air sampling study within RECOVERY RS clinical trial.



IMADGENN aerosol capture box arriving at the Royal Liverpool University Hospital - photo Caitlin Thompson

The next stage of the project, COVID Space, has been using a clear aerosol capture box called IMADGENN, specially designed by Public Health England. Participants sit facing this 500L box and perform, different respiratory activities, such as singing and coughing to see how much viral RNA and viable virus is detectable.



PhD candidate Caitlin Thompson with the IMADGENN aerosol capture box - she was a study participant after having recovered from COVID herself. Photo Susan Gould

IMADGENN is set up in the Clinical Research Facility at the Royal Liverpool University Hospital, in IMADGENN the research team can use different types of samplers including one that separates particles by size. Recruited early in infection participants are also asked to use a small wearable button sampler and have a sample collected from their room at the clinic - some even sample using portable or wearable samplers at home.

Diagnostics

The diagnostics team at LSTM remains the single UK collaborating site for the Foundation for Innovative New Diagnostics (FIND) COVID-19 diagnostic evaluations. The team generated analytical and clinical evaluation data for more than 30 brands of SARS-CoV-2 Point-of-Care tests, enrolled over 1680 SARS-CoV-2 suspects in hospital and test centre settings. The team has been constantly recruiting participants and currently it is the only site in Europe open for clinical evaluations of COVID-19 point-of-care diagnostic tests for FIND.

The team also established a pipeline for COVID-19 diagnostics to support SME on the evaluation of early diagnostics prototypes and produce data to help them towards the CE marking progress.

During the past year the team has collaborated with Mologic, a UK based SME, to develop a lateral flow test for SARS-CoV-2 infection. It was able to rapidly co-develop prototypes, and progress the test through CE marking via the generation of robust evaluation data. The test is now commercially available, and importantly will be available at cost in low- and middle-income countries.

The team also carried out work looking at environmental sampling, including an LSTM led study carried out in partnership with Imperial College London and Loughborough University, looking at the transmission risk of COVID-19 from sports equipment. Funded by philanthropic donations the study found that the risk was probably low and likely to be lower than the transmission risk from player interaction before, during and after the sporting activity itself.

Product Testing

Working via the iiCON consortium, LSTM's researchers led by Dr Grant Hughes, have tested a new 'military grade' disinfectant developed by an Essex inventor alongside the British Army. The Army asked LSTM to test VIRUSEND in the Bio Security Level 3 Laboratory over a period of five weeks, with the team finding that the product was highly effective at reducing SARS-CoV-2. The product was developed in conjunction with, and partly funded by, the British Army in addition to a £180,000 Innovate UK grant from the British Government.

Some dental authorities and leading dental academics recommend mouthwashes be used to help reduce the levels of coronavirus in saliva and help control person to person transmission of the virus. As a result, LSTM collaborated with fellow iiCON partner, Unilever, one of the world's largest manufacturers of oral hygiene products, to rapidly assess the performance of mouthwashes against SARS-CoV-2. This work demonstrated the efficacy of the CPC (cetylpyridiniumchloride) technology Unilever uses in its mouthwashes and provided essential data for regulatory approval and claims in key markets such as India, Italy, Indonesia, Vietnam, Russia.

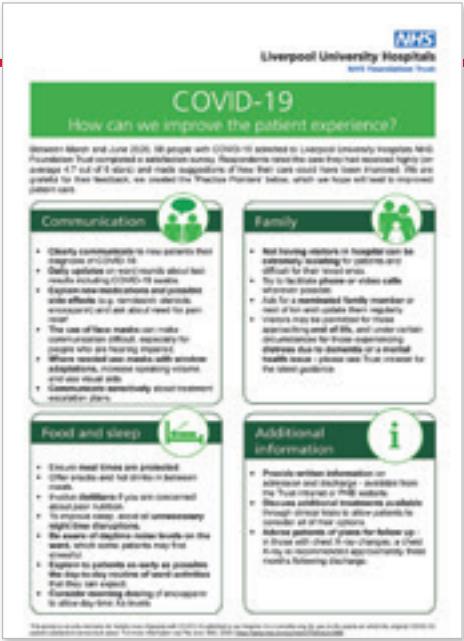
K4D



The pandemic underlined the importance of decision makers being able to access emerging evidence to inform their decisions. From March 2020 to May 2021, LSTM led on regular K4D COVID-19 Health Evidence Summaries published to signpost FCDO and other UK government departments to the latest relevant evidence and discourse on COVID-19 to inform and support their response. These summaries covered themes such as epidemiology and modelling, social science and the indirect impact of COVID-19. They were published weekly, and at its peak daily, with 122 published in total.

COVID Patient Survey

LSTM's Dr Tom Wingfield led a team of doctors at the Liverpool University Hospitals Foundation Trust in carrying out the first peer reviewed COVID patient survey, recording the satisfaction levels of patients being treated for COVID-19. Carried out during the first wave of infections in Liverpool, the results informed an educational bundle to help improve care and the team made the survey template available for use by other NHS Trusts. Issues highlighted included the need for improved communications around medications and the impact of mask-wearing on communication, as well as the negative effects of wearing PPE such as depersonalisation and fear and, particularly in older patients, isolation while being treated without visits from friends or relatives.



Patient Care

Like many of LSTM's clinical researchers, Professor Miriam Taegtmeier saw the demands on her clinical work increase significantly throughout the pandemic. Arising from her clinical duties within the Liverpool University Hospitals Trust she responded to health systems challenges such as hospital acquired infection. She established "Co-flow": bringing together infectious diseases, infection control, public health and patient flow - determining safest possible patient journey through the two hospitals. In November 2020 she oversaw the introduction of lateral flow testing in emergency departments at Royal and Aintree hospitals when these were very newly available - this saw a dramatic fall off in time spent in unsafe mixed COVID areas and less nosocomial infection and became a national approach.

She has also been working together with Liverpool City Council to improve the equity of COVID vaccine uptake in four of the most deprived wards in Liverpool using approaches to improve health equity from her work in Africa and HIV testing. Professor Taegtmeier has also been Co-PI on a study comparing experiences between health systems responses to COVID in Liverpool and Liberia, with briefs put together that outline key principles for action by health systems leaders responding to pandemics.

Nepal

In response to the COVID-19 pandemic in Nepal, LSTM and long-term collaborator Birat Nepal Medical Trust (BNMT) led on the establishment of the Epidemic Intelligence consortium project, funded by the Wellcome Trust, to conduct large scale whole-genome sequencing of SARS CoV-2, the virus which causes COVID-19.



The project aims to both improve the understanding of the emergence and ongoing transmission of the virus in Nepal and to build capacity for pathogen sequencing in Nepal to enable more effective rapid pandemic response in the future. The project is collecting and sequencing 1,500 SARS CoV-2 samples from three locations spanning Nepal: Bheri Hospital in Nepalgunj (Far West), Koshi Hospital, Biratnagar (Eastern Nepal), and Sukraraj Tropical Infectious Diseases Hospital in the capital city, Kathmandu (central region). It will follow up with the participants at three and six months to understand the frequency and symptoms of long-term complications of COVID-19 illness (known as Long COVID) in the Nepali population.

In addition to LSTM and the three hospital sites, the consortium partners are: Birat Nepal Medical Trust (BNMT), Centre for Molecular Dynamics Nepal (CMDN), Oxford University Clinical Research Unit Nepal (OUCRU-Nepal), Nepal Health Research Council, and University of Cambridge.

The Cochrane Infectious Diseases Group and COVID-19



The explosion of research evidence in COVID-19 and the demand for answers has really tested the research evidence to policy and practice pipeline. This has been a particular challenge in low- and middle-income countries, but skilled networks linked to the Cochrane Infectious Disease Group (CIDG) kicked into action. In India, researchers and clinicians treating COVID-19 patients collaborated to develop national India guidelines, led by Professor Priscilla Rupali from the Christian Medical College in Vellore. Professor Paul Garner was the guidelines methodologist and Dr Tom Fletcher chaired the External Advisory Panel. This formal process arose out of an earlier project developing national clinical guidelines for extrapulmonary TB with the Government of India and CIDG funded by FCDO.



COVID-19 antigen testing centre Warora Maharashtra, India. Photo via CreativeCommons

The CIDG also worked hard in challenging the infodemic - the fake news about fake treatments. A Cochrane review by an international team of authors showed that hydroxychloroquine is ineffective for COVID-19, at a time when global demand was at its highest for the drug, described as a 'game changer' by the former US President Trump.



Another review looked at an antiparasitic drug, ivermectin, for COVID-19. Some advocacy groups used data from trials now shown to be fake to push for its widespread use. The Cochrane review authors showed there really was no evidence to date to back the extraordinary claims of benefit made for this drug, and the review was quoted widely worldwide in newspapers and on Twitter to counter the erroneous claims that it should be used.

The Vaccine Team

Following the success as a site for the Phase III trial of the Oxford AstraZeneca COVID vaccine trial, LSTM was once again selected as a site for further vaccine testing, this time for the world's first COVID vaccine trials looking at mixing and matching different vaccines for first, second and booster doses.

The trials, COM COV I and COM COV II, involved volunteers who had already had their first dose in the community and then, blinded and randomised, would receive one of the three widely available vaccines as their second dose. The study also looked at different intervals for the timing for the second dose and participants were followed up with regular blood tests for the next 13 months to track the immune response and understand what the potential impact that mixing vaccines might have on efficacy.

These activities were again supported by specialist nurses from the Well Travelled Clinics (WTC). Three of the WTC nurses also worked at vaccine hubs in the region to support the roll out of the vaccines once they were approved for use in the population.

Estates & COVID-19 support

Estates have also provided support across its global activities during the COVID19 pandemic to ensure that LSTM's operations could continue in a safe and secure manner whilst continuing to deliver its programme of works. This included repurposing and recommissioning CL2 laboratories into CL3 laboratories to assist in the vaccine research. These repurposed facilities were fully utilised 24 hours a day and 7 days a week at the height of the pandemic.

Bump it Forward

As vaccines were being rolled out in advanced economies over the past year, the health inequalities across the world became starker. For health systems, especially those on the African continent, which were already under-resourced, having to deal with a second wave and new strains of COVID-19 became a monumental challenge. Many hospitals and clinics had to operate without the basics to protect their staff and patients. PPE and basic sanitation remained in short supply causing further shortages amongst health workers in many countries. Throughout 2021, the LSTM campaign 'Bump it Forward', asking the public to donate the equivalent cost for their free vaccine, managed to raise over £250,000, which has been distributed to provide PPE to protect health workers in Malawi, Kenya, Zimbabwe, Uganda, Sierra Leone, Tanzania and Liberia.

Members of the vaccine team. Photos by Phil Tubb and Mair Thomas



Introduction to the Feature Articles



Participating in sustainable and innovative partnerships both overseas and in the UK is still the key philosophy behind LSTM's research and education programmes. This focus has been maintained and further enhanced over the past year despite the major global health and financial challenges that have hit the sector. LSTM's long term commitment to delivering impact through the full translational research cycle has continued to evolve and ensured LSTM was uniquely placed to respond immediately and effectively to the rapidly shifting priorities triggered by the ongoing COVID pandemic.

This pandemic continued to put extraordinary strain on our day-to-day research and education activities requiring constant re-adjustment of work arrangements whilst ensuring that key objectives were still being met. LSTM completed its submission for the Research Excellence Framework (REF) 2021 and commenced with strategic estates expansions in both Malawi and Liverpool. Both new centres will enable the expansion of research and teaching activities to deal with the global health challenges of the future including the development of the research leaders of the future, addressing critical areas such as drug resistant and emerging infectious diseases and ensuring we have the trained workforce and skills base to address the interplay between human infection and other global priorities such as climate change. The Clinical Research Excellence and Training Open Resource (CREATOR) facility in Malawi will expand the training capacity by 30% over the next 10 years and include the only specialist postgraduate medical training centre in the country, enabling to retain the brightest talent in-country and promoting a sustainable work force leading, ultimately, to better health outcomes.

Many of our overseas partners faced huge challenges due to the COVID-19 pandemic putting already fragile health systems under considerable pressure. The lack of available vaccines for health workers and significant shortages of basic personal protective equipment (PPE) to keep them safe were particularly acute with the real potential to completely derail all efforts to manage the pandemic. Thanks to thousands of generous donors, LSTM's Bump it Forward campaign, which launched in January 2021, managed to purchase and distribute PPE, diagnostic kits and other life-saving essentials to our colleagues and partners in seven countries across the African continent.

This and other activities outlined in the following feature articles emphasise the power of effective and sustainable partnerships and collaboration in delivering solutions to anticipated and unanticipated global health emergencies.

Professor Steve Ward,
Deputy Director



Donations of PPE, diagnostic kits and other life-saving essentials to our colleagues and partners in, from top right and clockwise: Tanzania, Malawi, Kenya, Sierra Leone, Zimbabwe and Uganda. Donations were also made in Liberia

FEATURE ARTICLE:

Neglected Tropical Diseases

LSTM is working to identify critical bottlenecks in the field of Neglected Tropical Diseases (NTDs) through its research and implementation activities, whilst evaluating alternative strategies to overcome the existing barriers and to improve strategies for their control and elimination.

Centre for Neglected Tropical Diseases

As a multidisciplinary centre, CNTD has extensive expertise across all NTDs, which builds on the strengths of all our NTD research: from drug and diagnostics discovery and development to delivery, evaluation and deployment into health systems to span the translational research spectrum

The cuts to UKAID announced this year by the Foreign, Commonwealth & Development Office (FCDO) has had a major impact on our FCDO funded NTD programmes, ASCEND and COUNTDOWN. Here we review the impacts these programmes have had on NTDs over the past two decades.

Centre for Neglected Tropical Diseases – LF Elimination Programme

In 2000 the LF Support Centre was established to support endemic countries to deliver mass drug administration (MDA) through the Global Programme to Eliminate Lymphatic Filariasis (GPELF). The Centre for Neglected Tropical Diseases (CNTD) was formed in 2009 with a grant of £10.5M from the Department for International Development (DFID) to work towards the goal of elimination of Lymphatic Filariasis (LF) as a public health problem by 2020 through disease mapping followed by MDA. In 2013, DFID increased its commitment with further funding of £20M over four years to support the scale up of national programmes delivering treatments for LF across entire populations at risk in 12 countries in sub-Saharan Africa and Asia. CNTD's role was to support national NTD programmes in strengthening and increasing their capacity for NTD programme implementation; improve laboratory facilities and the provision of diagnostic services and carry out monitoring and evaluation and operational research to provide evidence of elimination.

Under the academic leadership of Professors David Molyneux (2000–2008), Moses Bockarie (2008–2014), Charles Mackenzie (2015–2016) and Mark Taylor (2016–present), LSTM's CNTD comprised of a programme management/technical team providing direct support to their counterparts in national programmes and a finance and administration team that supported activities across all project countries. CNTD also employed national technical and financial management staff in Bangladesh, DRC and Mozambique who provided direct support to the NTD programmes in country.



Included within the £20M was a commitment of funding for morbidity management and disability prevention (MMDP), which became an integrated component of the overall LF Elimination programme. In July 2017, DFID confirmed a further £8.4M commitment to the programme, extending the end date of the programme to 31st March 2019 bringing the total funding to £39.5M for the period 2009 to 2019.

The DFID funded LF Elimination programme was part of WHO's GPELF, launched in 2000. GPELF brought together national governments of endemic countries, bilateral and multilateral donors, pharmaceutical companies, academic and other technical support centres to achieve its elimination strategy which has two aims, to:

- Stop the spread of infection: interrupt transmission of LF by MDA, and
- Reduce the suffering caused by the disease: morbidity management and disability prevention

In the early stages of the LF programme (2000–2012), CNTD's activities were focussed on supporting national programmes to carry out mapping and starting drug distribution. Following DFID's increased funding commitment to LF elimination in 2013, CNTD's activities were expanded to support 12 project countries to eliminate LF as a public health problem by 2020. To achieve this, the programme supported:

- Scale up to full geographical coverage of LF MDA across the 12 project countries
- Evidence gathering of the impact of LF treatment through Monitoring & Evaluation
- Development of context appropriate transmission surveillance strategies
- Training for national MOH staff in programme planning and management
- Burden assessments of lymphoedema and hydrocele cases
- Training for health care workers and patients in lymphoedema care and case management
- Significant contributions to the evidence base for LF elimination through operational research
- Use of operational research findings to adapt implementation in the field
- Improvement of the quality of data and its management and reporting

- Capacity building of staff from national NTD laboratories across 17 countries
- Achievement of ISO standards in 2 regional NTD laboratories
- Production of the necessary documentation for WHO elimination assessment (elimination dossier)



Camera set up to take thermal images of lower legs of LF patients. Photo by Louise Kelly-Hope

Summary of Programme Achievements

- Malawi reached its LF elimination target in 2020.
- The number of people treated exceeded target milestones each year since 2016 and a total of 335,742,171 treatments for LF were delivered.
- The cost per person treated ranged from \$0.06 to \$0.54.
- In project countries, the reduction in the proportion of people at risk of LF was 98%. The protective effect of progressive MDA's supported by this programme led to 79,462,796 people being protected and no longer at risk of LF.
- Collaborative and participatory approach: The programme was implemented with and through the national Ministries of Health at central, provincial and district levels in each project country and involved multiple stakeholders such as community activists, self-care groups as well as other organisations working on other NTD related projects.
- Reaching the poorest: LF is a disease of poverty and those suffering from LF related morbidity are particularly affected both physically and mentally from disabling acute attacks and swelling of the limbs and genitals that prevent them from being able to work and are often ostracised by their communities. Surgeries supported by this programme enabled patients and their carers living in some of the poorest communities to return to work and pursue a fuller life within their families and communities.
- Equal beneficiaries of change: The programme was successful in finding solutions that benefit the most vulnerable and marginalised individuals and groups. It addressed issues of inequality and gender discrimination where the delivery of treatment to females in MDA has consistently been higher than for males. Evidence from the impact of hydrocele surgeries on care givers, who are predominantly female, ensured that women and girls benefitted from MMDP interventions, even when they were not the direct recipients of treatment.
- Bangladesh conducted the largest scale up of Transmission Assessment Survey (TAS) surveillance reported in any of the LF endemic countries in the world with an estimated 70 million people at risk
- All project countries submitted data and evidence that transmission of LF is reducing and 11 out of 12 project countries qualified for TAS in at least one evaluation unit, with 123 districts progressing through TAS. Of the 6 countries still undergoing MDA, 5 have evidence that transmission of LF is reducing and they are on target to stop MDA by 2022.
- Integrated delivery of treatments. The integrated delivery of interventions for multiple NTD's was achieved for LF/onchocerciasis and Soil Transmitted Helminths.
- Partnership with pharmaceutical partners. The programme supported the administration of 1,102,736,584 tablets of albendazole, ivermectin, and DEC, leveraging a total donation value of £883,956,096 from pharmaceutical partners. GSK also contributed over £1M towards the Global Alliance for the Elimination of LF and CNTD's operational research projects between 2009 and 2021.
- Improved verification methods: CNTD developed LQAS (lot quality assurance sampling methodology) surveys that can provide ward level information that enable national programmes to determine which wards, if any, had very low coverage.
- Post MDA surveillance methods: In the absence of WHO recommended guidelines or standard protocols for post elimination surveillance, this programme supported the development of surveillance methods in Bangladesh and Malawi.
- The number of hydrocele surgeries completed exceeded target milestones each year since 2016. A total of 45,993 hydrocele surgeries were done since 2015, 10 countries are now implementing and scaling up their morbidity management activities.
- Development of mHealth tools for improved reporting: This programme developed mHealth tools (MeasureSMS) that use SMS messaging for MDA reporting and MMDP case reporting.

- *Evidence synthesis: This programme made a significant contribution to the evidence base for LF elimination through numerous peer-reviewed publications, the provision of technical guidance and programme evaluations. Operational research activities facilitated the adaptation of treatment strategies and provided essential support and information to understand and predict the reduction in transmission and where to focus resources.*
- *Developing alternative treatment strategies: In DRC, the co-distribution of the parasite Loa loa complicated the scale-up of MDA due to the risk of severe adverse events associated with ivermectin and the national LF programme needed a practical approach to make decisions on the safest and most effective treatment strategies. CNTD developed a decision map and process for national programmes to work from that includes five practical steps to determine the most appropriate treatment strategy. Following the publication of this and review by the WHO Scientific & Technical Advisory Group, a new treatment protocol for co-endemic areas was agreed and is now the international standard and fully operational in DRC.*

LSTM and CNTD continues to work closely with MoHs and the NTD community towards the goals laid out in the WHO NTD 2021-2030 roadmap and build on the gains made over two decades of support to national programmes through continued translational, operational and implementation research across the spectrum of NTDs. We thank the dedicated teams at LSTM and in our partner endemic countries that have contributed to delivering the impact of this programme. In 2019 FCDO launched the ASCEND programme as its flagship NTD programme to continue the implementation of NTD control and elimination programmes, which was forced to end prematurely in 2021 due to the cuts to UKAID funding and is featured in the TDB department's annual report.



COUNTDOWN has been an innovative seven-year FCDO funded project, which brought together a multi-disciplinary implementation research consortium focused on the scale-up of integrated interventions against NTDs. Across contexts, we have been working proactively and collaboratively with health policy makers and NTD programme implementers at country level to ensure that research evidence generated has been of maximum benefit to NTD programmes through constant dialogue and dissemination. In the last year COVID-19, plus requests from FCDO to cut back on activities, due to funding restrictions, has led to the revision of workplans, with all project teams now working on final stage evaluation and research uptake (RU). COUNTDOWN's investment in proactive RU via the use of the co-ordinated communications has enabled accessible research narratives that has led to evidence informed policy change at national and international levels.



COUNTDOWN partners meeting in Ghana

COUNTDOWN has built upon its previous research findings to develop and pilot interventions that demonstrate how NTD programme activities can reach those who are currently missed by services. Embedding female genital schistosomiasis services into the primary care system in Nigeria and Liberia shows how women and girls can be treated and supported without complex diagnostics and complicated referral systems. The creation of peer support groups for those living with NTDs in Nigeria is another way that COUNTDOWN research demonstrated the need of this type of intervention and then developed it collaboratively with local stakeholders including those affected by the diseases.

COUNTDOWN's health system focus and related research has meant that it was asked to support the restart of NTD activities after they were paused due to the COVID pandemic. COUNTDOWN teams advised on the tools for restarting and have been asked to evaluate the process to ensure that the voices of health workers and community volunteers are heard.



Health promotion in Nigeria of albendazole - a free drug to treat filarial diseases. Photo by Noela Gwani.

A key step to onward sustainability has been to build the research capacity of all of its partners. Much of this work has been through active participation through all stages of the research cycle. This year saw the implementation of a competitive junior researcher scheme aimed to provide and support early career researchers from Liberia, Nigeria, Cameroon and Ghana on how to apply for research grants, manage their research (from ethics to impact) and disseminate their findings. The combination of peer support, targeted webinars and mentoring by more senior researchers was felt by the early career researchers to be hugely beneficial.



COUNTDOWN Outcomes by More than Minutes

COUNTDOWN's research identified how health workers and community volunteers could be supported through the introduction of updated training materials and job aids. The teams have worked with stakeholders to develop these new tools that are locally designed and adapted to the local context. By developing these tools collaboratively and using a process of quality improvement (revise and repeat) has meant that the tools have been very well received by those that use them.

- *Global impact: COUNTDOWN's multidisciplinary implementation research approach is highly regarded as a best practice model of NTD research. In particular, the use of social research to coproduce adaptations to NTD programmes demonstrates how barriers to access can be overcome. The impact of these multidisciplinary approaches has strengthened MDA and supported those living with NTDs in Nigeria and Liberia.*
- *Challenge: restarting NTD activities after they were halted for a year meant that there were many competing priorities. COUNTDOWN's engagement with stakeholders as co-researchers has helped to manage the time constraints and strain that was being felt by many and ensure that activities were appropriately prioritised and supported.*
- *Results: understanding systematic noncompliance of MDA through multidisciplinary research enabled researchers to highlight the contextual challenges that exist and demonstrate that overcoming these barriers is a complex interaction of political, societal, environmental and community factors and underlines the need for acceptable alternative strategies.*
- *Impact and results: Engagement and validation of findings using visual techniques has encouraged interactions between non researchers and researchers to reach wider audiences. The research showed how images can be powerful and are recognised beyond literacy levels, culture, and language. They amplify the voices of those affected by NTDs, create ownership, and can be used for social change.*

- *Risk and challenge: a key priority for the final phase of COUNTDOWN was to reach a wider range of stakeholders internationally by presenting the findings of the research in an engaging way through regional meetings, cross country visits and collaboration with other stakeholders. These wider interactions had the potential for wide ranging impact and increased value for money.*



Sian Freer, Chief Operating Officer, CNTD/ASCEND



Dr Rachael Thomson, Director of COUNTDOWN



Professor Mark Taylor, Director of the Centre for Neglected Tropical Diseases, Principal Investigator for COUNTDOWN.

The last phase of COUNTDOWN has seen a series of national and international dissemination activities where research findings were presented to stakeholders who discussed the impact of the programme and committed to embed the learnings into policy and practice. The final webinar was held on 28th September and was attended by over 150 people from across the world. NTD implementers, researchers and policy makers from Nigeria and Liberia came together to discuss how the lessons from COUNTDOWN aligned with the NTD roadmap pillars and what this means for the future of NTDs.

Centre for Snakebite Research and Interventions



Throughout its 50-year history the Centre for Snakebite Research and Interventions (CSRI) has been focused on developing, testing, and implementing strategies aimed at mitigating the burden of tropical snakebite. The Centre and its staff are led by Director Professor Nicholas Casewell and is part of the Department of Tropical Disease Biology. Its herpetarium hosts the largest and most diverse collection of tropical venomous snakes in the UK to support its research activities.

Despite the struggles of COVID and the impact it has had on the centre's ongoing programmes, such as limiting the scope of activities due to restrictions, and funding being prematurely withdrawn due to the UKAID cuts, CSRI has continued to grow with the successful funding of three major research grants from Wellcome's Snakebite Priority Area research fund. In addition to these three major grants, the centre has successfully been awarded multiple smaller grants from Wellcome, FCDO, Bloomsbury and the RSTMH. These grants include diverse academic partners from Kenya, India, the USA, Belgium and the Netherlands.

During the last year, the centre's ongoing programmes, such as the NIHR-funded African Snakebite Research Group (ASRG) and the FCDO-funded Scientific Research Partnership for Neglected Tropical Snakebite (SRPNTS) have continued with a focus on capacity building in partnership with collaborators in India, Kenya, and Nigeria.

The ASRG is now in its final year, with research and capacity building activities including the Nigerian and Kenyan Snakebite Research and Intervention Centres (N-SRIC and K-SRIC) completing the construction of their herpetarium and pre-clinical testing facilities. These facilities will be used to house local snake species allowing for the collection of venom, testing the efficacy of antivenoms, and further enhancing their snakebite research capacities. The partners, Institute of Primate Research (IPR), Kenya and Bayero University Kano (BUK), Nigeria, with the support of NIHR funding, are being assessed for the silver accreditation for their Good Financial Grant Practices after having achieved their bronze status in 2019/2020. These were the second and third institutions globally to receive this accreditation. Both these institutions have benefitted from the GFPG accreditation with additional funding sources opening to them.

The SRPNTS programme, after initially ending prematurely in March 2021 due to cuts in UKAID funding has recently been awarded limited term project extension until the end of March 2022. This will allow us to improve the research capacity at partner institutions and complete key science activities around the proof-of-concept snakebite therapeutic research within the grant.

During the lockdowns in 2020, early career researchers (ERC) within the CSRI established International Toxin Talks (ITT) with the idea to provide a free, easily accessible platform for ECR toxinologists around the world, and in October 2021 ITT celebrated its first birthday. Over 5 days, over 100 people attended to listen to ECRs from Myanmar to Mexico, Singapore

to the United States, give short research talks and participate in two discussion panels with world-leading researchers and snakebite advocates. ITT has now been invited to form the formal ECR component of the International Society of Toxinology to continue to build upon their pioneering science communication work.

Hybridisation in UroGenital Schistosomiasis (HUGS)

HUGS is a new 4-year Joint Investigator Award from the Wellcome Trust with Professor Stothard and Dr Musaya as co-PIs. The project started in April 2021 and will follow a cohort of people and livestock to assess the importance of hybrid schistosomes.

Based in Mangochi and Nsanje Districts, Malawi, pilot surveys have determined a hitherto unrealised endemicity of *Schistosoma mattheei* and *Schistosoma bovis* in cattle. The close proximity of cattle watering points to washing/water collection points of local villagers creates significant opportunities for zoonotic spill over of hybrid schistosomes into the human populace.

HUGS will track these hybrid worms as they intermingle with *Schistosoma haematobium* to determine if they cause heightened disease or are more resilient to praziquantel treatment in people. Recent assessments of the prevalence of urogenital and intestinal schistosomiasis in local school children demonstrate more than 50% are currently infected and desperately need preventive chemotherapy.

Post-COVID mass drug administration actions are starting up in Malawi with treatments being offered in December. The results of HUGS will help the national control programme optimise a more holistic or OneHealth approach for control of schistosomiasis in Malawi and in neighbouring countries.

School health surveys in Mangochi District, Malawi, restarting post COVID. Photo by Russell Stothard



Department of Tropical Disease Biology

Tropical Disease Biology (TDB) is a leading international research and teaching department with a focus on translational research of tropical infectious diseases. Translational research is at the core of the department, with activities in 'product discovery and development', 'translation of knowledge into practice' and 'capacity strengthening'. A key strength of the department is that we use community/field observations to inform basic laboratory experiments and in the same way aim to use findings from basic research to influence clinical treatment and community prevention initiatives.



*Professor Giancarlo Biagini
Head of Tropical Disease Biology*

Research Focus

The department carries out world leading research across all of the major human infections to address unmet Global Health challenges, these include emerging and high consequence infectious diseases (e.g. Crimean-Congo haemorrhagic fever, Zika, SARS-Cov-2), multi-drug resistant (MDR) bacteria (e.g. MDR M. tuberculosis and WHO-identified priority AMR pathogens), malaria, and neglected tropical diseases (NTDs) such as intestinal nematodes or soil-transmitted helminths, schistosomes, filarial worms and snakebite.

Within TDB there are three centres: the Centre for Drugs and Diagnostics (CDD), the Centre for Neglected Tropical Disease (CNTD) and the Centre for Snakebite Research and Interventions (CSRI). The Centres are key vehicles within the Department, moving research into developable solutions e.g. drugs, diagnostics, vaccines; enabling technologies; implementing activities and policies.

Promoting a positive research culture and investing in our future generation

TDB firmly believes that responsible innovation is key to sustainability. Shaping an inclusive environment in which diversity is valued is at the core of TDB's strategic plans. TDB promotes positive actions for the recruitment, retention and progression of underrepresented groups.

TDB adheres to the San Francisco Declaration on Researcher Assessment (DORA), committing to making assessments of research performance based primarily on the quality of the research, judged by peer review. This helps ensure a transparent and fair consideration of research quality, across a range of outputs taking into account different career stages and disciplines. TDB is aligned to the Concordat for Research Integrity and has developed an action plan, which includes a pro-active approach to standards in the laboratory, research on human subjects and in systematic review-based research.

The Department has pro-actively engaged with the implementation of The Concordat to Support the Career Development of Researchers and the Knowledge Exchange Concordat (KEC). As a result, researchers have access to a broad range of training opportunities, internal pump-priming and fellowship awards and recognition of impact outside of the traditional measures of research income and publications. In addition, there has been integration of early career researcher (ECR) participation within decision-making structures.

TDB has a vibrant ECR community and this year we are delighted to report that three of our ECRs, Dr Ana Cubas Atienzar, Dr Taline Kazandjian and Dr Laura Jeffreys, were successful in securing a Director's Catalyst Fund (DCF) award. In addition, Dr Stefanie Menzies, Dr Michael Abouyannis and Dr Becky Edge received grants from the Royal Society of Tropical Medicine and Hygiene (RSTMH) & Hamish Ogston Foundation to investigate diagnostic, pathogenesis and biological research questions in snakebite.

It is with great pleasure that the Department can also celebrate career progression and announce lectureship appointments, within the school's career track (CT) scheme, of four new investigators:

Dr Stuart Ainsworth is a UKRI Future Leader Fellow based within CSRI. Originally a microbiologist, Dr Ainsworth's fellowship is based on investigating the use of virus-like-particles, decorated with key venom components, to produce an antivenom which will possess significantly greater efficacy and geographic utility than current, crude venom derived antivenoms.

Dr Thomas Edwards' research focus is the design of innovative molecular diagnostics, using novel technologies to improve the speed, ease of use, or multiplexing ability of diagnostic tests. During the next three years he will drive early translational research in diagnostics at LSTM, in AMR and tropical fevers, working

with academic, clinical and industrial partners in the UK, Turkey and Uganda, to evaluate these tests in the field and bring them closer to market.

Dr Cassie Modahl's research expertise and interests are in the use of "omic technologies" as tools for developing neglected tropical disease treatments. Working within TDB's CSRI, Dr Modahl's current research focuses on defining the pathophysiology caused by snakebite and developing monoclonal antibodies to treat snakebite.

Dr Ghaith Aljayyousi is a Pharmacokinetic/ Pharmacodynamic (PK/PD) modeller who is currently working on a range of projects, principally in drug discovery, within LSTM and with international academic, non-academic and industrial partners. Dr Aljayyousi developed a software tool, MMVSola.org, that is an open source online platform, created in collaboration between LSTM and Medicines for Malaria Venture (MMV). It allows scientists in the international drug discovery community of malaria therapeutics to test their candidates, rank them and generate dosing predictions. It is predicted to lead to a dramatic decrease in the use of animals for malaria research.

Research Performance

TDB has achieved another outstanding year of research outputs, with some 200 peer-reviewed publications across the translational T1-T4 continuum, including publication of step-changing studies in leading journals. Key to its success is recognition that collaboration and partnership are essential for innovation, this is underlined by the department's formal collaborations in over 35 countries. TDB's reputation as a leading research department of international calibre is further evidenced by our ability to secure significant competitive funding – during this reporting period, TDB's active grant funding is approximately £70M split over more than 60 awards from a broad portfolio of funders.

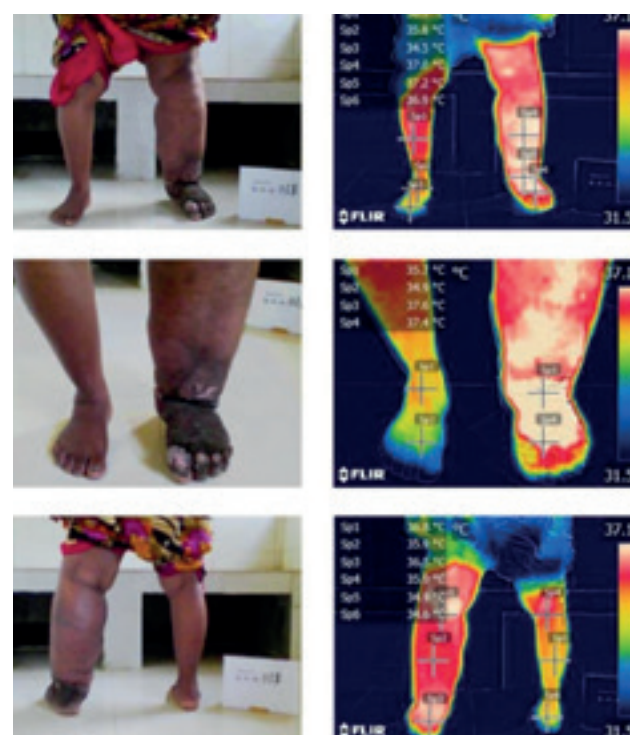
Investment in Infrastructure

TDB recognises the importance of working with pathogens of diseases and not surrogates, and has previously invested in establishing and operating multiple containment level 3 laboratories. This year, we have made a further ca. £1million investment in new state-of-the art infrastructure that includes new imaging platforms and analytical platforms. These new facilities are unique in the academic sector and will allow TDB to continue to be a world leading department in translational research for infectious diseases.

Research Highlights

The cuts to UKAID made by the Foreign, Commonwealth & Development Office (FCDO) had a major impact on our FCDO funded NTD programmes, ASCEND and COUNTDOWN. Highlights of the impacts these programmes made to NTD programmes over the past two decades is to be found in the Feature Article on Neglected Tropical Diseases.

This year saw two advances in the care and monitoring of lymphatic filariasis (LF) patients with lymphoedema. Two papers published in the Journal of Clinical Medicine reported improvements in lymphoedema status and frequency of acute attacks in patients with enhanced care packages including self-massage and breathing exercise. In the same journal Dr. Louise Kelly-Hope et al. reported on a new thermal imaging camera, which by measuring skin temperature was able to detect subclinical cases and predict the progression of lymphoedema and is now being evaluated in a multi-country prospective cohort study in Bangladesh, Ethiopia and Malawi.



Thermal imaging of lymphoedema (Kelly-Hope, LA et al (2021) Journal of Clinical Medicine 20, 2301)

The COUNTDOWN team published in BMJ Global Health the outcomes of a large-scale cross-sectional study for why onchocerciasis transmission persists after 15 years of annual ivermectin mass-drug administration. They showed a very low adherence to ivermectin treatment with many refusing any treatment at all. Interviews with community members highlighted a fear of adverse events following ivermectin, which is a risk in areas with co-endemic loiasis. The study emphasised the need for alternative strategies for onchocerciasis elimination where negative perception of ivermectin is an entrenched barrier to community participation in elimination programmes.

Working within CDD, several teams have made significant advances in therapeutics development and antimicrobial resistance research. Professors Steve Ward and Mark Taylor and Dr Joe Turner are leading projects for two potential alternative treatments designed to

target the filarial symbiont *Wolbachia*; AWZ1066S and ABBV-4083 (TylaMac), which are currently progressing through clinical trials in DRC in partnership with DNDi and Abbvie and in Liverpool in partnership with Eisai and the Clinical Research Unit, Liverpool University Foundation Hospitals Trust, with the aim of delivering safe and effective macrofilaricides to support the elimination of onchocerciasis and LF.

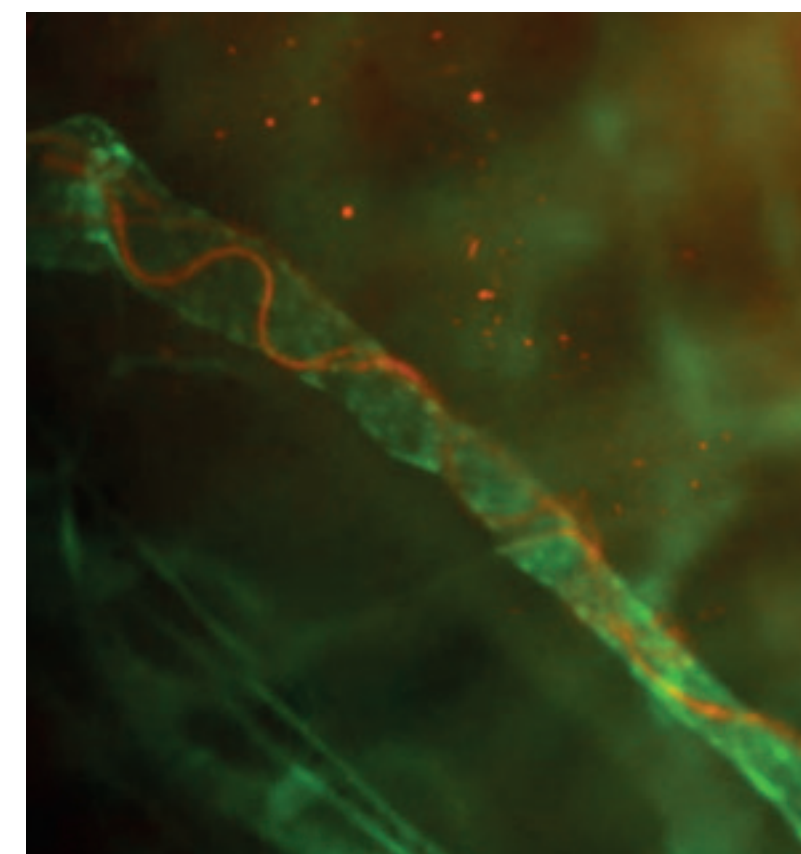
CDDs discovery drug portfolio has a broad range of projects against a number of diseases including TB, malaria, SARS-CoV-2, onchocerciasis and lymphatic filariasis and WHO-identified priority AMR bacterial pathogens. Work led by Dr Roberts' team funded by a recent European Regional Development Fund Award, has led to extremely productive collaborations with innovative SMEs in the Northwest of England who were looking to test, validate and improve their antimicrobial products with a view to getting them nearer to market. Projects have been completed with BioData Network Ltd, AmDel Medical and ShimyaTech.

TDB is committed to developing knowledge exchange activities to help drive regional economic, social and cultural recovery and growth. Professor Giancarlo Biagini, received a personal award from the UKRI as an "Innovation Scholar". During this role, he will take an academic lead towards the development of sustainable academic-industry partnerships that aim to generate breakthrough innovation for the treatment and management of infectious diseases. Aligned to this ambition, research teams within the CDD have worked with multiple regional companies and international agencies during the COVID-19 pandemic on developing new pre-clinical drug testing platforms, screening company drug assets against SARS-CoV-2 and testing agents for antiviral activity against SARS-CoV-2, including using a new platform for testing the efficacy of air sterilising solutions against artificially generated aerosols of SARS-CoV-2.

Significant SARS-CoV-2-related knowledge exchange activities with industry have also been conducted by the research team led by Dr Grant Hughes. The team have studies examining viral persistence, transfer of virus between skin and surfaces, and developing novel anti-viral surfaces. In addition, the team have a partnership with Unilever examining the capacity of oral care products to inactivate virus, and have looked at COVID-19 infection in cats and dogs. Catalysed via the flagship iiCON project, TDB investigators working on anti-infective research have significantly increased their engagement with regional and national SMEs and industrial partners. For example, the research team, led by Dr Adam Roberts, is continuing to assemble a substantive environmental bacteria library (currently >30,000 bacteria) so it can be available for screening by the CDD, other research institutions and companies, for new antimicrobial products. This is an extension of LSTM's citizen science project "Swab and Send" where things and places are swabbed by schools,

colleges and members of the public in order to find new bacteria naturally producing novel antimicrobials.

In more fundamental studies on NTDs, Dr Joe Turner and colleagues in CNTD and CDD have unravelled the mechanism by which a common and affordable antibiotic works as a lymphatic filariasis anti-morbidity treatment. Whilst it has been over a decade since Professor Taylor first discovered that doxycycline is remarkably effective at reducing elephantiasis, the mechanism by which the drug works has remained a mystery.



Filarial worm (red) captured immediately after invading the lymphatics (green). Image by Dr Joseph Turner

Surprisingly, the recent investigation demonstrates that doxycycline has a number of anti-inflammatory properties which culminate to prevent the pathogenic growth of malfunctioning and swollen lymphatic vessels following initial infection. The researchers now hope to embark on new studies to identify the precise nature of inflammation provoking disease and test affordable, readily available anti-inflammatory drugs as new treatments for this devastating disease of poverty. Fundamental studies on the mode of action of the antimalarial class, the 8-amino quinolines, continues within TDB following a recent award from the MRC. This award will support the team within TDB to work with partners MMV and GSK Pharmaceuticals to define the mechanism underpinning the mode of action of this important class of drugs that are currently the only therapies for the treatment of relapse malaria.

The diagnostic teams led by Drs Emily Adams, Tom Edwards and Ana Cubas Atienzar, working within TDB's CDD, completed a project with the UK Public Health Rapid Support team to develop a point of care molecular test for Crimean Congo haemorrhagic fever using the GeneDrive platform. The test was shown to be 95% accurate during studies at the UK Health Security Agency (UKHSA) and is currently being validate in trials in Turkey. The assay has now attracted further funding to progress its development into a final freeze-dried kit. The diagnostic group has also been working on a project to develop bacteriophages as biosensors for the early detection of blood stream infection and has isolated and characterised a library of novel phages with potential diagnostic applications.

CSRI focuses on developing, testing and implementing strategies aimed at mitigating the burden of tropical snakebite. CSRI researchers have described a number of important scientific outcomes over the past year, including a paper in Nature Communications revealing how combination therapies of small molecule repurposed drugs offer broad preclinical protection against viper snakebite, findings in Science detailing how toxins associated with defensive venom spitting have evolved, and public health findings in PLOS Neglected Tropical Diseases relating to the economic cost of snakebite Burkina Faso and risk factors associated with treatment adverse reactions in Nigeria.

Professor Stothard and Dr Musaya (MLW) are continuing to track the unexpected changes in epidemiology of both urogenital and intestinal schistosomiasis in Lake Malawi funded by a Wellcome Trust Joint Investigator award. In addition, Professor Stothard's team will be leading research themes in schistosomiasis in the recently awarded NHIR funded Shire Valley Vector Control Project (ShiVec).



TDB continues with the expansion and innovation of novel antibody platforms. Professor Pleass, in collaboration with

Dr Eleanor Gaunt from the Roslin Institute, has recently obtained funding for proof-of-concept studies to demonstrate the therapeutic potential of sialylated Fc domains of human IgG as both for therapeutic discovery of new disease immune modulators and antiviral drugs.

Dr Hastings and colleagues continued their work on optimizing methods to estimate malaria drug effectiveness, and published the fourth in a series of papers showing the current WHO-approved methods most likely miss around half of all drug failures and that deep-sequencing 3 to 5 carefully selected genes is accurate and should become the new "gold standard" in surveillance for drug resistance. They also continued to work on how insecticides can be deployed to control disease vectors while minimizing selection for resistance.

Special Thanks to Professor Robert Harrison



Professor Robert Harrison and the late Mr Kofi Annan.
Photo by Kofi Annan Foundation

This year marked the retirement of Professor Robert Harrison, former Director of CSRI. Professor Harrison joined LSTM in 1994 and made major research contributions to the field, including applying some of the first transcriptomic approaches to define snake venom composition and pioneering the use of rationally selected toxin epitopes as novel ways to generate venom-specific therapeutic antibodies. Simultaneous, Professor Harrison became a globally recognised advocate for snakebite, and was a key player in successfully lobbying the WHO, Wellcome and the Kofi Annan Foundation to formally recognise snakebite as a priority neglected tropical disease. At LSTM, Professor Harrison's legacy is best exemplified by the growth of a small snakebite research group into the 25-person strong CSRI that exists today. We wish Professor Harrison a very successful retirement and thank him for his outstanding contributions to the field of neglected tropical diseases.

FEATURE ARTICLE:

Malaria and other Vector Borne Diseases

LSTM hosts a diverse research portfolio in vector borne diseases (VBDs), from mosquito genomics to health economics, spanning the whole translational research pathway. While the global burden of malaria has dramatically declined over the past two decades, there is evidence that these gains are stalling, insecticide resistance rising and new tools in prevention and treatment are urgently needed. The technical expertise, strong collaborations with research and implementation partners in disease endemic countries and ongoing expansion with the next generation of VBD scientists, puts LSTM in a prime position to tackle the ongoing challenges in this field.

CEASE

The LSTM led CEASE project – Controlling Emergent *Anopheles stephansi* in Ethiopia and Sudan – began in 2020, looking at the reasons that the invasive mosquito species has been found in the horn of Africa, far from its traditional home in the Middle East and South Asia. Between 2000 and 2010, the mosquito hitchhiked its way to the Arabian Peninsula via freight traffic and eventually reached the Horn of Africa. A mainly urban dwelling insect, the *Anopheles stephansi* has been linked to an increase in cases of malaria in cities, including an unusual outbreak in Djibouti City.



anopheles stephensi. Photo by RadboudUMC

With the UN estimating that 56% of the population of Africa will live in urban areas by 2050, an urban-adapted malaria mosquito could be a real problem in a country where the disease is already endemic. A £3.5 million award from the Wellcome Trust will enable the collaboration to understand the spread and offer targets to control this invasive species.

The interdisciplinary CEASE team is divided into entomological, epidemiological, mathematical and geostatistical modelling and social sciences work packages in order to map the spread and the route of the mosquito.

The collaboration brings together experts from Jimma University and Armauer Hansen Research Institute, both in Ethiopia; University of Khartoum, Sudan; Institute of Tropical Medicine (ITM), Belgium; Imperial College London, Lancaster University and LSTM.

PIIVeC

The Partnership for Increasing the Impact of Vector Control (PIIVeC) was established with funding from the Global Challenges Research Fund. Bringing together leading research institutes and national disease control programmes in Burkina Faso, Cameroon and Malawi, the partnership is generating new evidence to develop effective, locally appropriate strategies for the control of vector borne diseases and strengthening research capacity in this area.



Generating new knowledge and tools to support vector control

Through a network of researchers in partner countries, PIIVeC co-created a multidisciplinary research programme to address some of the most pressing challenges and evidence gaps. It supported 12 African research fellows to establish their own independent research groups by providing research funding, access to a multidisciplinary network or advisors at LSTM and partner organisations, and by supporting a further 20 junior scientists who are mentored by PIIVeC's research fellows. Over half of the research fellows have already secured follow on funding and/or permanent research positions in African research organisations and several have received invitations to join key advisory boards at WHO. Through ongoing dialogue with Ministries of Health, PIIVeC commissioned over 15 small, demand-led

operational research projects, on topics ranging from quality control of insecticide treated bednets to opportunities for strengthening community engagement in dengue control.

Building local research capacity in vector control

In addition to supporting our African Research Fellows transition to independence, the partnership has invested in institutional capacity strengthening. Following capacity assessments in the four partner research organisations, action plans were developed to fill capacity gaps. Actions supported by PIIVeC included physical improvements to laboratories and experimental field stations, training in quality and data management systems and support for Good Financial Grant Practices accreditation.

Reinforcing links between researchers and policymakers

Throughout the project we have provided training and support to all researchers in the communication of their research findings to diverse audiences; this aspect of the programme was highly valued by all participants in a recent evaluation. To strengthen the utilization of evidence, technical vector control advisory groups (TVCAGs) were established in each country. These serve as knowledge translation platforms that enable a two-way dialogue between researchers and policymakers with each multi-sectoral TVCAG comprised of members from government, research, and industry. Together, they have defined the vector control research agenda in each country and, as testament to their success, all three countries have identified pathways to maintaining the TVCAGs after the current cycle of funding ends next year.

Examples of Research Supported by PIIVeC



- *Alert on high levels of dengue in patients with acute febrile illness in Cameroon*
- *Data on performance of new classes of insecticide for malaria control in Malawi*
- *Identification of threats to sleeping sickness control in Southern Cameroon and piloting of vector control tools.*
- *Identification of a new method to rapidly detect exposure to pyriproxyfen, and insect growth regulator being incorporated into new classes of insecticide treated nets.*
- *Quantification of the impact of malaria on productivity of cotton farmers in Burkina Faso*
- *Development and evaluation of improved traps for blackflies and tsetse*
- *Characterisation of ectoparasites of cattle in Cameroon*
- *Profiling of insecticide resistance, and underpinning mechanisms, in Aedes and Anopheles mosquitoes.*

MALCOV

MALCOV, a study designed to determine the interaction between malaria and COVID-19 on disease progression and severity, led by Professor Feiko ter Kuile of the Malaria Epidemiology Group. It is funded by the Bill & Melinda Gates Foundation, has been ongoing in western Kenya since January 2021. It is conducted in collaboration with the London School of Hygiene and Tropical Medicine and the GRASS institute in Burkina Faso.

ATSB

In addition, a large new vector control trial co-led by Professors Ter Kuile and Donnelly is scheduled to start in early 2022, looking at the impact of attractive targeted sugar bait (ATSB) to reduce malaria transmission in about 70 rural villages in western Kenya. The trial is funded by the Innovative Vector Control Consortium (IVCC) and is part of a larger international network of partners conducting similar large trials in Mali and Zambia. ATSBs are bait stations hung on the exterior walls of houses to target the population of outdoor biting *Anopheles* mosquitoes responsible for the continued transmission of malaria in areas where insecticide-treated bednets, targeting indoor biting mosquitoes, are widely used. The baseline ATSB studies started in 2021.

Innovation to Impact (i2i)

A continuation award of \$2million USD from the Bill & Melinda Gates Foundation to the Innovation to Impact (i2i) team at LSTM will help to reduce the impact of vector-borne diseases by improving the product development landscape for vector control tools. Supporting enhanced evaluation processes for new products the team will work with the World Health Organization Pre-Qualification Vector Control Team in Geneva as well as stakeholders from global and country level policy makers, product developers, donors, regulators and implementing partners to streamline data generation, while working to address regulatory bottlenecks at country level.

The need for new vector control tools is now more urgent than ever. This is particularly true in Africa, where the challenges have been exacerbated by the development of insecticide resistance amongst vector populations. New tools are required to urgently address this threat and allow countries to expand their effective portfolio of tools to combat vector borne diseases in a wider range of settings.

The i2i leadership team has now transitioned to LSTM's Vector Biology Department and will be supported by a Steering Committee comprising global experts in product development, regulatory affairs, trial design and public health.

House Modification

In a study led by Penn State University, researchers from LSTM looked at a new type of housing modification which reduces malaria incidence among children by between 40 and 50%.

The intervention uses window screening, together with PVC tubes fitted with insecticide-laced screens and installed under the eaves of homes, as a novel method of killing malaria mosquitoes as they attempt to enter the house. By combining a physical barrier plus an insecticide, the housing modification both blocks and kills mosquitoes, thereby protecting not only the people living inside, but also the community at-large. The study has been published in *The Lancet*.

Nitisinone in the Control of Tsetse Fly Populations

A study led by LSTM's Dr Alvaro Acosta-Serrano has found that nitisinone, a drug used to treat a number of human genetic diseases can be repurposed to kill blood feeding insects including the tsetse fly.

Tsetse fly. Photo by Dhruv Patel



Tsetse flies transmit the parasitic disease, African trypanosomiasis, which is fatal to both humans and animals if left untreated. Without a vaccine, the most effective way of controlling the disease is to control the tsetse flies that carry it. The FDA-approved drug nitisinone acts by blocking the insect from breaking down the amino acid tyrosine, which is found in abundance in animal blood. The catabolism of tyrosine is crucial for blood-feeding insects such as mosquitoes, ticks and kissing bugs as accumulating amounts of tyrosine becomes toxic to these species if it is not degraded and eliminated. This international team demonstrated that nitisinone was lethal to tsetse flies when administered either orally in the bloodmeal or topically to the insect cuticle. The resulting accumulation of tyrosine led to rapid fly paralysis, tissue disintegration and death.

The drug does not have the same impact on insects that do not feed on blood, making it safe for insects that are beneficial to the environment, such as bumble bees, which is different to widespread use of insecticides. This means that there is potential for an insecticide-free control tool and could compliment insect control strategies to block the transmission of malaria, African trypanosomiasis and other vector borne diseases in Africa.

Bed Nets

Researchers from LSTM confirmed that in areas with high pyrethroid resistance in mosquitoes, fewer people were infected with malaria parasites when piperonyl butoxide (PBO) + pyrethroid-treated bed nets were used. An updated Cochrane Review shows these benefits were sustained over two years.

Bed nets treated with pyrethroid insecticides are an effective way to reduce malaria transmission and have widely been deployed across Africa. However, the spread of insecticide resistance in mosquitoes threatens their impact. One way to control insecticide-resistant mosquito populations is by using insecticide synergists, such as PBO, alongside the insecticide in the bed net. PBO is not an insecticide, but it blocks the substance (an enzyme) inside the mosquito that stops pyrethroids from working.

A recently updated Cochrane review, led by LSTM's Katherine Gleave, assessed the available data to help better understand whether pyrethroid-PBO bed nets were more effective at reducing the burden of malaria compared to standard pyrethroid nets.

The World Health Organization (WHO) requires two randomized trials, in different malaria-endemic settings, demonstrating the public health benefit of an intervention before they can make a policy recommendation to support its use. This update of Gleave incorporates data from a second clinical trial conducted by researchers working with the Government in Uganda in partnership with LSTM scientists.

The review update included 16 trials, conducted between 2010 and 2020, that compared standard pyrethroid nets to pyrethroid-PBO nets. These consisted of 10 experimental hut trials and four village trials that measured the effect of

pyrethroid-PBO nets on wild mosquito populations, as well as two randomized controlled trials (RCTs) which measured the impact of the nets on malaria infection in humans.

The analysis demonstrates that when mosquitoes had high levels of resistance to pyrethroids, pyrethroid-PBO nets performed better than standard pyrethroid-only nets, increasing mosquito mortality and reducing blood feeding rates. In addition, the two RCTs involving 10,603 participants in areas where mosquitoes are very resistant to pyrethroids, found that fewer people were infected with malaria when the population used pyrethroid-PBO nets.

Collating the evidence from the different trials in this systematic review greatly assists WHO in updating Global Policy recommendations on the use of pyrethroid-PBO bednets.

***Wolbachia* in Malaria Control**

A study carried out by researchers from LSTM along with colleagues at the London School of Hygiene and Tropical Medicine (LSHTM) amongst others, and published in

Current Biology, provided evidence of high-density natural *Wolbachia* infections in *Anopheles* mosquito populations. The study showed that not only was the bacterial symbiont found in some of these populations that act as a vector for malaria, but that these strains of *Wolbachia* are transmitted maternally to following generations. Already used in control strategies for arboviruses, this study has provided evidence that raises the possibility that the same could be possible for malaria control.

Genome sequencing of these *Wolbachia* strains obtained genome depths and coverages comparable to other insects known to be infected by *Wolbachia*, providing further evidence for the infection. These sequencing data also showed these strains possessed genes which are known to enable the bacteria to spread through host populations, which is critical if *Wolbachia* is to be used for control approaches.

The researchers determined the prevalence, density and genetic diversity of *Wolbachia* strains in geographically diverse mosquito populations of Cameroon, Kenya and the Democratic Republic of Congo (DRC).

Fluorescent in situ hybridization of Wolbachia infections in Anopheles moucheti ovaries (Wolbachia – red, mosquito nuclei stained by DAPI – blue). Image taken by Shivanand Hegde.

Department of Vector Biology

The Department of Vector Biology has a research portfolio spanning from studies on the functional genomics, behaviour and ecology of disease vectors, to clinical trials, implementation research and the development of tools for monitoring and evaluation of disease transmission. Its aim is to contribute to the control or elimination of vector borne diseases afflicting the world's poorest populations.



*Professor Martin Donnelly
Head of Vector Biology*

Dr Anne Wilson and a team of collaborators from the Gambia National Malaria Control Programme, Durham University, MRC Gambia at LSHTM, LSHTM and the Royal Danish Academy, have conducted experiments evaluating the impact of window screening on indoor climate and entry of malaria mosquitoes into houses in The Gambia. Experimental houses with window screening had lower indoor temperatures and fewer malaria mosquitoes than un-screened houses. Computational fluid dynamic modelling showed that screening works by weakening plumes of carbon dioxide released by humans when sleeping. The house is the most common location of malaria transmission in Africa and by making simple modifications to the house structure we can reduce mosquito entry and make the house cooler, encouraging use of insecticide-treated bednets.



*Experimental houses at Walikunda field station, MRC Gambia at LSHTM.
Photo by Anne Wilson*

Based in the Chikwawa region of southern Malawi, the newly awarded NIHR Shire Valley Vector Control Project (Shire-Vec) led by Dr Chris Jones, Dr Themba Mzilahowa and team, will focus its research on a 40,000-hectare irrigation scheme in the Shire valley exploring its effect on endemic vector borne diseases, such as malaria and schistosomiasis. Working with local farmers and agricultural stakeholders, Shire-Vec will investigate how the irrigation scheme influences smallholder farming practices and disease

burden in the area, and will offer practical solutions to manage the impact of the scheme across both public health and agriculture. The project aims to reduce the transmission and burden of vector-borne diseases for smallholder farmers in the lower Shire Valley, while maintaining the socio-economic benefits of expanding agricultural development in southern Malawi.

Dr Tony Nolan and team have been researching methods of genetically manipulating the *Anopheles funestus* mosquito. This year, with Prof Charles Wondji, they showed for the first ever time that it is possible to introduce specific DNA changes of choice into this mosquito. This is important because *Anopheles funestus* is the major vector of human malaria in several regions of Africa. The emergence of resistance to insecticides in these mosquitoes is a big problem in controlling vector populations, and thereby malaria. The study findings allow us to study the genetic basis of resistance to insecticides and open up the possibility of developing new tools to control these mosquitoes.

This year Dr Grant Hughes and his team confirmed that the mosquitoes *Anopheles moucheti* and *Anopheles demeilloni* harbour natural *Wolbachia* infections. Using genome sequencing, PCR, and fluorescent microscopy they showed that these mosquitoes possess high density *Wolbachia* strains that are transferred from mother to progeny. This research provides the first robust evidence that *Wolbachia* naturally resides in *Anopheles* mosquitoes and these strains are ideal candidates to transfer into other medically relevant *Anopheles* species for novel vector control approaches.

Dr Acosta-Serrano and colleagues have discovered that interrupting the metabolism of tyrosine (an amino acid taken from the blood meal) using repurposed herbicides, kills tsetse flies and other blood feeding insects, but not sugar feeders like insect pollinators. With financial support from Bill & Melinda Gates Foundation, they have now demonstrated that the same compounds kill *Anopheles* mosquitoes when administered in sugar or blood meals. Pending on new funding, they plan to start conducting field tests next year, mainly using attractive targeted sugar baits. If the strategy works, it could be used to complement other malaria control strategies and as an integrated approach for the control of several vector-borne diseases.

Along with colleagues at MLW, Dr Michelle Stanton has been quantifying the influence of small dams and their resulting reservoirs on Anopheles mosquito abundance in Kasungu, Malawi. They conducted monthly indoor mosquito catches in 90 homes across three communities from May-August 2021, alongside drone mapping to identify mosquito larval habitat and subsequent larval habitat sampling. The results of this study will help identify which communities are at a higher risk of malaria during the dry season, allowing malaria control programmes to target their interventions accordingly.

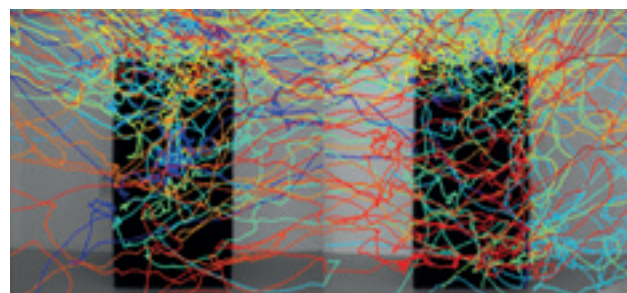
Indoor spraying of residual insecticides is one of our main malaria vector control tools and this year Dr David Weetman and colleagues conducted research to understand the genetic basis of the resistance to pirimiphos methyl, an insecticide used for this purpose. The work used a combination of in silico analysis of data from the 1000 genomes project and laboratory work on West African samples gathered by project partners. The research found that duplicate copies of the resistance gene are needed for demonstration of the resistance phenotype. This could provide a new technique by which to monitor resistance in the field which can inform malaria control programmes on when to change insecticides.

Dr Jennifer Lord has reached the interview stage for the MRC Career Development Award with a project investigating the transmission dynamics of Japanese encephalitis virus in Bangladesh. The proposed research would involve an iterative process of mathematical modelling and empirical data collection in Bangladesh. Part of the research will assess the ability to predict Japanese encephalitis virus risk based on livestock census survey data which may be used to target vaccination strategies.

In DRC, Professor Steve Torr and colleagues have been scaling up the deployment of Tiny Targets in the former province of Bandundu aiming to control tsetse vectors of Gambian sleeping sickness (Gambian human African trypanosomiasis, gHAT). Tiny Targets were deployed over an area of ~12000 km² where >50% of cases of gHAT cases had occurred in the last five years; the deployment was carried out by the national programme (PNLTHA) and local communities with technical support provided remotely by LSTM. DRC has the highest burden of gHAT in Africa and strengthening the ability of

PNLTHA to implement large-scale tsetse control will enable the country to achieve the WHO goal of eliminating the transmission of gHAT by 2030.

Martin Donnelly and collaborators from LSHTM, IDRC Uganda, UCSF, Makerere University and the National Malaria Control Programme in Uganda have conducted a large clinical trial of a new type of long-lasting insecticidal net. The trial investigated whether the new type of net containing both pyrethroids and piperonyl butoxide (PBO), a synergist that can partially restore pyrethroid susceptibility in mosquito vectors, was more effective than a standard pyrethroid net. The team presented the data from this trial showing that the pyrethroid-PBO net was associated with lower malaria prevalence to WHO in April of this year and they are now moving forward with a new recommendation for how and where Ministries of Health should procure and deploy the new net type



Flight paths of *Aedes aegypti* mosquitoes as they navigate two bookcases during a tracking experiment in Recife, Brazil. Photo by Luca Facchinelli

Philip McCall's research team uses infra-red 3D video tracking and a range of bioassay methods to investigate the behaviour of mosquitoes during host location and in response to insecticides. Recent work has led to patented improved designs for insecticide-treated bednets in Africa, currently under evaluation in a clinical trial in central Africa, while in collaboration with Instituto Oswaldo Cruz in Recife, Brazil are building 'Indoor Maps' of the movements during flight and resting behaviour of the arbovirus vector *Aedes aegypti*. The research aims to inform the design of novel vector control methods that overcome resistance to existing insecticides or obviate the need for insecticides in disease endemic communities.

Combined rice-duck farming in Bangladesh, which provides suitable larval habitat for potential Japanese encephalitis virus vectors and hosts of both virus and vector. Photo by Jennifer Lord



FEATURE ARTICLE:

Resistance Research and Management

Antimicrobial resistance (AMR) continues to represent a serious, global public health threat and may well have been exacerbated in certain sectors by the COVID-19 pandemic. COVID has changed health-seeking behaviour in different countries in different ways, and the effects of these changes are reflected in antimicrobial use.

It is possible, and in some cases likely, that this will impact the resistance seen in bacteria circulating in healthcare and in the environment at large. The effects might remain unknown for years to come but researchers at LSTM are focused on pandemic preparedness, international awareness, surveillance and capacity building to cope with any changes in AMR that may manifest over the next few years.



Agar letters with environmental bacteria and fungi growing spelling out LSTM and TB ahead of World TB Day 2021. Made by LSTM's Ellie Allman and Claudia McKeown using agar letters instead of plates provides additional public engagement opportunities to inform audiences on AMR.

International Collaborations

To this end, LSTM's Dr Adam Roberts was part of an international team of 23 researchers who earlier this year published a landmark paper on 'Key considerations on the potential impacts of the COVID-19 pandemic on antimicrobial resistance research and surveillance'. In the paper the authors call for continued, internationally coordinated and targeted research on AMR so that healthcare systems can be proactive in their response to new disease outbreaks, rather than reactive as we have been with COVID-19.

Despite the serious funding cuts to overseas work experienced in 2021 and the continued disruption to international travel and face-to-face meetings, LSTM has been able to continue to lead on its AMR-facing international projects and collaborative efforts with overseas partners.



Dr Adam Roberts

One of our key AMR projects, funded by the Medical Research Council, is drawing to a close.

The 'Drivers of Resistance in Uganda and Malawi' (DRUM) project, led by Professor Nick Feasey, is in its final year and has generated a wealth of data that is currently being analysed. This ranges from the DNA sequence data and data on human behaviour, to results of policy implementation research. Policy implementation is key to turning the findings of the study into action which can translate into benefits for society. Understanding the barriers to this process are key if policy is to be implemented successfully.



Influencing Policy

The policy work strand of DRUM, led by Russell Dacombe from LSTM's Centre for Capacity Research (CCR), has two main research objectives: to explore key actors' perceptions of barriers to and enablers of the collaborative development and implementation of AMR control policy in Malawi and Uganda, and to explore the collaborative processes and actions of AMR policy development and implementation in those countries.

Data has been collected from in-depth interviews with stakeholders with supporting policy document reviews over the last few years. Most stakeholders in these countries framed the causes of AMR as a development issue, focusing on antibiotic use in the human and animal sectors. Some structural differences in policy formation and implementation were also found, with Uganda operating through an existing One Health structure. Barriers to the development and implementation of AMR policy included competing and conflicting policy priorities and a lack of evidence to push for more prioritisation. The challenges between sectors included AMR being viewed as a human health issue and structural issues negatively impacting on efforts to establish cross-sectoral budgets for joint activities.

Capacity Development

Once policy is in place it is important that capacity and capability exist to effectively carry out that policy and to provide reliable data packages which will further guide development of healthcare infrastructure.

LSTM has been particularly active within The Fleming Fund Country Grants which are designed to provide technical

assistance to strengthen laboratory capacity and surveillance systems to improve the monitoring of AMR. The CCR is part of a consortium led by international development agency DAI that has been awarded Fleming Fund Country Grants for Nigeria, Bangladesh, Pakistan, and Indonesia.

The team supported the renovation of 17 laboratories in Nigeria, as well as two national reference laboratories in Pakistan. The renovated laboratories have received new equipment to improve their AMR diagnostic capabilities. Biorepositories have been formed in the main reference laboratories, which will be used to collect samples from across the country's laboratory network and will form important collections to monitor individual country's AMR trends. Work is progressing between LSTM, DAI and the Indonesian Ministry of Health to undertake a large-scale sequencing-based AMR surveillance project, and a further 20 laboratories from the human and animal health sectors across Pakistan, Indonesia and Bangladesh are in various stages of design and renovation, with work expected to be completed next year.

Quality assurance

CCR also supported the National Institute of Health in Pakistan to update its external quality assurance system for bacteriology in line with international ISO standards; samples for the updated system were distributed to 26 laboratories across Pakistan. As well as helping to improve diagnostic and surveillance-based laboratory quality, the system will also help to form national support networks. The Pakistan model is now being adapted to help update comparable systems for human and animal health in Bangladesh.

Other international collaborations



Another international project, 'AMR Responsive Dialogues', is being led by Dr Eleanor MacPherson at MLW in Malawi. This Wellcome Trust-funded team is using participatory methods to co-create solutions and policy asks to address AMR. The project brings together experts, policy makers and different groups (farmers, community prescribers and dispensers, and care givers) as part of the research process. We are also working with the Wellcome Trust Public Engagement team at the Mahidol Oxford Tropical Medicine Research Unit (MORU) to share the project learning across Malawi and Thailand.

In September, LSTM entered a new partnership with the Faculty of Public Health (UK) and the Ghana Public Health Association (GPHA). Supported by a small grant from the Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS), this partnership positions the consortium well for future collaborative efforts and funding for antimicrobial stewardship work in Ghana. Both GPHA and CwPAMS are influential in the activities of the Ghana National Platform Antimicrobial Resistance, the body mandated by the government to drive the national agenda on antimicrobial resistance in policy.



Policy also features heavily in the NIHR Global Health Professorship recently awarded to Professor Nick Feasey. This award is aimed at answering the question of how the WHO Infection Prevention and Control (IPC) guidelines can be adapted to the African context, and iteratively improved by using causal inference to investigate their efficacy and economic modelling to evaluate their cost-effectiveness. It will provide five years of funding to enable Professor Feasey and his team to describe the effectiveness, efficacy and cost effectiveness of an IPC programme in Africa. Success in Malawi will entail the development of a cadre of IPC professionals that will establish a learning health system capable of sustaining an effective IPC programme, which will be able to respond to future threats such as pandemics.

Department of Clinical Sciences

As has been the case across LSTM, the past academic year has been a challenging one for the Department of Clinical Sciences (DoCS). Lockdowns and reduced funding have had their impacts but there are also reasons for optimism. The department's researchers and clinical workers have continued to deliver a diverse translational impact as well as making significant 'bench to bedside' contributions to the COVID-19 response.



Professor Daniela Ferreira
Head of Clinical Sciences

Human Challenge

The need for the rapid development of safe medicines has impacted on our established controlled human infection models (CHIM). Professor Daniela Ferreira and her team are moving from single infection models and are instead establishing co-infection models which better mimic the real-world environment in which viruses and bacteria circulate and frequently interact in their human host.

2021 also marked the completion of an important step in consolidating the CHIM facility in Blantyre, Malawi. The team will now start a randomised controlled trial to investigate how vaccines against common causes of pneumonia behave differently in Malawi compared with in the high-income countries in which they were designed. The results will directly benefit the populations most at risk from these diseases.

COVID-19

This year saw the publication of the first immunological description of severe COVID-19 in Africa. The evidence was produced by an international team of scientists which

included DoCS staff and demonstrates the strength of this approach in delivering the best science, and quickly.

As outlined in the COVID overview at the beginning of this report, the Cochrane Infectious Diseases Group (CIDG) published a review of ivermectin in COVID-19. This has been widely cited in major newspapers and is #160 out of 190 million research outputs tracked by Altmetrics.

As the review showed, ivermectin does not work in the treatment of COVID-19, but the delivery of high-quality care and careful research at the individual level do. Staff in Kenya, Malawi, Uganda and elsewhere have continued important capacity building through clinical provision, training and supporting the availability of PPE through LSTM's #BumpltForward campaign. Key to this success has been the long-term partnerships between LSTM collaborators and ministries of health, hospitals, and NGOs. We are living through difficult times but continue to celebrate these important connections and friendships.

Respiratory Research

IMPALA (International Multidisciplinary Programme to Address Lung Health and TB in Africa) is a four-year collaboration

The IMPALA team in Durban, South Africa



funded by the National Institute of Health Research (NIHR). The programme was completed in September 2021 and has been highly successful. It has seen five PhD students from the Global South drive relevant research agendas in acute and chronic respiratory care. Larger scale projects have included a birth cohort examining early life impact of the environment on lung health, and the integration of health systems for chronic respiratory disease. This trans-disciplinary group has woven policy, clinical and health systems aspects into 39 publications, 30 media events, 36 conference presentations, broad training in science and project administration, and more.



Tupumue community team creating a mural in the Mukuru informal settlement, Nairobi. Photo by Hellen Meme

Respiratory care themes continue within the Tupumue (a Kiswahili word meaning 'let's breathe') study of childhood non-communicable lung disease in Nairobi, Kenya through creative arts (theatre, street art, puppetry, storytelling), novel testing for asthma using a running test, and the measurement of personal air pollution exposure.

There was also considerable tuberculosis-related activity including the provision of multiple systematic reviews to WHO

by Dr Peter MacPherson and colleagues, and policy-changing primary research demonstrating the efficacy of automated chest X-ray-based screening.



Equitable North-South Partnerships

The department's commitment to equity within its international partnerships is clear. This year members of DoCS took this further by leading the production of consensus guidance to promote equitable partnerships in manuscript submissions.

LSTM researchers were part of a multi-disciplinary team of researchers and journal editors from South Africa, Kenya, Tanzania, Nigeria, Malawi and the UK who reviewed relevant literature and existing guidelines and developed the proposed guidance. The team sought to address the problem of parachute research, i.e. research that is conducted in low- or middle-income countries (LMICs) by researchers from institutions in high-income countries without adequate recognition of the contribution of the LMIC research teams. The proposed guidelines provide guidance to journal editors about how they should assess these statements when decisions to accept or reject submitted manuscripts are made. The authors urge journal editors to adopt these recommendations to ensure the practice of parachute research stops and current authorship inequities in their journals is being addressed.

North-South learning in Antimicrobial Resistance

Antimicrobial resistance (AMR) is a globally important issue which is increasingly compromising human health. It occurs when microorganisms (bacteria, fungi and protozoans) develop the ability to grow in the presence of the antibiotics, antiseptics and antimicrobials that are supposed to either kill them or prevent their growth. DoCS is involved in this vital research. This year Professor Nick Feasey was awarded an NIHR Global Health Professorship which ties his work in AMR in Malawi to the drug resistance group within the LSTM led infection innovation consortium, iiCON. Also, Dr Patrick Musicha will join DoCS from the Sanger Institute to continue AMR work in Malawi as part of his Wellcome Africa International Fellowship.

The Global Health Trials Unit (GHTU)

The GHTU is a specialist unit with an international outlook and focus. It designs, conducts, analyses, and publishes global health trials in low and middle-income countries (LMICs). The expert statistical, epidemiological, and other methodological advice supports many successful trials whilst benefitting from LSTM's experience in wide-ranging research.

The team remained very active during the COVID pandemic and supported a number of related trials including MALCOV, designed to look at the interaction of Malaria and COVID; a COVID diagnostic study with Mologic, manufacturers of rapid antigen tests, and led on the AGILE drug trial in South Africa, as part of the larger AGILE platform testing the efficacy of drugs for use following early diagnosis of COVID-19.

To date, GHTU supported more than 20 studies with many still active and more scheduled to start.

Acute Medical Care in LMICs

Sepsis remains a key driver of global mortality and an important focus for DoCS. This year key publications from Dr Joe Lewis and colleagues have identified tuberculosis as an important contributor to the sepsis problem in Malawi, and further epidemiological work by Dr Peter MacPherson's and colleagues suggests that targeted HIV inpatient care might reduce mortality.

However, identifying and treating human disease can be very complex, even for 'simple drugs' for 'simple conditions'. The rise of multimorbidity (the presence of two or more long-term health conditions) which has resulted from global trends in non-communicable diseases and the persistence of infections as major health risks, demands that we deliver more horizontally-integrated care. Dr Felix Limbani at MLW and Dr Jamie Rylance have been awarded £5m by NIHR to address the issue and its health system considerations in hospitals in Malawi and Tanzania (the Multilink project).

Menstrual, Sexual and Reproductive Health in Adolescents

Adolescence is a sensitive time for girls' sexual and reproductive health. Biological changes occur alongside heightening pressures for sexual activity which unfortunately can result in sexually-transmitted infections. A team led by Professor Penelope Phillips-Howard has completed the follow-up to a trial for menstrual and health solutions for out-of-school adolescent girls in Kenya. The study has revealed the factors associated with sexual activity and sexually-transmitted infections and highlighted the vulnerability of this group of young women, particularly among those experiencing early menarche. The team's baseline data will be followed-up with the results of a randomised controlled trial of the impact of menstrual cups and cash transfers in reducing infections and school dropout rates.

Paediatric Nutrition

Bacteria that occur naturally in breast-fed infants may help to prevent gut infections and improve gut health, which can have profound health implications for those children. Professor Stephen Allen is leading a study in western Kenya which will test whether dietary supplements given to children over 0-6 months can improve their gut health and prevent malnutrition. LSTM is also leading the Neonatal Nutritional Network and the Gut Health Workstream of the GCRF Action Against Stunting Hub (AASH) which is active in Nigeria, Senegal, India and Indonesia.



(More than Minutes)



FEATURE ARTICLE:

Lung Health and TB

LSTM's lung health and tuberculosis (TB) research takes a holistic, person centred and gender sensitive perspective recognising that men, women and children experience a heavy burden of lung disease which manifests with a range of symptoms.

The causes of these problems are complex, very often rooted in poverty and include infections caused by viral and bacterial pathogens as well as non-communicable conditions such as asthma and chronic obstructive pulmonary disease.

The solutions require multi-disciplinary collaborations aimed at prevention and management of the full spectrum of communicable and non-communicable lung conditions.

IMPALA

This year saw the successful completion of the International Multidisciplinary Programme to Address Lung Health and TB in Africa (IMPALA). This has been a four year collaborative Lung health research and capacity strengthening programme led by Professors Mortimer and Chakaya and Dr Obasi at LSTM, working with scientists from 22 institutions from 14 countries, including 10 in Africa, which has been the focus of IMPALA activities.

Key studies have been completed by PhD students in five disciplinary areas: clinical, social science, health systems, health economics and policy as follows:

- A mixed-methods prospective evaluation of the diagnostic utility of point of care ultrasound study of 213 adults with acute respiratory symptoms in Kenya (Kagima)
- Exploration of patient and health worker needs & experiences around communication for Chronic Respiratory Diseases (CRDs) management in public health facilities in Kampala, Uganda (Ayakaka)
- Health system readiness evaluations of responses to patients with chronic respiratory diseases and an evaluation of the health system impact of COVID-19 (Mulupi)
- Model-based analyses of data on 1282 adults to measure the health burden of airflow obstruction and the relationship of health-related quality of life to lung function (Njoroge)
- Evaluation of the use of CXR in TB screening for the large-scale identification of non-TB lung disease and the assessment of the feasibility assessment of operational modelling in the use of TB policy in Kenya (Mungai).



IMPALAA PhD students (from l to r): Martin Njoroge; Jacqueline Kagima; Irene Ayakaka; Brenda Mugai and Stephen Mulupi

Other larger studies completed this year include a mixed-methods, cross-country (Sudan & Tanzania) evaluation of a health systems strengthening intervention and prospective cohort study of the association of maternal diet, food insecurity, air pollution, household energy use on lung function of 564 pregnant women & their babies in Uganda.

Our key findings have contributed new knowledge in four thematic areas:

Lung health diagnostics include confirmation that use of clinician-performed point of care ultrasound (PoCUS) can promote accurate & early diagnosis & treatment to acutely breathlessness patients. This is particularly relevant in LMICs where access to advanced diagnostics can be limited.

The examination of **lung health systems** challenges in chronic respiratory disease has found that non-TB lung diseases are neglected. The majority of symptomatic patients who do not have TB receive no diagnosis. Asthma-related stigma undermines diagnosis & management. Low-cost lung function tests are feasible but not accepted by community due to stigma associated with being seen with peak flow meters or inhalers. For those receiving treatment asthma care was unaffordable to most & not covered by existing social protection. IMPALA's co-designed health system strengthening approach is an acceptable and feasible way to address some of these challenges.

Research into **lung health across the life course** has shown that the nutritional intake of a high proportion of pregnant women in the study communities in Uganda were insufficient for healthy lung development in their infants; that exposure to high levels air pollutants & low socioeconomic status suggest population at high risk of CRDs later in life; and that previous

TB and declining lung function significantly impacts health related quality of life.

Lung health policy research identified the urgent need for strengthened prioritisation of non-TB lung disease and that operational modelling may be an acceptable and feasible way to strengthen lung health policy making.

IMPALA has also led important global initiatives to strengthen lung health research in LMIC. For example, the publication in *The Lancet* (Meghji et al) of an already highly cited review of strategies to improve lung health in LMIC which synthesised recommendations from a number of global and regional lung health organisations. This includes the Global Asthma Network, The International Union Against TB and Lung Diseases, The Pan African Thoracic Society and the WHO. To further facilitate uptake of research findings have been presented at a number of key international policy forums including two presentations to the Network of African Parliamentary Committees of Health.

In addition to the training of ten early career researchers IMPALA has this year trained and certified 18 clinicians in Kenya in bedside sonography and 201 spirometry practitioners in eight countries on how to train others, contributing to a sustainable legacy of enhanced lung capacity.

LIGHT Consortium

Men have twice the burden of undiagnosed TB compared to women and face substantial barriers in achieving timely diagnosis and treatment. LIGHT (Leaving no-one behind: transforming gendered pathways to health for TB) research programme, a UK aid-funded six-year cross-disciplinary global health research programme, is a consortium of partners based in Kenya, Malawi, Nigeria, Uganda and the UK. It aims to provide new evidence on the effectiveness of gender-sensitive pathways and approaches to health for those with TB in urban, HIV-prevalent settings.

Following the kick-off meeting in September 2020, the team has been busy establishing themselves, despite the challenges faced due to the ongoing COVID-19 pandemic. LIGHT contributed to a systematic review in Emerging Infectious Diseases looking at pooling samples (sputum) as a potentially efficient approach in testing for tuberculosis (TB) during the COVID-19 pandemic.

The team has taken to social media, writing blogs to highlight the importance of a gender-sensitive response in order to end TB; calling for a paradigm shift in addressing the social determinants of TB; and looking at gender equitable access to healthcare as an essential element of a resilient TB response in Nigeria.

They have employed three African Early career researchers to look at areas of study such as health economics, epidemiology and clinical practice. LIGHT was well represented at this year's Union World Conference on Lung Disease, with several presentations disseminating research findings.

IMPACT TB

Three publications from the IMPACT TB programme, PI Dr Maxine Caws, have shown that its community based Active Case Finding interventions for tuberculosis (TB) in Vietnam and Nepal are successfully reaching the poorest, most vulnerable members of the community, who often lack access to conventional health services. Patients often incur substantial costs through having TB. These costs are termed 'catastrophic' due to their long-term impact on the wellbeing of the patient and the household. The programme's health economic evaluation has shown its interventions also reduce the prevalence of 'catastrophic costs' among TB patients and their families in both Vietnam (a middle-income country) and Nepal (a low-income country). Six further publications explored the ways in which evidence contributes to active case finding policy in national TB Programmes of high burden countries, and the critical evidence gaps hindering policy translation and implementation.



A BNMT drone operator flying a banner for World TB Day - Photo by Hem Tamang

Dr Caws' programme of work in collaboration with the Birat Nepal Medical Trust (BNMT) in Nepal continues to grow and now incorporates projects investigating nutritional support for people affected by TB (TB Recovery), the first large scale whole genome sequencing of *Mycobacterium tuberculosis* in Nepal (TARGET TB), piloting of socioeconomic support models for TB patients (ASCOT), the impact of COVID-19 pandemic on TB service delivery (TB READY) and medical cargo drone transport in remote rural areas. Together these projects take a holistic, multidisciplinary approach to addressing the multiple aspects of the complex challenges facing tuberculosis patients, their families and the healthcare workers supporting patients to access and complete

treatment. The COVID-19 pandemic has underlined our need for strong, patient-centric and accessible health services everywhere to ensure early diagnosis and effective treatment of infectious diseases. Sadly, the strain on fragile health services caused by the pandemic has had a devastating effect on people affected by TB, with many patients unable to access care, delaying diagnosis or dropping out of treatment early. The travel restrictions and diversion of healthcare staff to pandemic response exacerbated the barriers already faced by people suffering from TB in LMIC.

The community based active case finding at the core of this Nepal programme of work is focused on developing optimised, resilient models of patient-centric care for people affected by tuberculosis. The pandemic also highlighted the need to strengthen infectious disease research capacity in LMIC, which has been a focus of LSTM's global programme since its inception. LSTM's collaboration in Nepal is building a team of early career researchers at BNMT who work with a network of international collaborators. This capacity building will support the future development of Nepali science and public health implementation to find locally appropriate and locally driven solutions to the health and development challenges facing the country.

Tupumue

The Tupumue (Kiswahili for 'let us breathe') study is quantifying the burden of childhood non-communicable lung diseases in two communities in Nairobi, Kenya. In addition, it explores children's experiences of lung problems and whether the adult lung disease in Africa starts early in life.

Children aged 5-18 years are being recruited in the informal settlement of Mukuru and adjacent Buruburu. Unusual aspects of Tupumue include the training of local lung health champions to raise the profile of lung disease, the use of creative arts (theatre, street art, puppetry, story telling), the testing of children for asthma using a running test, the measurement of personal air pollution exposure and the use of Child Health Card records of birth weight, serial weights and chest infections.

Tupumue is aiming to recruit 2000 children, which started in late January 2020 and halted in March 2020 by COVID-19. Recruitment restarted in May 2021 and to date 2413 parents have allowed us to approach their children and we have measured the lung function of 1117 children.

Tupumue is led by researchers from the Kenyan Medical Research Institute (KEMRI) supported by researchers from 13 UK institutions, led by LSTM.

Malawi

Dr Peter MacPherson and colleagues from MLW undertook four systematic reviews and meta-analyses to inform the new 2021 WHO TB Screening Guidelines. Their review of the impact of active case finding on the community epidemiology of tuberculosis changed WHO recommendations, which now recommend that "Systematic screening for TB disease may be conducted among the general population in areas with an estimated TB prevalence of 0.5% or higher.

Dr MacPherson undertook the first randomised controlled trial to evaluate an artificial intelligence intervention for health. In the PROSPECT Study, adults with symptoms of TB who received computer-aided chest x-ray screening for TB were significantly more likely to be diagnosed with TB and had a much shorter time to initiation of TB treatment than individuals in the routine care system. These trial findings have already contributed to TB Screening Guidelines, with WHO recommending that computer-aided TB screening can be used for TB diagnosis and triage testing.

Researchers from LSTM and MLW, Drs Ben Morton and Dr Kondwani Jambo, led a study exploring the diagnosis and treatment of COVID-19 in Sub-Saharan Africa, the results of which were published in the journal Nature Communications.

The researchers recruited patients who had been admitted to hospital in Malawi with severe acute respiratory infection and suspected COVID-19 disease. The team found that for patients suspected of COVID-19 who tested negative



A trial participant in Blantyre, Malawi. Photo Neema Toto



for SARS-CoV-2 (via a nasal swab PCR) but who had a positive serum antibody test, demonstrated very similar immunological profiles to patients who had laboratory-confirmed SARS-CoV-2 infection. These clinically suspected patients were not given specialised COVID-19 clinical care, including dexamethasone treatment, and were more likely to die than laboratory-confirmed COVID-19 patients. Specialised COVID-19 clinical care in this hospital setting was restricted to laboratory-confirmed COVID-19 patients.

The team also looked the transfer of the unique human carriage model from its birthplace in Liverpool to

Malawi. The team tested the feasibility of using a human pneumococcal challenge model in Malawi to understand immune correlates of protection against carriage and to trial alternative vaccine candidates, concluding that it was in fact feasible and can be used to test vaccine efficacy in this population in Malawi.

Liverpool

The Accelerator Research Clinic (ARC) commenced a clinical trial this year that is academically sponsored and commercially funded by Pfizer. In this trial it will be using its extensive experience in the Experimental Human Pneumococcal Challenge model to test the current pneumococcal vaccines available in the UK. The team aims to determine which vaccine offers more protection against colonisation of pneumococcal bacteria in the nose. Two commonly found serotypes of the bacteria will be used to determine short-term (spn 3 at 1 month) and long-term protection (6B at 6 months) post vaccination.

Healthy volunteers aged 18-50 years will be screened to determine their eligibility prior to enrolment. They will be randomly allocated to receive a Pneumococcal vaccine (PCV-13 routinely given to children or PPV-23 routinely given to adults over 60yrs old) or placebo (saline injection). Participants will be experimentally challenged with pneumococcal bacteria and attend clinic appointments to monitor colonisation.

The trial is running through the Accelerator Research Clinic with the assistance from the Well-Traveller Clinic nursing staff. It will help to understand why serotype 3 is still causing disease in the community (vaccine escape) despite being included in both pneumococcal vaccines.



Tupumue mural



Department of International Public Health

The Department of International Public Health (DIPH) brings together people from diverse professional backgrounds to support a range of research models, from individual fellowships and project grants to large multi-partner consortia. Department members particularly focus on health systems implementation research and intervention studies combatting high-burden diseases, all in partnership with researchers, policy makers and other stakeholders in low-resource settings.

This year members of the department have been shortlisted for national awards in recognition of their collaborative working and their supervision and mentoring of research students. In the 2021 Research Excellence Framework, academic staff submitted 86 research papers that were considered internationally excellent or world leading and two impact case studies on HIV control. Our research income in the last year was around £100m.

DIPH also includes the Health Systems and Workforce Strengthening Unit, the Community Health Systems Group and the Gender, Health and Social Determinants Group. Their activities are featured in the Feature Article: Health Policy and Health Systems Research.

Centre for Health Systems Strengthening (CHES)

CHES is a multi-disciplinary group using research and teaching to strengthen health systems and to improve health and wellbeing amongst the poorest and marginalised in low- and middle-income countries (LMICs). CHES brings together researchers from DIPH's Health Systems and Workforce Strengthening Unit, the METRe Group (Monitoring and Evaluation Technical assistance and Research), the Centre for Capacity Strengthening (CCR), the Community Health Systems Group, and the Gender, Health and Social Determinants Group. Staff from the team are involved in numerous projects which you will find outlined in the Health Policy and Health Systems Research Feature Article. They include health and wellbeing for marginalised people in cities (ARISE and the African Cities Research Consortium), health system strengthening in fragile contexts (ReBUILD for Resilience), health workforce strengthening (PERFORM2Scale), and addressing severe stigmatising skin diseases (REDRESS and sister projects). DIPH researchers were also involved in COUNTDOWN as highlighted in the Feature Article: Neglected Tropical Diseases.

Cross-cutting Social Science and Anthropology Research

This research agenda is led by Dr Nicola Desmond and is delivered by centres in both DIPH and with the Department

of Clinical Sciences. The work explores the processes and impacts of global public health practice to promote engagement with gendered health seeking and improved health behaviours within communities and the wider health system. It includes work on acceptability, bioethics, social capital, behaviour change, community engagement, trust and risk, as well as the intended and unintended impacts of health technologies, such as vaccines and diagnostics, on health behaviours. The team has a number of long-term collaborations with partners in Africa and elsewhere including the Global Health Bioethics Network, a Wellcome Strategic Award, work with PATH and WHO on vaccine acceptability, and strong collaborations with University of Oxford, University of Liverpool and London School of Hygiene and Tropical Medicine. Funding has also supported a long-term programme for capacity strengthening and career development in mixed-methods social science research at MLW (Malawi Liverpool Wellcome) in Malawi.

Monitoring, Evaluation, Technical assistance and Research (METRe)

METRe works in low resource countries to provide technical assistance and build capacity on how to effectively collect, analyse and use robust data. It does this to assess the coverage of communities with essential health services, to monitor the quality of clinical care in communities and to improve evidence-based decision making for health programmes and policies. The team, led by Professor Joseph Valadez, is active since 2010, working to support ministries of health, civil society and donors throughout Africa, Latin America and Asia.

METRe's implementation research is conducted in diverse locations facing diverse challenges. In South Sudan, METRe supports the Ministry of Health, World Bank, UNICEF, Foreign, Commonwealth and Development Office and USAID in strengthening the health system in all 10 states. In Uganda, METRe works to strengthen health systems in refugee settlements, while in Laos the team collaborates with UNICEF to aid the Ministry of Health in



Professor Shabbar Jaffar
Head of International Public Health

planning and implementing its first major health system assessments in districts and sub-districts. In each setting METRe develops innovative biostatistical methods to improve information quality and to gain insight about the population health. Now working with other departments, METRe is developing new approaches to rapidly assess anti-microbial resistance.

Centre for Global Health Economics

Economic questions around disease control and health systems in global health are addressed by the Centre for Global Health Economics. The team quantifies the health and economic burden of diseases and assesses the costs and cost-effectiveness of new health delivery approaches. This work is complemented by research on healthcare financing and financial protection, and on the efficiency and equity of health systems.

The team works across departments and its current portfolio includes studies on HIV prevention and control studies, diabetes and hypertension modelling, snakebite and neglected tropical diseases, lung health and tuberculosis, prebiotics and synbiotics in infants, malaria control, and anti-microbial resistance and sepsis. Almost all its work is in low-resource settings, including Ivory Coast, Burkina Faso, Ethiopia, India, Moldova, Kenya, Nigeria, Liberia, Cameroon, Ghana, Malawi, Uganda, Tanzania and Zimbabwe.

Centre for Sexual Health and HIV AIDS Research (CeSHHAR), Zimbabwe

HIV continues to be a massive burden in sub-Saharan Africa, with more than 25 million people living with the disease and more than 900,000 new infections each year. The Centre for Sexual Health and HIV AIDS Research Zimbabwe conducts a large portfolio of research on HIV prevention and sexual and reproductive health, with a particular focus on key populations.



The Centre, based in Zimbabwe and led by Professor Frances Cowan, is supported by a Wellcome Trust Collaborative Award in Science and a multi-disciplinary team which investigates the impact and cost effectiveness of approaches to strengthen differentiated care for sex workers in southern Africa. CeSHHAR is part of a large consortium evaluating the expansion of self-testing for COVID-19, which builds on its considerable experience in HIV self-testing in Africa.

Deputy Director at CESHAR, Dr Webster Mavhu, has recently been awarded a five-year intermediary fellowship on research to promote positive masculinity and sexual health among younger adolescents in Zimbabwe.

Research Partnership for the Control of Chronic Diseases in Africa (RESPOND-AFRICA)

RESPOND-AFRICA's research focus is on the prevention and management of HIV, diabetes and hypertension. The programme, which began with NIHR funding in 2017, is still in the early stages of its development but it is hoped that it will guide policy and practice and build research capacity in this area for years to come. More details are in the Feature Article on HIV.



RESPOND-AFRICA is a group of European institutes (LSTM, Liverpool John Moores University, University of East Anglia, University of Bergen, University College Dublin and ISGlobal Barcelona) and African research partners (National Institute for Medical Research at Muhimbili University of Health and Allied Sciences and Shree Hindu Mandal Hospital, both in Tanzania, and MRC/UVRI/LSHTM Uganda Research Unit and The AIDS Support Organisation, Makerere University both in Uganda). The team has strong links with the ministries of health in Tanzania and Uganda, and with patient and community leaders, civil society organisations and other stakeholders.

The group was short-listed in the International Collaboration of the Year category at the 2021 Times Higher Education Awards.

Centre for Capacity Research (CCR)

CCR specialises in 'research on research systems' and the science of research capacity strengthening. This is a process of individual and institutional development leading to higher levels of skills and a greater ability to perform high-quality research. CCR is a global leader in generating evidence on research systems and in advancing capacity strengthening practice in LMICs. It does this through conducting high-quality, implementation-focused research, and by sharing learning and advocating for evidence-informed improvements to research systems and capacity strengthening practice.



Laboratory technicians' workshop, Lusaka, Zambia. Photo Royal Society



CWNH training of Bereavement Champions in Nairobi, Kenya. Photo CWNH

CCR is by Professor Imelda Bates and Dr Justin Pulford and works with funders, external agencies and in-country institutions to identify barriers which may be preventing their research systems and those working in them from functioning effectively. Over the past 12 months, CCR has produced 49 knowledge products and led or supported a portfolio of 17 projects. They include:

- *Funding from the Wellcome Trust Institutional Translational Partnership Award allowed CCR members to develop training workshops aimed at removing barriers between research disciplines and to promote 'team science'. The team facilitated a series of training seminars on identified bottle necks to foster confidence and increase knowledge, and to allow individuals to move their research along the translational research pathway. All of the 452 individuals who attended the workshops reported an increased understanding in the subject area which included designing research capacity strengthening components within proposals, how to create and use a 'Pathway to Impact' and how to manage research consortia.*
- *The CCR-led MUDI project was hosted within the International Multidisciplinary Programme to Address Lung Health and TB in Africa programme, studying the working strategies of its cross-disciplinary research teams, approaches and actions. MUDI generated robust evidence about what works for fostering cross-disciplinary global health research which has since been widely disseminated, eg the team was invited by Vitae - the global leader in supporting professional development of researchers - to lead an interactive workshop on cross-disciplinary research and the development of cross-disciplinary researchers.*

Centre for Childbirth, Women's and Newborn Health (CWNH)

The Centre for Childbirth, Women's and Newborn Health is a multidisciplinary group of applied health researchers with a shared vision that all women and newborns can access high quality and respectful healthcare, wherever they live. The team is led by Professor Dame Tina Lavender and works across global settings and a WHO Collaborating Centre.

CWNH focuses on applied maternal and newborn health research, including the prevention of stillbirth and newborn deaths, improving support for bereaved parents and families, and enhancing access and uptake of quality, respectful maternal and childbirth care in LMICs.

Capacity strengthening, particularly for front-line midwives and nurses in LMICs, is a unifying thread in the centre's activities. Working in partnership with the Lugina Africa Midwife Research Network, the CWNH recently completed a four-year programme of research and capacity development in six African countries, funded by the National Institute of Health Research.

Emergency Obstetric Care and Quality of Care Unit

The Emergency Obstetric Care and Quality of Care Unit conducts research on ways to reduce maternal mortality/morbidity through improved quality of care. The team, which is led by Dr Charles Ameh, combines rigorous research with capacity strengthening and technical support to optimise its impact, working in partnership with policy makers and local researchers to ensure its research is locally relevant and informs policy. Specific areas of research include antenatal care, emergency obstetric care, quality of care and obstetric clinical care monitoring tools.

More information on the work of the Unit as well as CWNH can be found in the Feature Article on Maternal, Newborn and Child Health.

FEATURE ARTICLE: HIV

As HIV continues to cause substantial mortality and morbidity across the globe, LSTM has seen an expansion in the extent and scope of HIV-related research as well as research into other chronic conditions that often cause complications and sit as co-infections to HIV. The portfolio spans UK based work as well as global work on prevention, diagnosis and care.

HIV in the UK

In Liverpool, LSTM participates in the coordination of the HIV Fast Track Cities initiative that brings together local government, civil society and health services. Liverpool aims to reduce the proportion of residents living with undiagnosed HIV and extend the UNAIDS 90-90-90 target to 95-95-95 through accessible high-quality service delivery, support, information and choices to people living with HIV in our city. We want to make our care pathways stronger, more integrated and eliminate stigma. One way we are aiming to achieve this is through a LSTM funded project which listens and works with local HIV community champions to increase the uptake of HIV testing within communities living in Liverpool using a tailored HIV self-testing distribution model.

An LSTM Directors Catalyst Award study, led by Dr Victoria Watson, was conducted to understand the current barriers to accessing HIV testing services within Liverpool. The aim of the study was to increase uptake of HIV testing in order to reduce the number of undiagnosed infections and the high rate of late diagnosis present within Liverpool.

Working in collaboration with Fast Track Cities, Public Health Liverpool, Axxess Sexual Health (NHS), and Sahir House, the pilot launched in six Liverpool community pharmacies on June 1st and for two months members of the local community were able to access free HIV self-test kits.

Pilot results showed that 53% of tests accessed were by individuals testing for HIV for the first time, with an additional 25% having last tested over a year ago. The pilot successfully showed that HIV self-testing is an innovative accepted way to increase HIV testing uptake within previously untested groups in Liverpool.

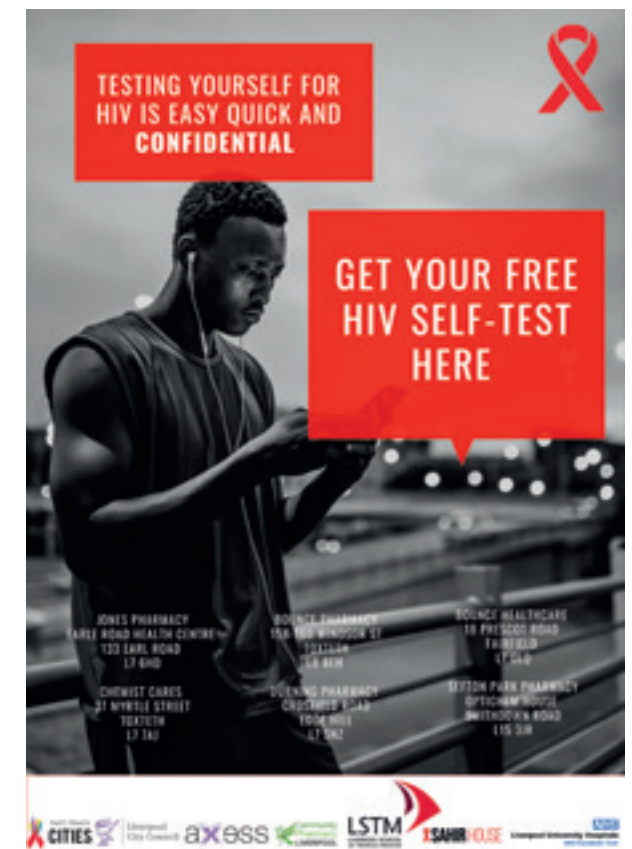
World AIDS Day



Every year a part of LSTM estates lights up red to mark World AIDS Day. LSTM is one of the many well-known landmarks throughout Liverpool's city region that does so to raise awareness and support those who are living with HIV.

The initiative is led by Sahir House and is meant to challenge and remove the stigma that still surrounds HIV and acknowledge the progress around treatment and prevention.

HIV Programmes



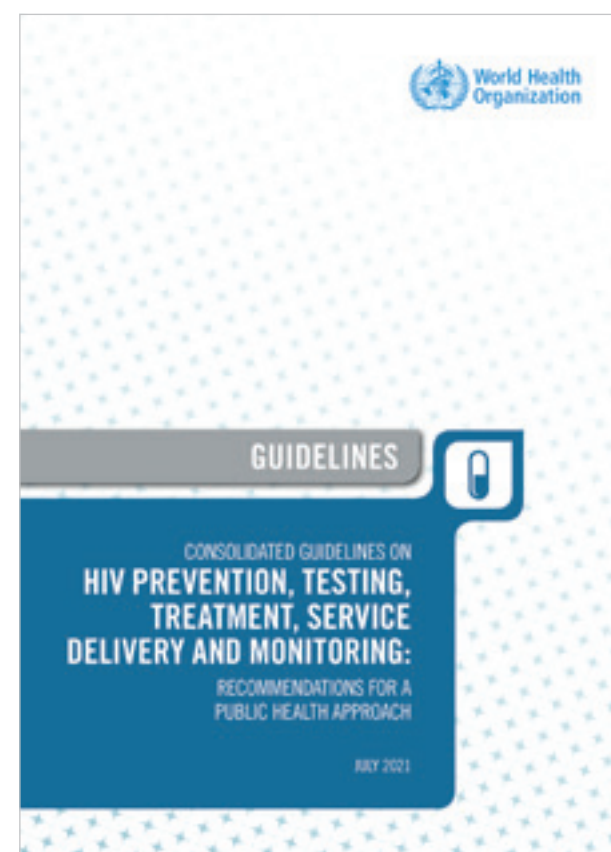
Globally, LSTM's HIV work involves the Zimbabwe based Centre for Sexual Health and HIV AIDS Research (CeSHHAR). It conducts rigorous implementation research in HIV and sexual and reproductive health, generating policy relevant evidence on scale up of HIV self-testing. It now also looks into SARS COV -19 Antigen self-testing as well as voluntary male circumcision, programmes for HIV positive adolescents and prevention of mother to child transmission. LSTM works in partnership with Unitaids, PSI, WHO and colleagues from LSHTM, UCL and the University of York, bringing together a collaboration of epidemiologists, social scientists, modelers and economists,

conducting a wide range of HIV research projects with sex workers in Zimbabwe, exploring how to minimise their risks of acquiring HIV and optimising HIV treatment if they need it.

LSTM's community health systems group has been conducting research on stigma reduction, and on increasing access to HIV self-testing in different low-resource settings including Kenya and Zimbabwe and here in Liverpool. The group is also involved in research on (HIV) treatment adherence and retention in HIV-care.

LSTM continues to work on late-stage HIV-infection with partners at LSHTM, St Georges University of London, National Institute of Medical Research Tanzania (NIMR).

WHO 2021 HIV Guidelines



Dr Peter MacPherson and colleagues from MLW undertook two systematic reviews and meta-analyses to inform the 2021 WHO Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring. These reviews provided evidence on the harms and benefits of starting antiretroviral therapy in people with symptoms of tuberculosis and defined the optimal periods for starting antiretroviral therapy in people with confirmed tuberculosis (TB) disease. In a new recommendation, for the first time, WHO recommends that people with symptoms of TB can start HIV treatment on the same day that they are diagnosed with HIV, removing substantial barriers to patients initiating antiretroviral therapy.

Research into Other Chronic Conditions



Sign for the Diabetes Centre in Wakiso, Uganda

Rates of diabetes and hypertension have risen sharply in sub-Saharan Africa. About 2 million people every year are now dying prematurely from the complications of these conditions. Both diabetes and hypertension can be controlled through diet and lifestyle advice and through low-cost drugs available widely in generic form. However, only about 10% of people living with these conditions are in regular care and even among this small proportion, less than 50% have good control of hypertension and glycaemia.

The international research partnership on the control of chronic conditions – RESPOND-AFRICA - has been conducting research to identify novel approaches of preventing and managing HIV, diabetes and hypertension in sub-Saharan Africa settings.

Research is being undertaken in partnership with researchers in Tanzania, Uganda and the UK, and involves working closely with patient leaders, civil society groups, senior disease control managers and policy makers.

Management of Chronic Conditions in Africa (MOCCA) was the initial pilot of the group, testing integrating care for HIV, diabetes and hypertension. It showed that the approach was feasible, generally popular with patients and health care providers as well as being potentially cost-effective. This was followed by the INTE-AFRICA trial, a large cluster-randomised trial, which will finish in 2022, comparing integrated care with standard vertical care for HIV, diabetes and hypertension in Tanzania and Uganda.

The META trials are evaluating whether metformin, a drug that has been commonly used to treat people with diabetes since the 1950s, can now be used to prevent progression to diabetes when given to people with HIV who are at high risk of developing diabetes.

Qualitative research has also been undertaken with the foundation for innovative new diagnostics (FIND) into the feasibility and useability of self-testing for Hepatitis C. This formed part of a large, multi-country trial into the use of self-testing for Hepatitis C.

COVID-19 has had a major impact on RESPOND-AFRICA's research studies but due to the strength of the partnership and the trust that has been built, the team has been able to continue to collaborate. The network of partners in Uganda and Tanzania were able to procure and deliver £49k worth of PPE to health facilities as part of LSTM's Bump It Forward campaign.

Partnerships

Malawi Liverpool Wellcome (MLW) Clinical Research Programme



Since its inception in 1995, the Malawi Liverpool Wellcome Clinical Research Programme (MLW) has transformed medicine and health in Malawi, with enormous impact on malaria, pneumonia, childhood diarrhoea, HIV, TB and capacity strengthening.

In addition, COVID presented MLW with a unique opportunity to leverage its close partnership with institutions within Malawi such as the Queen Elizabeth Central Hospital, Kamuzu University of Health Sciences (formerly College of Medicine and Kamuzu College of Medicine) and the Ministry of Health as well as outside of Malawi with the Liverpool School of Tropical Medicine, University of Liverpool and Wellcome, to deliver an exemplary COVID response in a limited-resource setting.

MLW and COVID Response

MLW's contribution to the COVID response in Malawi has been acknowledged and appreciated widely. Early in the pandemic, MLW partnered with Queen Elizabeth Central Hospital (QECH) and the District Health Office to target the greatest needs – diagnostics, oxygen, and Personal Protective Equipment (PPE).

Communication

MLW has played a key role in promoting positive and responsible COVID messages. When COVID vaccines became available in Malawi, MLW mobilized its Communications and Public Engagement team and scientists to partner with the Ministry of Health, the World Health Organization, and media houses to communicate important COVID vaccine messages to the public with authority and based on scientific facts.

Diagnostics

Most recently, in June 2021, MLW was the first laboratory in Malawi to sequence the SARS-CoV-2 virus and generated critical data about the variants responsible for the second and third waves of COVID in the country. These data enabled public health officials to understand the origin and transmission dynamics of the variants of concern circulating in Malawi. The State President of Malawi thanked MLW for this development in his address to the nation.

Clinical Care

In August 2021, MLW donated three Continuous Positive Airway Pressure (CPAP) breathing machines to Queen Elizabeth Central Hospital to assist patients with severe breathing problems, including those suffering from severe COVID. The machines were bought with

support from the #BumpltForward campaign organised by MLW partners in the UK. With reducing COVID, from September 2021, the equipment is now used predominantly by patients with general causes of severe respiratory illness admitted to the hospital's Respiratory High Dependency Unit.

Oxygen Provision

In May 2021, MLW donated 100 oxygen cylinders (each with a capacity of 7000 litre, 30kg) and 100 flow meters to Queen Elizabeth Central Hospital to assist in the management of emergency tent-based COVID patients, or patients in other hospitals surrounding Blantyre. The cylinders are filled from the hospital's oxygen plant and will benefit patients with pneumonia, TB, HIV related lung conditions and chronic lung disease for many years. The cylinders and flow meters were bought with support from the #BumpltForward campaign and other well-wishers in the UK.

Scientific Enquiry and Purposeful Intervention

MLW is a leader in hospital- and community-based COVID research in Malawi including molecular characterisation of the viral variants circulating in the country and determining immune responses to SARS-CoV-2 (serology) among healthcare workers, blood donors and COVID patients with different degrees of disease severity. Additionally, MLW researchers have conducted qualitative studies to explore the public's understanding of, and response to the COVID pandemic. Findings from the research have informed Malawi's public health response and have been published in peer-reviewed scientific journals such as Nature Communications.

Other MLW Success in 2021

Despite the many challenges presented by the COVID pandemic in the last 12 months, MLW has not wavered in its quest for excellence.

Construction of Kafukufuku Building

Construction of a building to house an additional research pharmacy, an expanded freezer archive and field workers offices was completed in August 2021 and is now fully functional. The new building has eased spacing issues, particularly in the laboratory and allowed for smoother expansion of molecular biology and immunology projects at MLW.

Construction of CREATOR Building

We are excited to report the start of the construction of the Clinical Research Excellence And Training Open Resource (CREATOR) building. CREATOR will be a purpose-built centre of excellence, which will enable MLW to increase research capacity by 30% over the next ten years and will provide the first specialist postgraduate clinical

training facility in the country. This will enable Malawi to train and retain more specialist doctors and attract the best research minds to the region to work together to save and improve lives. It will also enable us to centralise the health research agenda issues, not just at MLW but across the country and the wider regions.

Ultimately, CREATOR will nurture a step-change in the scale of clinical research and a reversal of the accepted norm of trainees leaving Malawi, through enabling us to train and retain the brightest talent in-country. It will promote clinical and research excellence and collaboration, focussed on catalysing new ideas, better health outcomes and improved clinical care for the people of Malawi and the wider sub-Saharan African region.

ISO15189 Accreditation of MLW laboratory

MLW laboratory was one of six Malawi laboratories congratulated by the Minister of Health for attaining the Southern African Development Community Accreditation Services (SADCAS) ISO15189:2012 accreditation at a ceremony held in Lilongwe in July 2021. As a community, we are extremely proud of this achievement which will enhance the quality of our work.

Clinical Trials

MLW was one of six sites in five countries that participated in the AMBITION trial. The trial explored a simplified treatment for HIV-associated cryptococcal meningitis and released its findings at the International AIDS Society scientific conference in July 2021. The trial findings have been hailed as ground-breaking and lifesaving by healthcare personnel, people living with HIV and policymakers. The AMBITION trial findings have led to a change in the Malawi guidelines for the treatment of HIV-associated cryptococcal meningitis. MLW Policy Unit spearheaded the dissemination of the trial results to national policymakers and stakeholders at an event held in Lilongwe on 20th August 2021.

MLW also conducted the TyVAC trial to assess the efficacy of a single dose of typhoid conjugate vaccine (TCV). This mammoth trial recruited 28,000 children in less than a year and recently published its findings in the New England Journal of Medicine. The results prove that TCV vaccines are safe for infants (from 9 months old) and young children in the preventing Typhoid disease.

The Malawi Government has embraced the trial findings and will introduce mass campaign and roll out of the vaccine in late 2022. This is a milestone for MLW.

MLW TyVAC study team member with a study participant. Photo by MLW



Diversity and Inclusion

Two events to promote and enhance diversity and inclusion at MLW have taken place in 2021. First, Strategic Workshop 2 (SW2) took place in May 2021. SW2 reviewed the progress we have made in addressing key recommendations from the first workshop (SW1) and tackled key scientific and operational issues in preparation for the next Core grant renewal.

Second, a review of the culture and values (Culture Review) at MLW, conducted in conjunction with our partners, is near completion. The goal of the review is to ensure that MLW remains an organisation in which all staff and students thrive and work together to achieve our institutional vision. Recommendations from SW2 and the Review will enhance the working environment at MLW.



MLW staff members at the MLW 2021 Strategic workshop. Photo by MLW

Personal training fellowships awards

MLW has maintained its focus on training the next generation of researchers, even in the era of the COVID pandemic. In the last 12 months, MLW trainees excelled in open international competition and were awarded prestigious fellow- and scholarships.

Our congratulations go to:

Dr Donnie Mategula who received a MRC-DTP Case PhD Fellowship;
Dr Clifford Banda for being awarded a Wellcome Trust and NIHR International Training Fellowship;
Dr Richard Kamwezi for his GSK MSc Scholarship for Future Health Leaders;
Dr Patrick Musicha who received a Wellcome Trust and NIHR Training Fellowship;
Mr Clinton Nkolokosa for his a Wellcome International Trust Masters Fellowship;
Dr Innocent Sulani for being awarded a Beit Trust-University of Glasgow MSc Fellowship;
Ms Dalitso Kalua for her LSHTM MSc Merit and HNTI Scholarship and
Ms Letitia Suwedi-Kapesa for her Commonwealth PhD Fellowship.

KEMRI/CDC in Kenya



In Kisumu, Kenya, Professor Phillips-Howard and team continue their close collaboration with the Kenya Medical Research Institute (KEMRI) and have successfully completed field work for their randomised controlled trial among ~4000 schoolgirls which evaluates the effects of cash transfer or menstrual cups, or both, to reduce girls' risk of school dropout or of acquiring HIV or HSV2.

Other studies are ongoing, including a study with the University of Illinois at Chicago, KEMRI, and Nyanza Reproductive Health Society, Kisumu, investigating the effect of menstrual cups on the vaginal microbiome and potential implications for acquisition of STI and HIV among 440 post-pubescent girls. A study in the same area is also underway to investigate the menstrual, mental health, and sexual and reproductive health needs of out-of-school girls.

Next stage studies planned include following up the trial population to evaluate if intervention effects are sustained into adulthood, including the effects of the COVID pandemic environment on the sexual and reproductive health, education, and employment of adolescent girls and young women.

The malaria related studies, led by Professor Feiko ter Kuile, include multicentre trials of malaria chemoprevention in the post-discharge management of children with severe anaemia, which are ongoing in eight hospitals in western Kenya and Uganda and two large chemoprevention trials for the control of malaria and sexually transmitted and reproductive tract infections in pregnancy in Kenya, Malawi and Tanzania. The work has been expanded to look at the interaction between COVID-19 and malaria funded by the Bill & Melinda Gates Foundation led by Professor ter Kuile.

Two new Cooperative agreements (CoAG) with CDC were signed to support KEMRI in conducting medical research at its Centre for Global Health Research. One CoAG with CDC is for malaria research (2020-2025) and is a continuation of three previous 5-year collaborative agreements with CDC that focuses on research to improve malaria surveillance. In addition, a new 5-year CoAG (2021-2026) for HIV and TB and laboratory-based research was approved in May 2021, which significantly expands the research collaboration with CDC and KEMRI beyond malaria. These new CoAGs allow several Kenyan students to enrol for PhDs studies at LSTM while conducting their research on-site in Kenya.

K4D

The Knowledge, Evidence and Learning for Development Programme (K4D) supports the use of learning and evidence to improve the impact of development policy and programmes.



It is funded by UK aid and is designed to assist UK government departments and partners to be innovative and responsive to rapidly changing and complex development challenges. LSTM is a partner in this consortium led by the Institute of Development Studies (IDS) in Brighton, UK.

Since the beginning of the COVID-19 Pandemic the team the team produced 122 K4D COVID-19 Health Evidence Summaries in total arranged to cover themes such as Epidemiology and modelling, Social Science and the Indirect impact of COVID-19 among many others. During the height of the pandemic these summaries were published daily, reducing to a weekly, before ceasing in May 2021.

The Liverpool-Guangdong Drug Discovery Consortium

The Liverpool-Guangdong Drug Discovery Consortium, in collaboration with University of Liverpool and academic institutes in Guangdong, China, focussed on the development of new drug therapies for the treatment of tuberculosis, malaria, neglected tropical diseases and other infectious diseases.

The collaboration has been extended to include the South China University of Technology (SCUT), International Healthcare Innovation Institute (Jiangmen) and Wuyi University. The group has developed a number of UK/China co-funded initiatives in the critical area of AMR.

MRC Confidence in Concept/Tropical Infectious Disease Consortium

LSTM's Centre for Drugs & Diagnostics (CDD) manages the Medical Research Council (MRC) Confidence in Concept (CiC), which brings together much of the UK's expertise in tropical infectious diseases into a single translational partnership, known as the Tropical Infectious Disease Consortium.

Partners are LSTM, the London School of Hygiene and Tropical Medicine (LSHTM), the Jenner Institute at Oxford University and Public Health England, Microbiology Research Services, Porton Down (PHE), who are strategically placed to deliver a portfolio of domain specific expertise in all the key research areas of interest.

To date, the TIDC has received ~ £4million in funding from the MRC CiC. These funds have supported 95 projects, ~50% of which involved collaborations within the consortium, 50% included academic partners external to the Consortium, and >70% involved industrial partners.

The funded themes have so far included: vaccine development projects (for emerging/outbreak pathogens and established tropical infectious diseases), drug/biologics discovery projects, diagnostic discovery/development projects (including AMR), new insecticide resistance focussed products, surveillance and control tools, translational enabling technologies, anti-venom therapies, adjunct therapy projects and other interventions (e.g. bed net innovation).

MRC CiC project funding has directly contributed to 1 spin-out, 15 patent applications (4 granted to date), and 1 trademark. Completed projects have gone on to attract approximately £59million in additional external follow-on funding (national and international funders) from 49 out of the 95 funded projects – an almost 15-fold return in investment.

AGILE

With a mission to shorten the time taken to identify safe, effective and affordable treatments for COVID-19, AGILE is a collaboration between the University of Liverpool, LSTM, the Southampton Clinical Trials Unit, and other external partners.

The team includes infectious diseases clinicians, clinical and pre-clinical pharmacologists, clinical trials specialists and statisticians, bringing skills and expertise to design the best platform possible.

AGILE will be the key link in the chain of accelerated drug development, evaluating potential candidate treatments for COVID-19 and advancing only the compounds most likely to be effective into large-scale clinical trials. The platform have successfully launched 3 clinical trials, one of which is in South Africa, with 2 more to initiate in the coming months.

CeSHHAR Zimbabwe

The Centre for Sexual Health and HIV/AIDS Research Zimbabwe (CeSHHAR Zimbabwe) was founded in 2012 in response to the need to expand implementation research to accelerate and optimise public health policy and impact in Southern Africa. Over the past decade, CeSHHAR has expanded its research, programmatic footprint and research capacity strengthening activities, employing 260 people to work across Zimbabwe. Preparations for the 10th anniversary are underway!

CeSHHAR aims to conduct research which influences the global HIV and Sexual Health policy environment and strengthens the quality of provision of evidence-based HIV prevention, treatment and sexual health care. Headed by LSTM's Professor Frances Cowan, CeSHHAR works closely with the Zimbabwe Ministry of Health and Child Care and National AIDS. CeSHHAR is supported by a range of international donors addressing four thematic areas: Key Populations, Integration of HIV Prevention with Sexual and Reproductive Health, Masculinity Studies and Children and Adolescents. CeSHHAR's research has facilitated important innovations in implementation of HIV prevention and has contributed to national policy and guideline development. Most recently CeSHHAR is also conducting research to support the regional COVID response.

The Global Alliance to Eliminate Lymphatic Filariasis (GAELF)

LSTM has hosted the GAELF Secretariat since 2004. GAELF supports WHO's Global Programme to Eliminate Lymphatic Filariasis (GPELF) primarily by advocacy and communication.

2020 welcomed the launch of WHO's 2021-2030 roadmap and also marked the 20th anniversary of the Global Programme to Eliminate Lymphatic Filariasis. A total of 17 countries of the 72 endemic countries are now certified as eliminated. Only 3 countries remain to commence MDA.

Lancaster University

The MRC funded Translational and Quantitative Skills Doctoral Training Partnership (DTP) in Global Health was established in 2016 between LSTM and Lancaster University.

The programme seeks to train the next generation of leading 'bridge' scientists working in translational research in Global Health. Attracting further support from the RCUK National Productivity Investment Fund, the LSTM – Lancaster DTP currently has funding to support some 50 PhD studentships. Most projects involve co-supervision of PhD students between the two institutions for collaborative projects in all of LSTM's departments and along the entire translational research pipeline.

In 2021, there was a national competition for new DTP programmes and the DTP was again successful in securing a further 3 years of support, with a further 2 years if the programme continues to be successful.

The partnership has been strengthened by the successful award of MRC Skills Development Fellowships (SDF) in Translational and Quantitative Skill in Global Health. This programme, which has been running for 5 years, is focused on training of PhD graduates in translational research with an emphasis on quantitative skills. The programme is already bearing fruit with recent awardees Dr Ghaith Aljayyousi and Dr Victoria Ingham securing lecturer roles at LSTM and Heidelberg University, Germany, respectively.

University of Liverpool

The academic collaboration to deliver education and research projects between LSTM and the University of Liverpool continues to thrive as illustrated in initiatives such as MLW, LHP, Pandemic Institute and LIV-TB.

HCRI & MSF

Together with the Humanitarian & Conflict Response Institute (HCRI) of the University of Manchester and the international medical NGO Médecins Sans Frontières (MSF),



the Leadership Education Academic Partnership (LEAP) integrates world-class higher education into the career paths of humanitarians, with the intention of strengthening leadership within the sector.

Over the past year, all 3 partner organisations have collaborated on the development of an extended 4-year term of LEAP with an agreed case for support now in place from all 3 organisations. The extension of this partnership is testament to the ongoing impact the programme has had on MSF and the wider humanitarian workforce during a period of unprecedented change.

Liverpool Knowledge Quarter

Knowledge Quarter Liverpool (KQ Liverpool) is a 450-acre innovation district which spans more than half of Liverpool City Centre. Since coming into being KQ Liverpool has overseen £1bn of new developments, with a further £1bn in the pipeline.

Paddington Village is the flagship KQ Liverpool expansion site which is home to the Spine – the new northern home of the Royal College of Physicians – Kaplan and Rutherford Cancer Centre. Sciointec, the KQ Liverpool spin-out development company, will undertake the next development on Paddington Village, HEMISPHERE.

In July 2020, KQ Liverpool launched their 2025 Vision setting out a roadmap for ambitious yet sustainable, inclusive growth for the innovation district and beyond.

LSTM is one of KQ Liverpool's partners, in addition to the University of Liverpool, Liverpool John Moores University, Liverpool University Hospitals NHS Foundation Trust, Liverpool City Council and Bruntwood Sci-Tech.

LIV-TB

LIV-TB is a collaboration between LSTM and the University of Liverpool and co-led by Nadia Kontogianni and Dr Tom Wingfield.

LIV-TB features monthly seminars by its members and visiting researchers, which are open to all. Membership has grown from 60 to over 160 members over the past three years with speakers and attendees from all over the globe.

The seminars are relevant to healthcare professionals, advocates, people with TB, and researchers and cover a wide variety of TB topics from the laboratory to the bedside, from prevention to long-term quality of life, from low- to high-burden settings.

LIV-TB has been heavily involved with the UK Academics and Professionals to End TB group and contributed to the national and international agenda on TB.



NHS

LSTM works closely with multiple NHS trusts, including the Royal Liverpool and Aintree sites of the Liverpool University Hospitals NHS Foundation Trust (LUHFT) and Alder Hey Children's Hospital.

At LUHFT, LSTM clinical academics work in a number of relevant clinical specialties including Infectious Diseases, Clinical Microbiology & Parasitology, Respiratory Medicine, Critical Care, Haematology, and Genito-Urinary Medicine. Two consultant paediatric clinical academics work at Alder Hey.

All of LSTM's clinical links with the NHS enhance research that is relevant for LSTM's mission. For example, the Experimental Human Challenge research, which examines susceptibility to a number of respiratory pathogens and contributes to the development of interventions, including vaccines is closely linked with LSTM's respiratory and infectious diseases clinicians.

LFC Foundation

Following on from the Health Goals Malawi project, LSTM and LFC Foundation have maintained their partnership and are planning to upscale the project bringing it to Liverpool communities.

An initial study of the sex and relationship education needs of adolescent participants engaged in the LFC Foundation's "Kicks" programme has been conducted. This will inform implementation of a programme of life-skills development and sexual health promotion activities linked to football sessions and tournaments in the city, with delivery starting in Spring 2021, funded by the UEFA Children's Foundation and the LFC Foundation.

NaTHNac

The National Travel Health Network and Centre (NaTHNac), commissioned by the UK Health Security Agency (formally Public Health England), has the aim of protecting the health of British travellers.

NaTHNac seeks to improve travel health advice given by health professionals and provides reliable information to the public, health professionals, travel industry and national government.

NaTHNac works in partnerships with network founders which include LSTM.

UK Health and Security Agency

LSTM clinicians continued to provide specialist advice to the government body responsible for protecting the nation's health and wellbeing and reducing health inequalities. It



is currently in transition to become the UK Health and Security Agency, UKHSA.

Professor Hilary Ranson provides entomological support to the Advisory Committee on Malaria Prevention in Travellers. Dr Nick Beeching, Emeritus Professor at LSTM and Honorary Consultant at the Royal Liverpool University Hospital, is part of the PHE Imported Fever Service. Professors Laloo and Harrison sit on the PHE committee, which advises on management of exotic envenoming in the UK.

Everton in the Community



LSTM and Everton FC signed a 3-year partnership in November 2020. By partnering together, Everton's community reach and LSTM's scientific expertise will be used for community outreach and engagement initiatives delivered by Everton and Everton in the Community as part of its Blue Family campaign.

Activities include visits to participating primary schools highlighting how to respond to health needs, such as COVID-19 as well as the benefits pursuing a scientific career.

Visits will continue across Merseyside throughout the 2021/22 school year – and will act as the pre-cursor of major collaborations, culminating in LSTM's 125th anniversary in 2023

Liverpool Health Partners



LSTM is a founding member of Liverpool Health Partners (LHP), the academic health science system for Cheshire and Merseyside. LHP is a network of four HEIs and eight NHS Trusts, working together to develop ground breaking research strategically developed to address the diverse and complex needs found across Cheshire & Merseyside.

Pandemic Institute



LSTM is a founding partner of the Pandemic Institute, a partnership of academic & health organisations plus local/regional government in the Liverpool area, all focused on preparing the world for future pandemics. These partners have proven capability for pandemic research innovation and impact.

With headquarters in Liverpool, the Institute has a unique local and global ecosystem, unifying on the ground intelligence to generate scientific excellence with societal impact for all. The Institute will provide comprehensive end-to-end capability across the pandemic lifecycle, a game changer that will allow the world to respond at pace in the race to prepare for the next pandemic.

FEATURE ARTICLE:

Maternal, Newborn and Child Health

Maternal, neonatal and paediatric conditions continue to pose major global health risks, especially in lower-and middle-income settings. Complications around pregnancy and childbirth; infections such as with malaria, HIV and tuberculosis during pregnancy and severe acute malnutrition and undernutrition amongst children under the age of 5 still pose significant challenges despite progress made over the past years.

Centre for Childbirth, Women's and Newborn Health (CWNH)

Led by Professor Dame Tina Lavender, CWNH is a dynamic, multidisciplinary group of applied health researchers working across global settings. In partnership with the Lugina Africa Midwife Research Network (LAMRN), the Centre recently successfully completed a 4-year programme of research and capacity development in six countries in Africa funded by the National Institute of Health Research.



Professor Dame Tina Lavender



The NIHR Global Health Research Group on Stillbirth Prevention and Management in Sub-Saharan Africa was a unique partnership between Kenya, Malawi, Tanzania, Uganda, Zambia, Zimbabwe and UK aimed at reducing stillbirth, supporting bereaved families and strengthening capacity in stillbirth research in Africa and UK.

Exploratory work in Tanzania and Zambia around women's experiences of care revealed how physical distance and lack of "connectedness" characterised dysfunctional intrapartum referral systems and pathways. Crucially, women's and family's willingness to access maternity services was also diminished by experiences and perceptions of disrespect and abuse in health facilities. Relational care was not prioritised and communication between staff was often suboptimal. Antenatal care preferences were investigated further in a discreet choice experience (DCE) in Tanzania. Proximity to the clinic, perception of a friendly welcome and respectful care were identified as priorities. A new antenatal care

bundle co developed with community engagement and stakeholder groups is planned to address gaps in existing services, aiming to improve engagement and reduce adverse outcomes.

Respectful maternity and newborn care are a particular area of interest, the group has developed a context-specific educational film to address unconscious bias amongst health workers in Tanzania. Previous successes with game-based learning informed the development and testing of new educational game – Dignity – promoting understanding and practice of Respectful Maternal and Newborn Care. Testing in Malawi and Zambia with students and midwives confirmed this was an enjoyable experience, enhanced reflection on practice and motivated to behaviour change. A respectful care bundle, including the game, the video and other components will be co-created and tested in Malawi and Tanzania in the next phase of the work.

Improving the availability and quality of bereavement support for parents after the death of a baby in LMICs, including Kenya and Uganda, has also been an important focus. Building on previous exploratory work, the team have co-developed and tested the feasibility of a multicomponent interventions to improve facility and community support following stillbirth. A bereavement champion network was created in two facilities to support health workers to develop and sustain care and postnatal telephone peer support offered to women after discharge. Despite COVID-19 interruption 100 women were willing to take part and most completed the research. The team are now planning a large-scale evaluation. The NIHR Group also developed a novel training package "Advancing Bereavement Care in Africa" to improve health workers' understanding of the impact of baby death on parents. Piloting in Malawi, Uganda, Zambia and Zimbabwe was recently completed.

The programme also targeted women experiencing the double tragedy of obstetric fistula, a debilitating and stigmatising birth complication, and stillbirth. Following work to identify the psychological, social and economic challenges, engagement with stakeholders and communities helped define a package of interventions to be tested in a feasibility study.

Emergency Obstetric Care and Quality of Care Unit

Dr Charles Ameh leads the Emergency Obstetric Care and Quality of Care unit which conducts research on ways to reduce maternal mortality/morbidity through improving quality of care, combines rigorous research with capacity strengthening and technical support to optimise impact, whilst working in partnership with policy makers and local researchers to ensure research is locally relevant and informs policy.



Dr Charles Ameh

Antenatal and Postnatal Care (ANC&PNC)

In line with the Global Fund Strategy 2017-2022 to invest in building sustainable and resilient systems for health (or “RSSH”), the Global Fund team of the EmOC & QoC Unit is working with partners and governments in five African countries is conducting implementation research under three grants: 2020-2023, \$5.1M for Nigeria, Tanzania and Kenya, 2020 for Chad Euros 633, 129, 2020 for Togo \$570, 578. The purpose of these grants is to implement, document and disseminate innovative approaches to improving the screening, testing and treatment of HIV, TB and malaria and improve integrated service delivery at facility and community levels.



The programmes phased implementation research approach to support sustainable improvements in the quality of antenatal and postnatal care in these countries includes 3 areas 1) Identification of the ‘bottle necks’ to providing Quality

of Care (QoC), 2) Design and introduce a Quality Improvement process at health facility level and 3) Evaluate effectiveness and efficiency. These are achieved through partnerships with Ministries of Health, sub national health authorities and local research institutions.



Training material for the Nigeria expanded EmOC programme

Implementation and research have started in Nigeria, Kenya, Togo and Chad. Implementation in Tanzania will start in 2022.

Ongoing implementation research studies:

- Baseline assessment on antenatal and postnatal care services, with focus on HIV, TB and Malaria in selected healthcare facilities in Togo
- Where is the ‘C’ in ANC and PNC: a multi-country survey of availability of Antenatal and Postnatal Care
- Development of a Risk Scoring System for Maternal and Child Health in Chad
- Randomised stepped wedge trial to assess the effectiveness of healthcare provider training on the availability and quality of Antenatal (ANC) and Postnatal Care (PNC) in Chad
- Crossed randomised stepped wedge trial to assess the effectiveness of standards-based audit and healthcare provider training on the availability and quality of Antenatal (ANC) and Postnatal Care (PNC) in Togo
- Economic assessment of a capacity-building intervention to improve the quality of integrated HIV, Tuberculosis, and Malaria services within antenatal and postnatal care in Kenya
- What are the essential components of Antenatal Care? A systematic review of the literature and development of signal functions to guide monitoring and evaluation” in all countries

- What are the essential components of Postnatal care? A systematic review of the literature and development of signal functions to guide monitoring and evaluation” in all countries
- Understanding women’s experiences of respectful maternity care during antenatal and postnatal care in Lomé, Togo. A cross sectional descriptive study.
- Change in knowledge and skills after antenatal and postnatal training in Togo
- What are the enablers and barriers for healthcare providers providing integrated ANC and PNC including HIV, TB and malaria care in Togo?
- COVID-19: How has the global pandemic impacted maternity care provision in Lomé, Togo? A qualitative study



Skills training at the Kenyan Medical Training College in Nairobi

Emergency Obstetric Care and Midwifery Education

In Kenya, LSTM, with the UK FCDO funding, is delivering a £13M Reducing Maternal and Newborn Deaths programme (2019-2023). This programme is designed to:

- support the implementation of methods to improve Quality of Maternal and Newborn Care
- strengthen the capacity of the workforce through in-service Emergency Obstetric and Newborn Care training interventions
- Strengthen the capacity of pre-service training institutions
- Support the development, implementation and evaluation of a mentorship and supportive supervision package
- Disseminate findings and lessons learned to improve implementation.

Current studies include an RCT evaluating the Implementation of the Updated Midwifery Syllabi for Pre-Service Training in Kenya and mixed methods study to evaluate the barriers to the practice of assisted vaginal births in Kenya.

Also in Kenya, with \$1.3M from the Johnson and Johnson Foundation (2020-2023), LSTM is designing and evaluating a midwifery educator continuous professional development programme (CPD). All nurses and midwives are required to attain CPD points to renew their annual licence. However, accredited programmes specific for midwifery educators are limited. Working with Kenya’s Ministry of Health, LSTM is designing a 20 credit (20 hour), Nursing Council of Kenya approved, module to upskill midwifery educators’ teaching skills. The mandatory self-directed component of midwifery educator package will be hosted on a web e-learning platform, accessible to most nursing and midwifery councils in Africa.

With \$117, 787 from UNFPA (2021), LSTM continues its work to strengthen global midwifery curricula by developing a standardized package of evidence-based modules aligned with the International Confederation of Midwives competencies. These are accompanied by standardized assessment and accreditation tools, training packages for midwifery education facilities, midwifery educators, and new graduates. The outputs of this work are feed into the Global pre-service midwifery education technical working group.

In Nigeria, through Johnson and Johnson Foundation funding (2020-2022), LSTM in partnership with the Nursing and Midwifery Council of Nigeria and the Kwara State Ministry of Health, is establishing a Centre of Excellence for Emergency Obstetric and Newborn Care training. The centre is equipped for competency based EmONC training and serves as a Mandatory Continuous Professional Development centre for nurses and midwives, and a centre for doctors to update their knowledge and EmONC skills, with nurses and midwives being able to earn CPD credits towards their practice licence renewal.

Health System Strengthening

With \$109, 882 from Johnson and Johnson Foundation, LSTM conducted a COVID-19 health system preparedness study published in the American Journal of Public Health and through LSTM’s Nigeria programmes, supported the Nigeria COVID-19 response by procuring and providing PPE, hygiene and sanitary materials to national and state governments and key stakeholders. LSTM also supported the COVID-19 response in Kenya through funds mobilised from British Citizens through the Bump it Forward campaign. These funds were used to procure PPE to the value of £65, 548, which has protected health care workers in Uasin Gishu, Vihiga, Kilifi, Taita Taveta and Garissa counties.

Malaria in Pregnancy

MIMBA Antimalarial Pregnancy Registry

The malaria epidemiology team, led by Professor Feiko ter Kuile has continued to expand the MMV-funded global pregnancy registry on the safety of antimalarials. This is a multi-centre, multi-country, prospective cohort study in sub-Saharan Africa to collect information on inadvertent real-world exposures to a range of antimalarials during the first trimester of pregnancy. Despite complications due to COVID-19, the project has now been rolled out across 35 sites in western Kenya, involving over 17,000 women of childbearing age. A PhD student is undertaking a nested study, while a second is being recruited and capacity development and study preparations to expand the registry to Burkina Faso are underway.

Malaria Vaccine Utilisation in Western Kenya

This has been a landmark year for malaria control in children with the recent announcement in October by the WHO of a broad recommendation for “the RTS,S/AS01 malaria vaccine to be used for the prevention of *P. falciparum* malaria in children living in regions with moderate to high transmission”. The decision was reached after a careful review by WHO’s joint meeting of the Malaria Policy Advisory Group (MPAG) and the Strategic Advisory Group of Experts on Immunization (SAGE) members of data on the safety, impact, feasibility, acceptability and equity provided by the malaria vaccine evaluation partners. This included findings from the healthcare utilisation study (HUS) led by Dr Jenny Hill in western Kenya.

New Malaria Preventive Therapy in Indonesia

Dr Hafidz Firdaus joined the malaria epi team to work with Dr Jenny Hill on the MRC-funded implementation study of intermittent preventive treatment in pregnancy (IPTp) with dihydroartemisinin-piperaquine in Papua, Indonesia. Dr Firdaus will be based in Papua for the duration of the study working closely with our local research partners at the Timika Research Facility. Preparations are ongoing in collaboration with the Indonesian Ministry of Health for its implementation in high-malaria transmission areas in southern Papua in 2022.

Integration of Malaria Prevention in Pregnancy and Children

Dr Hill is leading a process evaluation of a new EDCTP-funded implementation trial led by the Malaria Research and Training Centre (MRTC) in Bamako, Mali, in collaboration with the Institut De Recherche En Sciences De La Santé (IRSS), Burkina Faso. The INTEGRATION study aims to evaluate whether the delivery of intermittent

preventive treatment to pregnant women (IPTp), can be improved by integrating its delivery through the seasonal malaria chemoprevention (SMC) community-based channel in Mali and Burkina Faso. SMC is a control strategy targeting young children that successfully reaches up to 90% of children. The aim is to use the SMC channel to increase access to pregnant women during the rainy season when malaria transmission peaks and access to health facilities is reduced and mobilise pregnant women to attend the eight antenatal care contacts as recommended by WHO. The pilot will be implemented by the Malian and Burkinoise Ministries of Health in Q2 2022.

IMPROVE

The multi-centre IMPROVE trial in Tanzania, Malawi and Kenya, led by Professor ter Kuile, concluded in 2021. The trial assessed alternative regimens for the chemoprevention of malaria in pregnancy in 4,680 HIV-uninfected pregnant women in areas of high drug resistance. Results were unexpected and showed that intermittent preventive treatment in pregnancy (IPTp) with the new antimalarial dihydroartemisinin-piperaquine was much more effective than the standard of care with sulfadoxine-pyrimethamine, against which parasites have developed high levels of resistance. However, this did not translate into better pregnancy outcomes. Even though sulfadoxine-pyrimethamine failed as an antimalarial, it was found to have potent non-malarial effects that improved foetal growth and resulted in better birth outcomes. This is likely to have important policy implications.

Sub-studies on the acceptability and feasibility of IPTp with dihydroartemisinin-piperaquine, led by Jenny Hill, provided additional evidence on the health systems effectiveness to deliver these 3-day regimens through antenatal care and pregnant women’s adherence to a multiday regimen in a real-life setting.

PMC

Professor ter Kuile’s team in western Kenya also completed the post-discharge malaria chemoprevention (PMC) trial conducted in nine hospitals in western Kenya and Uganda. Dr Titus Kwambai from the Kenyan Ministry of Health led the trial in East Africa as part of his PhD studies. Three months of post-discharge malaria chemoprevention reduced the number of re-admissions and death in children admitted with severe anaemia by 70%. The study was published in the New England Journal of Medicine. Because of the unexpected large beneficial impact, it caught the attention of policy-makers in Uganda, Kenya and Malawi and the WHO. PMC Implementation research, led by Dr Jenny Hill, is scheduled to start in 2022.

Paediatrics and Child Health

PROSYNK

In partnership with the Kenya Medical Research Institute (KEMRI), the PRObiotics and SYNbiotics in infants in Kenya (PROSYNK) study in Homa Bay, western Kenya, is comparing the effects of 3 different pro/synbiotic supplements on gut health and growth in the first 0-2 years. Recruitment of 600 newborns is expected to be completed early in 2022. To date, compliance with the supplements and research procedures has been excellent with very few withdrawals. Linked MSc projects with LSTM co-supervisors have confirmed that pro/synbiotic supplements are acceptable to mothers, families and health staff and that this intervention may be affordable and able to be scaled-up should it prove to be beneficial.

GCRF Action Against Stunting Hub

LSTM leads the Gut Health work stream of the GCRF Action Against Stunting Hub (AASH). The role is to assess how poor gut health interacts with epigenetics, nutrition, the home and food environment and education and child development to develop a new typology of stunting. In cohorts of children 0-2 years in Senegal, India and Indonesia and working with the in-county teams and UK collaborators, the team is assessing biomarkers of environmental enteric dysfunction in stool and blood, bacterial and parasitic pathogen colonisation and the gut microbiota. In the Senegal Synbiotic (SENGSYN) study, the team is comparing linear growth at one year and the other outcomes being assessed in the AASH in infants who receive one of the synbiotic supplements being evaluated in the PROSYNK study. This will allow the team to compare the effects of the same intervention in two different settings.

Neonatal Nutritional Network

The Neonatal Nutritional Network in sub-Saharan Africa continues to grow and generate research outputs. These have included the effects of COVID-19 lockdown on institutional delivery, neonatal admissions and prematurity and the perceptions of parents regarding core outcomes for neonatal research in Nigeria and an overview of systematic reviews on the evidence that informs feeding practices in very low birthweight and very preterm infants in sub-Saharan Africa.

In collaborative research with colleagues in Sri Lanka, UK and Canada the Network reported very high levels of oxidant stress alongside marked anti-oxidant deficiencies in the different β -thalassaemia syndromes paving the way for intervention studies and completed a cost-of-illness analysis of β -Thalassaemia major in children. The Network also contributed to the analysis of long-term outcomes and survival in Haemoglobin E Thalassaemia patients followed-up prospectively for over 20 years.

Related Activities

Supported by the LSTM Cochrane Infectious Diseases Group, the systematic review of probiotics for the treatment of acute diarrhoea was updated, highlighting the lack of evidence for efficacy despite numerous clinical trials conducted over many years.

At Alder Hey Children’s Hospital, studies on loneliness, isolation and relationships in children and young people with inflammatory bowel disease and of ferric maltol, a novel iron supplement, in iron deficiency, were completed.



Members of the Neonatal Nutrition Network



Field supervisor Auxilia Omwanda records an IMPROVE participant's weight measurements on the case report forms, in Rabuor Sub County Hospital, Kisumu, Kenya. The LSTM led IMPROVE collaboration conducts research into alternative drug regimens for women with malaria in pregnancy in Tanzania, Malawi and Kenya. Photo: EDCTP.

Public Engagement

LSTM is committed to engaging the public about its world-class research, both nationally and internationally, to promote awareness of global health issues and enhance the significance and impact of LSTM's research with target audiences and to inspire the next generation of scientists.

Knowledge Exchange Framework Agenda

LSTM's current public engagement strategy is being reviewed and revised as part of the Knowledge Exchange Framework (KEF) agenda. The aim of the Knowledge Exchange Framework is to increase efficiency and effectiveness of the use of public funding for knowledge exchange and to further a culture of improvement within academia. It will allow institutes like LSTM to better understand and improve their own performance, as well as provide businesses and other users with more information to help them access the world-class knowledge and expertise embedded within LSTM. An important aspect of KEF is community and public engagement.

LSTM's Public Engagement Manager is working alongside colleagues to consult with staff and students on Community and Public Engagement, which will feed into the revision of the current strategy contributing to LSTM's submission to the KEF. In addition, the team will identify barriers and challenges to improving LSTM's KEF score regarding community and public engagement, including developing an adequate definition of community and public engagement for LSTM and issues of reporting engagement.

Summer Science Day



Summer Science Day at Liverpool's VG&M. Photo by Amy McLeman

A team from LSTM engaged with children and adults at a Summer Science Day at Liverpool's Victoria Gallery & Museum. LSTM's Amy McLeman and team set up hand stamps on agar, for the children to culture their hand bacteria to feed into the citizen science Swab and Send project. The team also took games and puzzles to play with the visitors which included puzzles to show bacteria and antibiotic interactions and top trumps bacteria battles. In addition, LSTM's Natasha Neitham explored the unseen world of Liverpool's parks with the families visiting the Summer Science Day, showcasing videos and art of Sefton and

Princess Park microbes. The teams received excellent feedback from the families attending the Summer Science Day.

"It was slightly nerve-racking but exciting returning to face-to-face engagement after so long but the support from you all has made it easier. I cannot emphasise enough how much our families get out of events and how much they appreciate meeting LSTM staff working in so many interesting areas",

Kirsty Hall, Education Officer VG&M.

Swab and Send



The citizen science project 'Swab and Send', led by Dr Adam Roberts, aims to identify the next new antibiotic in the homes and schools of participants. The identification of new antibiotics is of vital importance as the rise of infections caused by antibiotic-resistant bacteria continues. Most of the antibiotics we use today come from bacteria and fungi that inhabit the soil. The next antibiotic might come from microbes that live in the back of people's cupboards, bins, or other unusual environments.

Dr Roberts asks school children, families and adults to pledge to buy swabs and join in the hunt for the next antibiotic, the participants are sent swabs which are used to swab areas collecting some potentially interesting microbes. Returned swabs are tested to see if any bacteria are present and if they are making antibiotics. The past year has seen the team collect bacteria from an ornamental ship within a fish tank which showed activity against *Candida* spp. Whilst a chicken feeder, a bathroom overflow and the inside of a hose pipe all harboured isolates that showed activity against *E. coli*. Highlighting the reach of the Swab and Send project, the

team were thrilled to receive swabs of stockfish resin from a very small fishing island in Norway called Røst; one isolate from Norway showed antimicrobial activity against *E. coli*, MRSA and *M. luteus*. Other samples received by the team included swabs of some mouldy blueberry yoghurt, a leaky tap in a greenhouse and a Shih Tzu dog mouth.

Virtual Pint of Science Festival in Liverpool

For the fourth year running Liverpool hosted Pint of Science, this annual festival brings engaging science and latest research findings to pubs and bars across the world. Dr Laura Dean, Lecturer at LSTM spoke to 40 viewers during 'Medicine, children, and skin disease: a moral journey.'

In her talk entitled 'The stigma and burden of skin diseases,' Laura discussed the stigma, social exclusion and poverty caused by severe stigmatising skin diseases in Liberia and how her team has used participatory methods, such as photovoice, to work with faith healers and community members to break down barriers in accessing treatment and support.



Everton in the Community

LSTM continues to work with Everton in the Community providing opportunities for staff and students to visit primary and secondary schools within the Blue Mile to engage the pupils on LSTM's research and history. Everton in the Community is the official charity of Everton Football Club and delivers a range of programmes to promote health, education, social inclusion and equality to over 30,000 participants every year across Merseyside and North Wales using the power of sport.

Everton in the Community provide training to the staff and students visiting schools, and the PE Manager and Communications Team provide support in the form of images and videos, and helping researchers make their science jargon-free and engaging.

Social Mobility Foundation

LSTM continues to provide mentorship to secondary school pupils as part of its relationship with the Social Mobility Foundation.

BBC Radio Merseyside

LSTM guests, including Professor Nick Beeching and Dr Tom Wingfield, have regularly spoken on BBC Radio Merseyside Breakfast show providing reassurance and information to listeners as the Liverpool City Region moved out of COVID-19 lockdowns and saw the further easing of pandemic restrictions. BBC Radio Merseyside continues to offer radio slots enabling LSTM to present new research and its outcomes.

DTMH Audio Blogs

DTMH student, Dr Lia Lopez, worked with Professor Nick Beeching and Dr Tom Wingfield to create two audio blogs on the topics of, respectively, working overseas and teaching tropical medicine, and burnout and work-related stress during the COVID-19 pandemic. These were the first audio blogs created, following on from the success of the regular DTMH blog series.

LSTM Podcasts

LSTM's PE Manager and the Technology Enhanced Learning (TEL) Team are supporting Dr Kim Ozano and PhD student Beatrice Egid in producing podcasts highlighting the role of participatory methods in health science research. Topics discussed by the team include social mapping and photovoice approaches with guests and interviewees coming from across LSTM and Sightsavers.

Public Engagement Training

The Public Engagement Manager continues to provide training for LSTM staff and postgraduate researchers on public engagement. Most notably, the Public Engagement Manager and Senior Media Officer gave a virtual training session to staff based in Kenya. Sessions focused on the history of public engagement, the relationship between one-way dissemination and two-way methods of communication and science and society controversies.

Decolonising Agenda

The Public Engagement Manager is currently working with the staff involved in the decolonising agenda of the LSTM's research and education, and the BAME network to reach communities within Liverpool LSTM does not currently target. In the first instance, ethics approval is being sought to conduct a mapping exercise to identify where communities can be found within Liverpool and how best to target them.



125th Anniversary

LSTM's Public Engagement Manager is also participating in LSTM's 125th Anniversary (in 2023) preparations and activities, preparing grant applications and working alongside LSTM's Fundraising Office, National Museums Liverpool and DW Consulting.

FEATURE ARTICLE:

Innovation, Discovery and Development

Innovation and translation are at the forefront of work at LSTM as it aims to discover and develop, then go forward with implementation of its innovative ideas. In doing so, LSTM considers itself unique in spanning the translational pipeline from discovery to implementation. Decades of under-investment in new drugs and diagnostics means the world is ill-equipped to respond to the burgeoning challenge posed by infectious diseases, antibiotic resistance, and emerging pandemics.

In response to this challenge, the LSTM led Infection Innovation Consortium (iiCON) bridges the gap in the infection innovation ecosystem. The consortium brings together industry, academia, and the NHS in a collaborative effort with a clear aim: to save lives globally by accelerating the discovery and development of innovative new treatments, diagnostics, and preventative products for infectious diseases.

Success in the First Year

Since launching in September 2020, iiCON has established itself as a global centre for infectious disease R&D. Founded with an £18.6 million government grant provided through UK Research and Innovation's flagship Strength in Places Fund, iiCON has raised an additional £154.9 million in public and private investment in its first year – creating a £173.5 million programme.

iiCON

infection innovation consortium

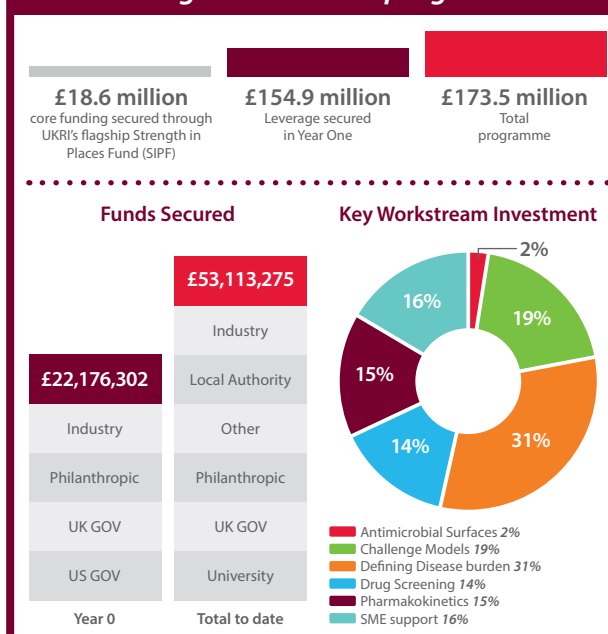
The collaborative R&D programme is based in the North West of England. Operating across ten open-access, commercially-sustainable specialist research platforms able to pivot to handle any infectious disease, the consortium is designed to drive innovation and provide pandemic resilience.

Bringing together industry, research and the NHS in a collaborative effort, iiCON's other partner members are Unilever, Evotec, Liverpool University Hospitals Foundation Trust, University of Liverpool, and Infex Therapeutics.

"Since our launch in 2020, the consortium's model of partnership-led co-innovation has enabled a remarkable impact both in terms of driving forward innovation and bringing new products to market, and is starting to shape health policy at a regional, national, and global level - saving and improving millions of lives."

iiCON's founding Director,
Professor Janet Hemingway CBE

Leverage and Scale of programme



Source: iiCON Annual Report

Global Health Impact

The consortium is already having an impact on global health, saving and improving lives by enabling and supporting innovative collaborations that are fast-tracking new treatments and products to communities across the globe.

Over the last 12 months, iiCON has launched collaborative partnerships with over 186 UK SMEs and start-ups alongside key projects with global industry giants including Pfizer and Unilever. The programme has also attracted significant support from organisations including The Bill and Melinda Gates Foundation, The Wellcome Trust, and the Medical Research Council.

The last year has seen iiCON accelerate the development of new treatments and preventions for COVID-19 and a number of other important infectious diseases.

iiCON validated the first COVID-19 lateral flow test for asymptomatic, pre-symptomatic and symptomatic people. It also worked with the Ministry of Defence to develop a surface spray that deactivates COVID-19 in 60 seconds, which was

Key partners include:

298
MAJOR COMMERCIAL /
INDUSTRY STAKEHOLDERS

40
CONTRACT RESEARCH
ORGANISATIONS

54
LABORATORIES

Source: iiCON Annual Report

used in UK COVID testing sites. Under an iiCON-brokered programme, LSTM collaborated with Unilever, one of the world's largest manufacturers of oral hygiene products, to rapidly assess the performance of mouthwashes against SARS-CoV-2. This work demonstrated that the technology Unilever uses in its mouthwashes inactivated COVID and provided essential data for regulatory approval and claims in key global markets.

Other contributions to the global COVID effort include co-developing a new model organoid that replicates the impact of COVID-19 on the lungs more accurately than traditional plate bioassays, with the UK SME Newcells BioTech. This innovation will be used to screen more targeted treatments for COVID-19 and other respiratory infections.

Discovering and developing new treatments for deadly resistant infections is a key priority for iiCON's platforms. Partner Infex Therapeutics is expecting to progress two novel therapeutics to tackle dangerous multi-drug resistant microbial infections into clinical trials over the next 12 months – helping to address the major global health threat of Anti-Microbial Resistance.

iiCON's work is influencing international health policy, supporting communities across the globe, including Africa. iiCON is building on the trial that found that piperonyl butoxide long-lasting insecticide treated nets (PBO LLINs) offered more protection against malaria than conventional non-PBO LLINs over a period of up to 25 months in Uganda. It is supporting two new trials in DRC, to look at simpler ways of large-scale testing and evaluate a novel new bednet shape. Data from the Uganda trial was scrutinised by the WHO Vector Control Advisory Group, resulting in a recommendation for WHO

Prequalification to change policy advice for PBO-nets. Following this important work, 33% of the millions of treated mosquito nets distributed in Africa in 2021 were PBO nets – helping to protect communities and save lives. An iiCON follow on study in DRC is now comparing the biological and chemical efficacy of different PBO nets from four manufacturers.

"iiCON has had an incredible first year. As lead partner, we are delighted with the programme's impact in enabling collaboration and driving forward world-changing innovation in infection research and development that will ultimately help to save and improve the lives of millions of people."

Professor David Laloo, Director LSTM

A rapid COVID-19 antigen test, validated by researchers at LSTM through iiCON is being used to deliver large-scale testing in key areas of need across Africa as part of a major FIND and UNITAID programme. The consortium is also working with the Malawian Government and the Wellcome Trust to provide data that is shaping the country's COVID-19 policy response.

Strengthening Capacity and Creating Jobs of the Future

Strengthening Infection R&D capacity and capability within the North West is an important part of iiCON's purpose. Since launching, the consortium has created 176 new high-value jobs across the North West and invested £9.4 million in local capacity and workforce development.

Source: iiCON Annual Report

Future Proofing

INVESTMENT & JOB CREATION

91

Secured contracts valued at **£48M**

176

high value jobs created in the North West

44

Industry projects totalling **£11.2M**

387

total jobs created to date

It is investing in developing the next generation of global health leaders and supporting the interface between industry and academia to bolster collaboration and innovation in the infection space. A £2.5 million investment secured by iiCON from the Liverpool City Region Combined Authority, has provided anchor funding to establish a pioneering new capacity development centre for co-innovation and training at Pembroke House.

Building on the region's world-leading capability in infectious disease research and innovation, the new centre will provide a bespoke centre for world-class collaborative and interactive online learning, industry collaboration, and community engagement and training.

Pembroke House will drive impactful partnerships between industry, research, and the NHS to support pioneering

infection innovation R&D, contributing to the Liverpool City Region target of R&D increasing to five per cent of GDP.

Through iiCON companies will be able to access high-quality professional and industrial training, alongside opportunities for high-quality networking and partnering. This will be critical in facilitating the research/industry interface and will act to rapidly connect iiCON's innovative research with industry.

The centre will also be used to support ongoing collaboration with regional partners, including Everton in the Community, to engage with young people and those living in the local community around the career opportunities available in health and life sciences and infection innovation.

*iiCON Director Prof Janet Hemingway and Liverpool Metro Mayor Steve Rotherham.
Photo by Ruth Cobban.*



FEATURE ARTICLE:

Health Policy and Health Systems Research

LSTM's Health Policy and Health Systems Research is broad in its scope, ranging from individual-level capacity building and disease treatment through to national-level research and policy change. However, the uniting factor is a drive to translate research into policy and practice and improved health and wellbeing for some of the world's most vulnerable people.

COVID-19 has inevitably featured heavily in LSTM's health systems work this year, in all cases disrupting work and in several providing new avenues for research.

REDRESS

The REDRESS consortium works to address severe stigmatising skin diseases (SSSDs) such as destructive skin ulcers and elephantiasis in Liberia. The consortium uses action research processes to develop person-centred approaches, with a specific focus on mental health, disability inclusion and gender-transformative approaches. For many people with SSSDs, a lack of access to health and social services results in significant physical and psycho-social consequences, complex treatment journeys and catastrophic socio-economic impacts. REDRESS is using integrated health system approaches to reduce the associated illness, stigma, social exclusion and poverty.

REDRESS is funded by NIHR as part of its Research Innovation for Global Health Transformation (RIGHT) programme, and has been co-developed by researchers, patients and programme implementers at the request of the Liberian Neglected Tropical Diseases (NTD) programme. The programme directly responds to the needs addressed in the country's 'Investment Plan for Building a Resilient Health System'.

Key successes for REDRESS this year include:

- *Formative research successfully conducted across four themes and intervention development underway.*
- *Working closely with the Ministry of Health technical advisory board as key programme partners to support the revision of the national NTD master plan, feeding REDRESS findings into policy adjustments. Also the successful recruitment and engagement of people affected in the key data collection and analysis phases of the research.*
- *Community engagement which has included a presentation on 'engaging community minds to challenge stigma and support mental wellbeing' at the Pint of Science festival, and running workshops for RIGHT sister projects on photovoice and approaches to stakeholder engagement for WHO.*



- *A series of virtual skills building sessions have been conducted with Liberian Fellows and external partners. They have included protocol development, data analysis, paper writing, research methods, safeguarding, ethics and implementation research.*
- *A series of photovoice booklets has been produced that explores experiences of community health assistants and volunteers, faith healers and traditional healers in providing care for people affected by SSSDs.*
- *A Memorandum of Understanding has been established with the Carter Center to jointly develop tools to improve the psychosocial support and mental health service provision for people affected by SSSDs/NTDs in Liberia.*
- *REDRESS colleagues co-produced two policy briefs which focused on principles for promoting resilient health systems in the context of the COVID-19 response, with learnings from Liberia and Merseyside.*

REDRESS aims to instigate social change for people affected by SSSDs and to tackle marginalisation and discrimination through the development of innovative interventions that reflect the needs and values of those affected. For example, the collaboration with Effect Hope, based in Canada, led to the creation of a counterpart project in Tshikapa Health Zone, Democratic Republic of Congo (DRC), which seeks to develop and pilot a community mental health intervention package for NTD-affected communities; less is known about mental health impacts in countries that have experienced conflict and fragility, such as DRC and Liberia. This study aims to understand the existing mental health burden (depression and anxiety) in the general population and the NTD-affected population in Kasai region in DRC, while also working with communities and health workers to understand the best way to support affected people.

Strengthening Health Systems and the Health Workforce

LSTM's work on workforce and health systems strengthening has continued this year with substantial progress made across a number of programmes.

The ReBUILD for Resilience Research Programme Consortium focuses on health systems in fragile contexts experiencing violence, conflict, pandemics and other shocks. Two billion of the world's poorest people live in

such settings and that figure is rising, fuelled by growing inequality, violence, conflicts and other shocks, including the current COVID-19 pandemic. In these shock-prone contexts, and with growing threats from climate change, population displacement and epidemics, progress towards universal health coverage is slow. Working in Lebanon, Myanmar, Nepal and Sierra Leone, ReBUILD for Resilience seeks to understand how to develop stronger and more resilient health systems which deliver both local and global health.

The programme, funded by the UK government's Foreign, Commonwealth and Development Office (£7.68 million), has achieved many successes since launching in May 2020:

- Completed a highly successful inception year which exceeded set targets and outputs.
- Conducted research on health systems and COVID-19:
 - Health system, health worker and community resilience in addressing COVID-19: a case study from Myanmar.
 - Understanding health system resilience to respond to COVID-19 in a federalised context: a case study of health workforce management at sub-national level in Nepal.
 - The gendered experience of close-to-community providers in fragile and shock-prone settings: implications for policy and practice during and post COVID-19. This work was conducted in Lebanon, Sierra Leone, Nepal and Myanmar.
 - Health system resilience amid outbreaks: understanding the politics of sexual and reproductive health service adaptation in eastern DRC.
 - Delivered webinars on health systems strengthening; close-to-community providers, gender and COVID-19; and disability-inclusive health systems in fragile & shock-prone settings.
 - Developed numerous products including papers, policy briefs and blog posts.

The PERFORM2Scale management development programme has now been running for more than three years, during which it has gradually scaled-up its activities to 27 districts across three countries in Africa.

PERFORM2Scale focuses on improving health workforce performance in Ghana, Malawi and Uganda, and as the programme enters its final year country partners have been negotiating with their respective governments about how to continue the scale-up. The team has completed the end line evaluation and is now teasing out the important lessons about management development and the scale-up of complex interventions.

Also on the governance of the health workforce, but at a different level, the team is working with WHO. They have completed case studies on the coordination of health workforce stakeholders and strategic human resource management in Malawi, Sudan and Nepal, which will feed into background documents for the World Health Assembly in May 2022.

Urban Health and Wellbeing

LSTM's work on urban health and wellbeing has continued through the GCRF Accountability for Informal Urban Equity ARISE Hub and contributions to the newly-launched African Cities Research Consortium.

ARISE's participatory research with informal settlement communities works to support the most marginalised people in protecting their health and wellbeing during the COVID-19 pandemic. It has also informed the pandemic responses of municipal and national governmental and non-governmental bodies. The team is building on what it has learnt to promote equitable access to COVID-19 vaccines for people living and working in informal settlements, as well as fostering inclusive pandemic preparedness and climate crisis adaptation processes.

ARISE has also built the capacities of people living in informal settlements to conduct research with professional researchers, and to use these skills to plan community actions to promote health and wellbeing. For example, with support from ARISE researchers, young co-researchers in the Kollyanpur informal settlement in Dhaka, Bangladesh won a prize in an Urban Health Innovations Challenge and presented their plans to the Mayor of Dhaka South City Corporation.

The Perform2Scale team



Community and professional researchers discuss Intimate Partner Violence and HIV/AIDS linkages in Korogocho settlement in Nairobi. Photo by Beate Ringwald

ARISE has also communicated its learning through Stories of Change, blogs, papers, presentations, photo stories, videos and webinars, and to FCDO advisors through a Learning Journey on Leaving No-one Behind in Universal

Health Coverage. Its findings also informed the UK International Development Select Committee report on Secondary Impacts of the COVID-19 pandemic.

As joint lead on the Health, Wellbeing and Nutrition and cross-cutting Gender 'domains' of the African Cities Research Consortium, the LSTM team has developed conceptual notes on key areas of focus for cross-sectoral, political settlements and 'city systems' research. Nairobi, Freetown and Lilongwe are the first cities where research on health, wellbeing and nutrition will take place, with further locations to follow in a second wave.



Centre for Capacity Research (CCR)

This year CCR has again been involved in the African Capacity Building Initiative. Funded by the Royal Society and FCDO, the initiative aims to strengthen the research capacities of universities and research institutions in sub-Saharan Africa. After a successful CCR-led workshop in 2019 on quality management systems for laboratories

Youth Associate members acting as community researchers in Kollyanpur informal settlement in Dhaka, Bangladesh



and educational skills for laboratory technicians, a series of virtual workshops took place in March and October 2021. Laboratory technicians who had attended the 2019 workshop were invited to present progress on their quality improvement projects, highlighting successes and identifying the barriers faced. Their experiences have since been developed into a Royal Society case study featuring recommendations and lessons learned.

CCR is also supporting the Shire Valley Vector Control Project (Shire-Vec). Along with robust work packages to monitor disease burden and the perceptions and behaviours of local farming communities, this multi-disciplinary project will strengthen the research capacity of individuals and institutions. Led by Dr Chris Jones (LSTM Vector Biology) and Themba Mzilahowa (Malaria Alert Centre), Shire-Vec will establish a network of experts in vector biology, agriculture and veterinary science from academic and governmental partners to share knowledge, skills and on-the-ground knowledge to support the training and development needs of future vector scientists in Malawi. Research capacity will be strengthened through training materials and courses in vector and One Health methods, as well as training in research skills such as grant and paper writing, geographic information systems, epidemiology, social science, vector biology and statistics. The first cohort of trainees who will benefit from the network will include two post-doctoral research assistants, three PhD candidates and three MSc students who will be funded by Shire-Vec.

Mainstreaming Disability, Mental Health, Equity and Rights within NTD Programmes and Health Systems

It has been a year of progress for LSTM's work to mainstream disability, mental health, equity and rights within its NTD programmes and health systems research. As already highlighted, REDRESS, ReBUILD for Resilience and ARISE have delivered work to address these issues, spanning disability- and gender-inclusive health systems research, disease management to challenge stigma and support mental wellbeing, and equitable access to COVID-19 vaccines.

Despite entering its final year, the COUNTDOWN project has continued to champion this area as well. The last phase has seen a series of national and international dissemination activities where research findings – including those which focus on chronic morbidity, mental ill-health and disability associated with NTDs - were presented to stakeholders who discussed the impact of the programme and committed to embed the learning into policy and practice. The final webinar was held on 28 September and was attended by more than 150 people from across the world. NTD implementers, researchers and policy makers from Nigeria and Liberia came together to discuss how the lessons from COUNTDOWN aligned

with the NTD roadmap pillars and what this means for the future of NTDs. For more information on COUNTDOWN see the Feature Article on Neglected Tropical Diseases

Research, Evidence, and Development Initiative (READ-It)



In 2021, READ-It has continued to strive for healthcare decisions based on unbiased, reliable, critical summaries of research evidence. This initiative, within the Department of Clinical Sciences, is led by Professor Paul Garner and Paula Waugh and includes the Cochrane Infectious Diseases Group (CIDG) managed by Dr Deirdre Walshe.

The team has had some terrific reviews this year, especially following the lead role CIDG took in countering the 'infodemic' around ivermectin. Fake trials and badly -conducted systematic reviews fuelled a global demand for this antiparasitic drug, and politicians in countries that had not organised COVID-19 vaccines promoted it as an alternative to other treatments. The Cochrane review, 'Ivermectin for preventing and treating COVID-19', did not show evidence of any COVID-19-related benefit to this drug. These findings were quoted in newspapers worldwide, and there were more than 10,000 tweets about the review. Dr Walshe also worked closely with the Central Cochrane Editorial Team and the University of Birmingham, UK, on widely cited reviews of COVID-19 diagnostic tests.

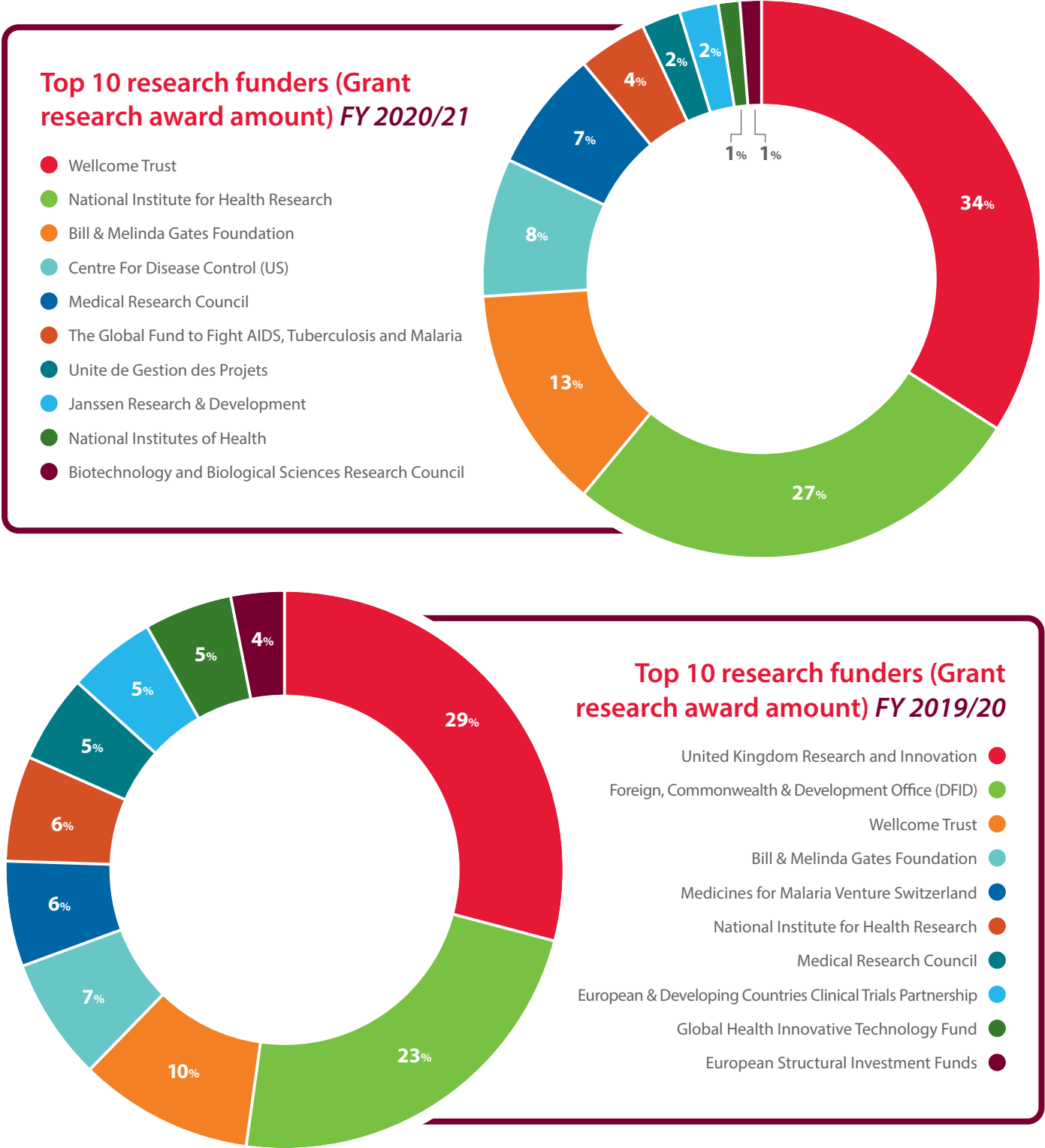
The 2020 Impact Factor for the Cochrane Library is 9.3 and for the Cochrane Infectious Diseases Group 7.5.

Guideline development is part of the READ-It brief, and this year the team was the technical and methods resource for WHO plague guidelines and TB diagnostic guidelines. They were also part of India's evidence-based COVID-19 treatment guidelines for clinicians.

LSTM's Top Research Funders

The graphics below show the top funders in terms of total contract value (by ultimate funding source) for LSTM during financial year 2019/20 and 2020/21.

Source: Converis



Finance, Procurement and Research Services (FPRS)

External communication with the wider organisation was FPRS' focus in 2021, a key objective in the delivery of the transformation strategy. This included introducing new internal intranet site, self-service information desk and virtual sessions to share information and best practice. The department has undertaken customer services training during 2021, all held virtually and are now working to implement the skills and strategies obtained from these sessions.

FPRS Online

FPRS launched its new intranet site in 2020/21, which gives news articles of recent events and a monthly newsletter. It contains frequently asked questions with directions of where to find information, and a key section "You said, we did", explaining how FPRS is consulting and listening to the LSTM community to make changes that help make processes better. The site also details upcoming events of training and "BiteSize" sessions, and deadlines such as month end close off dates.

Top Desk is a self-service portal that many LSTM professional service teams use to provide a single point of entry for enquiries and information. The FPRS Top Desk contains information about all four FPRS sections (Finance Operations, Procurement, Business Partners and Research Management Services) with "how to" guides and video tutorials across a wide spectrum of business activities. Help and guidance is also available such as how to complete bank transfer forms, how to use FPRS systems, tax advice, budgeting and financial planning, how to prepare a grant proposal and support on running projects. The Top Desk facility has helped bring together all the information that FPRS holds into one central place, making it easier for staff to quickly find the help and information they need.

FPRS BiteSize

In April 2021, FPRS launched "BiteSize". These are mini virtual sessions, 25 minutes in length, and run every 6-8 weeks with a hot topic and Q&A. Hot topics are selected to be relevant for each session and have so far covered getting the best out of company credit cards, a demo on information on Top Desk and a demo on accessing and interrogating Power BI statements. Each session is recorded and is made available to all LSTM staff from the dedicated BiteSize area and link on the FPRS site. BiteSize aims to make FPRS staff more accessible and the aim is that these sessions will become a "one stop shop" info session. This has been a success during the pandemic as virtual sessions were more widely attended than in the past when they were held face to face.

FPRS in Action

There is a lot of day to day work undertaken within the FPRS department, but we are also given some great opportunities to use our talents and skills to achieve great value for



The FPRS team at an away day

LSTM. This year, with a grant of £1.1m, LSTM were able to upgrade the equipment used for research, with the FPRS team working together to ensure the speedy purchase and delivery of 34 pieces of equipment. Through our supply chain and procurement networks FPRS was able to make budget savings of around 20%, allowing for extra items to be purchased to get the most out of this funding stream. The FPRS team also worked closely with the IT department to replace outdated hardware with equipment suitable for virtual and hybrid meetings.

Management Information

FPRS has been working hard to improve the support to business activities and during 2020/21 continued to target management information as key for improvement. Considerable work was done on the configuration and development to our reporting software, Power BI for budget/expenditure statements, delegated authority and grant cost recovery.

Budget/expenditure statements are self-service, accessed via Top Desk, giving an up to date position on account expenditure and where relevant redesigned in consultation with user groups. These reports give month-end access to all types of accounts: research, core, profit centre and discretionary with meaningful analysis, greater interrogation and a more user-friendly visual presentation. A series of training events were held at the launch and regular refresher trainings are held. Similar user group consultation and training was undertaken for reports on delegated authority access to accounts.

Managing the finances of over 400 projects and with many activities overseas, the Research Management Services (RMS) team has been working to report on grant cost recovery, giving key management information to senior management on the health and strength of the research portfolio.

Research Governance, Ethics and Integrity

LSTM's Research Governance, Ethics and Integrity Office works with researchers an programme management staff to promote sound governance, awareness of ethical practice and adherence to research integrity principles.

Processes

For the past year the team has worked through systems and processes whilst adapting to off site working through the pandemic. This has enabled us to look at different and more streamlined ways of working. An example of this is remote monitoring where we have been developing a hybrid model to monitor studies to provide assurance. With this model we are improving our carbon footprint and reducing to costs to study budgets in challenging times.

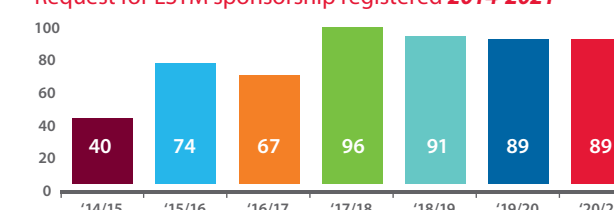
The new research management system EDGE is now up and running and we are starting to roll it out to sites to enable live information to be captured for recruitment figures. The reporting tool within the system has been invaluable for oversight of LSTM sponsored activity and track approvals of studies to identify any barriers we can help tackle to get the study open.

Overview of Activity

Reviewing all live studies, the map below shows where LSTM is currently operating. Of these, 78% of non-UK study countries are hosted in Africa and 10% of study countries are located across Asia.

89 studies were approved for LSTM sponsorship in 2020/2021. 67 studies were open to recruitment to participants.

Request for LSTM sponsorship registered 2014-2021



Location of LSTM Studies as per October 2021



First Phase I Sponsored

Over the past year LSTM has been working to open its first sponsored phase I clinical trial of an investigational medicinal product in the UK. Recruitment is planned in November 2021.

COVID-19

COVID-19 has led to the team following agile working, the team have managed to maintain a supportive service to researchers. Studies affected by COVID-19:

- One study's follow up on hold
- Three studies recruitment on hold
- One study closed due to COVID-19

Research Integrity Working Group

To support the on-going work LSTM undertakes to improve the culture within LSTM, the team have set up a Research Integrity Working Group. It is created to represent all groups within LSTM so the group can identify issues that need work, give feedback from their peers and to have a platform to share best practice. There are sub-groups which lead on certain streams.

The Year Ahead

The team will continue to develop their processes and training opportunities in 2021/2022. Drop-in sessions are planned to support researchers which will ensure the support available is visible to researchers. Research Integrity is a theme for the year ahead with a new Dean for Research, Culture and Integrity, the work to bring a more holistic approach across LSTM for research activities, through collaboration of different teams, will be a key focus.

Education

The past year has been particularly challenging again for Education as a result of the impact of COVID and the need to navigate a pathway to deliver courses under highly unpredictable and fast-changing circumstances. Ahead of the start of academic year 2020-21 we had informed students of our intention to run with a blended format, in line with much of the sector.

Adapting Teaching for COVID

Having learnt from the previous year, retaining face-to-face teaching was important for student well-being to reduce withdrawal. For safety we planned for socially distanced on-campus learning, working with the safety advisors and Estates teams. This reduced the capacity of large teaching spaces from a capacity of up to 90 to 40 and meant many smaller teaching rooms could not be used practically. This caused us to review capacity levels for each programme. To prevent too many students being on campus at once to preserve social distance, and to reduce pressure on the larger teaching rooms, the timetable was replanned to a model of alternating online and on-site days. This required substantial planning and a series of guidance documents were produced by staff in education to guide appropriate pedagogic design to sequence online and campus-based activity appropriately. Adding to this complexity was the growing number of self-isolating students, requiring creative use of technology to maintain a sense of togetherness with students on-site and joining online.



Students in LSTM's Dagnall teaching lab, masked and social distancing meaning smaller groups and repeat sessions. Photo by James LaCourse

Due to the winter surge in cases, all MSc courses reverted to fully online for the first two blocks of Semester 2 (January to March). Whilst the students were disappointed with this move, they were pleased with LSTM's swift decision making which was taken before the government's advice changed. Education staff worked closely with programme directors and module leads to ensure teaching was engaging and to support effective teaching strategies. However, student well-being, along with everyone else, was impacted by the prolonged lockdown and the Student Wellbeing team were managing large numbers of cases. As restrictions reduced Government guidance allowed students on practical courses to return to campus after Easter 2021, we decided to run those modules with computer or



Dr Martyn Stewart - Interim Head of Education

laboratory work back on site, to relieve pressures on students. It was also agreed to allow students back on site over the summer to work in the research laboratories and access library services.



Student wellbeing info on display in student break-out room

Despite the challenges in planning and adapting technology-use very rapidly, there were many innovations in teaching and new skills acquired by academic and Education staff and students alike that are being incorporated into our future course designs.

New Education Strategy

LSTM's Education Strategy 2021-26 sets out the vision for a high quality sustainable education portfolio. At the heart of the strategy is the development of a learning environment that enables students to fulfil their potential, developing attributes in critical thinking and problem solving, as well as being culturally and ethically aware in preparation for working and under-taking research in resource-poor environments. At the institutional level the strategy outlines the vision for establishing an operationally sustainable and financially viable education portfolio, and the recognition of teaching and education alongside research.

Restructure of MSc programmes and academic framework

Alongside the planning and delivery challenges caused by COVID, the Department and academic teams continued with the process of restructuring the programmes and module structures for the existing MSc courses ahead of their relaunch in September 2022, with the new Masters in Public Health, MSc in Tropical Disease Biology, MSc in Humanitarian Studies and MSc in Tropical Medicine undergoing approval, along with a new Masters in Research programme. Whilst changing so many courses simultaneously has caused problems in terms of workload, the whole restructure process allowed us to address

long-standing structural issues and redesign the underlying curricular architecture for a more efficient course model that is simpler to operate and expand.

Retirement of the Dean of Education

Professor Phil Padfield decided to retire from his position as Dean of Education in August 2021. He was Dean at LSTM for three and a half years during which time he has led the development of both our teaching plan and the education department. Dr Martyn Stewart has been appointed as Interim Head of Education from September 2021 whilst a new Dean of Education is recruited. We pass on our great thanks to Phil for his considerable contribution to LSTM and his passionate advocacy for education and teaching.

Pembroke House

The year saw a great deal of planning for the refurbishment of Pembroke Place as LSTM expands its footprint in Liverpool. Pembroke House is a new Capacity Development building shared between the Education Department and iiCON Consortium to evolve the education and workforce capacity at all career stages. Building work commenced in October with the opening scheduled for autumn 2022 to align with the relaunched MSc courses.

Plans for the building include new education and training spaces designed around flexible use and to enhance collaborative and interactive online learning. Spaces include a pop-up immersive suite that can project onto walls a range of simulated settings such as hospital wards or outdoor field environments to create a more authentic and engaging context to apply learning. Other rooms are designed with blended learning in mind, for individuals off-site also to be able to participate with those on-site, which will be essential for building future educational collaborations.

Staff and Student Achievements

Over the past year we had 21 staff and postgraduate research students completing LIGHT: LSTM's Leading in Global Health Teaching programme. Achieving Fellowship demonstrates recognition of teaching experiences and practices and this is achieved through submission of a comprehensive reflective piece against a set of criteria which are linked to the UK Professional Standards Framework (UKPSF). LSTM's LIGHT programme is accredited by Advance-HE and we award Fellowships that meet the criteria.

The distribution of Fellowship achievements this year is:

- 8 Associate Fellows (PhD students, Postdocs, technical staff and/or staff on learning support roles)
- 10 Fellows (mostly teaching staff and technical staff and staff on learning support roles with significant teaching experiences)
- 3 Senior Fellows (staff who are coordinating education processes and lead on teaching programmes)

The distribution by department of this year's Fellowships is:

- Vector Biology: 5
- International Public Health: 5
- Clinical Sciences: 3
- Tropical Disease Biology: 3
- MLW Programme in Malawi: 2
- Education: 3

The next round of LIGHT will start in December 2021 and end in June 2022, managed by Christos Petichakis.

For students, we award prizes to the top performing student in each MSc programme. This year's winners were:

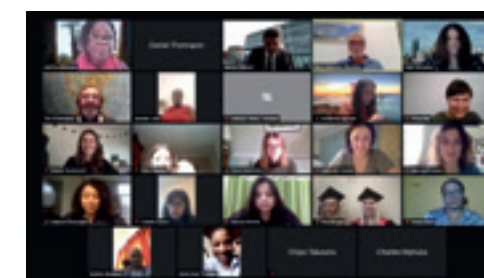
Rachel McCormick: Debbie Quinney Prize (MSc International Public Health – Humanitarian Assistance)

Thomas Arme & Jessica Dagley: Joint winners of the Jervis Prize (MSc Tropical Disease Biology)

Claire Turnbull & Laura Williams: Humanitarian Prize (MSc in Humanitarian Studies & Humanitarian Health and Programme Management).

Graduation 2020

LSTM held its annual graduation ceremony in January 2021, virtually and delayed from its usual December slot because of COVID-19.

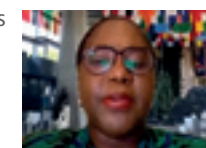


Screenshot of some of the graduates and LSTM staff during the virtual ceremony

A total of 235 students graduated, with around 130 joining the ceremony from all over the world.

The ceremony was opened with a welcome from LSTM's Director Professor David Laloo, congratulating the Class of 2020 for all of their hard work in the face of unique and difficult circumstances.

The two recipients of the honorary degree Doctor of Science were WHO Director of the Department of Control of



Dr Mwelecele Ntuli Malecela



Dr Anarfi Asamoah Baah

Neglected Tropical Diseases, Dr Mwelecele Ntuli Malecela, and LSTM alumnus and former WHO assistant Director-General, Dr Anarfi Asamoah Baah.

Students and Courses

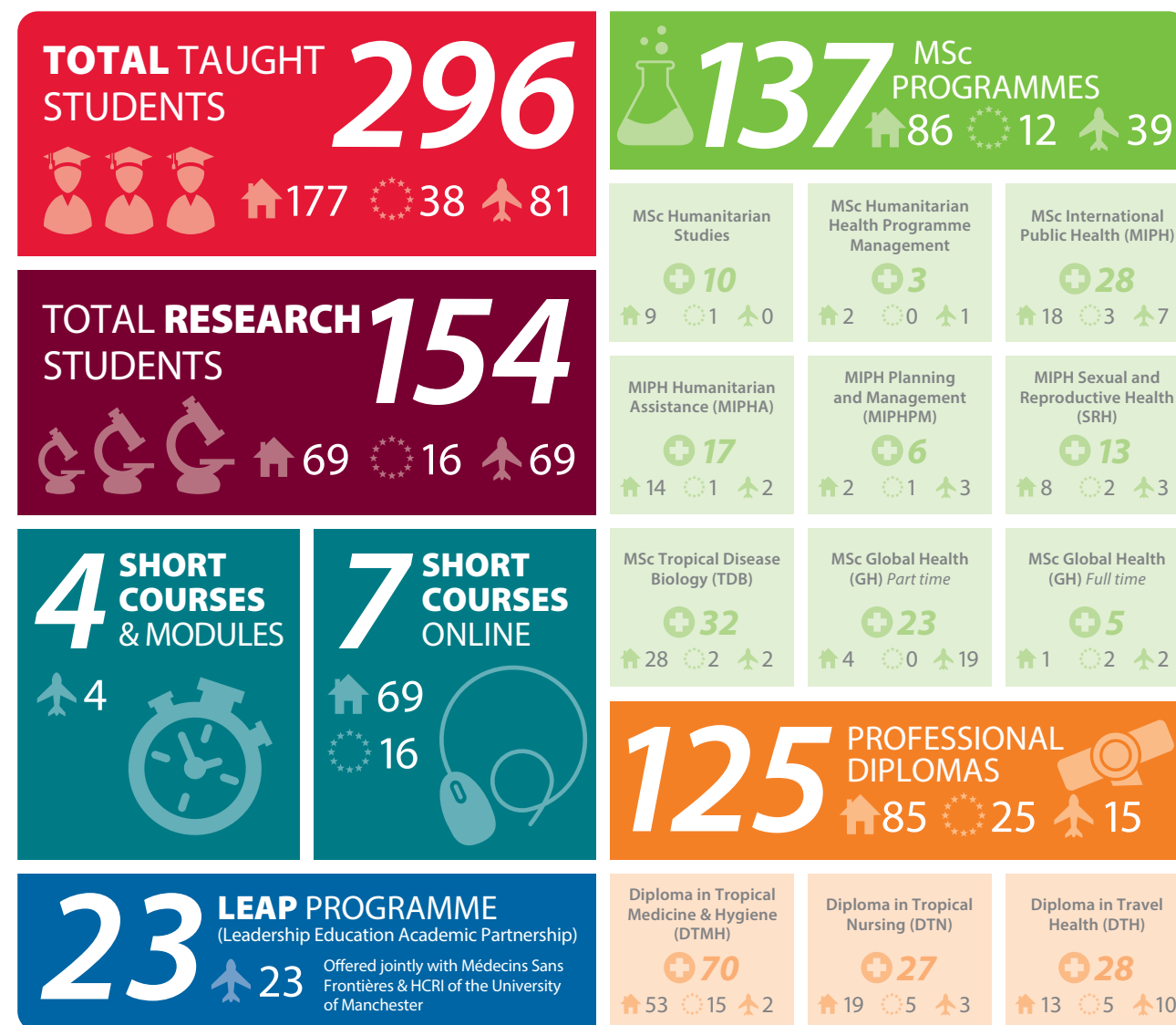
LSTM's Education revenue is directly linked to the number of postgraduate taught and postgraduate research students recruited each academic year.

In 2020/1, we saw a 10% increase in student numbers from the previous year on our campus-based MSc programmes. This was due to increased demand from the intercalating 'Home' market as well as heightened interest by students to study LSTM's topical programmes amidst a global pandemic.

LSTM also teaches 3 professional diplomas: the Diploma in Tropical Medicine and Hygiene (DTMH), Diploma in Tropical Nursing (DTN) and Diploma in Travel Health (DTH). Over the past year we saw a 28% decrease in numbers compared to the year before. The decrease is directly attributable to

COVID-19 as we had to cap student numbers due to social distancing restrictions. Furthermore, many of the intended participants of these clinical programmes were directly involved in the COVID-19 response and needed to defer their studies due to professional commitments.

Despite these challenges, we have managed to run successful cohorts of students, albeit with reduced capacity. Students have expressed appreciation to LSTM for running these programmes and adapting the delivery model to accommodate COVID-19 challenges.



TOTAL
 HOME
 EU
 OVERSEAS

Clinical Diagnostic Parasitology Laboratory (CDPL)

The CDPL offers a referral service for the identification of a wide range of human parasites from clinical specimens. The team in the CDPL examined around 3,700 clinical samples throughout this year. These samples were referred to the CDPL from NHS trusts and private clinics throughout the UK as well as those throughout Europe. The laboratory provides diagnostic testing for a full range of human parasitic infections including some of those that LSTM specialises in such as malaria, filariasis, schistosomiasis, strongyloides and African trypanosomiasis.



Jayne Jones - Manager of CDPL

January 2021 brought continued success for the Clinical Diagnostic Parasitology Laboratory (CDPL) when UKAS accreditation to ISO15189:2012 International standard was maintained for all tests placed on scope of practice. This inspection saw the start of a new UKAS four-year cycle and therefore took the form of a main visit which examined adherence to all aspects of the ISO15189:2012 International standard. The inspection was carried out virtually and demonstrates the quality service provided by the CDPL around the UK and globally. Service users are assured that they are receiving a quality service, provided by professional staff who are using the tests appropriate to their user demographic.

The CDPL is enrolled in five national external quality assurance schemes for faecal parasitology, blood parasitology, parasite serology, malaria rapid and faecal molecular panel. The unit also participates in Interlaboratory comparison schemes with peers for tests that are not covered by the national schemes.

The CDPL continues to integrate with the LSTM diagnostics research team. This link provides the mechanism for

validation and verification of molecular tests that will enhance the portfolio of the diagnostic testing performed within the CDPL. This link also strengthens the bonds between clinical work and research being performed within LSTM. We are currently evaluating additions to the faecal PCR panel that was launched in September 2020, this is being evaluated for *Enterobius vermicularis* detection plus detection of *Schistosoma haematobium* from urine samples. The next phase of molecular validation and verification will be a review of the unit's Leishmania diagnosis algorithm.

The CDPL staff also supports the teaching team at LSTM by providing demonstrator and examiner roles for the practical sessions of the DTM&H courses. This gives the staff a chance to meet the students and interact with the LSTM teaching team enhancing links and sharing knowledge external to the unit.

The CDPL continues to work with the Ministry of Defence (MOD) and is contracted to perform diagnostic work within certain MOD personnel groups. This sees a very busy time for the CDPL staff when samples arrive annually in bulk. However, the team all work together to ensure the samples are processed in a timely manner.

The CDPL is performing an External Quality Assurance role for a global funded study called "Febrile Illness Evaluation in a Broad Range of Endemicities (FIEBRE) funded by the UK Government's Foreign, Commonwealth and Development Office (FCDO). The FIEBRE study is carried out at five sites in Africa (Malawi, Mozambique, Zimbabwe) and Asia (Laos, Myanmar) and focuses on detecting infections that are treatable and/or preventable. The CDPL is currently working through the samples and the data generated will feed into the study outcomes.

I am supported in the CDPL by Biomedical Scientists Iain Slack, Jessica Mason and Simone McLaughlin, Medical laboratory assistant Paula Wright and administration assistant Angela Hargreaves. The team continue to work in a committed professional manner, and I wish to pass my thanks on to them for their support and hard work during this year.



CDPL team members Jayne Jones, Paula Wright, Jessica Mason and Iain Slack. Photo by Gill Wareing.

Well Travelled Clinics



The travel business environment continued to be severely impacted by the global COVID-19 pandemic and because of this, the company ended the financial year at a net loss.



Philippa Tubb - Managing Director WTC

All Well Travelled Clinics (WTC) sales were behind budget, except occupational health income and revenue related to our NHS work and educational courses. We were able to reduce our losses through controlling staff costs, utilising the government furlough scheme where possible, and receiving a small business grant for our Chester clinic.

We continued to contribute to COVID-19 research during this financial year, with our nursing and administrative staff working on research at both LSTM and the University of Liverpool. In addition, a member of our medical team supported clinical work at the Liverpool University Hospitals NHS Foundation Trust. Three of our nursing team were deployed to support the local vaccination hubs during the COVID-19 vaccine roll-out.

WTC also designed and delivered a number of training courses on vaccination in research for pharmacists and research nurses who were going to be involved in vaccine trials, on behalf of the Northwest Coast Clinical Research Network.

Our Liverpool clinic has remained open to all essential workers throughout the pandemic and continued to carry out pre-employment vaccination and health screening for UK healthcare staff, international humanitarians, research staff, gas, oil, and shipping personnel across the world. We also continued to provide occupational health services to our UK-based clients.

Our Chester clinic, closed for most of the year, finally reopened for 2 days per week in May 2021. We plan to increase the opening hours leading up to Christmas 2021 and into the New Year.

The Occupational Team was involved in supporting LSTM's response to the pandemic in relation to reviewing COVID risk assessments, staff and student testing and providing advice and support in relation to COVID-19 to the HR team and the COVID Emergency Management Team when required.

WTC implemented new COVID swab services to enable us to offer pre-travel "Fit to Fly" swabs to our clients.

This required the company to register with the Department of Health and Social Care (DHSC) and apply for accreditation for this clinical service through the UK accreditation service (UKAS). We were awarded full accreditation by UKAS for COVID-19 swab sampling under ISO-15189 in August 2021. In addition to fit to fly testing, we have subsequently registered with DHSC to carry out "Test to Release" day 5 swabs, and day 2 and 8 swabs, and can now offer these services to our customers.

WTC continues to work in partnership with LSTM and the National Travel Health Network and Centre (NaTHNaC) in the delivery of the Professional Diploma in Travel Health. It has been another successful year, with two more student cohorts starting this course, 15 in cohort 4 and 13 in cohort 5.

WTC continues to underpin the values of LSTM by making a difference to health and wellbeing and achieving and delivering through partnership.

2020/2021 AT A GLANCE

This year, Well Travelled Clinics:

HAD
4796
PATIENT VISITS

ADMINISTERED
2195
VACCINES

DISPENSED
592 **PACKETS OF**
MALARIA TABLETS

and carried out:

- 48** *Sickness and absence medicals*
- 339** *Pre deployment medical screenings for overseas workers*
- 84** *Oil and gas medicals*
- 49** *Sea farer medicals*
- 96** *pre-employment screens for LSTM staff*

Liverpool Insect Testing Establishment (LITE)



LITE was formed 11 years ago in response to demand from agrochemical companies for a service to evaluate alternative chemistries against an array of mosquito vectors.



Professor Hilary Ranson - Interim Head of LITE

From an initial staff of 3 LITE has grown to a team of 16 and has expanded the range of mosquito populations, and bioassay and analytical platforms, to meet the growing demand for our services.

LITE is housed in purpose built facilities on the top floor of the LLSA building, also known as the 'Accelerator'. As member of the Good Laboratory Practice compliance

monitoring programme LITE is able to support manufacturers in assembling data packages for regulatory authorities, including the World Health Organization's vector control prequalification process, but also works with clients to develop bespoke assays for use earlier in the discovery phase of the pipeline.

This year has seen some key staff changes with the departure of our previous Head of LITE, Helen Williams, and the arrival of Noreen Shahid, who is acting as interim Test Facility Manager, supported by Professor Hilary Ranson and Study Directors Louise Ford and Amy Guy and the rest of the team. The technical team has been restructured to provide more opportunities for training and career progression.

In July LITE was awarded a competitive tender from IVCC to support their insecticide development pipeline for a further 3 years. This funding provides an excellent platform to embark on LITE's next phase of expansion: in January 2022 LITE will be transitioning to a spin out company, in partnership with iiCON. This transition will enable LITE to expand its client base, and offer a wider range of services, including assays on other nuisance pests, whilst maintaining strong links with the technical expertise in vector control at LSTM.

Images clockwise from the left: Maintaining our multiple lines of insecticide resistant mosquito populations; Aspirating mosquitoes in preparation for insecticide testing; Testing the durability of insecticides on alternative mud surfaces. All photos by Robert Prendergast





Dr Nick Hamon, CEO of IVCC

IVCC is the only product development partnership (PDP) working in vector control. Our goal is to support the development of a toolbox of new and enhanced vector control interventions to address the growing threat of pyrethroid resistance, the mostly commonly used public health insecticide in vector control.

Our strategy since inception has been focussed on three distinct areas of product development; to increase the availability of new indoor residual sprays (IRS) to support their annual rotation and therefore the longevity of the insecticide; secondly, to reduce reliance on pyrethroid only bed nets which malaria carrying mosquitoes are increasingly showing resistance to and thirdly to look for new tools that can help address the challenge of outdoor biting mosquitoes. Our progress to date has been both successful and rewarding.

A Suite of New Indoor Residuals Sprays Delivered

With Sylando® (BASF) and VECTRON™ T500 (Mitsui Chemicals Agro) awaiting WHO PQ listing, along with K-Othrine® Polyzone (Bayer), Actellic® 300CS (Syngenta), Fludora® Fusion (Bayer) and SumiShield®50WG (Sumitomo Chemical), the toolbox of IRS products that will allow for best practice insecticide resistance management through rotation has been delivered. Through the Unitaid-funded NgenIRS initiative, we have learned a great deal about the strong performance of IRS as well as created competition to lower intervention costs and increase coverage with effective products.

Focus on New Generation Bed Nets

The introduction of Interceptor® G2 (BASF) is paving the way for a new generation of dual active ingredient bed nets. Starting in 2010 with an archive of over 4.5 million compounds, IVCC has studied and optimised 27 chemical classes with activity against mosquitoes and narrowed the field down to a handful of lead candidates. Three novel insecticides new to public health are in full development. Our focus over the next five years is converting the chemistry pipeline into 2 repurposed and 2 novel public health insecticides. This relies on strong partnerships with a fast-consolidating R&D based agrochemical industry and with companies having expertise in net development, manufacturing, and distribution. IVCC is contributing funding, scientific support, know-how and technical evaluation capacity in malaria endemic countries across Africa and, more recently, the Indo-Pacific region.

Outdoor Transmission Prevention, the Next Frontier

Protecting people against mosquitos biting when they are outdoors is the next technical challenge to be tackled to enable malaria eradication. IVCC's strategy is driven by two key projects: establishing Attractive Targeted Sugar Bait (ATSB®) public health value in sub-Saharan Africa and the evaluation of last mile outdoor protection tools in the Greater Mekong Subregion.

Although the concept of ATSB®s was not new, it was an IVCC 'Call for Proposals' in 2015 that brought the potential of ATSB®-type technologies to the forefront. A first generation ATSB®s (from Westham) is in an advanced stage of development and about to be deployed in large scale epidemiology studies in Kenya, Mali and Zambia, with an expectation to open a new vector control product class by 2025. There is also strong interest in evaluating the use of ATSB®s against urban malaria (*Anopheles stephensi*), their potential for indoor use and their performance against vectors of dengue, Zika virus and Chikungunya.

Nothing can be done without Highly Effective Partnerships

IVCC is a product development partnership (PDP), with the emphasis on partnership. None of the progress made in the past year could have been achieved without the collaboration with donors, industry, the academic community, national malaria control programmes (NMCPs) and non-government organisations. It is the quality of these partnerships which will allow for insecticide resistance management (IRM) and integrated vector management (IVM) strategies to preserve new tools from resistance.

There is a critical need to have IRM and IVM strategies and agreements in place with industry partners and NMCPs to preserve new interventions and optimise their performance. The scale-up of new tools, which is almost always more costly at launch than the products they replace, calls for the implementation of sustainable catalytic market shaping initiatives in key endemic countries. From an operational perspective, IVCC recognises a need to increase its footprint in endemic countries to inform strategy and support on the ground activities.

Public Health Revolutions

The development of a COVID-19 vaccine in little more than 12 months with no compromise on safety or efficacy demonstrates what can be achieved when the right resources, scientific expertise and political will are focused on a public health challenge. The same recipe can be applied to malaria, so NMCPs can have access to effective new vector control tools and deploy them at scale.

The WHO endorsed malaria vaccine, RTS,S/AS01 (trade name: Mosquirix) is a major breakthrough in the elimination of malaria. Modelling and experience tells us it is essential that this long-awaited new tool is complemented by antimalarial drugs, diagnostics and highly effective vector control to maximize its efficacy. It is the right combination of tools in the right geography, aided by effective surveillance-informed decision-making that will allow the world to finally be free of malaria. As Yacine Djibo, the founder and executive director of 'Speak Up Africa' wrote in a letter to the New York Times back in October, 'With more investments and effective tools, we can be the generation that will end the disease for good'.

LSTM in the Media

Yet again LSTM media output has been dominated by the COVID-19 pandemic. The year has seen more than 120 press and news releases published, alongside numerous requests for comment and reassurance from LSTM's experts, resulting in thousands of mentions in the online, broadcast and print media with a potential reach of hundreds of millions.

COVID-19 remained the biggest story of the last 12 months, with LSTM's experts being called on to talk about all aspects of the pandemic, from testing to vaccination roll-out and the post-Christmas lockdown. Professors Bertie Squire and Kevin Mortimer alongside Emeritus Professor Nick Beeching and Drs Tom Wingfield, Tom Fletcher and Angela Obasi became familiar faces and voices to local and regional audiences throughout. News of the approval of the Oxford AstraZeneca over Christmas, and the fact that LSTM had been a site for Phase III of the trial, meant that Dr Andrea Collins and Dr Helen Hill gave comment on the possible rollout. The success of LSTM's part in the trial meant that the team were called on again to take part in the ComCov trial which saw different vaccines as primary and booster jabs to test the efficacy of doing so. Utilising the local media, participants were recruited in record time, regardless of the narrow criteria and meant strong coverage for the start of the trial with regional broadcast media as well as ITN and Channel 5 News visiting LSTM.



BBC North West Tonight reporter Andy Gill at LSTM during the ComCov vaccine trial - photo Clare Bebb

Other aspects of LSTM's research also hit the headlines with Dr Emily Adams and her team, who had become familiar faces in the media in relation to the search for effective diagnostics for COVID-19, being interviewed about their study into the transmission risks posed by sports equipment. Dr Adams and Dr Thomas Edwards were interviewed by BBC Sport as well as earning a front page on the national tabloid paper, The Daily Star, when they found that the risk of transmission from sports equipment was likely to be relatively low, opening discussions at a national level in regard to reintroducing amateur sport again as the UK started to ease some restrictions. The work was part of wider research by the team, looking at how the virus was transmitted, which also included surface swabbing and air sampling within medical and testing settings.

The relationship that has been built between LSTM's clinicians and scientists and the media has been of benefit to LSTM with a few notable examples: The reporting on International Day of Women and Girls in Science, when ITV Granada came and filmed some of the women who had been involved in the pandemic research and clinical trials,

which was featured on the news regionally and prominent on ITV's national news website. The second example of the importance of a good relationship with the media was LSTM's Bump it Forward Campaign, launched to encourage people to donate the equivalent value to their COVID vaccine in order to provide quality PPE to our colleagues working on the frontline in Africa until they received their vaccinations. BBC North West Tonight covered the campaign, interviewing Drs in Malawi and Professor Kevin Mortimer at LSTM and donations of over £25,000 were received in a few hours after the programme's transmission.

LSTM has continued to work with the Science Media Centre again this year, carrying our experts voices far and wide. LSTM's Dr Tom Wingfield remains in close contact with the team in London, which has seen him regularly quoted by nearly 400 outlets throughout the UK media as well as across the world, with audience figures in the millions. He has also written, with his colleague Professor Miriam Taegtmeier, several pieces for the online platform The Conversation about the impact of the pandemic on frontline health care, which have also been picked up by national newspapers, including the Independent.



Partial capture of LSTM's daily media monitoring report - 4 August 2021

Early September saw the launch of the Pandemic Institute, which is a partnership across Liverpool institutions including LSTM, which will look at pandemic preparedness. LSTM featured heavily in the launch publicity with Good Morning Britain going live from the lab on the morning of the launch and local BBC and ITV, Sky news and Al

Jazeera interviewing Professor Daniela Ferreira and Dr Carla Solórzano Gonzalez about the importance of development of platforms that would make delivering vaccines and therapeutics for future pandemics much quicker. LSTM and



Dr Carla Solorzano Gonzalez with ITV Granada News for their report on Women and Girls in Science 2021 - photo Clare Bebb

MLW's Professor Henry Mwandumba was also interviewed by Al Jazeera and featured in an article in the Observer, alongside Professor Ferreira, about the importance of pandemic preparedness for international partners.

Also, from March 2021 onwards, LSTM advocated on behalf of science and global health in the face of the UK Government's decision to reduce the amount of GDP spent on the Official Development Aid budget as a means of economic recovery in the face of the pandemic. Director Professor David Lalloo spoke publicly not only about the lives that could be potentially lost due to the cuts, but also the damage to the UK's world standing as a health and science superpower and to international partnerships in Lower-and Middle Income Countries (LMICs), because programmes would be cut short or budgets significantly reduced.

As well as giving comment to the Financial Times and the Lancet, he jointly authored an Editorial in the Daily Telegraph about the cuts, alongside the then Director of the London School of Hygiene and Tropical Medicine, Professor Peter Piot, and the Director of the Institute of Development Studies, Professor Melissa Leach. Alongside these editorials, Professor Hilary Ranson spoke to the Daily Telegraph about the cuts to the vector control programme PIIVeC, which saw the programme's funding stopped just months before its completion, at the vital results gathering stage. This was also featured on Channel 4 News, including an interview with PIIVeC fellow Dr Tresor Melachio in Cameroon.

DT opinion



Fundraising

LSTM's 125 anniversary campaign received a boost from the Lord Leverhulme's Charitable Trust who pledged £125,000 to mark this significant milestone for LSTM in 2023. The funding will support the new Pembroke House development (see Estates elsewhere in this report), creating a flagship centre for training and capacity development at the heart of the campus in Liverpool.



Karen Brady - Director of Fundraising



also received, supporting students on online and campus programmes. LSTM aims to secure 125 new scholarships as part of the Anniversary campaign.

The ambitious fundraising campaign focuses on supporting LSTM's growth as a global organisation; breaking the cycle of poor health and poverty, and bridging the gap in health inequalities. The campaign supports four key aims: Building Connections (via partnerships and a connected global infrastructure); Creating Opportunities (through scholarships, PhDs and our virtual incubator, HiVE); Generating Knowledge (through catalyst seed funding for exciting new research and the establishment of a flagship Institute for Resilient Health Systems); and Developing Capacity (by investing in global scientific talent and associated training and development).



More information can be found here:
www.lstmed.ac.uk/support-us

The first donations towards the 125 Anniversary Scholarships programme were

A significant focus for the Fundraising team throughout 2021 has been the Bump It Forward (BIF) campaign, which was launched in January 2021 in response to reports of high COVID-19 rates in Malawi and inadequate levels of PPE. The campaign was created and launched in three days and was run via JustGiving, asking donors to 'bump forward' the equivalent of their vaccine (c£25) in order to protect health workers in African countries until the vaccine reached them. The response has been phenomenal, with the campaign raising £268,249 in online and offline donations from 4,863 donors.

This funding has enabled LSTM to support partners in seven countries to purchase 1.3million items of PPE to date, which have been distributed to over 160 healthcare facilities. The impact of this has been profound, genuinely helping to keep health workers safe at a time when they are most needed as health systems became overwhelmed. Bump It Forward was featured in regional, national and international media.

We are truly grateful to the individuals, foundations and businesses who supported our work over the last year.

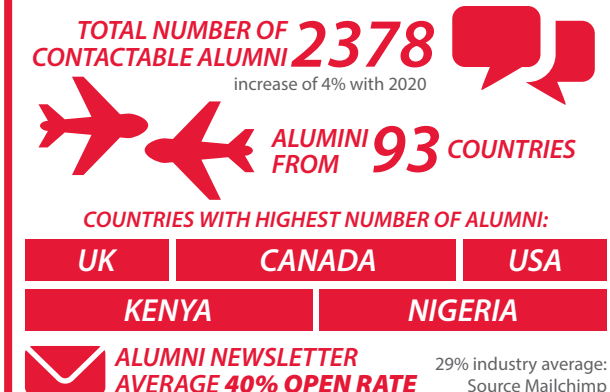


All gifts, regardless of size or designation, help us to tackle the global health challenges facing humanity.
www.justgiving.com/campaign/bumpitforward



Dr Fumbani Limani, Dr Chanizya Mulambia, Dr Dingase Dula and Dr Melita Gordon on the ward in Blantyre, Malawi wearing PPE provided by BIF. Photo by Melita Gordon

Key Alumni Stats



Environment and Sustainability

LSTM is a centre of research excellence on global health challenges that affect some of the most disadvantaged communities in the world, and given our mission, we have an obligation to advocate for change and be a leading force in the fight against climate change.

Sustainability and Environment Committee (SEC)

LSTM set-up the Sustainability and Environment Committee (SEC) in January 2021. SEC has broad representation across LSTM's departments and career stages and is responsible for the development and implementation of environmental sustainability across LSTM ensuring an integrated, proactive approach that is informed by best practice, and aligns with our values, objectives and strategy.

SEC works in close partnership with other parts of LSTM governance structures and reports to LSTM's management committee.

The SEC and its Environmental Working Group (and sub groups) have developed an Action Plan, which includes measures and targets across corporate governance, operational management, procurement and travel.



PROGRESS TO DATE:



2019

LSTM introduces dry mixed recycling bins around all LSTM buildings, in communal, and open office areas.



2020

Jul: the Carbon/Travel subgroup carries out a schoolwide survey and focus group discussions to investigate staff international travel throughout 2019, and gauge opinions on how LSTM could best reduce its carbon footprint. A Report is submitted to Management Committee, and published on LSTM website.

Oct: LSTM switches from brown electricity – containing fossil fuels – to 100% certifiable renewable energy



2021

Jan: Sustainability & Environmental Committee is established (SEC).

Feb: LSTM decides to divest from fossil fuel companies.

Aug: LSTM Estates in collaboration with an external consultant carries out a short Travel Attitude Survey to better understand how staff are feeling about travelling to work or study (locally).

Sept: The Data subgroup reviews the People and Planets guidelines and assessment categories and submits LSTM's data. For the first time ever, SEC launches external webpages dedicated to sustainability and environment at LSTM <https://www.lstmed.ac.uk/about/sustainability-environment-at-lstm>

Oct: The Green Working subgroup launches The Green Laboratory Guide, inclusive of a green pledge for LSTM lab users to show their commitment to ensuring green laboratory practices at LSTM.

Nov: COP26 (31st October – 12th November). Estates lights up the main building in green. The Comms subgroup books speakers & arranges for a board in the social space for people to share their thoughts.



2022

Developing Biodiversity & Sustainable Construction statements and make them publicly available

Reducing air travel emissions and sustain this reduction

Enhancing awareness of carbon costs in collaboration with new travel provider

Investigating offsetting options

Awareness raising

Developing local travel plan aimed at decreasing the environmental impact of transport to and from LSTM

Appointing an Environmental Officer

Promoting responsible procurement practices throughout our Supply Chain



People and Culture

'Our aim is to ensure that LSTM is a place where colleagues can thrive and flourish, where they feel valued and recognised whilst developing their career prospects and where managers are supported to lead their teams successfully'

Management Committee response to staff survey 2020.

Pandemic

The pandemic continued to dominate our work throughout 2020-2021, as we supported colleagues to work remotely and onsite. Working closely with health professionals, we developed a health risk assessment, which helped us to understand the risk of COVID exposure, based on a range of individual health factors. We also facilitated early access to the vaccination programme. Over 70 colleagues were supported through the furlough scheme, which helped individuals and teams who were unable to deliver projects or normal work because of the pandemic. We extended our Career Track programme by 12 months, giving participants longer to achieve targets required for successful completion. We provided means by which colleagues could share how the pandemic had impacted them, through annual performance review conversations.

Maintaining mental health and resilience have been important throughout this period: thanks to our wellbeing champions - a team of dedicated volunteers who organised a series of wellbeing activities and events to support colleagues throughout the year.

In September 2021, we introduced a new agile working programme which enables people to work to a more flexible working pattern, including a combination of onsite and remote working, to support better work life balance, whilst still meeting organisational needs. This was the culmination of a review undertaken by a working group, who canvassed views across the organisation and took account of our experience of remote working during the pandemic.

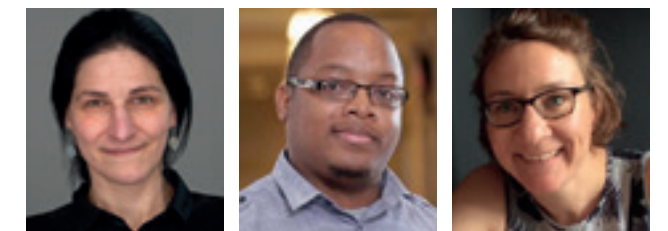
Career Progression

Support for career progression and development continues to be a cornerstone of our work. This year we have launched a learning and development programme and hosted targeted career development events across all professional disciplines:

to support promotion and development for researchers, technicians, programme managers and professional services colleagues; we have successfully promoted opportunities through apprenticeships with over 30 colleagues participating.

Our aim is for everyone at LSTM to have their own active growth and development plan and we will continue to evolve our Learning and Development programme.

Our successful Career Track Programme welcomed a further 8 future academic leaders in 2020-21. We would like to recognise the achievements of Dr Eva Heinz, Dr Kondwani Jambo and Dr Anne Wilson (pictured from left to right) who successfully completed this challenging programme this year.



We have reviewed our academic promotions scheme to include a more systematic approach to identifying and supporting potential future candidates and opportunities for those from non-traditional routes to apply and be considered. Congratulations to the following who were promoted in the last academic year:

Senior Lecturer: Dr Eva Heinz and Dr Kondwani Jambo

Principal Research Associate: Dr Jenny Hill

Reader: Dr Emily Adams, Dr Charles Ameh, Dr Grant Hughes, Dr Tim Martineau, Dr Lisa Reimer and Dr David Weetman.

We successfully piloted a regrading process to enable colleagues across LSTM to have their role reviewed and appropriately recognised.





Engagement and Culture

We undertook an LSTM wide staff survey last year. The feedback illustrated the strong sense of pride that people have, working for LSTM and the commitment to our mission and success. It also highlighted the opportunity for strong leadership and further action to improve opportunities for progression and develop and to improve equity and inclusion. The outcomes have been shared and incorporated into our plan of work.

Equity and Inclusion remains a major focus of work. As part of our longer-term plans for race equality work, we have established a Race Equality Advisory Panel which will provide evidence-based advice and recommendations for the development of race equity strategy and actions and has commissioned an external review, which will report back later in the year. In 2021, we published our first ethnicity pay gap report, using 2020 data and have also achieved earlier publication of our 2021 pay gap reports. We have seen the gender pay gap reduce, but the picture for ethnicity pay gap is not so clear: overall, this is a result of the lower numbers of minoritised ethnic colleagues. We have set actions to close the gaps over coming years.



2020-2021 saw the relaunch of the Athena SWAN charter and we are continuing our self-assessment process in preparation for our application for a silver award in 2022, focusing on trends in our staff profile, opportunities for progression and diversity across committees and governance structure

In 2020-2021, we will publish our revised inclusion strategy, which will bring together our Athena SWAN plans and race equity actions alongside other priorities.

Our staff networks play an important role in the development of equity and inclusion at LSTM. In the last year, both the BAME Network and the LGBTQ+ network have organised activities, acknowledged and celebrated events such as Black History Month, Pride, International Women's Day and National Pronouns Day and contributed to the development of our strategy. We are currently exploring further networks and resource groups including a disability network.



HR and Wellbeing

Within HR, we have appointed a Global HR Manager, based in Malawi, who will support the development of international HR practices in the coming years. Following Brexit, we have supported our staff from European countries, to navigate the Settlement Scheme, enabling them to continue to work and

live in the UK. Changes to the visa and immigration system have seen an increase in roles being offered internationally.



We have developed a range of wellbeing resources and activities including a central hub of resources and information, health and wellbeing support and advice, accessible via mobile and app for colleagues globally; we have trained mental health champions and menopause champions who can provide specific support to colleagues. We will develop a wellbeing strategy in the months ahead.

Research Culture

The culture of a research institute affects who does research, what research is done, how it is done and the reach and impact of that research. In the last few years there has been increased awareness across the sector of the negative impacts of a hyper competitive research environment, both on the individual and the institution. At LSTM we strive to create a healthy research culture that recognises and rewards the contributions of all across the organisation for their varied contributions to research, encourages all to support the career development of others and enables all to generate and disseminate excellent, impactful research that meets the highest standards of research integrity.

Over the last 12 months we have revised our academic promotions documentation to take a more holistic view of the varied contributions to research, avoiding the use of misleading metrics, and developed an action plan to support the development and career pathways of researchers, utilising learnings from early career researchers that have recently left LSTM to identify areas for improvement.

We have also been improving our guidance, training and policies on research integrity and data management to improve the reproducibility of research. Building on ongoing reflective learning on equitable partnerships, we seek to create a research environment where all staff are encouraged to speak up if they witness questionable research practices in any aspect of our work, and any such activities are promptly addressed, with lessons learnt embedded across the organisation. Much remains to be done but by working together across the organisation, great progress can be made.

Safeguarding at LSTM

LSTM recognises its role in safeguarding and protecting our staff, students, volunteers and other representatives as well as research participants, patients and communities with whom we have direct and indirect contact through our work.

A Strategic Safeguarding Oversight Committee (SSOC) is in place to monitor the organisation's progress against our safeguarding action plan which identifies four work streams:

Reporting; People & Training; Policy & Practice and Risk Identification.

Reporting

- LSTM encourages reporting of concerns through our "Freedom to Speak Up" (FTSU) system which is available to all staff and students. The system aims to instil a culture of "speaking up" about any concerns in order to improve the safety and security of our research participants, patients and other people who come into contact with us, as well as that of our staff, students and other representatives.
- We also have a paper-based reporting form on our external website which any member of the public or our collaborative partners can access to raise concerns. Any concerns raised during the year have been managed in accordance with the relevant LSTM policies and procedures.

People & Training

- A safeguarding training needs matrix has been developed outlining the type and level of training available for different levels of staff and safeguarding focal points. Induction training and mandatory 3 yearly safeguarding training is in place for all staff and students.
- Role descriptions have been developed and approved for the Safeguarding Lead, Safeguarding Focal Points and the Lead Trustee for Safeguarding.
- During 2020/21 nine face to face workshops on Safeguarding in Research and five online Introduction to Safeguarding workshops have been delivered for research teams and an online Safeguarding Information Point has been developed on the LSTM website.

Policy and Practice

- The Strategic Safeguarding Policy and The Protecting Children and Vulnerable Adults' Procedure have been reviewed and updated.
- The safeguarding lead has continued to work closely with a number of LSTM departments, to support the development of their safeguarding systems and processes and improve practice.

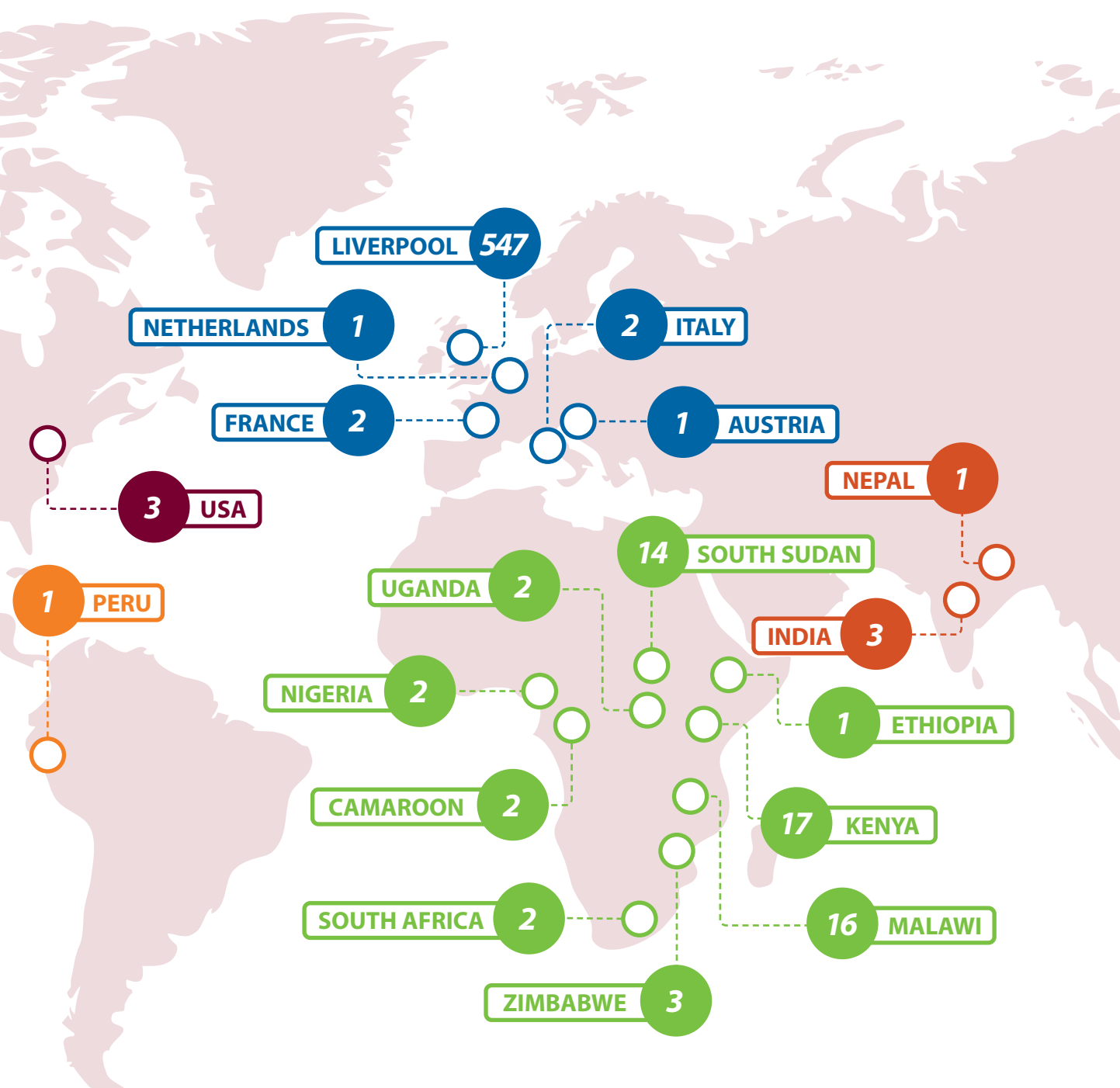
Risk Identification

- LSTM has identified key organisational safeguarding risks, and these are regularly reviewed. The SSOC continually re-assess these risks to identify further controls and monitor progress against our action plan.
- LSTM has developed a safeguarding risk mapping tool to allow teams to consider safeguarding risks related to the delivery of research activities and identify actions to mitigate and identify appropriate referral mechanisms. There is still ongoing work required in this area to ensure that safeguarding risk assessments are reviewed regularly.

Priorities for the Year Ahead

- To promote continued use of the FTSU system and advertise the safeguarding focal points.
- Ongoing training, development and capacity building of safeguarding processes across LSTM and in conjunction with our collaborative partners.
- Continue to promote roll out and adoption of safeguarding risk assessment.

Staff Overview



Total number of staff **620** Numbers as per 1 September 2020 - excluding IVCC & WTC staff members
Stats include all LSTM staff on UK and respective national contracts

Information and Knowledge Exchange

The Information Services Team faced many challenges this year. Whilst the Library was closed, our work to support LSTM continued. Information services has supported LSTM's commitment to REF, Open Access and DORA (the San Francisco Declaration on Research Assessment).

Publishing

Throughout the year we provided support through access to transformative publishing arrangements and publisher deals to allow increased access to publication funding, alongside providing greater access to our research in line with LSTM's mission, values and DORA commitments. We worked with a cross organisational team to ensure compliance through our Institutional Repository to not only support our REF submission but to guarantee funder requirements were met.

Library

Our ongoing support to teaching and learning allowed us the opportunity to expedite our planned expansion of services the library has to offer to support the immediate shift to online and remote working. This was welcomed by staff and students alike, from the click and collect offer for physical resources when the staff were back on site, to more complex inter library loans and document supply that proved extremely challenging whilst so many libraries were closed, to the vastly increased access to electronic resources including large upgrades to eBooks, providing access whilst teaching and learning was operating remotely but will ensure our expanded offering will continue. Whilst we are proud to say that during the last year our service never stopped, we are delighted that we have been able to open our doors physically once again and are welcoming library users to study and browse our shelves once more.

Knowledge Exchange (KE)

KE is defined as "Research information and expertise that is exchanged with businesses, society and/or the economy to enhance the contribution higher education (HE) makes to the economy and society". At LSTM, KE activities include, but are not limited to, engaging stakeholders beyond the academic community in order to increase impact of research, commercialisation, technology transfer, public engagement and engagement with policy and professional practice.

KE activity is now being assessed via the Knowledge Exchange Framework (KEF). This is a national exercise currently in the infancy stages. Universities are scored and ranked on the following criteria:

- Research Partnerships
- Working with business
- Working with the public and third sector
- Skills, enterprise and entrepreneurship
- Local growth and regeneration
- IP and Commercialisation
- Public and community engagement

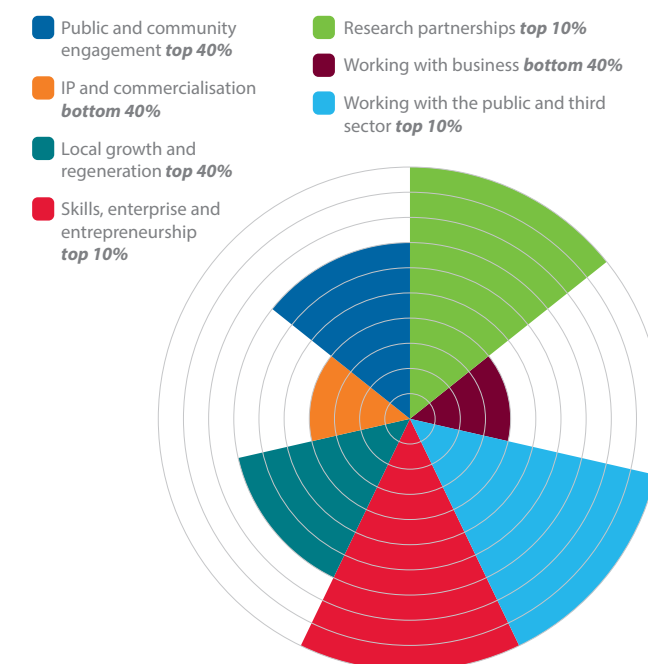
LSTM is in a cluster with other research-intensive organisations and our performance is scored relative to others in the cluster.

To support our KE activity aligned with the KEF metrics LSTM are signatories to the Knowledge Exchange Concordat (KEC) and have committed to developing our knowledge exchange activity to help drive economic, social, and cultural recovery and growth.

The KE concordat will facilitate the development, enhancement and transparency of the wide range of knowledge exchange activities performed by LSTM and support partnerships integral to our success.

KE at LSTM is a fundamental part of our mission and a KE Steering Group has been established to share, develop and coordinate opportunities, based on the KEF metrics and eight principles of the KEC (Mission, Policies and processes, Engagement, Working transparently and ethically, Capacity building, Recognition and rewards, Continuous improvement, Evaluating success).

Through the Wellcome Trust Institutional Translational Partnership Award we have made good progress in staff and student capacity building. Following a gap analysis conducted with staff to identify barriers in translational research 30 workshops have been made available to 963 registered staff/students/overseas partners. Evaluation surveys conducted post workshops have shown a 100% increase in knowledge/confidence in the workshop topic.



Governance and Assurance

As a specialist institution focusing on research and teaching, LSTM occupies a unique space in the global Higher Education landscape. As predominantly a post-graduate institution, the teaching/research interconnection at LSTM is extremely important as is the student proximity to cutting edge research. This is a fundamental part of the learning experience here and creates the unique identity of LSTM.

The determination and resilience that our students have demonstrated throughout the pandemic is congratulated by the Board of Trustees. Their ability to adjust to restrictions and adapt to new models of teaching and learning have been exemplary.

The Board of Trustees also acknowledged the work of the Management Team and all staff for their commitment and rapid response during these unprecedented times. Creating a stable and sustainable working environment, whilst managing financial risks has been well managed and well executed. These are the challenges faced as a specialist research intensive provider, and it is crucial to be agile and responsive when considering the implications to the organisation when operating under continued restrictive measures.

Board of Trustees

For the majority of 20-21, the Board of Trustees continued to meet virtually and received detailed updates throughout the pandemic response from the Director of LSTM and Chairs of Finance and Investment, Audit Committees and the LSTM executive. This provided the Board with significant assurance during a continued turbulent period. It was clear that LSTM's response and action were always transparent and well communicated across the institution.

The challenges faced by our communities both in Liverpool and overseas, as situations deteriorated late in 2020, were worrying for all concerned. The visit from the Minister of Science to Liverpool to launch the £18M Strength in Places grant reinforced the message about the importance of infectious disease research and why Liverpool and LSTM specifically are the front-runners in this arena. The Trustees congratulated Professor Janet Hemingway on the success of this significant grant from UKRI to work on the infection innovation consortium (iiCON).

In its September 2020 virtual away day, The Board formerly welcomed Lynne Elliott in her capacity as Student Representative. For almost 20 years, Lynne has worked in global health, having extensive experience as a senior consultant and Director leading and reviewing large-scale health and development programmes in over 25 countries across Africa, Asia and Latin America. The Board always asks the Student Representative to engage the student body in communication so that the diversity of views of the entire student body, can be articulated back to the Board of Trustees.

At the November 2020 Board of Trustees meeting, LSTM's acting Chair, Sue Russell reported back on the work of the Selection Committee for the recruitment of a new Chair to the Board of Trustees. After a rigorous selection and interview process, the committee endorsed the appointment of Jim McKenna, formally as a Trustee and as Chair elect. Jim, who is the former COO of Logica, an international IT service firm, is an experienced Chair and Non-Executive Director and has worked extensively in the commercial, charity and higher education sectors. The Board of Trustees and staff were delighted to have him appointed as LSTM moves towards its 125th anniversary.

At her final Board meeting as Acting Chair, the Board of Trustees unanimously thanked and congratulated Sue Russell for her role in supporting the Chair position since March 2020. LSTM is extremely grateful to Sue and all Trustees who provide their time and commitment to LSTM's work.

LSTM held its 121st AGM on the 26th November 2020, which was the first in our history to be held virtually. A COVID-19 related amendment to the Corporate Insolvency and Governance Act 2020 allowed Charitable companies and Charitable Incorporated Organisations to hold their AGMs online up until 30 December 2020. Jim McKenna was formally appointed as a Trustee at the AGM and Sue Russell announced Jim McKenna as the new Chair elect to its Board of Trustees. Reporting on LSTM's financial situation, Treasurer John O'Brien talked about the impact of the pandemic and the UK lockdown on LSTM's finances and the challenges it posed, but that the institution had responded well. He concluded that overall, the financial condition of LSTM, with the support of our research funders, remains healthy despite the pandemic. During the AGM the Annual Report and Financial Statements were formally adopted.

Jim McKenna formally took over as Chair on the 1st February 2021 and one of the first tasks to oversee was an independent review of governance arrangements. How LSTM adapts to the emerging challenges presented by the pandemic, addressing greater awareness of significant structural inequalities, and a need to address our organisational sustainability all require robust leadership from the Board of Trustees and so it was crucial to identify ways in which LSTM's Board and the executive team can collectively address these challenges.

Board Governance Effectiveness Review

The Board of Trustees commissioned an external support to review and enhance its governance effectiveness. Using the Governance Maturity Framework, Advance HE engaged with Board members over a series of meetings and presented its report back to Trustees. Advance HE's main findings were delivered over the summer '21 and are structured across four main priorities:

- *Academic Governance Oversight – This area will undergo a further review to enhance good governance oversight arrangements, building upon the good work already implemented by the Education team.*
- *Strategy Oversight – As LSTM moves into the 2023-2028 strategic development and implementation period, the Board of Trustees have already started to engage further and deeper across LSTM through more regular, formative strategic discussions and strategy oversight on a more holistic basis.*

- *Performance – LSTM's executive are also prioritising their model of LSTM performance monitoring and how this is reported back in summary to the Trustees.*
- *Board composition – Ensuring diversity and succession planning of members is critical to the future stability and succeeds of LSTM's Board of Trustees.*

The report summarised that governance arrangements at the Liverpool School of Tropical Medicine are effective. Being enabled by good practices, policies and processes and realised through a Board and wider governance structure that is generally fit for purpose and clearly committed to the institution's long-term success.

The Board welcomed Advance HE's assessment and will discuss the action plan related to the activity as part of their ongoing commitment to developing governance effectiveness over the next 12 months.

GOVERNANCE MATURITY FRAMEWORK REVIEW

The assessment framework is designed to reflect the fact that every provider's Board of Trustees effectiveness review will be different to that of their peers. The brief of this review was aimed to:

- + Be forward looking, developmental and support LSTM in the realisation of its strategic ambitions, and be contextualised within its own vision, mission, and values.
- + Be informed by best practice in the HE sector, with demonstration of knowledge and evidence of relevant examples across HE and other sectors in the UK and internationally.
- + Examine LSTM's governance culture and ethos and the role of the Board in helping to determine the LSTM's strategy.
- + Evaluate LSTM's commitment to and understanding of embedding equality and diversity
- + Consider the scope, remit, and scheme of delegations of the four Committees of the Board (Audit; Finance & Investment; Nominations & Governance; and Remuneration).
- + Explore and evaluate the relationships between the Board and its committees and the Board of Trustees and the Management Team.
- + Be fully contextualised: examining the relevant reference points and benchmarks, including the *Regulatory Framework for Higher Education in England and other publications issued by the Office for Students (OfS), the Committee of University Chairs' HE Governance Code and the HE Remuneration Code.*
- + Stimulate an informed deliberation of existing practice, structures, processes, behaviours, and opportunities for improvement.



Estates

Throughout the last academic year, Estates, in collaboration with research groups, education and other professional service teams, has supported all manner of activities, both in the UK and overseas, ranging from travel safety and security to multimillion pound capital projects.

Safety and Laboratory Management

The safety and laboratory management team continue to provide effective support across all LSTM activities both on campus and abroad, identifying and minimizing potential risks, safeguarding LSTM's reputation, and providing pragmatic advice on safety matters.

LSTM laboratories were maintained to support COVID research projects and those staff and students working on site:

- Statutory notifications to HSE were undertaken to allow work on COVID-19 specific projects.
- The containment laboratories were routinely monitored & maintained at CL3 standard.
- Full training for new staff and students wanting to work within the containment laboratories was provided or reviewed and approved.
- The Laboratory Management Team ensure that statutory testing is completed on time to support the safe working with pathogens within the school.

On campus the team were involved in reviewing and updating the COVID risk assessment and measures to ensure the safe working of staff and students around LSTM campus.

The structure of the Health, Safety Oversight Committee is the Health & Safety (H&S) risk register and the management of H&S within LSTM, ensuring an effective risk-based approach to all LSTM activities.

The Travel Team, working closely with the Travel & Overseas Working Group and Procurement are implementing a new Travel Management Process with an integrated risk assessment solution for staff, students, consultant and volunteers travelling overseas on business. This will provide a more streamlined travel booking and monitoring process whilst ensuring LSTM meets in duty of care to all travellers.

Facilities Management

The long-standing cleaning service contract ended in May 2021 and tenders via the

CPC Framework for Cleaning Services were dispatched. The aim of the exercise was to obtain optimal value for money for cleaning services for all current LSTM buildings and put in place a framework of costs for future buildings as they come online.

The contract was awarded to Churchill Contract Services and the Living Wage was included as part of the contractual arrangements. There are numerous social value benefits to moving to the Living Wage and the evaluation team felt this was in line with LSTM's values as an organisation.

Environmental Management

LSTM being fully committed to operating in an environmentally friendly and sustainable manner has introduced a new Environmental Policy and has established a Sustainability and Environmental Committee.

To support the implementation of the policy all refurbishment projects incorporate environmental and/or energy improvements whenever practicable. This will include the aspiration to achieve a BREEAM Very Good rating on significant projects.

LSTM now recycles at source:

- Oct 17-18 about 13% of waste.
- Oct 18-19 about 22% of waste.
- Oct 19-20 about 28% of waste.
- Oct 20-21 about 33.2% of waste.

Energy is LSTM's second highest area of spend. During the reporting period, the switch to purchasing sustainable energy that represents best value for money via a flexible purchasing model has realized significant savings of around £139k to £189k for gas and electricity.



Pembroke House at the LSTM campus in Liverpool. Render by MCAU architects

Capital Works

Capital works are now picking back up following the mass roll out of the COVID-19 vaccination programme. The redevelopment of Pembroke House will extend and refurbish this existing teaching facility. The works involve the strip-out of internal fabric, forming of new windows and lift openings, and category B fit-out to provide state of the art teaching facilities. The existing 1-storey block will be extended to 2-storeys with feature wraparound glazing elements.

Site clearance for the CREATOR building, Blantyre, Malawi. Photo by Daniel Chafulumira



The project secured with funding from the Liverpool City Region Combined Authority (LCR), the Infection Innovation Consortium (iiCON) a collaborative industry: NHS: academic partnership and LSTM Education are the key users.

The project has planning approval and construction works started in October 2021.

The Clinical Research Excellence and Training Open Resource (CREATOR) building project in Blantyre, Malawi, is currently at RIBA Stage 5 (construction) and site preparation has already commenced on site.

In addition to the CREATOR project a new building to house research critical freezer archives was completed in 2020.

Awards and Honours

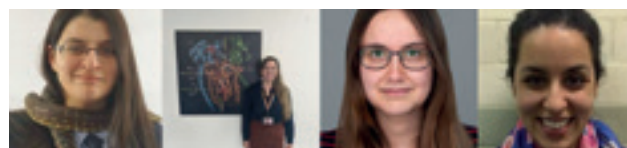
In June, **Dr Fiona Marston** was awarded the honour of OBE in the Queen's Birthday Honours List 2021.



Professor Kevin Mortimer

Professor Kevin Mortimer and his team received the Medical Research Foundation's Changing Policy and Practice Award for their work to evaluate an enhanced asthma care package for children in Malawi.

The 2021 LSTM's Director's Catalyst Fund awards were allocated to early career researchers pursuing independent and innovative research projects. The 4 recipients (pictured from left to right) were:



LSTM Director's Catalyst Fund Award winners 2021

- **Taline Kazandjian** for *evaluating novel snake venom gland organoid technology as a platform to accelerate antivenom research and development.*
- **Laura Jeffreys** for *elucidating the mechanisms of action of new chemical entities and repurposed drugs against SARS-CoV-2*
- **Ana Cubas Atienzar** for *accelerating diagnosis of Crimean Congo Haemorrhagic Fever through simultaneous detection of viral antigens and IgM.*
- **Jamilah Meghji** for *redeveloping models of care for symptomatic former TB patients in urban Blantyre, Malawi*

July saw four students **Josephine Shepherd**, **Jemima Hair**, **Jack Singleton** and **Abraham Gilbody**, who all attended taught modules at LSTM, win top prizes as they graduated from the University of Liverpool with BSc. degrees in Tropical Disease Biology (TDB).

Every year LSTM welcomes intercalating medical students and veterinary students. As part of supporting these students, LSTM awards competitive Intercalating Medic Prizes to support the cost of their MSc research project. This year's winners were **Celina Mitala** (MSc International Public Health – Sexual & Reproductive Health), **Beth McCallum** and **Rachel McCormick** (both MSc International Public Health – Humanitarian Assistance).

Also in July, **Dr Lucas Cunningham** has been awarded a substantial grant from the Caudwell LymeCo Charity, which raises money specifically for diagnostics and treatments into Lyme disease

In September, **Dr Carla Solórzano-Gonzalez** received a £50K catalyst pump-priming award from the University of Birmingham for her work in bacterial vaccinology to explore new approaches and strategies to advance vaccines in partnership with Lower-and Middle Income Countries and industry.

PGR student **Stephen Woolley** was awarded the Membership of the Order of St John for his COVID-19 work for the Royal Navy.



President Janet Hemingway wearing the RSTMH presidential chain. Photo RSTMH

In October, LSTM **Professor Janet Hemingway FRS**, director of the iiCON Consortium, became President of the Royal Society of Hygiene and Tropical Medicine (RSTMH), during their Annual General Meeting in Liverpool.

At the same meeting LSTM's **Professor Charles Wondji** was named as recipient of the RSTMH Chalmers Medal. The award recognises his work in tropical medicine and global health mentoring and professional development of junior investigators and other forms of capacity building.



Professor Charles Wondji

Emeritus Professor Nick Beeching was elected to Fellowship of the International Society of Travel Medicine in May and was awarded the Guthrie Medal of the Royal Army Medical Corps as outstanding Honorary Civilian Consultant Adviser to the Army in October.



Dr Emily Adams and Dr Fiona Marston OBE

Dr Emily Adams and **Dr Fiona Marston OBE** were both listed as 'Movers and Shakers' in BioBusiness 2021, an annual report published in November, which features the profiles of 30 talented individuals who are tackling the current biggest health

challenges, creating new opportunities for growth by combining a human understanding of technology and data with the drive to make healthcare improvements more accessible.

Also in November, Senior Lecturer in Global Health and Social science, **Dr Webster Mavhu**, has been awarded a five-year NIHR-Wellcome Trust Global Health Partnership International Intermediate Fellowship.



Dr Webster Mavhu

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President

Sir Richard Evans CBE

Chair

Jim McKenna

Director

Professor David Laloo MB BS MD FRCP FFM RCPS (Glasg)

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Jesper Kjaedegaard

Steven Mogford

Dame Lorna Muirhead DBE

Dame Jane Newell DBE JP

Sir Stephen O'Brien KBE

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James Ross OBE

Dr James Smith CBE

Sir Crispin Tickell GCMG KCVO

Sir Mark Walport FRS FMedSci

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TRUSTEES

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Joanne Dodd BA ACA

Lynne Elliott MPhil MBA PGCE BSc (Hons) – retired November 2021

Professor David Laloo MB BS MD FRCP FFM RCPS (Glasg)

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Andy Wright BSc MSc

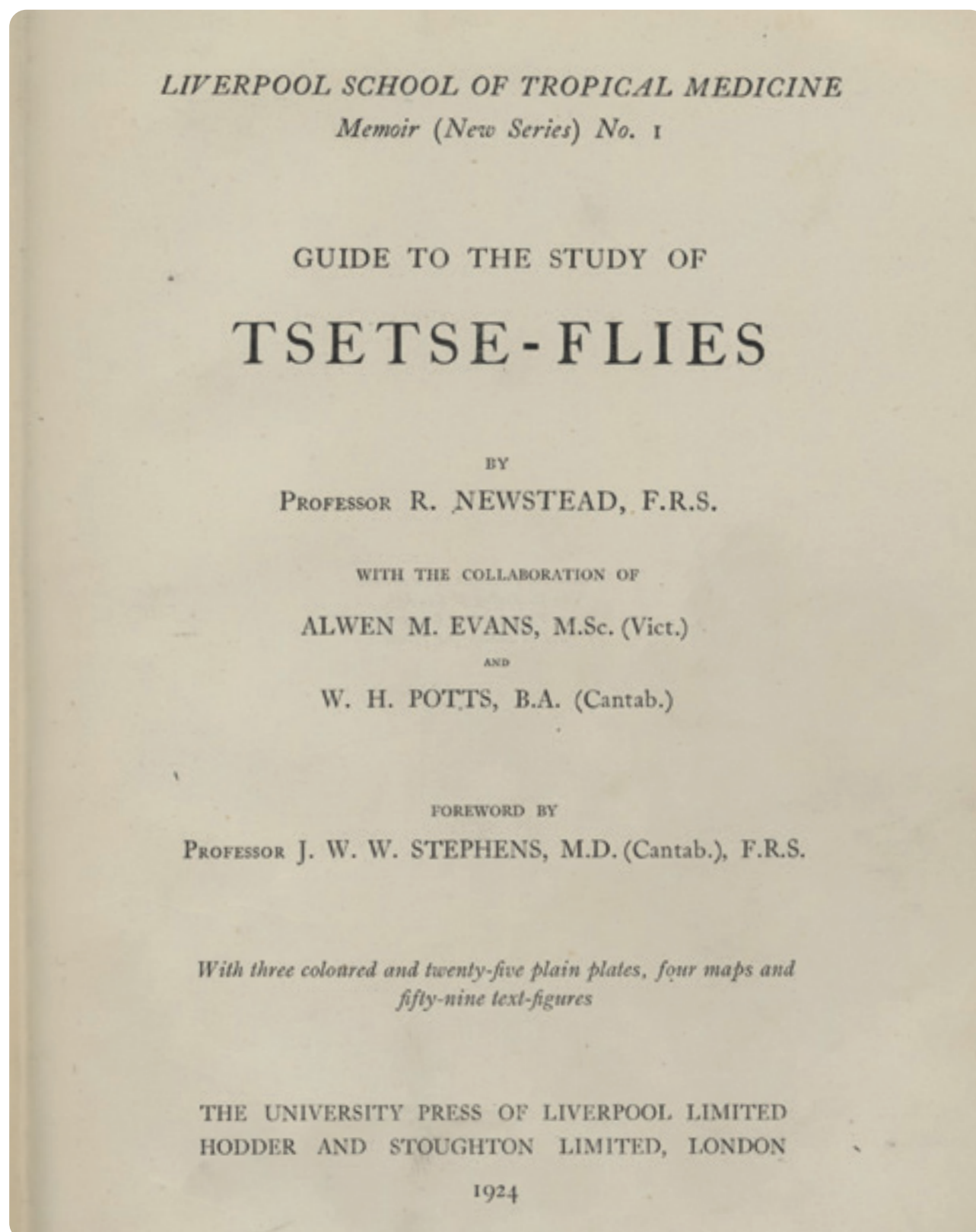
SECRETARY & CLERK

Robert Einion Holland FCCA MBA

Publications

The Online Archive brings together LSTM's published research outputs into one central repository, ensuring that they are made available worldwide.

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



LSTM Pioneers

Professor Herbert Michael Gilles
 CMG UOM KCSJ MSc DSc MD FRCP
 FFPH DMedSc (1921 – 2015)

LSTM's longest serving vice-president and former Dean. First 'lecturer-at-large' for LSTM and seconded to the University of Ibadan, Nigeria, in 1960. Professor Gilles later established Ghana's first tropical medicine institute. Deeply respected for his expertise in Tropical Medicine throughout the world and one of LSTM's greatest ambassadors.



In Nigeria, Maltese-British Professor Gilles became the mentor of Professor Adetokunbo Lucas, who later became WHO Director for Tropical Disease Research.

Returning to LSTM in 1965, he was offered a Senior Lecturer position by LSTM Director Professor Maegraith, before taking the Warrington Yorke Chair in Tropical Medicine.

Professor Gilles retired in 1986, having spent the previous five years as Dean of LSTM. He received LSTM's highest award, the Mary Kingsley Medal, in 1994 and the WHO awarded him the Darling foundation medal in 1990.



Prof. Gilles receiving the insignia of Companion of the Order of St Michael and St George from Queen Elizabeth II, 2005.

After his retirement, he continued to teach in Ireland, Italy and Malta and helping postgraduates who are seeking further training overseas. He was awarded the CMG for his outstanding work overseas and was appointed Companion of the Most Exalted Order of the White Elephant by the King of Thailand for his involvement with the faculty of Tropical Medicine at Mahidol University in Bangkok.

Professor Herbert Gilles published over 150 papers in scientific journals and several books, including 'A Short Textbook of Public Health Medicine for the Tropics', co-written with Professor Lucas and first published in 1973.



A Short Textbook of Public Health Medicine for the Tropics

Returning to LSTM in 1965, Professor Gilles was offered a Senior Lecturer position by LSTM Director Professor Maegraith, before taking the Warrington Yorke Chair in Tropical Medicine

Research Consortia Hosted and Managed by LSTM

The African Snakebite Research Group

Significantly and sustainably improving health outcomes after snakebite in sub-Saharan Africa

Funded by: NIHR

Web address:

www.lstmed.ac.uk/the-african-snakebite-research-group



The African Research Collaboration on Sepsis (ARCS)

Establishing centres of sepsis research excellence in Malawi, Uganda and Gabon

Funded by: NIHR

Web address: www.lstmed.ac.uk/ARCS



ARISE

Working in partnership with marginalised people in informal urban spaces towards improving accountability for their health and well-being, in Bangladesh, Kenya, India and Sierra Leone

Funded by: UKRI

Web address: www.ariseconsortium.org



CEASE

The CEASE project aims to investigate the origins, epidemiological importance and control of the invasive malaria mosquito *Anopheles stephensi* in the Horn of Africa

Funded by: Wellcome Trust/NIHR



COUNTDOWN

Investigating solutions to control and eliminate the seven most common NTDs by 2020

Funded by: UK Government Foreign, Commonwealth and Development Office (FCDO)

Web address: <https://countdown.lstmed.ac.uk/>



Drivers of Resistance in Uganda and Malawi (DRUM)

Investigating the drivers of antibiotic resistance in Uganda and Malawi

Funded by: Cross-research council AMR initiative and NIHR

Web address: www.lstmed.ac.uk/DRUM



Essentials

Developing and evaluating approaches to assess the performance of new classes of insecticide treated nets (ITNs) for malaria control

Funded by: The Bill & Melinda Gates Foundation

Web address: <https://essentials.lstmed.ac.uk/>



The Infection Innovation Consortium (iiCON)

A global infectious disease R&D programme bringing together industry, academia and the NHS in a collaborative effort to save lives by accelerating the discovery, development and deployment of new antimicrobial treatments and products

Funded by: UKRI: UK Government Department of Business Energy and Industrial Strategy (BEIS)

Web address: www.infectioninnovation.com



Innovation to Impact (i2i)

I2i works to address barriers to the introduction of new vector control tools. It works with stakeholders across the product development spectrum to address issues pertaining to efficient and effective testing, quality assurance and regulatory affairs to better streamline the product development value chain

Funded by: The Bill & Melinda Gates Foundation

Web address: www.innovation2impact.org



IMPACT

Strengthening the evidence around cardiac safety and drug-drug interactions with Arvs

Funded by: European Union/EDCTP2

Web address: <https://www.lstmed.ac.uk/research/collaborations/impact-improving-the-impact-of-existing-malaria-products-%E2%80%93-acts>



IMPACT

Translating global malaria in pregnancy policy to country-level policies and clinical guidelines

Funded by: European Union/EDCTP2

Web address: www.lstmed.ac.uk/research/collaborations/impact

IMPACT TB

Finding and treating TB cases in communities in Nepal and Vietnam

Funded by: European Union/Horizon2020

Web address: <http://impacttbproject.org/>



International Multidisciplinary Programme to Address Lung Health and TB in Africa (IMPALA)

Improving the health of children and adults in Africa through multi-disciplinary applied health research on lung health and TB

Funded by: NIHR

Web address: www.lstmed.ac.uk/impala



IMPROVE & IMPROVE-2

Conducting research into alternative drug regimens for women with malaria in pregnancy in Tanzania, Malawi and Kenya

Funded by: European Union EDCTP2

Web address: www.lstmed.ac.uk/research/collaborations/improve



LIGHT

LIGHT aims to support policy and practice in transforming gendered pathways to health for those with TB in urban, HIV prevalent settings to improve health, socio-economic and equity outcomes and to stop the spread of TB

Funded by: UKAID (FCDO)

Web address: <https://www.lstmed.ac.uk/light>



NEAR-AMR: Network of European and African Researchers on Antimicrobial Resistance

The Network of European and African researchers on Antimicrobial Resistance (NEAR-AMR) is analysing AMR surveillance and capacity strengthening in different national contexts

Funded by: The Joint Programming Initiative on Antimicrobial Resistance (JPIAMR) via the MRC

Web address: www.lstmed.ac.uk/near-amr



Partnership for Increasing the Impact of Vector Control

A partnership to reduce the burden of vector-borne disease through effective, locally appropriate, sustainable vector control

Funded by: Medical Research Council

Web address: www.piivec.org



Perform2Scale

Scaling up health management strengthening interventions

Funded by: European Union

Web address: www.perform2scale.org



REACHOUT

Strengthening the vital work of close-to-community providers of healthcare in Africa and Asia

Funded by: European Union

Web address: www.reachoutconsortium.org



READ-It

Focusing on evidence in malaria, TB, child health, maternal health, and health systems. Preparing and updating Cochrane Reviews. LSTM hosts the Cochrane Infectious Disease Group

Funded by: UK Government's Foreign, Commonwealth and Development Office (FCDO)

Web addresses:

www.evidence4health.org and <http://cidg.cochrane.org>



ReBUILD for Resilience (R4R)

Investigating health systems in fragile contexts experiencing violence, conflict and other global health challenges

Funded by: FCDO

Website: <https://www.rebuildconsortium.com/>



REDRESS

Using a person-centred approach to health systems design REDRESS will evaluate, develop and adapt health systems interventions for the management of severe stigmatizing skin diseases in Liberia

Funded by: NIHR

Twitter: @redress_liberia



RESPOND AFRICA

Established in 2017, the Partnership for the Control of Chronic Diseases in Africa (RESPOND-AFRICA) is a multi-disciplinary group from Tanzania, Uganda, Europe and the UK. Our vision is to improve the health outcomes of people with chronic life-long conditions in Africa through research, conducted in partnership with researchers from different disciplines, policy-makers, patient and community leaders and other stakeholders

Funded by: NIHR, EDCTP and Horizon 2020

Twitter: www.lstmed.ac.uk/RespondAfrica



SQALE

The USAID SQALE Community Health Services Program is a partnership between LSTM, LVCT Health and The University Research Company. We work closely with the Kenyan Ministry of Health, through the Community Health and Development Unit (CHDU) to develop and test quality improvement approaches

Funded by: USAID

Web address: <http://usaidsqale.reachoutconsortium.org/>



Tropical Infectious Diseases Consortium

A collaboration between LSTM, the London School of Hygiene and Tropical Medicine (LSHTM), the Jenner Institute at Oxford University and Public Health England, managing the MRC Confidence in Concept funding for individual projects that accelerate the transition from discovery science into therapeutic, diagnostic and vaccine development

Funded by: Medical Research Council

Public Benefit Statement

The charity trustees of the Liverpool School of Tropical Medicine are its Board of Trustees who have had due regard to the Charity Commission's guidance on Public Benefit, and particularly to its supplementary public benefit guidance on purpose, which primarily for LSTM, is the advancement of education and research, and advancing health/saving lives.

Although primarily concerned with teaching, learning, research, knowledge transfer, and the development of the potential of its students, both for their own sake and to serve the needs of society and the economy, LSTM also plays a major role in shaping a democratic, sustainable, and inclusive society by striving for its research to impact policies and implementing practices.

These distinct purposes inevitably impact on its governance structures and practices, including in the need to engage both staff and students in the governance of their institution and a clear recognition of the importance of public benefit.

Public benefit reporting is also an increasingly important aspect of LSTM's transparency and accountability, and this helps the staff, students, and the wider public appreciate what activities LSTM delivers in return for both public funding and tax exemptions. A representative record of those activities is published throughout this Annual Report and Financial Statements.

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Financial Statements 2020-2021



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Report to the Members of the Board of Trustees

1. Constitution and Organisation

The Liverpool School of Tropical Medicine (LSTM) was formally inaugurated on 22 April 1898 and incorporated on 30 January 1905 as the Incorporated Liverpool School of Tropical Medicine. LSTM was registered as a charity on 11 October 1963. LSTM is a company limited by guarantee and holds no share capital and is governed by a Board of Trustees.

The Incorporated Liverpool School of Tropical Medicine changed its name on 30 November 1992 to Liverpool School of Tropical Medicine.

The Secretary of State for Business, Innovation and Skills, by an Order of Parliament, under section 129 of the Education Reform Act 1988, designated LSTM as a Higher Education Institute (HEI) on 19 July 2013. LSTM receives direct funding from the Office for Students (OfS) and UK Research and Innovation (including Research England).

2. Memorandum of Association

LSTM’s Memorandum and Articles of Association was amended by special resolution and adopted at the AGM on 24 November 2017. Its main objects are:

To engage in, promote and encourage research, study and instruction in connection with the origin, character, alleviation, prevention and cure of every or any type of tropical disease which is now or may hereafter become known in any part of the world where such disease either manifests itself or has effects; and to advance and encourage learning and the practice of all sciences and arts allied with or which may be usefully studied in connection with the matters aforesaid, and to collect and circulate information with regard to such diseases, sciences and arts.

3. Statement of Public Benefit

LSTM is a registered charity subject to regulation by the OfS and the Charity Commission under the Charities Act 2016. LSTM reports annually on the ways in which it has delivered charitable purposes for public benefit.

The Board of Trustees, in reviewing LSTM’s activities in this regard, has taken into account the Charity Commission’s guidance on public benefit. The Board is satisfied that the activities of LSTM as described in these Reports and Financial Statements, and detailed in the Annual Report, fully meet the public benefit requirements.

4. Vision and Mission

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.

5. Objectives

The year ending 31 July 2021 completes the 4th year of the LSTM strategic plan 2017-2023. This 6-year strategic plan to 31 July 2023 takes LSTM up to its 125th anniversary in 2023. LSTM continues to experience an ongoing transformation and growth. LSTM’s success is dependent on the quality, commitment, and ability of its staff and a continuing favourable research climate for global health issues. Work on the development of the next strategic plan is now commencing, to be launched at the beginning of our anniversary year.

Undoubtedly COVID-19 has continued to impact LSTM, its subsidiaries and many of the communities, both overseas and in the UK, that we work with. LSTM, in partnership with the others in the Liverpool City Region, has mobilised the major concentration of infectious diseases expertise within the city to address the major research issues that COVID-19 poses globally. LSTM has had a central role in the response to COVID-19, extending from many staff working as clinicians to advice to governments. The LSTM COVID-19 multi-faceted response has brought researchers together from across all disciplines, such as pharmacologists, immunologists, clinicians and health systems researchers to work in partnership with multiple institutions and industrial organisations. This successful activity across the whole research pipeline, demonstrates the ability of the organisation to work flexibly and rapidly to changing circumstances which is critical to its success.

LSTM has had an exceptionally productive and stable cohort of senior academic and administrative staff leading the sustainable growth of the organisation over the last two decades. Further strategic appointments continue to enhance the exceptional research community within LSTM and will ensure that this momentum is maintained.

Our major strategic goals for the 2017-2023 period are:

- Strengthen the translational impact of our activities
- Expand our teaching portfolio
- Plan for growth

These 3 goals are expanded into 10 actions throughout this strategic cycle. We will:

1. Expand significantly our teaching portfolio in line with market demand
2. Identify, attract, retain and develop internationally competitive leaders in translational research
3. Align our research portfolio with global infection priorities
4. Ensure that our research focus covers the T1-T4 translational continuum
5. Ensure that our learning and teaching developments and research activities are aligned and integrated
6. Accelerate transition of research outputs into health impact
7. Enable genuine interdisciplinary activity

8. Enable effective global partnerships with multiple stakeholders in teaching and research
9. Consolidate and enhance our relationships with major funders
10. Provide the environment that supports the above

LSTM management undertakes regular monitoring and evaluation under the supervision of the Board of Trustees to ensure that the items are contemporary and are followed up each year. LSTM does not expect COVID-19 to impact the achievement of these goals and in fact, the Pandemic has played to LSTM’s strength as a world leader in managing infectious diseases.

Operating and Financial Review

6. The Nature, Objectives and Strategies of the Charity

LSTM continues to focus itself as a global leader in its field. Through the added strength and reach of its partnership working, both in the UK and overseas, our group turnover has achieved £210m in 2020/21 (£134m excluding gifts in kind). The organisation focuses on providing high quality scientific evidence and translating our scientific discovery into policies and practices and working collaboratively in over 70 countries to fulfil our mission of improving the health of the world’s poorest people. Supporting the Sustainable Development Goals remains central to LSTM’s mission.

LSTM is a centre of excellence in research and postgraduate teaching. Our multidisciplinary approach to global health research allows us to translate research innovation and scientific breakthroughs from laboratory research into effective interventions for those most in need, working in partnership with researchers and academic organisations in Low- and Middle-Income Countries. LSTM and IVCC’s combined research portfolio has now reached £617 million and staff numbers and the estate continue to grow, without accessing any borrowing.

We intend to remain at the cutting edge of innovation in research and intervention by attracting the best researchers from around the world to address some of the biggest problems in global health today and to attempt to break the cycle of poor health and poverty. Providing unrivalled, relevant, learning opportunities to students within the UK and across the world is also key, offering students the opportunity to excel in their careers in public health, medicine and academia and to set them on their paths to be global health leaders.

LSTM is now four years into the strategic planning period 2017-2023, and leading up to the celebration of the 125th anniversary of LSTM, the mission, and the values to which LSTM aspires, remain fundamentally unchanged. LSTM, and its subsidiary companies, are an increasingly visible part of the local Liverpool economy around which new initiatives can be seeded, benefitting both LSTM and the region in which it is embedded.

LSTM has always had a strong translational element to its activities and translational research is well embedded in many parts of LSTM, including within its subsidiary IVCC. Our focus continues in this area to ensure our activities are

relevant and have an increased beneficial impact on global health. Because of our focus on the whole translational research trajectory, LSTM and IVCC are ideally placed to work with partners to support the implementation of effective knowledge innovations across a broad range of disease areas. We excel in a co-ordinated and multi-disciplinary approach to strengthen capacity for delivering large scale operational and translational research and operate as a centre of excellence in research synthesis for evidence-informed policy and practice. In terms of demographic changes in resource poor setting, there is now an overlap between non-communicable diseases and infectious diseases, and LSTM is adapting to this changing environment.

LSTM continues to grow and develop its postgraduate and CPD courses to meet the needs of our academic community. A new Global Health MSc programme complements globally renowned courses in tropical and infectious diseases and helps to achieve our aim of providing high quality education for medical, public health and humanitarian students and professionals. The forced rapid and successful development of online platforms has enabled LSTM to provide a blended learning approach to meet the flexible demand for the course, which during the pandemic, has provided a strong platform.

Despite being an international organisation, a local focus is essential for the continued growth and health of LSTM. Multi-sectoral partnerships have been strengthened; LSTM engages successfully with the largest number of funders and industrial partners and is a key player in the local Knowledge Quarter initiative and Liverpool Health Partners. The new Liverpool University Hospitals NHS Foundation Trust is a key partner and there are growing and strong relationships with Liverpool City, Liverpool City Region, the Liverpool Combined Authority and the innovation network within the North West.

LSTM submitted its first full submission as an independent HEI to the Research Excellence Framework (REF) 2021 in March 2021. Despite the challenges of a global pandemic, a high quality submission was achieved, testament to the commitment and support of all involved. Outcomes of REF will not be available until March 2022 but LSTM is aiming to improve upon the results achieved from the 2014 return where LSTM took overall 24th place out of 128 institutions and 6th place out of 128 on impact according to the Times Higher Education (THE) analysis.

LSTM has continued to support and review its approach to equity and inclusion throughout 2020/21, working at dismantling barriers to inclusion and progression, creating an inclusive environment and reviewing our historical and cultural impact from our approaches to education and research. LSTM also recognises its role in safeguarding and protecting beneficiaries, research participants, patients and communities with whom we have contact through our work and in protecting any vulnerable staff, students, volunteers and other representatives. A tremendous amount of progress has been made in this area during the year and LSTM, IVCC and the rest of the Group now has a designated safeguarding officer who is the first point of contact for safeguarding enquiries or for raising concerns. We endorse and support the principles of the Universal Declaration of Human Rights, (UN, 1948); the UN Convention on the Rights of The Child, (UNICEF, 1989); the Declaration on the Elimination of Violence Against Women, (UN, 1993) and the UN Global Compact (UN, 1997).

7. Financial Performance

Principal Risks and Uncertainties

The full scope of principal risks is monitored and mitigated within the institution's risk register and include measured and mitigated risk around sources of income, particularly : Financial growth targets, student numbers/income, grant income overhead contribution and over dependency on specific funders/major clients, and the impact of Brexit and COVID-19.

Other key financial risks include the following:

- Liability to finance the deficit on the University Superannuation Scheme (USS):** On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. This has been disclosed in these financial statements as a post balance sheet event. Under the new valuation there is a considerable increase in the deficit provision that LSTM will be required to make for the coming year. It is anticipated there will be considerable discussion in the sector about the ability of HELs to manage these increased liabilities. This increase is offset by the requirement to repay the deficit over 17 years. As a result of LSTM's strong balance sheet and its significant cash and investments reserves, there is no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.
- Exposure to foreign exchange fluctuations on US\$ or Euro denominated grant income:** this is mitigated through hedging receipts in US\$ and Euros through forward exchange contracts.
- Brexit:** Following the UK's changed relationship with the EU effective 1 January 2021 LSTM is monitoring the impact this is having on operations and costs. The main impact to date has been on an increase in paperwork, and LSTM has also seen an increase in construction costs in particular, but this is likely also a factor of the pandemic.
- Failure to maintain the pipeline of research grants and consultancy:** Research grants and consultancy income of £106.2m (excluding gifts in kind, see notes 7 and 8) is 9.7% higher than in 2019/20, reflecting a recovery following a small decline in 2019/20 primarily due to the pandemic. This income represents 79.9% of the total LSTM Group income (excluding gifts in kind) of £132.9m. The principal risk to research income growth is the accessibility and success of research grant applications and this is mitigated through risk monitoring. Brexit has not had the feared impact of accessibility to EU grants and LSTM has been able to apply for EU funding. LSTM has demonstrated success in applying for COVID-19 grants since the pandemic started, and this can only help in increasing LSTM's prominence and reputation in this field. The unexpended balance of live grants and applications at 31 July 2021 was £250m and the application pipeline was £105m, compared to £276m and £118m respectively at 31 July 2020.
- Research turnover growth:** This is fundamental to the organisation with a target to increase income by over 30% (excluding subsidiary companies) within the strategic plan period ending in 2022/23. Sensitivity analysis shows that a reduction of 20% on the turnover from major funders has little effect on the bottom line of LSTM if sensibly managed due to a related reduction in expenses. However, any significant

change in funding policy from LSTM's major donors could have a major effect in the longer term. Following a small drop in 2019/20 due to COVID-19, research turnover growth continued to grow during 2020/21.

- Improvement to the research infrastructure:** This is perceived as a direct contributor to the quality and timescale for achieving high quality scientific results and attracting additional funding to LSTM. In fact, quality of facilities separates LSTM from other UK institutions and contextualises LSTM as a global player. Investment in laboratories is fully supported by the Board of Trustees and in 2020/21 LSTM invested £1.2m in new laboratory based cutting edge equipment. This investment is enabled by the generation of surpluses and capital funding from Research England/Office for Students, the Wolfson Foundation and others.

Financial Performance in the year

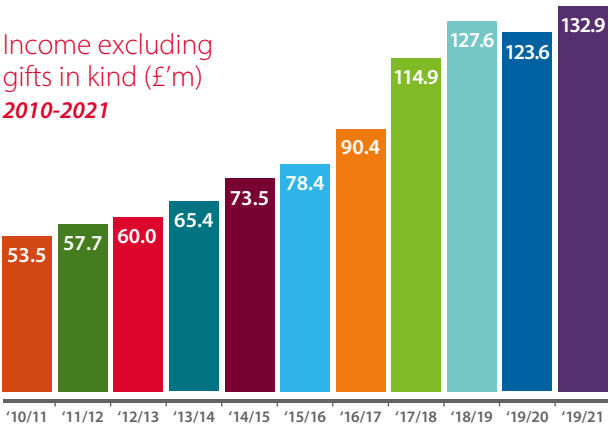
LSTM Group has reported total comprehensive income of £6.7m (2020 : £9.7m surplus). The surplus in the previous year was primarily due to a credit of £12.6m to decrease the Universities Superannuation Scheme (USS) pension deficit provision based on the 2018 scheme valuation. In the current year, there has been only a negligible movement on the USS pension provision, but since the financial year end the 2020 valuation has been signed and the impact of this is reflected in these financial statements as a post balance sheet event. In addition the surplus reflects £3.0m additional Research England COVID-19 funding and a £1.9m net unrealised revaluation of investments and endowments as markets bounced back after the initial impacts of the start of the COVID-19 pandemic.

These financial statements report the results of LSTM's activities for the year ended 31 July 2021 and have been produced in accordance with the Statement of Recommended Practice: Accounting for Further and Higher Education 2019 (2019 SORP) and in accordance with Financial Reporting Standards (FRS102). The results for the year include a number of accounting entries which influence the final comprehensive income of £6.7m in 2020/21. Stripping out these adjustments LSTM made an underlying operating surplus of £2.7m in the year, and the Group an operating surplus of £4.4m in the year, as shown in the table below.

	LSTM	Group
	£'000	£'000
Total comprehensive income for the year	5,665	6,718
USS pension deficit funding credit	(52)	(52)
Unrealised gain on revaluation of investments and endowments	(2,438)	(1,857)
Foreign exchange movements in relation to hedged currencies	(459)	(459)
Underlying operating surplus for the year	2,716	4,350

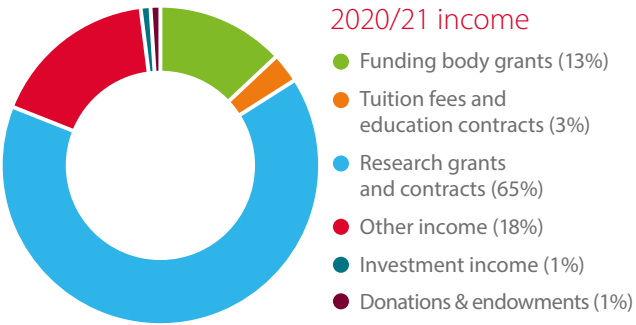
Income

LSTM's reported group income fell by 7.8% in the year but excluding gift in kind income (which decreased by 26%) income actually increased by 7.6%.



The main contributing factors to the increase in income are:

- An increase in income from research grants and contracts, excluding gifts in kind (12% and 15% higher in LSTM and Group respectively). This is partly due to a catch up from the prior year due to the impact of COVID-19, which delayed activity on some projects during the last 4 months of last year.
- A 20% increase in funding body grants, primarily related to an additional grant of £3m from Research England, for specialist institution status.
- Higher endowment and donation income was offset by a reduction in other income, primarily related to lower Well Travelled Clinic (WTC) activity.



Operating expenditure

LSTM's and the Group's reported total operating expenditure fell by 6% and 5% respectively (excluding gifts in kind expenses rose by 24% and 15% respectively), again a "bounce back" after the COVID-19 impact in 2019/20. The main elements of the change in operating expenditure are:

- The prior year reflected the release of £12.6m in relation to the USS Pension deficit provision, the movement on the provision is negligible in 2020/21.
- An increase in LSTM and Group other operating expenses (excluding gifts in kind), largely reflecting the increase in research activity/income.

Capital expenditure

Capital investment expenditure for the year was £2.4m (2020: £0.7m). Of this total, the largest components were building projects, IT capital projects and research equipment.

LSTM is currently investing in 2 large building projects – in Liverpool the development of Pembroke House as a bespoke teaching and learning space, and in Malawi, the Creator building, a research development working in partnership with Wellcome Trust and the University of Liverpool. The buildings are due to be completed in 2022 and 2023 respectively.

These investments have been funded through capital grants from Research England and OfS and internal funding and exclude other grant funded purchases bought as part of ongoing research projects.

Cash flow, financing and balance sheet

During the year LSTM generated net cash inflows from operating activities of £13.0m (2020: £4.2m outflow). These net inflows reflect mainly:

- A £6.8m increase in creditors, reflecting increased research activity
- The £5.7m surplus for the year

There was also a £8.0m inflow following transfer of investments to a subsidiary.

The net overall change in cash for LSTM for the year was an inflow of £19.0m (2020: £0.1m inflow).

Group net cash inflows from operating activities was £19.3m (2020: £15.2m outflow). The inflow is primarily a result of working capital movements, particularly a large decrease in debtors in IVCC and an increase in creditors. The outflow from investing activities of £13.0m (2020: £8.5m inflow) largely reflects reinvestment of surplus cash in investments following a more cautious approach in the prior year during the start of the COVID-19 pandemic.

The overall net change in cash for the year for the Group was an inflow of £5.9m (2020: £7.1m outflow).

Cash and cash equivalents at the year-end were £52.2m, representing 5 months of total operating expenditure (excluding pension provision movement, depreciation and gifts in kind expense). The majority of this cash represents research project working capital and is therefore not available for non-research operational or capital investment purposes.

Total Group net assets increased by £6.7m from £48.6m to £55.3m. This increase was principally driven by the operating surplus in the year and unrealised gains on investments and endowments.

Group Investments and endowments increased by £16.7m in the year due to reinvestment of cash following sales of some investment assets in the prior year and due to the rebound in market valuations from the relative low level at July 2020 early on in the pandemic.

Group Creditors due within one year increased by £7.3m, following the decrease in the prior year which reflected a catch up of expenditure with partners on research grants after previous large grant receipts in advance.

Key Performance Indicators

To measure performance and progress against the 6 year strategic plan LSTM uses a range of key performance indicators (KPIs), some of which are also part of LSTM's statutory reporting to Office for Students (OfS).

Underlying operating surplus/(deficit) in the year

£'000	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
Underlying operating surplus/(deficit)	4,350	(428)	3,882	4,392	1,827

LSTM monitors the underlying operating surplus or deficit after excluding accounting entries, as calculated earlier. Having achieved surpluses the last few years, 2019/20's results were negatively impacted by COVID-19. In 2020/21 activity has largely been able to resume and LSTM has also benefitted from £3m of exceptional funding from Research England.

Overall financial health

%	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
General reserves as a % of income (excluding gifts in kind)	20.8%	20.4%	12.6%	26.7%	29.5%

In recent years general reserves have been impacted by movements on the USS pension provision in particular. However, general reserves have remained strong over the last few years, under-pinned by a strong balance sheet.

Research income growth

£'m/%	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
Research & consultancy income £'m (excluding gifts in kind)	106.2	96.9	100.9	93.2	71.1
% change	9.6%	-3.9%	8.2%	31.1%	18.5%

8. Student Numbers

LSTM's Education revenue is directly linked to the number of postgraduate taught and postgraduate research students recruited each academic year. In 2020/21, 87 home, 12 EU students and 42 overseas students (total of 141) attended the School's Masters programmes. This represents an overall 12% increase in student numbers from the previous year of 125 students. The increase is due to several factors: increased demand from the intercalating Home market to study LSTM related programmes during the COVID-19 pandemic as well as heightened interest and capacity by students to study LSTM's topical programmes amidst a global pandemic.

LSTM also teaches three professional diplomas, the Diploma in Tropical Medicine and Hygiene (DTMH), Diploma in Tropical Nursing (DTN), and Diploma in Travel Health (DTH). Whilst these programmes are not credit bearing, like the Masters programmes, DTMH and DTN do attract Office for Students (OfS) funding. In 2020/21 a total of 112 students studied on these programmes comprising 82 Home, 21 EU and 9 Overseas. This does represent a 36% decrease in numbers from 2019/20 where we had 174 students.

The decrease is directly attributable to COVID-19 as we had to cap student numbers due to social distancing restrictions. Furthermore, as these are clinical programmes, many of the intended participants of the programmes were directly involved in the COVID-19 response and needed to defer their study due to professional commitments as well as travel related restrictions for overseas students. In spite of all the COVID-19 challenges for these markets, we have managed to run successful cohorts of students, albeit with reduced capacity. Participants on these programmes have expressed appreciation to LSTM for running these programmes and adapting the delivery model where necessary to accommodate COVID-19 related challenges.

LSTM also delivers a portfolio of non-credit bearing short CPD courses that do not attract OfS funding. Due to the COVID-19 pandemic and space limitations on our campus, we were unable to offer these programmes with the exception of several students who were deferred from a previous year. International students were unable to travel to the UK for a short period of time due to COVID-19 but in previous years, these short and intensive campus-based programmes were very popular with students. We therefore had a total of 11 students on these types of programmes compared to 128 in 2019/20.

In 2020/21, 136 students were enrolled on postgraduate research degrees (PhD, MPhil and MD) with 69 students registered off site. LSTM's track record in supporting PGR candidates has translated into success in the latest competition for MRC DTP/CASE studentships and has supported the award of other funded programmes with embedded PGR studentships (ARISE, LIGHT, NIHR HPRU, AMETHIST). Over the course of the year, 23 have successfully completed or are expected to complete a research degree.

9. Curriculum Developments

The new curriculum will place emphasis on scenario and simulation-led approaches that use real-world data and more immersive experiences that create more authentic contexts for learning. These will help students to learn how to deal with pressure, cope with complexity and change, and make difficult decisions in the context of ethical or moral challenges. To achieve this a newly established working group will identify scenarios to be designed into the curriculum with the intention that they will be augmented with infield video footage to bring authenticity to the learning experience. In support of the new educational approaches a specialist "Immersive Learning Environment" is being designed into one of the learning spaces in Pembroke House. This learning space will not only enable students to experience the sights and sounds of real world situations but also interact with the environment which can be targeted to develop key skills such as high pressure design making.

The development of Pembroke House will also play an important role in supporting LSTM's wider strategic vision for Education by enabling effective global partnerships with multiple stakeholders in teaching and research through high quality collaborative and interactive online learning. Each of the technologically advanced learning spaces has a slightly different focus to enable a rich mix of pedagogical approaches whilst taking into consideration the needs of our global partners.

Currently, a five-year PGR development plan has been drafted which includes an increased training and mentoring offer to students and supervisors, review of existing programmes

and delivery of new integrated MPhil- PhD and MRes-PhD programmes, and increased support and engagement with off-site students and supervisors. These activities are required to ensure that LSTM delivers an outstanding student experience with enhanced support for supervisors both on-site and off-site. It is anticipated that an improved student experience will result in LSTM attracting high-quality students in higher numbers both on- and off-site.

10. Staff and Student Involvement

An e-newsletter is regularly distributed to all members of staff. Monthly Staff Forum meetings are held at which management reports any significant developments within LSTM. Staff representatives nominated through the Staff Forum sit on the School's Management Committee and there is a student representative on the Board of Trustees. In the Education department, Town Hall meetings are held regularly so that the Education management team can report and teams from within the Department can present on current projects.

Our Student Representation system is thriving. There are two elected student representatives for each Masters and Diploma programme, who are trained at the start of their role to run regular focus groups with the students, lead on the Staff Student Liaison Committee and sit on the Boards of Studies. Their feedback, alongside the module questionnaires, also feed into the Annual Programme Monitoring as part of our quality assurance procedures. Separately, two student representatives sit on the Quality Management Committee, which oversees the quality assurance of LSTM's taught provision. More widely, we have student representation on the Equality and Inclusion Committee and are advertising for a role on the Health and Safety Oversight Committee. Students have also been engaged in discussions and focus groups around Pembroke House and teaching space development. All teaching staff are encouraged to have an 'open door' policy for students and we promote the Freedom to Speak up System so that students can contact us anonymously about concerns.

11. Fundraising

Approach to fundraising

Our fundraising efforts are predominantly focused on relationship-based fundraising with trusts, foundations, corporates, high net worth and ultra-high net worth individuals. However, a substantial part of our income in 2020/21 has come through a major public fundraising initiative, Bump It Forward, which was run via JustGiving. This initiative was launched in response to a request from LSTM staff in Sub Saharan Africa and has raised more than £230,000 from 4,700 donors, the majority of whom are new supporters of LSTM.

For major donors, we undertake detailed due diligence which is overseen by the Management Committee and the Trustees. High risk or high value donations are referred to the Trustees for a decision, ensuring that we manage risk as much as possible. External due diligence is commissioned in the cases of any significantly high value or contentious approaches.

We undertake thorough research (in line with GDPR) and manage all donor records on a secure, dedicated database.

Alumni and friends who have been asked for funding this year had all opted in to receiving fundraising communications. Public donors via the Bump It Forward campaign were able to select communication preferences via JustGiving and so only those who had opted in to receiving contact from LSTM have been added to the database.

A new CRM system will be implemented in 2021/22 to enable better management of supporter and stakeholder relationships across LSTM. Donor data will have protected viewing rights restricted to the Fundraising team and a Data Protection Impact Assessment has been completed. All data subjects will be informed before their data is moved onto the new system and will have the option to change their personal preferences or be removed.

LSTM is undertaking a major fundraising campaign in the lead up to, and including, its 125th Anniversary in 2023. This will target the public and the major donor categories highlighted above with income strategically aligned to LSTM's vision for growth. This will ensure consistency in approaches to all donors. The campaign aims to raise £25m in philanthropic funding over the next 5-7 years. An external Campaign Board is being established to help support and oversee the fundraising strategy.

Work with, and oversight of, any commercial participators/ professional fundraisers

Over the last year, we have engaged a consultancy firm to support the creation of a fundraising case for a support and brand toolkit, reflecting the institutional vision. We plan to continue their engagement for a further six months to support the successful launch of the campaign. The consultants reported to the Director of Fundraising on a regular basis and worked to pre-agreed Terms of Reference and specific aims, under the guidance of LSTM's Ethical Fundraising Policy.

Fundraising conforming to recognised standards

All members of the fundraising team are members of the Chartered Institute of Fundraising, and the Director of Fundraising holds the Advanced Diploma in Fundraising, the highest qualification awarded by the Institute. LSTM has also signed up and paid the levy to the Fundraising Regulator, by virtue of which we also sign up to their Fundraising Code of Practice.

Monitoring of fundraising carried out on our behalf

We don't currently actively encourage volunteer fundraising on behalf of LSTM but do occasionally have a number of individuals who wish to undertake sponsorship events on our behalf. Several of the Trustees have been very supportive in engaging their contacts on behalf of LSTM and it is anticipated that this will expand to involve the new Campaign Board, when appointed. In all these cases, the leads are passed on to the Fundraising team and we liaise with the individuals involved, and ensure that donations can be collected in a secure and compliant way.

Fundraising complaints

Any complaints received by the Fundraising Regulator, or directly to LSTM, will be immediately referred to the Director and the Chair of the Board of Trustees, and an action plan promptly developed in responding to them. Safeguarding issues will be referred to LSTM's Safeguarding Lead.

Protection of the public, including vulnerable people, from unreasonably intrusive or persistent fundraising approaches, and undue pressure to donate

LSTM does not currently undertake any public (cold/non-opt-in) campaigns utilising telephone, door-to-door or ‘chugging’ (street fundraising). Any mass-participation fundraising campaigns are marketed through reputable platforms such as JustGiving and Crowdfunder.co.uk or via direct communication with individuals who have opted in to receive such communications. Contacts who have opted in to receive fundraising communications may be included in email or direct mail campaigns, based on their communications preferences.

All donors on the database have opted in to receiving our communications and their data is stored in line with GDPR 2018.

12. Taxation

LSTM’s activities do not fall to be charged to corporation tax, given that income and gains are applied for and used exclusively for charitable purposes. LSTM’s subsidiaries fall under the scope of corporation tax, except for IVCC, which has charity status. Due to the continued growth of LSTM, a tax strategy is updated and issued annually (available on the website). HMRC have changed their method of operations and LSTM no longer have an appointed customer compliance manager within HMRC. However, LSTM continue to comply with all relevant regulations and to contact HMRC as relevant on specific issues.

13. Employment of Disabled Persons

LSTM welcomes applications for employment from disabled persons and appoints on the basis of merit alone. The organisation works to the social model of disability and provides adjustments and additional support in the workplace so that all staff can operate effectively in their roles. We work to ensure all staff have opportunities for progression and development. Where an existing employee becomes disabled, every effort is made to ensure that the necessary support mechanisms are put in place to assist continued employment. We are currently reviewing our support for applicants and employees with disabilities and developing an Adjustment Passport to provide assurance and clarity for colleagues with reasonable adjustments when transitioning roles or line managers, as well as working to establish a Staff with Disabilities Network.

14. Disability Statement

In accordance with the Equality Act 2010 and Public-Sector Equality Duty, LSTM is committed to creating an inclusive and accessible environment. This includes making improvements to physical environment such as installing lifts, ramps, wheelchair-accessible toilets and clear signage, as well as providing mandatory training on disability awareness. In addition, we take care to ensure that internal and external communications are inclusive and accessible.

We have committed to accepting the accessibility regulations as good practice, and as part of our commitment to the Public Sector Equality Duty. We are working on ensuring that our external pages are all accessible and are building capacity to ensure that internal documents are all checked for accessibility

before publication, including mandating that all policies are accessibility-checked prior to publication.

15. Equality at LSTM

LSTM’s vision is based on fostering an inclusive culture for staff and students which goes above and beyond the specific legal responsibilities we have towards those employees with protected characteristics. We are in the process of developing our Inclusion Strategy with both leadership and grassroots engagement, which will establish our guiding objectives and approaches for the period 2021-2024. We are changing our language from discussion of ‘equality and diversity’ to ‘equity and inclusion’, to shift the focus towards differentiating support for colleagues and students who may face more barriers to inclusion than others. We are transforming our Equality Impact Assessment process to ensure that policymakers are considering equity impacts at the initial stages of designing their policy and encouraging substantial stakeholder engagement to ensure that a wide variety of perspectives are embedded into policy development. Social mobility questions are being added to HR’s staff and student data collection process as part of understanding and improving our diversity demographic

We are developing our training programme, with a focus on becoming a more inclusive organisation – this includes updating our Race in the Workplace training module, and also active bystander and microaggression training, which will be led by an external expert and be provided to all staff across LSTM.

Gender Equity

Athena SWAN is a charter mark for Higher Education Institutions, aimed at progressing gender equality within academia and academic institutions. We have an active Athena SWAN Self-Assessment team, representative of a diverse range of roles and seniority from across LSTM, who are responsible for looking at barriers to gender equality at LSTM; we currently hold a bronze award and we are preparing a submission for the silver award by April 2022. The assessment will also look at the intersectionality of gender with other protected characteristics, such as ethnicity, and provide an action plan that LSTM will look to progress over the next few years.

We have published our mandatory Gender Pay Gap (GPG) report (March 2021), and also opted to analyse our Ethnicity Pay Gap, which is not currently a statutory requirement, with targeted actions to reduce our Gender Pay Gap. Actions to address the Ethnicity Pay Gap are more complex (the gaps do not show clear trends), and will form part of our race equity review and action planning. Gender Pay Gaps are generally reported a year later than the snapshot date on which the relevant data is collected (31st March each year), and we have sought this year to report more proactively – therefore this year LSTM is publishing two Gender and Ethnicity Pay Gap reports.

Our Gender Pay Gap (median) has reduced from 13.4% (2018) to 11.1% in 2020 (reported in Spring 2021) and at the time of writing we are also publishing our second Gender and Ethnicity Pay Gap report (2021-22), which relates to data from a snapshot date of 31st March 2021 and shows a further reduction of the median gender pay gap to 8.7%. We have established a target for us to lower our median gap to 5.55% or less by 2026, and eliminate the gap in its entirety by 2028 – a target we are well on track to achieve. Our key actions to address the gap are to increase male recruitment into our lower-graded roles, and

to improve the proportion of female employees in our fourth (highest) quartile.

We are reviewing our support for students and staff who may experience sexual harassment and ensuring that our offer is in line with the recent recommendations from the recent Office for Students Statement of Expectations – this is sitting with our Safeguarding Oversight Committee, with input from our Equity & Inclusion Committee as required.

Race Equity

Our BAME Staff Network is active and has a representative on the School Equity & Inclusion Committee. We have developed an internal Race Equity Advisory Panel (REAP), in collaboration with the Network, which is tasked with identifying areas of activity with regard to race inequity within LSTM. The REAP have commissioned an external consultant who will be working with LSTM to identify barriers to inclusion for minoritised ethnic colleagues and students, and a focused action plan which will provide us with initiatives and actions to become a leading anti-racist Higher Education Institution.

LGBTQ+ Equity

Our LGBTQ+ Staff and Student network have a representative on our Equity & Inclusion Committee, and LSTM has signed up to the Stonewall Global Diversity Champions charter. This will support us in our work to ensure that our LGBTQ+ staff and students are as safe as possible whilst travelling overseas (particularly relevant for many of the countries that LSTM currently works in), and in developing our Trans Equality policy and support for managers of colleagues who are transitioning.

16. Transparency Arrangements

The Board of Trustees conducts its business through a number of committees. Each committee has terms of reference, which have been approved by the Board. Full minutes of all meetings are available from the Secretary to the Board at: Liverpool School of Tropical Medicine, Pembroke Place, Liverpool, L3 5QA

The Secretary to the Board maintains a register of financial and personal interests of the Board members. The register is available for inspection at the above address.

17. Planned Maintenance Programme

LSTM’s management, through the Building Steering Group, review the funding available for maintenance and identify an appropriate budget to deliver a prioritised planned maintenance programme for the year. All buildings are maintained to a high standard and LSTM scores highly in the sector in this regard.

18. Endowments

LSTM holds endowment funds from the following:

Andrew Campbell Prize, Corlett Prize, David Haddock Prize, John Hay Prize, Jephcott Prize, Jervis Prize, Toosey Prize, White Waller Prize, W. Glynn Williams Prize, Blacklock Medal, Holt Medal, Milne Medal, Cicely Williams Medal, Yorke Medal, William Hesketh Leverhulme Scholarship, Joseph P. Caplan Bursary, Jean Clayton Fellowship, Mildred Ellerker Award,

Gatsby, Sir Eric Griffith-Jones Memorial Fellowship Fund, Thomas Mark Fund, Kenneth Newell Bursary, Rhodes-Gilles Fund, Gwendolen Clayton Memorial Scholarships, David Smith Fund, A. M. Browne Bursary, Katherine Elliot Fund, Annie Evans Fund, Mamco Selab Scholarship Fund, Professorial Fund.

19. “Brexit”

On 23 June 2016 the UK voted to leave the European Union. In January 2020 the EU and the UK reached an agreement on their new partnership, and these new rules took effect from 1st January 2021. With 10 months experience the key issues impacting LSTM to date have been as follows :

- More complex import documentation, with small increases in costs
- Added complexity to employing EU staff
- Increased difficulty attracting EU students and staff
- Availability of consumables and associated price increases

However, the following concerns have not at this time materialised : increased currency volatility; decline in stock markets; decline in general macro-economic position and consumer confidence; GDPR data risks

20. Post balance sheet events

The ongoing impact on the Group from the COVID-19 pandemic has been considered by the Trustees and there are no related adjusting or non-adjusting events since 31 July 2021.

The financial statements include a pension provision of £9,206,000. This balance, and the £52,000 credit in the year, are based on a mandated calculation used across the sector. Subsequently, on 1st October 2021, the Universities Superannuation Scheme (USS) 2020 valuation was signed and filed with The Pensions Regulator, effective this date. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out over the next 17 years.

21. Professional Advisers

LSTM’s current professional advisors are:

Financial Statement & Funding Auditors:

Grant Thornton UK LLP
Royal Liver Building, Liverpool, L3 1PS

Bankers:

The Royal Bank of Scotland plc
1, Dale Street, Liverpool, L2 2PP

Internal Auditors:

RSM Risk Assurance Services LLP
3, Hardman Street, Manchester, M3 3HF

Solicitors:

Brabners LLP
Exchange Flags, Liverpool, L2 3YL

22. Members

The Board of Trustees are also the nominated directors under the Companies Act 2006 and their term of office is for three years. The members who served on the Board during the year were as follows:

Name	Date of appointment retirement* re-appointment **	Status of appointment	Capacity and Committees Served
Jim McKenna	November 2020 As Trustee and as Chair from February 2021	Elected	Chair of the Board of Trustees Nominations & Governance Remuneration Finance & Investment
Sue Russell LLB (Hons)	November 2019** Elected Vice Chair November 2019 then Acting Chair of LSTM March -November 2020	Elected	Joint Vice Chair of the Board of Trustees Chair of Audit Nominations & Governance Remuneration
John O'Brien, B.Comm, FCA	November 2020**	Elected	Hon Treasurer Chair of Finance & Investment Nominations & Governance Remuneration
Professor David Lalloo MB, BS, MD, FRCP, FFTM, RCPS (Glasg)	January 2019	Ex Officio/staff	Director of LSTM Nominations & Governance Finance & Investment
Mark Allanson	November 2019**	Elected	Trustee Remuneration
Joanne Dodd BA ACA	August 2019	Elected	Trustee Deputy Treasurer Finance & Investment
Lynne Elliott MPhil MBA PGCE BSc (Hons)	August 2020	Elected	Student Trustee
Jeremy Lefroy MP	November 2018** November 2019 elected Vice Chair	Elected	Joint Vice Chair of the Board of Trustees IVCC Board Member
Dr Julian Lob-Levyt CBE	November 2018**	Elected	Trustee Remuneration
Prof Nyovani Madise	August 2019	Elected	Trustee
Eileen Thornton, CBE, MEd, BA, FCSP, DipTP	November 2020** Interim Chair of Audit Committee March 2020 to November 2020	Elected	Trustee Audit Committee
Professor Stephen Ward BSc, PhD	November 2018**	Ex Officio / staff	Deputy Director of LSTM
Andrew Wright	March 2019	Elected	Trustee
Robert Einion Holland FCCA, MBA	June 2001	Non- member	Secretary to the Board

23. Statement of Corporate Governance and Internal Controls

The Liverpool School of Tropical Medicine is a company limited by guarantee and currently has 63 members, 12 of whom make up the Board of Trustees. Members meet at the Annual General Meeting where they elect the Board of Trustees, effectively the company board of directors. It is the Board's responsibility to bring independent judgement to bear on issues of strategy, performance, resources and standards of conduct.

LSTM operates under the following principal governance arrangements:

- LSTM Memorandum and Articles of Association, incorporating the instrument and articles of government.
- Committee of University Chairs – The Higher Education Code of Governance September 2020
- UK Charity Legislation
- Equality Challenge Unit – Governing bodies, Equality and Diversity and the Equality Act 2010.

And with due regard to best practice within - The UK Corporate Governance Code.

The Board of Trustees conducts its business through a number of formal committees, delegating the day-to-day management of LSTM to the Director of LSTM. The Trustees comply with the requirements of the Companies Act and of the Charities Act as to keeping financial records, the audit of accounts and the preparation and transmission to the Register of Companies. The Trustees also ensure that annual reports, annual returns and annual statements of account are completed by LSTM. Proper records of all proceedings at general meetings, meetings of Trustees, committees and all professional advice obtained are kept by the Secretary to the Board for the Chairman of the Board.

The Board is provided with regular and timely information on the overall financial performance of LSTM together with other information such as performance against funding targets, proposed capital expenditure, quality matters and personnel related matters such as health and safety and environmental issues. The Board of Trustees meet, as a minimum, on a termly basis and retain authority to request and conduct extraordinary meetings.

All Board members are able to take independent professional advice in furtherance of their duties at LSTM's expense and have access to the Secretary and Clerk who are responsible to the Board of Trustees for ensuring compliance with all applicable procedures and regulations. The appointment, evaluation and removal of the Secretary are matters for the Board of Trustees as a whole. Formal agendas, papers and reports are supplied to members in a timely manner prior to Board meetings. Briefings are also supplied on an ad-hoc basis.

The Board has a strong and independent non-executive membership and no individual or group dominates its decision-making process. The Board considers that each of its non-executive members is independent of management and free from any business relationships, which could materially interfere with the exercise of the independent judgement. There is a clear division of

responsibility in that the roles of the Chair, Deputy Chairs, and Director are separate.

Each committee chair, deputies and members receive delegated responsibility from the Board of Trustees. The Board of Trustees has also approved terms of reference for each committee.

- Audit Committee
- Finance and Investment Committee
- Nominations & Governance Committee
- Remuneration Committee

Collectively, these set out governance principles and arrangements for ensuring that LSTM is committed to maintaining the highest standards of corporate governance and are appropriate for the size and complexity of our organisation.

Appointments to the Board of Trustees

Any new appointments to the Board are a matter for consideration of the Board as a whole. The Board of Trustees has a Nominations & Governance Committee comprised of 4 members which is responsible for the selection and nomination of any new member for the Board's consideration. Ahead of, and during appointment, it is incumbent upon LSTM to ensure that "fit and proper persons" checks are in place to notify LSTM and the Chair of the Board of Trustees if there are any declarations that may require intervention.

Members of the Board of Trustees are appointed for a term of office of three years. Retiring Trustees shall be eligible for re-election subject to paragraph 5.5, 5.5.1 and paragraph 5.5.2 of the Articles (November 2017).

The Board of Trustees appoint four members as "Board Champions" who have career experience in Equality and Inclusion, PREVENT duty, GDPR and Safeguarding and these act as conduits across the organisation and lead on engagement activity. The Board is responsible for ensuring that appropriate training is provided as required to its members.

Members are expected to promote LSTM's values and protect its reputation by discharging their duties and principles as set out in the code of conduct. The code of conduct provides clear guidance on what is expected of staff, students, volunteers, trustees and other representatives, as well as providing examples of conduct that will always be unacceptable.

Patron

LSTM is honoured to have Her Royal Highness The Princess Royal KG KT GCVO as Patron. She succeeded her father, HRH the Duke of Edinburgh, in 1991. LSTM has enjoyed Royal Patronage since 1932 when HM King George VI became LSTM's first Patron.

President & Vice-Presidents

LSTM's President and Vice-Presidents are distinguished individuals drawn from the field of academia, business and politics and are committed to assisting LSTM in fulfilling its mission. They willingly give their help and advice and support in approaches for charitable donations.

Audit Committee

The Audit Committee has a maximum of 7 members and is comprised of at least 2 members of the Board (Chair and Deputy), 1 IVCC Board member and at least 1 co-opted independent member. The Committee operates in accordance with written terms of reference approved by the Board of Trustees. The Committee is comfortable that the Board representation is sufficient given the additional expertise of the co-opted members.

The Audit Committee meets on a termly basis and provides a forum for reporting by LSTM's internal and financial statements auditors who have access to the Committee for independent discussion without the presence of LSTM management.

LSTM's internal auditor team provide LSTM with independent advice and assurance in regard to the adequacy of systems of internal control, risk management controls and governance processes in accordance with an agreed plan of input and report their findings to management and the Audit Committee. Management is responsible for the implementation of the agreed recommendations and internal auditors undertake periodic follow up reviews. LSTM is able to ensure that such recommendations have been implemented. Management actions are reported to Management Committee alongside a summary of all reports received. The Audit Committee also advises the Board of Trustees on the appointment of internal and financial statements auditors and their remuneration for both audit and non-audit work.

Finance and Investment Committee

The Finance and Investment Committee has a maximum of 7 members and is comprised of at least 2 members of the Board. The Committee operates in accordance with written terms of reference approved by the Board of Trustees.

The Finance and Investment Committee advise the Board on financial policy, provide oversight, monitor and approve relevant returns to OfS/UKRI, HESA and other stakeholders and review in depth annual financial statements, management accounts, cashflows, budgets and the performance of the investment portfolio.

Remuneration Committee

Throughout the year ended 31 July 2021, LSTM's Remuneration Committee comprised the Chairman, Treasurer, and 2 other Board members. The Committee's responsibility is to review the remuneration policy for all staff and to make recommendations on the remuneration and benefits of the Director and other senior members of staff in LSTM.

Internal Control

The Board of Trustees is ultimately responsible for LSTM's system of internal control and for reviewing its effectiveness. However, such a system is designed to manage, rather than eliminate, the risk of failure to achieve business objectives & can provide only reasonable, not absolute, assurance against material misstatement or loss.

The Board of Trustees has delegated to the Director of LSTM as Accountable Officer, the day-to-day responsibility for

reviewing the adequacy of the system of internal control and making any appropriate amendments. The Director is also responsible for reporting to the Board any material weaknesses or breakdowns in internal financial control.

The Board of Trustees is of the view that there is a formal on-going process for identifying, evaluating and managing LSTM's significant risks that have been in place and operational for the year ended 31 July 2021. The Board regularly review this risk framework and the approach to internal control is risk-based. The process continues to be embedded with the adoption of a prioritised corporate risk register to include timescales and responsible officers. The process is now embedded within all levels of LSTM and covers business, operational, compliance and financial risk procedures.

Value for Money

LSTM strives to apply value for money considerations to all its processes and activities, and this is supported by strong awareness and vigilance across the senior management team. The Audit Committee receives an annual report on LSTM's value for money activity from a dedicated committee established several years' ago. The committee is made up from a cross section of the organisation. In addition, each internal audit review undertaken and submitted to the Audit Committee makes specific observations and judgements concerning the value for money demonstrated. The report for the year ended 31 July 2021 detailed the progress made against the 7 Value for money objectives for the year and sets out the objectives for the year to 31 July 2022.

Risk Management

A comprehensive risk management framework, defined in LSTM's Risk Management Policy, assists the management of LSTM in the identification of the key risks inherent in the delivery of its strategy. This is overseen by the Audit Committee in order to gain the necessary assurances on the efficacy of the framework and relay them to the Board of Trustees.

The Board of Trustees, through the Audit Committee, evaluates the risks inherent in all major plans and proposals, including the identification of the steps that would be required to mitigate, eliminate and control such risks. The Risk Register is reviewed by the Audit Committee on a routine basis and is presented to the Board of Trustees at each meeting.

The ongoing impact of COVID-19 upon the sector and in the areas of business continuity and disruption has led to the Board seeking increased review and assurance of its key strategic risks. The Board's assurance oversight and increased access to strategic risk reviews provides insight into the response from the Management team to the outbreak of COVID-19. The Board has been provided with assurance of enhanced internal management controls around business continuity and recovery and it continues to mitigate COVID-19 impact through its Management Team, where response and recovery planning provide further assurance to the Board that responsible and timely management of stakeholder funding and investment continues to support sustainable operations.

Statement by the Trustees on performance of their statutory duties in accordance with S172(1) of the Companies Act 2006

The Board of Trustees of LSTM consider, both individually and collectively, that they have acted in ways that they believe in good faith to be most likely to promote the success of the Group for the benefits of its members as a whole (having regard to the stakeholders and other matters set out in s172(1) of the Act) in the decisions they made during the year ended 31 July 2021.

The LSTM Board of Trustees comprises largely non-executive members, with three executive directors and a student representative. There are 3 full board meetings each year plus meetings of several sub-committees, which are also attended by various senior staff. The AGM is open to all staff and students.

Other than the executive members of the Board, trustees are not remunerated, and they join the LSTM Board to contribute their skill and expertise to help LSTM to achieve its vision and mission, as detailed in section 4 of this report. The Board of Trustees has a terms of reference that is reviewed annually and Board members receive regular external training on the duties of trustees of a charity. There is also a code of conduct and members are required to declare any conflicts of interest at every meeting.

The Board's key stakeholders have been identified as the following :

- *Members*
- *Students*
- *Employees*
- *Funders*
- *Local, national and international governments*
- *Research partners*

The Board engage with each of these groups throughout the year through face-to-face meetings, surveys, seminars and written correspondence to promote LSTM's mission.

Key decisions made by the Board this year include:

Approval of the 2021/22 annual budget: This year's budget was approved by the Board following a comprehensive review of our strategic priorities and risks to our business. Due to COVID-19 the budget reflects ongoing difficulties in student recruitment and for research grants operating overseas. The recent grant cuts to ODA funding have also been factored in.

Appointment of the Chair of LSTM: After a rigorous search, selection and interview process, the Chair of the LSTM Selection Committee made a recommendation to the Board of Trustees to appoint Jim McKenna as a Trustee and later as Chair, which was supported at the 121st AGM.

Communications Strategy: The Board of Trustees welcomed the LSTM Communications Strategy, which sets out LSTM's coordinated approach to comms, its ambitions to engage with stakeholders and our commitment to developing platforms to support improved engagement.

Capital approvals: The Board approved 2 major projects in 2019/20; the renovation of Pembroke House into a major teaching resource hub with state-of-the-art facilities and investment in a major overseas research and teaching facility in Blantyre, Malawi which will complement the existing

buildings at the Malawi, Liverpool Wellcome Trust Centre. Both projects continued to be given detailed oversight by the Board of Trustees during 2020/21, to ensure there is suitable financial sustainability and oversight.

Employee engagement statement

The Board of Trustees engage with employees using multiple channels, via the Director of LSTM and his senior team, through the work of the management group, ensuring that key messaging is delivered via LSTM-wide communications. Where appropriate, staff are fully engaged in strategic discussion and decision making under the delegated duties of Committees. LSTM welcome the feedback of staff, involvement in focus task groups and wider staff led projects. The Board of Trustees are presented with executive summaries of management committee's agreed actions and are fully briefed by the Director on all activity in relation to staff engagement.

There is also positive engagement by many staff through the various Board committees, where employees often present research activity updates to Board members. The Audit Committee works with HR staff in relation to equality and inclusion and the effectiveness of the HR processes. The Remuneration Committee, in addition to considering the remuneration of senior staff, received information and discusses overall reward policy and strategy including the gender and ethnicity pay gap.

LSTM wide engagement includes a monthly staff forum (SSF), attended by the Director, chaired by the management committee member for SSF and is also open to IVCC and other subsidiary company employees. Staff can also apply to work on a variety of projects/working groups addressing issues of gender equality, LGBTQ+, and as LSTM addresses key strategic issues, staff are frequently engaged through Town Hall events, surveys or focus groups. Board champions engage with Committee chairs in the areas of Equality and Inclusion, Prevent, Safeguarding and GDPR, supporting and engaging with the work of LSTM committees. LSTM regularly runs staff engagement surveys, the results of which are presented to the Board.

Statement on business relationships

The LSTM Board of Trustees and its committees comprise people with a variety of skills and backgrounds. Through their networks Board members are able to foster additional benefit to LSTM through their association with our stakeholders, this brings a greater breadth of knowledge into the organisation, particularly in relation to key decisions made by the Board.

Delivering our strategy requires strong mutually beneficial relationships with all stakeholders. LSTM continuously assesses its priorities related to its major funding partners, and the Board engages on this through regular strategy updates through the committees' structure in place.

LSTM's activity within the External Relations Committee also supports a strategic approach to stakeholder engagement that contributes to objectives of the strategic plan.

Carbon reporting

LSTM is fully committed to operating in an environmentally friendly and sustainable manner and has introduced a new Environmental Policy and established an Environmental

Working Group. The group will provide coordination and guidance to LSTM for the integration of sustainability principles and practices throughout core teaching, research and operational activities.

All refurbishment and capital projects incorporate environmental and/or energy efficiency improvements whenever practicable such as replacement windows, improved insulation, LED lighting and improvements to the automated Building Management Systems.

40 solar panels were installed in 2015, producing electricity savings year on year.

There has been an improvement in recent years as a result of the energy efficiency improvements which has seen a reduction in the independently assessed energy ratings and this is evidenced in the Display Energy Certificates.

The Building Management System (BMS) manages and monitors building services and will:

- ensure that an optimal level of efficiency and comfort is achieved by continuously maintaining the correct balance between operating requirements, external and internal environmental conditions and energy usage.
- facilitate the link to our metering systems to measure utility consumption to identify usage patterns, manage these against expected or desired levels and then assist in being able to adjust, control or remove waste.

During 2020/21 LSTM Group has used 2,667,938 kWh of electricity in owned buildings.

All calculations are based on National Energy Foundation simple carbon calculation.

24. Going Concern

As detailed in the accounting policies, these financial statements are prepared on a going concern basis. Since the outbreak of the COVID-19 pandemic LSTM has taken measures to mitigate the risk and the Trustees have assessed the period to November 2022, 1 year beyond the date these financial statements are signed. The reviews were based on monthly management accounts during 2020/21, the 2021/22 budget and monthly cash flows and forecasts, which were regularly assessed by senior management and the board. These measures are continuing at the time these financial statements are signed. The forecasts show that the group has sufficient cashflows to continue to settle liabilities as they fall due.

The Board of Trustees have also taken account of the post balance sheet event in relation to the USS pension deficit provision (disclosed in note 39) and have no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.

As a result of these measures and the strong balance sheet of the Group and LSTM the Trustees are satisfied that the use of the going concern accounting principle remains applicable.

25. Strategic Reporting

As LSTM is a registered charity, the strategic report is contained in the following sections:

4 Vision and Mission

5 Objectives

6 The Nature, Objectives and Strategies of the Charity

7 Principal risks and uncertainties, financial performance in the year & key performance indicators (KPIs)

26. Responsibilities of the Governing Body

In accordance with LSTM's Memorandum and Articles of Association, the Governing Body is responsible for the administration and management of the affairs of LSTM and are required to present audited financial statements for each financial year.

The Governing Body (the Governors, also referred to as the Trustees are also the directors of LSTM for the purposes of company law) is responsible for preparing the Report of the Members of the Board of Trustees including the Strategic Report and the financial statements in accordance with applicable law and regulations.

Company law requires the Trustees to prepare financial statements for each financial year. Under that law, the Trustees are required to prepare the financial statements in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards and applicable law) including FRS 102 'The Financial Reporting Standard applicable in the UK and Republic of Ireland'. In addition, the Trustees are required to prepare the financial statements in accordance with Office for Student's ('OfS') terms and conditions of funding for higher education institutions (issued March 2019) and the terms and conditions of its funding agreement with Research England through its accountable officer. Under company law, the Trustees must not approve the financial statements unless they are satisfied that they give a true & fair view of the state of affairs of LSTM and the Group and of the surplus or deficit, gains & losses, changes in reserves & cash flows of LSTM & the Group for that year.

In preparing the financial statements, the Trustees are required to:

- select suitable accounting policies and then apply them consistently.
- make judgements and accounting estimates that are reasonable and prudent.
- state whether applicable UK accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements; and
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Group will continue in business.

The Trustees are responsible for keeping adequate accounting records that are sufficient to show and explain LSTM's transactions and disclose with reasonable accuracy at any time the financial position of LSTM and enable it

to ensure that the financial statements comply with the Statement of Recommended Practice - Accounting for Further and Higher Education, OfS terms and conditions of funding for higher education institutions (issued March 2019), the Office for Students Accounts Direction (issued October 2019) and the Companies Act 2006. They are also responsible for safeguarding the assets of LSTM and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Trustees have taken reasonable steps to:

- ensure that funds from OfS, Research England and other funding bodies are used only for the purposes for which they have been given and seek to achieve value for money in accordance with OfS' terms and conditions of funding for higher education institutions (issued March 2019) and the funding agreement with Research England and any other conditions which the funding body may from time to time prescribe;
- ensure that LSTM has a robust and comprehensive system of risk management, control and corporate governance, which includes the prevention and detection of corruption, fraud, bribery and irregularities;
- ensure that there is regular, reliable, timely and adequate information to monitor performance and track the use of public funds;
- plan and manage LSTM's activities to remain sustainable and financially viable;
- ensure that it informs the OfS of any material change in its circumstances, including any significant developments that could impact on the mutual interests of LSTM and OfS;
- ensure there are adequate and effective arrangements for the management and quality assurance of data submitted to HESA, the Student Loans Company, the OfS, Research England and other funding or regulatory bodies;
- ensure an effective framework – overseen by LSTM's academic board or equivalent – to manage the quality of learning and teaching and to maintain academic standards; and
- consider and act on the OfS' assessment of LSTM's risks specifically in relation to these funding purposes.

The Trustees are responsible for the maintenance and integrity of the corporate and financial information included on LSTM's website. Legislation in the United Kingdom governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

The Trustees confirm that:

- so far as each Trustee is aware, there is no relevant audit information of which LSTM's auditor is unaware; and
- the Trustees have taken all the steps that they ought to have taken in order to make themselves aware of any relevant audit information and to establish that LSTM's auditor is aware of that information.

A resolution to reappoint Grant Thornton UK LLP will be

proposed at the Annual General Meeting, under the heading "Independent Auditors", subject to the results of a tender process to be undertaken.

Signed on behalf of the Board of Trustees

Jim McKenna
Chair
1 November 2021

Statement on the System of Internal
Financial Control to 31 July 2021

As HEI Accountable Officer, I acknowledge my responsibility for ensuring that an effective system of internal financial control is maintained and operated by Liverpool School of Tropical Medicine.

The system can provide only reasonable and not absolute, assurance that assets are safeguarded, transactions authorised and properly recorded, and that material errors or irregularities are either prevented or would be detected within a timely period.

The system of internal financial control is based on a framework of regular management information, administrative procedures including the segregation of duties and a system of delegation and accountability. In particular, it includes:

- *comprehensive budgeting systems with an annual budget which is reviewed and agreed by the Board of Trustees;*
- *regular reviews by the Board of periodic and annual financial reports which indicate financial performance against forecasts;*
- *setting targets to measure financial and other performance;*
- *clearly defined capital investment control guidelines; and*
- *the adoption of formal project management disciplines, where appropriate.*

Liverpool School of Tropical Medicine has a subcontracted internal audit service, which operates in accordance with the requirements of the Audit Code of Practice. The work of the internal audit service is informed by an analysis of the risks to which LSTM is exposed and annual internal audit plans are based on this analysis. The analysis of risks and the internal audit plans are endorsed by the Board of Trustees on the recommendation of the Audit Committee. The Chair of the Audit Committee provides the Board with a report on internal audit activity in LSTM at a minimum annually. The report includes the financial statement, grant and internal auditors’ independent opinions on the adequacy and effectiveness of LSTM’s system of internal control, risk management controls and governance processes, including internal financial control. The role of the external auditors is specifically to audit the year end financial statements, but they also report on the control environment and on any control issues identified during the annual audit, and report to the Finance and Investment Committee and the Audit Committee in that regard. No significant control weaknesses or failures were reported in relation to the year ended 31 July 2021.

My review of the effectiveness of the system of internal financial control is informed by the work of the internal auditors, the Audit Committee which oversees the work of the internal auditors, the executive managers within LSTM who have responsibility for the development and

maintenance of the financial control framework and comments made by LSTM’s financial statement and grant auditors in their management letters and other reports. The audit committee report annually to the Board in November regarding any control weaknesses or failures during the past financial year; there have been no significant control weaknesses or failures in the year ended 31 July 2021.

Professor David Lalloo
MB, BS, MD, FRCP, FFTM, RCPS (Glasg)
Director
1 November 2021

Independent auditor’s report to the governing
body of Liverpool School of Tropical Medicine

Opinion

We have audited the financial statements of Liverpool School of Tropical Medicine (the ‘LSTM’) and its subsidiaries (the ‘group’) for the year ended 31 July 2021, which comprise group and LSTM’s Statement of comprehensive income, the group and LSTM’s Statement of changes in reserves, the group and LSTM’s Balance sheet, the group and LSTM’s Statement of cash flows and notes to the financial statements, including a summary of significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable law and United Kingdom Accounting Standards, including Financial Reporting Standard 102 ‘The Financial Reporting Standard applicable in the UK and Republic of Ireland’ (United Kingdom Generally Accepted Accounting Practice). In our opinion, the financial statements:

- *give a true and fair view of the state of the group’s and the LSTM’s affairs as at 31 July 2021 and of the group’s and LSTM’s surplus, and its income and expenditure, gains and losses, changes in reserves and the group’s and LSTM’s cash flows for the year then ended;*
- *have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice and the Statement of Recommended Practice: Accounting for Further and Higher Education published in October 2018; and*
- *have been prepared in accordance with the requirements of the Companies Act 2006.*

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the ‘Auditor’s responsibilities for the audit of the financial statements’ section of our report. We are independent of the group and LSTM in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC’s Ethical Standard, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Conclusions relating to going concern

We are responsible for concluding on the appropriateness of the Governing body’s use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the group’s and LSTM’s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify the auditor’s opinion. Our conclusions are based on the audit evidence obtained up to the date of our report. However, future events or conditions may cause the group and LSTM to cease to continue as a going concern.

In our evaluation of the Governing body’s conclusions, we considered the inherent risks associated with the group’s and LSTM’s business model including effects arising from macro-economic uncertainties such as Brexit and Covid-19, we assessed and challenged the reasonableness of estimates made by the Governing body and the related disclosures and analysed how those risks might affect the group’s and LSTM’s financial resources or ability to continue operations over the going concern period.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the group’s and LSTM’s ability to continue as a going concern for a period of at least twelve months from when the financial statements are authorised for issue.

In auditing the financial statements, we have concluded that the Governing body’s use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

The responsibilities of the Governing body with respect to going concern are described in the ‘Responsibilities of the Governing body for the financial statements’ section of this report.

Other information

The Governing body are responsible for the other information. The other information comprises the information included in the annual report set out on pages 2-15 other than the financial statements and our auditor’s report thereon. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Opinions on other matters prescribed by the
Companies Act 2006

In our opinion, based on the work undertaken in the course of the audit:

- *the information given in the Strategic Report and the Directors’ Report, prepared for the purposes of company law, included in the Report of the Members of the Board of Trustees for the financial year for which the financial statements are prepared is consistent with the financial statements; and*
- *the Strategic Report and the Directors’ Report included in the Report of the Members of the Board of Trustees has been prepared in accordance with applicable legal requirements.*

Matter on which we are required to report under the Companies Act 2006

In the light of the knowledge and understanding of the group and LSTM and its environment obtained in the course of the audit, we have not identified material misstatements in the Strategic Report or the Directors' Report included in the Report of the Members of the Board of Trustees.

Opinion on other matters prescribed by the Office for Student's ('OfS') accounts direction (issued October 2019)

In our opinion, in all material respects:

- *funds from whatever source administered by LSTM for specific purposes have been properly applied to those purposes and managed in accordance with the relevant legislation;*
- *funds provided by the OfS and Research England have been applied in accordance with the relevant terms and conditions, and any other terms and conditions attached to them, and*
- *the requirements of the OfS's accounts direction (issued October 2019) have been met.*

Matters on which we are required to report by exception

We have nothing to report in respect of the following matters where the Companies Act 2006 requires us to report to you if, in our opinion:

- *adequate accounting records have not been kept by LSTM, or returns adequate for our audit have not been received from branches not visited by us; or*
- *LSTM's financial statements are not in agreement with the accounting records and returns; or*
- *certain disclosures of the Governing Body's remuneration specified by law are not made; or*
- *we have not received all the information and explanations we require for our audit.*

We have nothing to report in respect of the following matters where the OfS accounts direction (issued October 2019) requires us to report to you where:

- *LSTM's grant and fee income, as disclosed in the note to the accounts, has been materially misstated*

Responsibilities of Governing Body for the financial statements

As explained more fully in the Statement of responsibilities of the Governing body set out on pages 14-15 the Governing body (who are also the directors of the charitable company for the purposes of company law) are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the Governing body determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Governing body are responsible for assessing the group's and LSTM's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis

of accounting unless the Governing body either intend to liquidate the group or LSTM or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at: www.frc.org.uk/auditorsresponsibilities. This description forms part of our auditor's report.

Explanation as to what extent the audit was considered capable of detecting irregularities, including fraud

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We design procedures in line with our responsibilities, outlined above, to detect material misstatements in respect of irregularities, including fraud. Owing to the inherent limitations of an audit, there is an unavoidable risk that material misstatements in the financial statements may not be detected, even though the audit is properly planned and performed in accordance with the ISAs (UK).

The extent to which our procedures are capable of detecting irregularities, including fraud is detailed below:

- *We obtained an understanding of the legal and regulatory frameworks applicable to the group and LSTM, and the industry in which it operates and determined which may influence the financial statements. Given the nature of its operating activities, the group and LSTM is subject to several laws and regulations where the consequences of non-compliance could have a material effect on amounts or disclosures in the financial statements.*
- *We determined that the following laws and regulations are the most significant which are directly relevant to specific assertions in the financial statements:*
 - *Those that relate to reporting frameworks being FRS102 and the Statement of Recommended Practice: Accounting for Further and Higher Education published in October 2018, the OfS accounts direction (issued October 2019), the Companies Act 2006 and the relevant tax compliance regulations.*
 - *Those that relate to the operational activities of the group and LSTM as a higher education institution and research organisation being the regulatory framework for higher education in England, data protection and bribery and corruption practices.*

- *We assessed the susceptibility of the charitable company's financial statements to material misstatements, including how fraud might occur. We performed the following audit procedures to address the risks related to irregularities and fraud:*

- *evaluation of the processes and controls in place to address the risks related to irregularities and fraud;*
- *challenge of the assumptions and judgements made by management in its significant accounting estimates;*
- *review of performance targets and conditions to research funding received and their propensity to influence efforts made by management to manage earnings;*
- *review and testing of journal entries, in particular manual journal entries, relating to management estimates and journal entries impacting the reported result for the year;*
- *consideration of the potential for fraud in revenue recognition through the manipulation of revenue from research grant funding;*
- *identifying related parties and through our data interrogation tools performed a review for any related party transactions during the year.*

- *We enquired of management, the Audit Committee and the internal auditors whether there was any awareness of instances of non-compliance with laws and regulations or whether they had any knowledge of actual or suspected fraud. We corroborated the results of our enquiries to supporting documentation such as board minute reviews.*
- *In assessing the potential risks of material misstatement, we obtained an understanding of the group's and LSTM's operations, the applicable statutory provisions and business risks that may result in risk of material misstatement, and the group's and LSTM's control environment, including the adequacy of procedures for authorisation of transactions.*
- *The engagement team's experience with similar engagements, their understanding and knowledge of the group's and LSTM's industry and their understanding of the industry and regulatory requirements were considered in assessing the appropriateness of the collective competence and capabilities of the engagement team.*

No matters relating to non-compliance with laws and regulations or relating to fraud were identified in relation to the above-mentioned laws and regulations that were identified by us as most significant.

Use of our report

This report is made solely to the university's members, as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the university's members

those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the university and the university's members as a body, for our audit work, for this report, or for the opinions we have formed.

Carl Williams
Senior Statutory Auditor
for and on behalf of Grant Thornton UK LLP
Statutory Auditor, Chartered Accountants
Liverpool
1 November 2021

Statement of Comprehensive Income

		Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
	Notes				
Funding body grants	5	16,951	16,951	14,117	14,117
Tuition fees and education contracts	6	3,737	3,737	4,101	4,101
Research grants and contracts	7	99,174	72,740	78,274	56,970
Other income	8	88,471	74,324	130,049	110,907
Investment income	9	751	525	848	289
Donations and endowment income	10	1,255	1,255	680	680
Total income		210,339	169,532	228,069	187,064
Staff costs	11	37,622	32,390	38,560	32,442
Pension deficit funding costs	23	(52)	(52)	(12,591)	(12,591)
Other operating expenses	13	166,004	131,431	188,570	154,849
Surplus on disposal of investments		(196)	385	(372)	(372)
Depreciation	17	2,041	2,022	1,911	1,893
Interest payable	14	129	129	14	14
Total expenditure		205,548	166,305	216,092	176,235
Surplus on continuing operations before other gains/(losses)		4,791	3,227	11,977	10,829
Unrealised surplus/(deficit) on revaluation of investments and endowments		1,857	2,438	(2,958)	(2,958)
Surplus on continuing operations before taxation		6,648	5,665	9,019	7,871
Taxation	15	(39)	-	24	-
Surplus for the year	16	6,609	5,665	9,043	7,871
Other comprehensive income/(expense):					
Change in fair value of hedging financial instruments		109	-	642	-
Total Comprehensive Income for the year		6,718	5,665	9,685	7,871
Represented by:					
Restricted endowment comprehensive income/(expense) for the year		638	638	(307)	(307)
Unrestricted endowment comprehensive income/(expense) for the year		2,150	2,150	(843)	(843)
Expendable restricted endowment comprehensive income/(expense) for the year		114	114	(98)	(98)
Unrestricted comprehensive income for the year		2,479	2,730	8,494	9,284
Restricted comprehensive income/(expense) for the year		1,228	33	1,797	(165)
Unrestricted hedging reserve comprehensive income for the year		109	-	642	-
Total Comprehensive Income in the year		6,718	5,665	9,685	7,871

The income and expenditure account is in respect of continuing activities and there were no operations that were acquired or discontinued by the Liverpool School of Tropical Medicine Group during the year or in the previous year.

The surplus for the year and total comprehensive income for the year is attributable to the Liverpool School of Tropical Medicine. There are no non-controlling interests.

Statement of Changes in Reserves

	Unrestricted General Reserve £'000	Restricted General Reserve £'000	Unrestricted Hedging Reserve £'000	Permanent Unrestricted Endowments £'000	Permanent Restricted Endowments £'000	Expendable Restricted Endowments £'000	TOTAL £'000
GROUP							
Balance at 31 July 2019	16,044	6,208	(751)	8,873	8,019	593	38,986
Surplus/(deficit) for the year	8,494	1,797	642	(843)	(307)	(98)	9,685
Movement between reserves	678	(678)	-	-	-	-	-
Movement of cash in reserves	(63)	-	-	-	-	-	(63)
Surplus/(Deficit) from statement of comprehensive income	9,109	1,119	642	(843)	(307)	(98)	9,622
Balance at 31 July 2020	25,153	7,327	(109)	8,030	7,712	495	48,608
Surplus for the year	2,512	1,195	109	2,150	638	114	6,718
Movement between reserves	(36)	33	-	-	-	-	(3)
Surplus from statement of comprehensive income	2,476	1,228	109	2,150	638	114	6,715
Balance at 31 July 2021	27,629	8,555	-	10,180	8,350	609	55,323

	Unrestricted General Reserve £'000	Restricted General Reserve £'000	Unrestricted Hedging Reserve £'000	Permanent Unrestricted Endowments £'000	Permanent Restricted Endowments £'000	Expendable Restricted Endowments £'000	TOTAL £'000
LSTM							
Balance at 31 July 2019	15,654	619	-	8,873	8,019	593	33,758
Surplus/(deficit) for the year	9,284	(165)	-	(843)	(307)	(98)	7,871
Movement of cash in reserves	(55)	-	-	-	-	-	(55)
Surplus/(deficit) from statement of comprehensive income	9,229	(165)	-	(843)	(307)	(98)	7,816
Balance at 31 July 2020	24,883	454	-	8,030	7,712	495	41,574
Surplus for the year	2,763	-	-	2,150	638	114	5,665
Movement between reserves	(36)	33	-	-	-	-	(3)
Surplus from statement of comprehensive income	2,727	33	-	2,150	638	114	5,662
Balance at 31 July 2021	27,610	487	-	10,180	8,350	609	47,236

Company registration number: 00083405

Balance Sheets as at 31 July

		Group Year ended 31 July 2021	LSTM Year ended 31 July 2021	Group Year ended 31 July 2020	LSTM Year ended 31 July 2020
	Notes	£'000	£'000	£'000	£'000
Fixed Assets					
Tangible fixed assets	17	59,094	58,807	58,691	58,385
Investments in subsidiaries	18	-	80	-	54
		<u>59,094</u>	<u>58,887</u>	<u>58,691</u>	<u>58,439</u>
Current Assets					
Stock		81	36	94	32
Debtors	19	17,235	15,834	23,787	17,341
Investments and endowments	20	47,848	28,231	31,100	31,100
Cash at bank and in hand	29	52,154	25,797	46,250	6,842
		<u>117,318</u>	<u>69,898</u>	<u>101,231</u>	<u>55,315</u>
Creditors: amounts falling due within 1 year	21	73,242	33,702	65,933	26,819
Net Current Assets		<u>44,076</u>	<u>36,196</u>	<u>35,298</u>	<u>28,496</u>
Total Assets less Current Liabilities		<u>103,170</u>	<u>95,083</u>	<u>93,989</u>	<u>86,935</u>
Creditors: amounts falling due after 1 year	22	34,944	34,944	34,296	34,296
Provisions: pension provisions	23	9,206	9,206	9,258	9,258
Provisions: other provisions	24	3,697	3,697	1,827	1,807
NET ASSETS		<u>55,323</u>	<u>47,236</u>	<u>48,608</u>	<u>41,574</u>
Endowment Reserves					
Permanent restricted endowments	26	8,350	8,350	7,712	7,712
Permanent unrestricted endowments	26	10,180	10,180	8,030	8,030
Expendable restricted endowments	26	609	609	495	495
		<u>19,139</u>	<u>19,139</u>	<u>16,237</u>	<u>16,237</u>
Restricted general reserve	27	8,555	487	7,327	454
Unrestricted Reserves					
Unrestricted general reserve		27,629	27,610	25,153	24,883
Unrestricted Hedging reserve		-	-	(109)	-
		<u>27,629</u>	<u>27,610</u>	<u>25,044</u>	<u>24,883</u>
TOTAL FUNDS		<u>55,323</u>	<u>47,236</u>	<u>48,608</u>	<u>41,574</u>

The Financial Statements were approved by the Board of Trustees on 1 November 2021 and were signed on behalf of the Directors by :

JO'Brien
Honorary Treasurer

Professor D Lalloo
Director

Statement of Cash Flows

		Group Year ended 31 July 2021	LSTM Year ended 31 July 2021	Group Year ended 31 July 2020	LSTM Year ended 31 July 2020
	Notes	£'000	£'000	£'000	£'000
Surplus for the year		6,609	5,665	9,043	7,871
Adjustment for non-cash items :					
Depreciation	17	2,041	2,022	1,911	1,893
Deferred capital grants released to income	25	(1,622)	(1,622)	(1,912)	(1,912)
(Surplus) on disposal of investments & endowments		(196)	385	(182)	(182)
Movement on hedging reserve		109	-	642	-
Decrease/(increase) in stock		13	(4)	2	4
Decrease/(increase) in debtors		6,518	1,507	2,295	(1,869)
Increase/(decrease) in creditors		7,256	6,830	(16,911)	(477)
Increase in other provisions		1,870	1,890	654	639
(Decrease) in USS pension provision		(52)	(52)	(12,591)	(12,591)
Unrealised revaluation (gains)/losses on investments and endowments	20	(1,857)	(2,438)	2,958	2,958
Unwinding of interest on finance lease	14	129	129	14	14
Interest receivable		(1,556)	(1,330)	(1,075)	(516)
Taxation	15	39	-	(24)	-
		<u>12,692</u>	<u>7,317</u>	<u>(24,218)</u>	<u>(12,038)</u>
Cash flow from operating activities		<u>19,301</u>	<u>12,982</u>	<u>(15,176)</u>	<u>(4,167)</u>
Taxation paid		(5)	-	24	-
Net cash generated/(utilised) from operating activities		<u>19,296</u>	<u>12,982</u>	<u>(15,152)</u>	<u>(4,167)</u>
Cash flows from investing activities :					
Income from long term investments and unrestricted permanent endowments		1,552	1,326	953	394
Other interest received	9	4	4	122	122
Net expenditure from restricted endowments		-	-	(5)	(5)
Decrease/(increase) in investments		-	(26)	-	-
Purchase of tangible fixed assets	17	(2,444)	(2,444)	(747)	(747)
Payments to acquire investment & endowment assets	20	(17,344)	(5,158)	(2,545)	(2,545)
Receipt from sale of investments		2,649	10,080	9,443	6,169
Increase/(decrease) in cash in endowments		-	-	(185)	(185)
Deferred capital grants received	25	2,628	2,628	1,483	1,483
Net cash generated from investing activities		<u>(12,955)</u>	<u>6,410</u>	<u>8,520</u>	<u>4,687</u>
Cashflows from financing activities :					
Interest element of finance lease rental payment		(129)	(129)	(14)	(14)
Capital element of finance lease rental payment		(308)	(308)	(412)	(412)
Net cash used in financing activities		<u>(437)</u>	<u>(437)</u>	<u>(426)</u>	<u>(426)</u>
Increase/(decrease) in cash in the year		<u>5,904</u>	<u>18,955</u>	<u>(7,058)</u>	<u>94</u>

Notes to the Accounts

1. Company Information

The Liverpool School of Tropical Medicine (LSTM) was formally inaugurated on 22 April 1898 and incorporated on 30 January 1905 as the Incorporated Liverpool School of Tropical Medicine. LSTM was registered as a charity on 11 October 1963. LSTM is a company limited by guarantee and holds no share capital and is governed by a Board of Trustees.

The Incorporated Liverpool School of Tropical Medicine changed its name on 30 November 1992 to Liverpool School of Tropical Medicine. The registered office is at Pembroke Place, Liverpool, L3 5QA, UK.

The Secretary of State for Business, Innovation and Skills, by an Order of Parliament, under section 129 of the Education Reform Act 1988, designated LSTM as a Higher Education Institute (HEI) on 19 July 2013. LSTM receives direct funding from the Office for Students (OfS) and UK Research and Innovation (including Research England).

2. Basis of Preparation

i) Basis of Preparation

These financial statements have been prepared in accordance with the Statements of Recommended Practice (SORP) : Accounting for Further and Higher Education 2019, and in accordance with applicable United Kingdom accounting standards including Financial Reporting Standard 102 (FRS 102), ‘the Financial Reporting Standard applicable to the United Kingdom and the Republic of Ireland’ and the Companies Act 2006. LSTM is a public benefit entity and therefore has applied the relevant public benefit requirement of FRS 102. The financial statements are prepared in accordance with the historical cost convention (modified by the revaluation of current asset investments and derivative financial instruments).

The Financial statements are presented in Sterling (£).

ii) Going Concern

These financial statements have been prepared on a going concern basis. In light of the COVID-19 pandemic in late 2019/20 LSTM put in place measures to monitor the ongoing impact of the pandemic on the financial position and also the continued use of the going concern basis for accounting. These measures included weekly cash flow forecasts at the height of the lockdown (compared to usual monthly cashflow forecasts), weekly Pandemic Emergency Management Team meetings which covered both practical and financial issues, regular briefing for Board Trustees on the pandemic as it impacts LSTM, and adjustment to Tuition schedules, presentation and student numbers to continue to offer courses where practical on-line. With regard to research the 50 largest projects were reviewed initially with regard to covid risk and then all remaining projects, and specific discussions were held with key funders around continuation of projects and related funding as the pandemic has developed.

In the 2020/21 financial year, it has been possible to return to much of the activity that was delayed in 2019/20, albeit with

limited international travel possible, and ensuring LSTM premises in Liverpool and around the world were covid-secure. Therefore the COVID-19 2020/21 budget targets have been exceeded. Given the level of activity which was possible in 2020/21 and the current covid situation, reflected in the 2021/22 budget and three year forecast, the Board of Trustees consider that it continues to be appropriate to account for LSTM as a going concern.

Despite the COVID-19 pandemic, having set up monitoring procedures which will be ongoing, the Board of Trustees considers that the group and LSTM have sufficient financial resources and is confident that its future income streams will maintain these resources.

The Board of Trustees have also taken account of the post balance sheet event in relation to the USS pension deficit provision (disclosed in note 39) and have no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.

The Board of Trustees has a reasonable expectation that LSTM has adequate resources to continue in operation for the foreseeable future. Therefore it continues to adopt the going concern basis in preparing the financial statements.

iii) Basis of Consolidation

The Consolidated financial statements include LSTM and entities controlled, both unilaterally and jointly, by LSTM, for the financial year to 31 July 2021. Where LSTM does not exercise control over an entity and is not in a position to extract economic benefits, the results of that entity are not consolidated. A full list of subsidiaries and NGOs in which LSTM has an interest is shown in note 18.

3. Significant Judgements and Estimates

Preparation of the Financial statements requires management to make significant judgements and estimates. The items in the Financial statements where these judgements and estimates have been made include:

Judgements

i) Deferral of balances

Due to the nature of research grants, which in the majority of cases span over several years, judgement is exercised in the decision over deferral of these balances to ensure income and expenditure are accounted for in the appropriate and matching period or when performance conditions have been met.

ii) Accounting for the Liverpool Life Science Accelerator (LLSA) building

LSTM signed a lease for occupation of research space in autumn 2017 and took occupation in September 2017. The lease is for 25 years, at £400,000 a year (excluding inflationary increases) and would ordinarily be considered as an operating lease. However, LSTM has an option to purchase its share of the building within 10 years of the start of the lease, which it intends to exercise and given this option LSTM has treated the building as a finance lease since the start of this lease.

Estimates

iii) Provisions

Provisions have been set up in relation to operational receipts : Provisions have been made where cash receipts have a possibility that an element may have to be repaid or where a liability has been incurred prior to 31 July 2021 and where the amount can be reasonably calculated or estimated.

Provisions have also been set up in relation to onerous research grants : due to COVID-19 activity on some research grants has been impacted. Provisions are ascertained through the forecasting and monitoring process that the research management services team undertake on a quarterly basis with delivery teams. This process monitors progress and highlights any issues within projects which may impact receipt of income or overrun of costs, which are reflected in the financial statements as a provision where the amount can be reliably calculated or estimated.

iv) Financial Instruments

All derivatives are measured at fair value. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at a measurement date. Where a market for a financial instrument is not active, fair value is established using a valuation technique. These valuation techniques involve a degree of estimation, the extent of which depends on the instrument's complexity and the availability of market based data. The Group previously applied hedge accounting but with effect from 1st August 2020, this has ceased.

v) Gifts in Kind

Gifts in kind include 2 material items:

a) pharmaceutical drugs gifted for mass drug administration (MDA) in several countries in Africa of £64,757,000 (2020 : £101,486,000). Given the nature of the activity this has been treated as implementation consultancy income. The valuation of the gifts is based on an estimate of the purchase cost of the drugs had LSTM had to purchase the drugs directly for the MDA programme multiplied by an estimate of the number of drugs required to treat patients. Income and expense are recorded at the point at which reliable figures are available for the number of patients treated, which is on the publication of the annual report to the funder.

b) Mosquito nets gifted for an effectiveness study in Uganda of £12,632,000 (2020 : £3,092,000). The valuation of the gifts is based on the purchase cost of the nets had LSTM had to purchase the nets directly for the study. The quantification of the number of nets included at the purchase cost as a gift in kind was based on the number of nets distributed during the financial year under the control and direction of LSTM.

vi) Accounting for the USS pension deficit

FRS 102 makes the distinction between a group plan and a multi-employer scheme. A group plan consists of a collection of entities under common control typically with a sponsoring employer. A multi-employer scheme is a scheme for entities not under common control and represents (typically) an industry-wide scheme such as the Universities Superannuation Scheme. The accounting for a multi-employer scheme where

the employer has entered into an agreement with the scheme that determines how the employer will fund a deficit results in the recognition of a liability for the contributions payable that arise from the agreement (to the extent that they relate to the deficit) and the resulting expense in the Statement of comprehensive income in accordance with section 28 of FRS 102. The trustees are satisfied that Universities Superannuation Scheme meets the definition of a multi-employer scheme and LSTM has therefore recognised the discounted fair value of the contractual contributions under the recovery plan in existence at the date of approving the financial statements.

The USS provision is calculated using an approved consistent methodology used by all members, based on the 2018 valuation, with estimates made regarding discount rate, growth of staff numbers and increase in staff salaries. LSTM's discount rate is based on advice to the USS members from Mercer. Estimates regarding growth in staff numbers and salaries reflect the LSTM 6 year strategic plan which runs from 2017 to 2023, updated for the impact of COVID-19.

Estimates made in the year are as follows:
Discount rate: 0.79% based on Mercer HEI sector analysis
Salary growth: 1.5% the first 6 years, 2.5% thereafter
Staff numbers growth: 3.0% first 6 years, 5.0% thereafter

The recovery plan following the 2018 actuarial valuation requires employers to contribute 2% of salaries for the first 2 years, and 6% of salaries thereafter, towards repaying the deficit over a period of 10 years, of which 7 remain. The current total contribution rate, including this element, is 21.1% (from 1 October 2019, previously 19.5%). Details of this provision are included in note 23 to the financial statements.

Subsequent to the financial year end the 2020 valuation has been signed and approved. Using the approved consistent methodology and using the same assumptions as above, a revised provision has been calculated and is disclosed as a post balance sheet event in note 39 of the financial statements.

4. Statement of Principal Accounting Policies

i) Income Recognition

Student fee income is stated gross of any expenditure which is not a discount and credited to the Statement of comprehensive income over the period in which students are studying. Where the amount of the tuition fee is reduced by a discount for prompt payment, income receivable is shown net of the discount. Bursaries and scholarships are accounted for gross as expenditure and not deducted from income.

Income from contracts and other services rendered is credited to the Statement of comprehensive income when the goods or services are supplied to the external customers or the terms of the contract, including performance related conditions, have been satisfied. This is generally equivalent to the sum of the relevant expenditure incurred during the year and any related contributions to overhead costs. Any payments received in advance of such performance are recognised on the balance sheet as liabilities.

Investment income is credited to the Statement of comprehensive income on a receivable basis.

Funds LSTM receives and disburses as paying agent on behalf of a funding body are excluded from the income and expenditure of LSTM where it is exposed to minimal risk or enjoys minimal economic benefit related to the transaction.

Interest on funds held on deposit is included when receivable and the amount can be measured reliably by LSTM; this is normally upon notification of the interest paid or payable by the Bank.

ii) Grant Funding

Government revenue grants including recurrent teaching and research grants from Office for Students (OfS) and UK Research and Innovation (UKRI), including Research England, are recognised in income over the periods in which LSTM recognises the related costs for which the grant is intended to compensate. Where part of a government grant is deferred it is recognised as deferred income within creditors and allocated between creditors due within one year and due after more than one year as appropriate.

Government capital grants are recognised in income over the expected useful life of the asset. Other capital grants are recognised in income when LSTM is entitled to the funds subject to any performance related conditions being met.

Grants (including research grants) from non-government sources are recognised in income when LSTM is entitled to the income and performance related conditions have been met. Income received in advance of performance related conditions being met is recognised as deferred income within creditors on the balance sheet and released to income as the conditions are met.

iii) Expenditure and Irrecoverable VAT

All expenditure is accounted for on an accruals basis and has been classified under headings that aggregate all costs related to that category. Where costs cannot be directly attributed to particular headings they have been allocated to activities on a basis consistent with use of resources. Grants are reflected in the Balance sheet when a constructive obligation exists, notwithstanding that they may be paid in future accounting periods.

Irrecoverable VAT is charged as a cost against the activity for which the expenditure was incurred.

iv) Donations and Endowments

Non exchange transactions without performance related conditions are donations and endowments. Donations and endowments with donor imposed restrictions are recognised in income when LSTM is entitled to the funds. Income is retained within the restricted reserve until such time that it is utilised in line with such restrictions at which point the income is released to general reserves through a reserve transfer.

Donations with no restrictions are recognised in income when LSTM is entitled to the funds.

Investment income and appreciation of endowments is recorded in income in the year in which it arises and as either restricted or unrestricted income according to the terms or other restrictions applied to the individual endowment fund.

There are four main types of donations and endowments identified within reserves:

- 1. *Restricted donations - the donor has specified that the donation must be used for a particular objective.*
- 2. *Unrestricted permanent endowments - the donor has specified that the fund is to be permanently invested to generate an income stream for the general benefit of LSTM.*
- 3. *Restricted expendable endowments - the donor has specified a particular objective other than the purchase or construction of tangible fixed assets and LSTM has the power to use the capital.*
- 4. *Restricted permanent endowments - the donor has specified that the fund is to be permanently invested to generate an income stream to be applied to a particular objective.*

v) Gifts in Kind

Gifts in kind are recognised within research grant income and other income, and within operating expenses, where performance conditions have been met and when a fair value can be reasonably estimated. Fair value is estimated using market values at the date of the gift but where the date of the gift cannot be accurately determined it is estimated when information has been collected and verified.

vi) Accounting for Retirement Benefits

The two principal pension schemes for LSTM's staff are the Universities Superannuation Scheme (USS) and the University of Liverpool Pension Fund (ULPF). ULPF is a defined benefit scheme and USS changed from a defined benefit scheme to a hybrid scheme on 1 October 2016, providing defined benefits (for all members) as well as contribution benefits. LSTM also participates in the National Health Service Pension Fund, which is a defined benefit scheme. All three schemes are externally funded and contracted out of the State Second Pension (S2P). Each fund is valued every three years by professionally qualified independent actuaries.

Both the USS and ULPF are multi-employer schemes for which it is not possible to identify the assets and liabilities related to LSTM's members due to the mutual nature of the scheme and therefore these schemes are accounted for as defined contribution retirement benefit schemes.

LSTM participates in the Universities Superannuation Scheme. The assets of the scheme are held in a separate trustee-administered fund. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis. As required by Section 28 of FRS 102 "Employee Benefits" LSTM therefore accounts for the scheme as if it were a defined contribution scheme. As a result, the amount charged to the Statement of comprehensive income represents the contributions payable to the scheme. Since LSTM has entered into an agreement (The Recovery Plan) that determines how each employer within the scheme will fund the overall deficit, LSTM recognises a liability for the contributions payable that arise from the agreement (to the extent that they relate to

the deficit) with related expenses being recognised through the Statement of comprehensive income.

vii) Defined Contribution Plan

A defined contribution plan is a post-employment benefit plan under which LSTM pays fixed contributions into a separate entity and will have no legal or constructive obligation to pay further amounts. Obligations for contributions in defined contribution pension plans are recognised as an expense in the Statement of comprehensive income in the periods during which services are rendered by employees.

The assets of the three main LSTM pension schemes are held in separate trustee-administered funds. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis.

As required by Section 28 of FRS 102 "employee benefits", LSTM therefore accounts for the schemes as if they were a wholly defined contribution scheme. As a result, the amount charged to the Statement of comprehensive income represents the contributions payable to the schemes.

viii) Employment Benefits

Short term employment benefits such as salaries and compensated absences are recognised as an expense in the year in which the employees render service to LSTM and the Group. Any unused benefits are accrued and measured as the additional amount LSTM and the Group expects to pay as a result of the unused entitlement.

ix) Holiday Pay Accrual

The liability for untaken staff holiday entitlement at 31 July 2021 is accrued. The accrual is based on actual hours untaken at 31 July and valued using an estimate made of average salaries within LSTM. A 50% weighting factor is applied to acknowledge the limited probability that such a pay-out would be required for 100% of staff - LSTM is a going concern and 100% pay-out would only likely be required in the event of a wind up of an organisation.

x) Foreign Currency

Transactions in foreign currencies are translated at the exchange rate ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are translated at the exchange rate ruling at the balance sheet date. Foreign exchange differences arising on translation are recognised in the Statement of comprehensive income. Non-monetary assets and liabilities that are measured in terms of historical cost in a foreign currency are translated using the exchange rate at the date of the transaction. Non-monetary assets and liabilities denominated in foreign currencies that are stated at fair value are retranslated at the exchange rate ruling at the dates the fair value was determined.

The assets and liabilities of foreign operations, including goodwill and fair value adjustments arising on consolidation, are translated to the Group's presentational currency,

Sterling, at foreign exchange rates ruling at the balance sheet date. The revenues and expenses of foreign operations are translated at an average rate for the year where this rate approximates to the foreign exchange rates ruling at the dates of the transactions. Exchange differences arising from this translation of foreign operations are reported as an item of Other Comprehensive Income. Exchange differences arising from a monetary item receivable from or payable to a foreign operation, the settlement of which is neither planned nor likely in the foreseeable future, are considered to form part of a net investment in a foreign operation and are recognised directly in Reserves.

xi) Finance Leases

Leases in which LSTM assumes substantially all the risks and rewards of ownership of the leased asset are classified as finance leases. Leased assets acquired by way of a finance lease and the corresponding lease liabilities are initially recognised at an amount equal to the lower of their fair value and the present value of the minimum lease payments at inception of the lease.

Minimum lease payments are apportioned between the finance charge and the reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate of interest on the remaining balance of the liability.

xii) Operating Leases

Rentals under operating leases are charged to the Statement of comprehensive income on a straight line basis over the lease term.

xiii) Fixed Assets

Fixed assets are stated at cost less accumulated depreciation and accumulated impairment losses.

Where parts of a fixed asset have different useful lives, they are accounted for as separate items of fixed assets.

Land and Buildings

Costs incurred in relation to land and buildings after initial purchase or construction are capitalised to the extent that they increase the expected future benefits to LSTM.

Freehold land is not depreciated as it is considered to have an indefinite useful life. Freehold buildings are depreciated on a straight line basis over a period of 50 years.

Leasehold buildings are depreciated on a straight line basis over 50 years.

No depreciation is charged on assets in the course of construction.

Fixtures and Equipment

Fixtures and equipment, including computers and software, costing less than the de minimus per individual item is recognised as expenditure. All other equipment is capitalised.

Capitalised equipment (including computer and other equipment) is stated at cost and depreciated over 4 years.

Depreciation methods, useful lives and residual values are reviewed at the date of preparation of each Balance Sheet.

xiv) Investments

Endowment asset investments and current asset investments are included in the Balance sheet at market value. Investments in the subsidiary undertakings are stated at cost, adjusted by any necessary impairment.

LSTM's treasury management policy is for all endowments to be invested in a portfolio of long term investments, while working capital balances and revenue reserves are invested short term with interest received credited to the Statement of comprehensive income. The investment objective is to achieve maximum return with minimum risk.

Non-endowment investments are held as current assets as they are available to be drawn down on demand.

xv) Stock

Stock is held at the lower of cost and net realisable value, and is measured using an average cost formula. Where necessary provision is made for obsolete, slow moving and defective stocks.

xvi) Cash and Cash Equivalents

Cash includes cash in hand, deposits repayable on demand and overdrafts. Deposits are repayable on demand if they are in practice available within 24 hours without penalty.

Cash equivalents are short term, highly liquid investments that are readily convertible to known amounts of cash with insignificant risk of change in value.

xvii) Debtors

Trade and other debtors are recognised at the settlement amount due after any trade discount offered, less any impairment. Prepayments are valued at the amount prepaid net of any trade discounts due.

xviii) Creditors

Creditors are recognised where LSTM has a present obligation resulting from a past event that will probably result in the transfer of funds to a third party and the amount due to settle the obligation can be measured or estimated reliably. Creditors are normally recognised at their settlement amount after allowing for any trade discounts due.

xix) Provisions, Contingent Liabilities and Contingent Assets

Provisions are recognised in the Financial Statements when:

- (a) LSTM and the Group has a present obligation (legal or constructive) as a result of a past event;*
- (b) it is probable that an outflow of economic benefits will be required to settle the obligation; and*
- (c) a reliable estimate can be made of the amount of the obligation.*

The amount recognised as a provision is determined by discounting the expected future cash flows at a pre-tax rate that reflects risks specific to the liability.

A contingent liability arises from a past event that gives LSTM a possible obligation whose existence will only be confirmed by the occurrence or otherwise of uncertain future events not

wholly within the control of LSTM. Contingent liabilities also arise in circumstances where a provision would otherwise be made but either it is not probable that an outflow of resources will be required or the amount of the obligation cannot be measured reliably.

A contingent asset arises where an event has taken place that gives LSTM and the Group a possible asset whose existence will only be confirmed by the occurrence or otherwise of uncertain future events not wholly within the control of LSTM and the Group.

Contingent assets and liabilities are not recognised in the Balance sheet but are disclosed in the notes.

xx) Financial Instruments

Basic financial instruments are initially recognised at transaction value and subsequently measured at their settlement value.

Derivative financial instruments are recognised at fair value using a valuation technique with any gains or losses being reported in the Statement of comprehensive income. Outstanding derivatives at the reporting date are included under the appropriate category depending on the nature of the derivative.

LSTM and the Group hold derivative financial instruments in the form of foreign currency sterling forward currency contracts. Derivatives are initially recognised at fair value on the date the derivative contract is entered into and are subsequently re-measured at their fair value at the balance sheet date. Changes in the fair value of derivatives are recognised in the surplus or deficit as appropriate, unless they are included in a hedging arrangement.

The Group previously applied hedge accounting but with effect from 1st August 2020, this has ceased.

Changes in the fair value of derivatives designated as cash flow hedges, and which are effective, are recognised directly in total funds. Any ineffectiveness in the hedging relationship (being excess of cumulative change in fair value of the hedging instrument since inception of the hedge over the cumulative change in the fair value of the hedged item since inception of the hedge) is recognised in the surplus or deficit.

The gain or loss recognised in Other comprehensive income is reclassified to the Statement of comprehensive income when the hedge relationship ends. Hedge accounting is discontinued when the hedging instrument expires, no longer meets the hedging criteria, the forecast transaction is no longer highly probable, the hedged debt instrument is derecognised or the hedging instrument is terminated.

xxi) Taxation

LSTM and IVCC are non-exempt charities within the meaning of Part 3 of the Charities Act 2011, therefore are charities within the meaning of Para 1 of schedule 6 to the Finance Act 2010 and accordingly, LSTM is potentially exempt from taxation in respect of income or capital gains received within categories covered by section 478-488 of the Corporation Tax Act 2010 (CTA 2010) or section 256 of the Taxation of Chargeable Gains Act 1992, to the extent that such income or gains are applied to exclusively charitable purposes.

LSTM is registered for VAT. Irrecoverable VAT on inputs is included in the costs of such inputs. Irrecoverable VAT allocated to fixed assets is included in their cost.

Some of LSTM's subsidiary entities are trading companies and are liable to Corporation Tax in the same way as any other commercial organisation.

xxii) Reserves

Reserves are classified as restricted or unrestricted. Restricted endowment reserves include balances which, through endowment to LSTM are held as a permanently restricted fund which LSTM must hold in perpetuity.

Other restricted reserves include balances where the donor has designated a specific purpose and therefore LSTM is restricted in the use of these funds.

The Board of Trustees approved a strategic plan covering a six year period to 31 July 2023. This plan anticipates LSTM's general reserves being augmented by the end of the period. The Board has targeted for cash reserves to represent a minimum of 6 months pay expenditure.

5. Funding Body Grants

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Recurrent teaching grants	1,331	1,331	1,502	1,502
Recurrent research grants	10,919	10,919	8,271	8,271
Specific grants	3,606	3,606	2,962	2,962
Release of deferred capital grants (note 25):				
<i>Buildings</i>	474	474	711	711
<i>Equipment</i>	621	621	671	671
	<u>16,951</u>	<u>16,951</u>	<u>14,117</u>	<u>14,117</u>

6. Tuition Fees and Education Contracts

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Masters fee income	1,408	1,408	1,322	1,322
PhD fee income	515	515	559	559
Fee income from diplomas	545	545	974	974
Fee income from short courses	7	7	43	43
Training and other courses	929	929	824	824
Fee income from University of Liverpool	333	333	379	379
	<u>3,737</u>	<u>3,737</u>	<u>4,101</u>	<u>4,101</u>

Total grant and fee income is also split as shown below:

Grant income from the OfS	1,331	1,331	1,502	1,502
Grant income from other bodies	15,620	15,620	12,615	12,615
	<u>16,951</u>	<u>16,951</u>	<u>14,117</u>	<u>14,117</u>
Fee income for taught awards (exclusive of VAT)	2,295	2,295	2,684	2,684
Fee income for research awards (exclusive of VAT)	1,435	1,435	1,350	1,350
Fee income for non-qualifying courses (exclusive of VAT)	7	7	67	67
	<u>3,737</u>	<u>3,737</u>	<u>4,101</u>	<u>4,101</u>
	<u>20,688</u>	<u>20,688</u>	<u>18,218</u>	<u>18,218</u>

7. Research Grants and Contracts

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Research Councils	12,684	12,684	10,313	10,313
UK based charities	27,457	27,457	15,199	16,363
UK Central Government and other bodies	20,782	14,174	21,444	12,940
UK industry and commerce	810	810	814	694
European Union	7,587	7,463	5,409	5,313
Other overseas bodies	29,758	10,122	24,748	11,171
Other	96	30	347	176
	<u>99,174</u>	<u>72,740</u>	<u>78,274</u>	<u>56,970</u>

Included within LSTM is £3,009,000 (2020 : £1,164,000) allocated to LSTM by IVCC, a UK registered charity under the control of LSTM. This income has been recognised as non-EU based charities income of £1,320,000 (2020 : £264,000), UK government income of £1,689,000 (2020 : £875,000) and UK other income of £ Nil (2020 : £25,000), by being matched against the related charitable expenditure incurred by the Group. IVCC allocates funding to research institutions on a competitive basis as validated by its External Scientific Advisory Committees.

Also included in UK based charities income are amounts relating to gifts of mosquito nets of £12,632,000 (2020 : £3,092,000). In accordance with FRS 102 the income has been shown above and offsetting costs are included in Other Operating Expenses (note 13).

Details of the estimates and judgements made in relation to these gifts are given in note 3 v.

8. Other Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Diagnostic lab	331	331	302	302
Travel health related activities	523	-	847	-
Implementation research consultancy	19,695	5,166	21,633	4,538
Gifts in kind: Pharmaceutical drugs for MDA programme	64,757	64,757	101,486	101,486
Forward currency contracts	459	459	669	669
Health authority contracts	216	216	185	185
Health authority funded posts	399	399	370	370
Non-funding council releases of deferred capital grants (Note 25)	528	528	530	530
Other	1,563	2,468	4,027	2,827
	<u>88,471</u>	<u>74,324</u>	<u>130,049</u>	<u>110,907</u>

Gifts in kind relate to gifts of pharmaceutical drugs for a mass drug administration programme (MDA) in various countries in Africa. In accordance with FRS 102 the income has been shown above and offsetting costs are included in Other Operating Expenses (note 13).

Details of the estimates and judgements made in relation to these gifts are given in note 3 v.

9. Investment Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Dividend income and interest receivable	747	521	726	167
Other interest receivable	4	4	122	122
	<u>751</u>	<u>525</u>	<u>848</u>	<u>289</u>

10. Donations and Endowment Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Endowment income	805	805	227	227
Unrestricted donations	38	38	111	111
Restricted donations	412	412	342	342
	<u>1,255</u>	<u>1,255</u>	<u>680</u>	<u>680</u>

11. Staff Costs

	Group Year ended 31 July 2021 Number	LSTM Year ended 31 July 2021 Number	Group Year ended 31 July 2020 Number	LSTM Year ended 31 July 2020 Number
The number of persons (including senior post holders) employed at 31 July each year, expressed as full-time equivalents, was:				
<i>Academic contracts</i>				
Teaching staff	10	10	11	11
Research staff	139	139	129	129
Teaching and research staff	65	65	64	64
Clinicians	18	18	15	15
<i>Non-academic contracts</i>				
Other	469	324	431	310
	701	556	650	529

The increase in other staff in the Group largely reflects an increase in staff in CeSHHAR Zimbabwe.

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Staff costs for the above persons were:				
Salaries	29,916	25,333	30,461	24,992
Social security costs	2,854	2,585	2,783	2,482
Pension costs	4,809	4,429	4,768	4,420
Restructuring costs	61	61	226	226
Accrued but untaken holiday costs	(18)	(18)	322	322
<i>Staff costs before adjusting for pension provision costs</i>	37,622	32,390	38,560	32,442
Pension deficit funding costs	(210)	(210)	(12,945)	(12,945)
<i>Total staff costs</i>	37,412	32,180	25,615	19,497

The pension provision costs represent the commitment by LSTM to fund the underlying deficit on the USS hybrid pension scheme. Under FRS 102 these amounts need to be provided for. The total provision at 31 July 2021 is £9,206,000 (see note 23).

	Group Year ended 31 July 2021		Restated Group Year ended 31 July 2020	
	Number of Key Management Personnel	Number of Other Staff	Number of Key Management Personnel	Number of Other Staff
Salaries of the higher paid staff, excluding employer's pension contributions were within the following ranges:				
£100,000 - £105,000	1	4	1	3
£105,001 - £110,000	1	3	2	7
£110,001 - £115,000	1	3	-	2
£115,001 - £120,000	-	5	-	6
£120,001 - £125,000	-	5	-	2
£125,001 - £130,000	1	1	1	1
£130,001 - £135,000	-	1	-	2
£135,001 - £140,000	1	1	1	-
£140,001 - £145,000	-	1	-	2
£145,001 - £150,000	-	1	-	2
£160,001 - £165,000	-	-	-	1
£165,001 - £170,000	-	1	-	-
£170,001 - £175,000	-	1	1	1
£175,001 - £180,000	1	-	-	-
£180,001 - £185,000	-	1	-	1
£205,001 - £210,000	1	-	1	-
£240,001 - £245,000	1	-	1	-
£255,001 - £260,000	1	-	1	-
£265,001 - £270,000	-	1	-	-
£270,001 - £275,000	-	-	-	1
	9	29	9	31

12. Key Management Personnel

Key management personnel are those persons having authority and responsibility for planning, directing and controlling the activities of the school. The figures below include compensation paid to key management personnel.

	Group/LSTM Year ended 31 July 2021 Number	Group/LSTM Year ended 31 July 2020 Number
The number of key management personnel including the director was:	9	9

Key management personnel include the Director. In 2020/21 and 2019/20 all key management personnel earned a salary of over £100,000 (see salary bandings note 11).

Key management personnel's total emoluments were made up as follows:

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Salaries	1,464	1,387
Social security costs	191	167
Pension Contributions	160	167
Total emoluments	1,815	1,721

Remuneration specifically for the Director, David Lalloo is as follows :

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Salaries	256	256
Social security costs	34	34
Pension Contributions	4	37
Total emoluments	294	327

The pension contributions of the Director and key management personnel are in respect of employer's contributions to the USS and NHS pension schemes and are paid at the same rate as for other employees.

The members of the Board other than the Director and the staff members did not receive any payment from LSTM other than the reimbursement of travel and subsistence expenses incurred in the course of their duties.

The total expenses paid to or on behalf of trustees was £1,704 (2020 : £1,961). This represents travel and subsistence expenses incurred in attending meetings and events in their official capacity.

Senior staff pay

LSTM is a world leading research institution. We benchmark our rates of pay and HR practices against the higher education sector in general, and our key comparator group is Russell Group institutions. This reflects where we need to be in order to attract and retain the most talented people in our predominantly research field, particularly against global and national competition.

Average earnings in higher education are higher than the average for both the public and private sector and have grown faster than in the wider economy.

The Director's pay is linked to a pay scale. Incremental progression is not automatic, however any pay awards are based on consideration of an individual's contribution, supported by evidence of exceptional performance. Determinations of pay for senior executive staff are made by the Remuneration Committee, the members of which are Board trustees, and which is chaired by the Chair of the Board; however, the Deputy Chair presides over discussions of the director's pay. The remuneration Committee adopts the CUC's Higher Education Senior Staff Remuneration Code and publishes a separate annual report. Due to COVID-19 the Remuneration Committee did not meet in July 2020 as the decision was made for there to be no increase in salaries in August 2020 for senior staff as a result of the pandemic. The Committee met in autumn 2021 but Senior Management Group staff have again decided not to take an increase in August 2021.

David Lalloo's level of remuneration since he became director was determined taking account of the analysis of benchmark information to reflect the relevant market position. He took office in January 2019 and the first determination of contribution and his reward was due to take place before the end of the 2019/20 financial year. However, as the decision was made for there to be no annual increase in senior management group salaries at August 2020 and August 2021, this review has been delayed.

Median salary info

The FTE salary of David Lalloo as Director, expressed as a multiple of the median salary of all LSTM UK staff is 6.80 (2020 : 6.96).

The FTE total remuneration of David Lalloo as Director, expressed as a multiple of the median total remuneration of all LSTM UK staff is 5.87 (2020 : 6.73).

The basis of the calculation is as follows:

- All staff costs are grossed up to reflect amounts payable on a full time equivalent basis.
- Total remuneration includes employer pension payments, bonus payments and allowances.
- Salary details for atypical and agency staff have been excluded due to difficulties in obtaining the data from third parties.

Overseas activities

LSTM's business is such that a substantial amount of overseas activities are carried out by all staff, which includes senior post-holders and higher paid staff. It is not believed appropriate to account for this expenditure in a separate note.

13. Other Operating Expenses

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Research grants and contracts	66,607	45,276	58,583	39,928
Implementation research consultancy	16,535	3,821	18,875	3,457
Gifts in kind: Pharmaceutical drugs for MDA programme	64,757	64,757	101,486	101,486
Gifts in kind: Mosquito nets	12,632	12,632	3,092	3,092
Gifts in kind : Experimental drugs	14	14	-	-
Forward currency contracts	110	-	152	-
Premises costs	3,270	3,270	3,071	3,071
Academic and related expenditure	709	708	1,930	2,082
Administrative and central services	1,370	953	1,381	1,733
	166,004	131,431	188,570	154,849

Other operating expenses include:	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
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Financial statements auditor's remuneration

Financial statements audit	119	68	84	41
Audit related assurance services	-	-	7	7
Taxation compliance services	9	9	9	2
Taxation advisory services	14	14	11	7

Other auditor's remuneration

Internal audit	30	30	26	26
Research grant audit services	14	14	-	-
Component auditors	19	-	26	-

14. Interest Payable

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Finance lease interest for Accelerator Building	129	129	14	14
	129	129	14	14

15. Taxation

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Tax charge/(credit) in year	39	-	(24)	-
	39	-	(24)	-

16. Surplus on Continuing Operations for the Year

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Surplus for the year before gift aid	6,609	5,665	9,043	7,871
Surplus generated by subsidiary undertakings and transferred to LSTM under gift aid	-	-	-	-
Surplus for the year	6,609	5,665	9,043	7,871

17. Tangible Fixed Assets

Group	Leasehold Buildings £'000	Freehold land and buildings £'000	Fixtures & Equipment £'000	TOTAL £'000
Cost or valuation				
At 1 August 2020	14,223	57,269	5,281	76,773
Additions	-	985	1,459	2,444
Disposals	-	-	(473)	(473)
At 31 July 2021	14,223	58,254	6,267	78,744
Depreciation				
At 1 August 2020	1,033	12,877	4,172	18,082
Charge for the year	344	1,071	626	2,041
Eliminated in respect of disposals	-	-	(473)	(473)
At 31 July 2021	1,377	13,948	4,325	19,650
Net book value at 31 July 2021	12,846	44,306	1,942	59,094
Net book value at 31 July 2020	13,190	44,392	1,109	58,691
Financed by Funding body capital grants	-	6,430	1,188	7,618
Financed by government capital grants	1,504	17,379	-	18,883
Financed by other grants and LSTM	11,342	20,497	754	32,593
	12,846	44,306	1,942	59,094

The amount for freehold land and buildings includes a value for land of £3,907,000 which is not depreciated.

The net book value of tangible fixed assets include £10,057,000 (2020 : £8,772,000) in respect of assets held under finance lease. Depreciation of the finance lease asset was £218,000 (2020 : £189,000).

	Leasehold Buildings £'000	Freehold land and buildings £'000	Fixtures & Equipment £'000	TOTAL £'000
LSTM				
Cost or valuation				
At 1 August 2020	13,871	57,269	5,191	76,331
Additions	-	985	1,459	2,444
Disposals	-	-	(473)	(473)
At 31 July 2021	13,871	58,254	6,177	78,302
Depreciation				
At 1 August 2020	954	12,877	4,115	17,946
Charge for the year	337	1,071	614	2,022
Eliminated in respect of disposals	-	-	(473)	(473)
At 31 July 2021	1,291	13,948	4,256	19,495
Net book value at 31 July 2021	12,580	44,306	1,921	58,807
Net book value at 31 July 2020	12,917	44,392	1,076	58,385
Financed by Funding body capital grants	-	6,430	1,188	7,618
Financed by government capital grants	1,504	17,379	-	18,883
Financed by other grants and LSTM	11,076	20,497	733	32,306
	12,580	44,306	1,921	58,807

The amount for freehold land and buildings includes a value for land of £3,907,000 which is not depreciated.

The net book value of tangible fixed assets include £10,057,000 (2020 : £8,772,000) in respect of assets held under finance lease.
Depreciation of the finance lease asset was £218,000 (2020 : £189,000).

18. Investments in Subsidiaries

	LSTM Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2020 £'000
Investments in subsidiary companies	80	54

LSTM owns 100% of the issued ordinary £1 shares of LSTM Consulting Limited, a company incorporated in England and Wales. Its principal business activity is carrying out technical assistance on health issues in tropical countries. LSTM Consulting Limited has interests in the following companies and NGOs :

- LATH Nigeria (Dormant NGO)
- LATH Umoyo, Malawi (Dormant) - 50%
- LSTM Kenya - 100%
- LSTM Consulting USA - 100%
- LMS (Dormant) - 100%
- LATH South Sudan (NGO)

LSTM owns 100% of the issued ordinary £1 shares of Liverpool International Health Ventures Limited, a company incorporated in England and Wales. Its principal business activity is being a vehicle to remunerate employees of fellow group companies and a holding company for the following :

- Well Travelled Clinics Limited (WTC)
- Liverpool International Health I.P. Limited (LIHIP)

LSTM owns 100% of the issued ordinary £1 shares of EchiTab Study Group (UK) Limited, a company incorporated in England and Wales (Dormant).

LSTM is the sole member of IVCC, a company and registered charity incorporated in England and Wales. IVCC is a company limited by guarantee and holds no share capital. Its principal business activity is to carry out research into controlling vector-borne diseases such as malaria and dengue.

LSTM owns 99% of the issued ordinary 10 Rupee shares of Liverpool School of Tropical Medicine India Private Limited, a company incorporated in India. Authorised and issued share capital has been increased in the year.

LSTM also has an interest in the following, which are all NGOs:

- LSTM Malawi	Consolidated in LSTM Group Financial Statements
- CeSHHAR Zimbabwe (Charity)	
- LSTM DRC	Not consolidated due to negligible activity
- Liverpool Initiative for Health Development (Nigeria)	
- LSTM Sierra Leone	
- LSTM Uganda	

LSTM Tanzania was closed during the year

19. Debtors : Amounts falling due within 1 year

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Trade debtors	1,749	1,328	1,419	1,315
Amounts owed by subsidiary undertakings	-	-	-	120
Deferred taxation	-	-	34	-
Balances due on research grants and contracts	13,022	12,310	20,494	14,320
Prepayments and accrued income	1,693	1,628	1,553	1,483
Forward currency contracts	771	568	287	103
	17,235	15,834	23,787	17,341

A bad debt provision of £155,000 (2020 : £270,000) has been recognised against debtors of LSTM and the Group.

20. Investments and Endowments

	Group Investments Year ended 31 July 2021 £'000	Group Endowments Year ended 31 July 2021 £'000	Group TOTAL Year ended 31 July 2021 £'000	Group TOTAL Year ended 31 July 2020 £'000
Cost at 1 August 2020/2019	13,387	12,500	25,887	32,200
Additions	14,653	2,691	17,344	2,545
Disposals	(384)	(2,069)	(2,453)	(9,072)
Cost at 31 July 2021/2020	27,656	13,122	40,778	25,673
Unrealised revaluation reserve at 1 August 2020/2019	2,835	2,378	5,213	8,385
Unrealised revaluation in the year	172	1,685	1,857	(2,958)
Unrealised revaluation reserve at 31 July 2021/2020	3,007	4,063	7,070	5,427
Market value at 31 July 2021/2020	30,663	17,185	47,848	31,100
Represented by:				
Fixed interest stocks (listed)	11,508	2,580	14,088	14,301
Equities (listed)	3,415	12,384	15,799	13,573
Other	15,740	2,221	17,961	3,226
	30,663	17,185	47,848	31,100
Represented by:				
Fellowships and scholarship funds	-	8,061	8,061	7,531
Prize funds	-	145	145	131
Other funds	30,663	8,979	39,642	23,438
	30,663	17,185	47,848	31,100

Investments include bank deposits of greater than 3 months duration of £14,258,000 (2020 : £72,000).

	LSTM Investments Year ended 31 July 2021 £'000	LSTM Endowments Year ended 31 July 2021 £'000	LSTM TOTAL Year ended 31 July 2021 £'000	LSTM TOTAL Year ended 31 July 2020 £'000
Cost at 1 August 2020/2019	13,387	12,500	25,887	29,139
Transfer of investments at cost to IVCC	(7,668)	-	(7,668)	-
Additions	2,467	2,691	5,158	2,545
Disposals	(383)	(2,069)	(2,452)	(5,797)
Cost at 31 July 2021/2020	7,803	13,122	20,925	25,887
Unrealised revaluation reserve at 1 August 2020/2019	2,835	2,378	5,213	8,171
Transfer of revaluation reserve to IVCC	(345)	-	(345)	-
Unrealised revaluation in the year	753	1,685	2,438	(2,958)
Unrealised revaluation reserve at 31 July 2021/2020	3,243	4,063	7,306	5,213
Market value at 31 July 2021/2020	11,046	17,185	28,231	31,100
<i>Represented by:</i>				
Fixed interest stocks (listed)	4,077	2,580	6,657	14,301
Equities (listed)	3,415	12,384	15,799	13,573
Other	3,554	2,221	5,775	3,226
	11,046	17,185	28,231	31,100
<i>Represented by:</i>				
Fellowships and scholarship funds	-	8,061	8,061	7,531
Prize funds	-	145	145	131
Other funds	11,046	8,979	20,025	23,438
	11,046	17,185	28,231	31,100

Investments include bank deposits of greater than 3 months duration of £2,072,000 (2020 : £72,000).

21. Creditors: Amounts falling due within 1 year	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Unexpended balances of research grants and contracts	58,521	26,906	54,221	20,403
Trade creditors	882	700	287	176
Amounts owed to subsidiary undertakings	-	96	-	-
Other taxation and social security	867	856	950	896
Holiday accrual	672	672	690	690
Accruals and deferred income	10,986	3,310	8,546	3,548
Forward currency contracts	272	120	247	114
Short Term element of finance lease liability (note 32)	453	453	426	426
Short term element of deferred capital grants (note 25)	589	589	566	566
	73,242	33,702	65,933	26,819

22. Creditors: Amounts falling due after 1 year	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Long term element of deferred capital grants (note 25)	25,911	25,911	24,928	24,928
Long term element of finance lease liability (note 32)	9,033	9,033	9,368	9,368
	34,944	34,944	34,296	34,296

23. Pension Deficit Provision	Group/LSTM USS Year ended 31 July 2021 £'000
At 31 July 2018	6,623
Increase in provision during the year (staff costs, see note 11)	15,081
Increase in provision during the year (interest costs)	145
Total increase in provision during the year	15,226
At 31 July 2019	21,849
Decrease in provision during the year (staff costs, see note 11)	(12,945)
Increase in provision during the year (interest costs)	354
Total decrease in provision during the year	(12,591)
At 31 July 2020	9,258
Decrease in provision during the year (staff costs, see note 11)	(210)
Increase in provision during the year (interest costs)	158
Total decrease in provision during the year	(52)
At 31 July 2021	9,206

The obligation to fund the past deficit on the Universities Superannuation Scheme (USS) arises from the contractual obligation with the USS to fund deficit payments in accordance with the deficit recovery plan. In calculating this provision, management have estimated future staff levels within the USS scheme for the duration of the contractual obligation and salary inflation. Key assumptions are set out below.

The provision at 31 July 2021 is based on the sector-mandated model which reflects the latest valuation at 31 March 2018.

Management has assessed future employees within the scheme and salary payment over the period of the contracted obligations to calculate the value of the provision, and has made the following assumptions.

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Discount rate	0.79%	1.71%
Salary growth	1.5% 1st 6 years, then 2.5%	1.5% 1st 6 years, then 2.5%
Staff numbers growth	3.0% 1st 6 years, then 5.0%	3.0% 1st 6 years, then 5.0%

Sensitivity analysis

As set out in the accounting policies, there are some critical judgements made in estimating the obligation to fund the USS deficit. The sensitivity of the principal assumptions used to measure the USS deficit provision are set out below:

Change in assumptions at 31 July 2021	Approximate impact £'000	
0.5% pa decrease in discount rate	187	Increase in provision
0.5% pa increase in discount rate	(180)	decrease in provision
0.5% pa increase in salary inflation over duration	184	Increase in provision
0.5% pa increase in salary inflation year 1 only	45	Increase in provision
0.5% increase in staff changes over duration	182	Increase in provision
0.5% increase in staff changes year 1 only	44	Increase in provision

Approval of 2020 valuation

On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out/unwound over the next 17 years.

24. Other Provisions

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 31 July 2019	1,173	1,168
Net movement of provisions in the year	654	639
At 31 July 2020	1,827	1,807
Net movement of provisions in the year	1,870	1,890
At 31 July 2021	3,697	3,697

Other provisions comprise primarily provisions for issues in meeting project deliverables on research grants of £1,859,000, partly due to COVID-19 (2020 : £1,106,000), provisions for costs relating to the Liverpool Life Sciences Accelerator (LLSA) research space of £927,000 (2020 :£128,000) and a provision for the negative assets for the subsidiary intellectual property company of £335,000 (2020 : £293,000).

Information regarding settlement of the amounts provided for is anticipated in the next year.

25. Deferred Capital Grants

	Group/LSTM Funding Council Year ended 31 July 2021 £'000	Group/LSTM Other Funding Year ended 31 July 2021 £'000	Group/LSTM TOTAL Year ended 31 July 2021 £'000
At 1 August 2020			
Buildings	5,605	19,411	25,016
Equipment	478	-	478
Cash received			
Buildings	1,297	-	1,297
Equipment	1,332	-	1,332
Released to Statement of comprehensive income			
Buildings	(474)	(528)	(1,002)
Equipment	(621)	-	(621)
At 31 July 2021	7,617	18,883	26,500

Deferred capital grants are shown in Creditors and are split between Creditors : < 1 year and Creditors : > 1 year as follows :

Creditors < 1 year	589
Creditors > 1 year	25,911
	26,500

At 1 August 2019			
Buildings	5,445	19,941	25,386
Equipment	537	-	537
Cash received			
Buildings	871	-	871
Equipment	612	-	612
Released to Statement of comprehensive income			
Buildings	(711)	(530)	(1,241)
Equipment	(671)	-	(671)
At 31 July 2020	6,083	19,411	25,494

Deferred capital grants are shown in Creditors and are split between Creditors : < 1 year and Creditors : > 1 year as follows :

Creditors < 1 year	566
Creditors > 1 year	24,928
	25,494

26. Endowment Reserves

	Group/LSTM Permanent Endowment Restricted Year ended 31 July 2021 £'000	Group/LSTM Permanent Endowment Unrestricted Year ended 31 July 2021 £'000	Group/LSTM Expendable Restricted Year ended 31 July 2021 £'000	Group/LSTM TOTAL Year ended 31 July 2021 £'000
At 1 August 2020				
- Capital value	7,383	6,527	543	14,453
- Accumulated income	272	202	(49)	425
- TOTAL	7,655	6,729	494	14,878
Reclassification between restricted and unrestricted	(559)	559	-	-
Drawdown of endowment capital	-	-	(48)	(48)
Appreciation of endowment assets investments (realised)	255	367	48	670
Appreciation of endowment assets investments (unrealised)	760	822	103	1,685
Income for the year	185	123	12	320
Transferred to statement of comprehensive income	(196)	(123)	-	(319)
At 31 July 2021				
- Capital value	7,955	8,275	597	16,827
- Accumulated income	145	202	12	359
- TOTAL	8,100	8,477	609	17,185
Representing:				
Fellowship and scholarship funds	7,452	-	609	8,061
Prize funds	145	-	-	145
Other funds	503	8,477	-	8,980
Investments	8,100	8,477	609	17,185
Cash relating to endowments	250	1,703	-	1,954
Reserves	8,350	10,180	609	19,139
	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000
At 1 August 2019				
- Capital value	7,386	7,557	623	15,566
- Accumulated income	217	202	(44)	375
- TOTAL	7,603	7,759	579	15,941
Reclassification between restricted and unrestricted	553	(559)	-	(6)
Drawdown of endowment capital	-	-	(44)	(44)
Appreciation of endowment assets investments (realised)	268	54	93	415
Depreciation of endowment assets investments (unrealised)	(824)	(525)	(130)	(1,479)
Income for the year	147	128	56	331
Transferred to statement of comprehensive income	(92)	(128)	(61)	(281)
At 31 July 2020				
- Capital value	7,383	6,527	543	14,453
- Accumulated income	272	202	(49)	425
- TOTAL	7,655	6,729	494	14,878
Representing:				
Fellowship and scholarship funds	7,106	-	494	7,600
Prize funds	130	-	-	130
Other funds	419	6,729	-	7,148
Investments	7,655	6,729	494	14,878
Cash relating to endowments	57	1,301	1	1,359
Reserves	7,712	8,030	495	16,237

27. Restricted General Reserve

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 31 July 2019	6,208	619
Surplus/(deficit) from Statement of comprehensive income	1,797	(165)
Transfer from general unrestricted reserve	(678)	-
At 31 July 2020	7,327	454
Surplus/(deficit) from Statement of comprehensive income	1,228	33
At 31 July 2021	8,555	487

The reserves of IVCC and CeSHHAR Zimbabwe are considered to be restricted due to their status as charities/Private voluntary organisations (PVOs) and their objects being narrower than those of the group. In addition, at 31 July 2021 donations where there is a restriction over how they are used were transferred to this reserve from the general reserve.

28. Financial Instruments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
The carrying value of the Group and LSTM's financial assets and liabilities are summarised by category below:				
Financial assets				
Financial assets at fair value through surplus or deficit:				
Listed investments and endowments	47,848	28,231	31,100	31,100
Financial assets that are debt instruments measured at amortised cost:				
Trade, research and other receivables	15,646	14,454	22,962	16,734
Cash and cash equivalents	52,154	25,797	46,250	6,842
Financial assets measured at fair value through surplus or deficit				
Forward currency contracts	771	568	287	103
	116,419	69,050	100,599	54,779
Financial liabilities				
Financial liabilities measured at amortised cost				
Trade, research and other payables and accruals	69,718	30,353	63,054	24,127
Finance lease liability	9,486	9,486	9,794	9,794
Financial liabilities measured at fair value through surplus or deficit				
Forward currency contracts	272	120	247	114
	79,476	39,959	73,095	34,035

The Group previously applied hedge accounting for certain transactions entered into to manage the cash flow exposures of US dollar research income, but this practice ceased with effect from 1 August 2020. Foreign currency forward contracts are held to manage the exposure to fluctuations in US dollar and Euro rates and are designated as cash flow hedges.

Cash flows on both the US dollar and Euro research income and the foreign currency forward contracts are at regular intervals, based on predicted project related cash flows. The forward contracts had a mark to market valuation as at 31 July 2021 amounting to an asset of £499,000 (2020 : £40,000 asset). During 2020/21 a gain of £110,000 (2020 : gain of £642,000) was recognised in the cash flow hedge reserve for changes in the fair value of the forward contracts and a gain of £349,000 was recognised in income for the year (2020 : a gain of £517,000). No amounts of ineffectiveness were recognised in 2019/20.

The foreign currency forward contracts are not traded in active markets. These have been fair valued using observable forward exchange rates corresponding to the maturity of the contracts.

The Group's income, expense, gains and losses in respect of financial instruments are summarised below:

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Financial assets				
Total interest income for financial assets at amortised cost	4	4	122	122
Fair value gains and (losses)				
On financial assets measured at fair value through income and expenditure	349	459	517	669
On financial assets measured at fair value through the hedging reserve	109	-	642	-

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 1 August 2020	46,250	6,842
Cashflows	5,904	18,955
At 31 July 2021	52,154	25,797

30. Pension and similar obligations

LSTM and the Group's employees belong to two principal pension schemes, the Universities Superannuation Scheme (USS) and University of Liverpool Pension Fund (ULPF) although a small number of staff belong to the National Health Service Superannuation Scheme (NHSSS) and WTC Pension scheme. All schemes apart from the WTC scheme are defined benefit schemes, which are externally funded and contracted out of the State Earnings-Related Pension Scheme.

The defined benefit funds are normally valued every three years by a professionally qualified independent actuary using the projected unit method, the rates of contribution payable being determined by each fund's trustee on the advice of the actuary. In the intervening years the actuary reviews the progress of the scheme. Pension costs are assessed in accordance with the advice of the actuary, based on the latest actuarial valuation of the scheme, and are accounted for on the basis of charging the cost of providing pensions over the period during which the institution benefits from the employee's services. The total group pension cost for the year was £4,809,000 (2020 : £4,768,000).

Universities Superannuation Scheme (USS)

LSTM participates in the Universities Superannuation Scheme. The scheme is a hybrid pension scheme, providing defined benefits (for all members), as well as defined contribution benefits. The assets of the scheme are held in a separate trustee-administered fund. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis. As required by Section 28 of FRS 102 "Employee benefits", LSTM therefore accounts for the scheme as if it were a wholly defined contribution scheme. As a result, the amount charged to the statement of comprehensive income represents the contributions payable to the scheme. Since LSTM has entered into an agreement (the recovery plan) that determines how each employer within the scheme will fund the overall deficit, LSTM recognises a liability for the contributions payable that arise from the agreement (to the extent that they relate to the deficit) and therefore an expense is recognised.

The total contributions charged to the Statement of comprehensive income is £3,911,000 (2020 : £3,845,000).

Deficit recovery contributions due within one year are £1,125,000 (2020 : £406,000).

The latest available completed actuarial valuation of the USS Retirement Income Builder (defined benefit) is at 31 March 2018 (the valuation date), which was carried out using the projected unit method.

Since the institution cannot identify its share of USS Retirement Income Builder (defined benefit) assets and liabilities, the following disclosures reflect those relevant for those assets and liabilities as a whole.

The 2018 valuation was the fifth valuation for the scheme under the scheme-specific funding regime introduced by the Pensions Act 2004, which requires schemes to adopt a statutory funding objective, which is to have sufficient and appropriate assets to cover their technical provisions. At the valuation date, the value of the assets of the scheme was £63.7 billion, and the value of the scheme's technical provisions was £67.3 billion indicating a shortfall of £3.6 billion and a funding ratio of 95%.

The key financial assumptions used in the 2018 valuation are described below. More detail is set out in the Statement of Funding Principals

Pension increases (CPI)	Term dependent rates in line with the difference between the Fixed Interest and Index Linked yield curves, less 1.3% p.a.
Discount rate (forward rates)	Years 1-10 : CPI + 0.14% reducing linearly to CPI - 0.73% Years 11-20 : CPI +2.52% reducing linearly to CPI +1.55% by year 21 Years 21+ : CPI +1.55%
The main demographic assumption used relates to the mortality assumptions. These assumptions are based on analysis of the scheme's experience carried out as part of the 2018 actuarial valuation. The mortality assumptions used in these figures are as follows:	
Mortality base table	2018 Valuation Pre retirement 71% of AMCO0 (duration 0) for males and 112% of AFC00 (duration 0) for females. Post retirement 97.6% of SAPS S1NMA "light" for males and 102.7% of RFV00 for females.
Future improvements to mortality	CMI_2017 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% p.a for males and 1.6% for females

The current life expectancies on retirement at age 65 are :

	2021 valuation	2020 valuation
Males currently aged 65 (years)	24.6	24.4
Females currently aged 65 (years)	26.1	25.9
Males currently aged 45 (years)	26.6	26.3
Females currently aged 45 (years)	27.9	27.7

A new deficit recovery plan was put in place as part of the 2018 valuation, which requires payment of 2% of salaries over the period 1 October 2019 to 30 September 2021 at which point the rate will increase to 6%. The 2020 deficit recovery liability reflects this plan. The liability figures have been produced using the following assumptions :

	2021	2020
Discount rate	0.79%	1.71%
Pensionable salary growth	Years 1 - 6: 1.5% Years 7 - 16: 2.5%	Years 1 - 6: 1.5% Years 7 - 16: 2.5%

Approval of 2020 valuation

On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out over the next 17 years.

University of Liverpool Pension Fund (ULPF)

LSTM participates in the University of Liverpool Pension Fund (ULPF), a defined benefit scheme in the UK. The final salary section of the Fund is closed to new entrants with effect from 31 July 2011 and from 1 August 2011 new members are eligible to join the CARE section of the Fund. A full actuarial valuation was carried out at 31 July 2018 and the preliminary results have been updated to 31 July 2021 by a qualified actuary, independent of the scheme's sponsoring employer.

The contributions made by the employer over the period have been £199,000 (2020 : £211,000). The employer currently pays contributions at the rate of 16% of pensionable pay. Member contributions are payable in addition at the rate of 7.5% of pensionable pay for Final Salary members and 6.5% of pensionable pay for CARE members.

The assumptions which have the most significant effect on the result of the valuation are those relating to the rate of return on investments (i.e. the valuation rate of interest) and the rates of increase in salary and pensions. In relation to the past service liabilities the financial assumptions were derived from market yields prevailing at the valuation date. It was assumed that the discount rate would be 1.7% per annum (2020 : 1.5%) and salary increases would be 2.85% per annum (2020 : 2.55%). The valuation was carried out using the projected unit method.

At the valuation date the market value of the assets of the scheme was £620.1m (2020 : £533.3m) and the value of the past service liabilities was £517.6m (2020 : £511.2m) leaving a surplus of £102.5m (2020 : £22.2m).

During the year, LSTM contributed to 48 employees within this scheme (2020 : 52 employees). There was a total of 45 LSTM active members in this scheme at 31 July 2021.

National Health Service Superannuation Scheme (NHSSS)

LSTM participates in the National Health Service Superannuation Scheme (NHSSS), a defined benefit scheme which is a statutory, unfunded, multi employer, defined benefit scheme in which LSTM is unable to identify its share of the underlying liabilities and assets and is accounted for on a contributions basis.

The contributions made by the employer over the financial year have been £318,000 (2020 : £364,000), equivalent to 14.38% of pensionable salaries.

There were a total of 39 LSTM active members in this scheme at 31 July 2021.

31. Contingent Liability

A composite cross guarantee structure exists between Liverpool School of Tropical Medicine, Well Travelled Clinics Limited, Liverpool International Health Ventures Limited, Liverpool International Health I.P. Limited, IVCC and LSTM Consulting Limited. The aggregate amount outstanding under this agreement at the balance sheet date was £609,352 (2020 : £531,361).

32. Finance Lease Commitments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Amounts due in less than one year	453	453	426	426
Amounts due between one and five years	1,953	1,953	1,896	1,896
Amounts due in more than five years	7,080	7,080	7,472	7,472
	<u>9,486</u>	<u>9,486</u>	<u>9,794</u>	<u>9,794</u>

LSTM signed a lease for occupation of 2 floors of research space in the LLSA in autumn 2017 and took occupation in September 2017. The lease is for 25 years, at £400,000 a year. LSTM has an option to purchase its share of the building within 10 years of the start of the lease, and given this option LSTM has treated the building as a finance lease since 2017/18.

33. Operating Lease Commitments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Amounts due in less than one year	105	45	125	41
Amounts due between one and five years	83	81	161	114
	<u>188</u>	<u>126</u>	<u>286</u>	<u>155</u>

34. Capital Commitments

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
5% retention on building works	-	233
	<u>-</u>	<u>233</u>

The building work was completed to LSTM's satisfaction during the year to 31st July 2021 and the retention payment was made before the end of the financial year.

35. Related Party Transactions

The Group has taken advantage of the exemptions included in FRS 102 section 33 in not disclosing the transactions with other group companies as all such transactions have been eliminated on consolidating the group results for the year.

Due to the nature of LSTM's operations and the composition of the Board of Trustees (being drawn from local public and private sector organisations), it is inevitable that transactions will take place with organisations in which a member of the Board may have an interest. All transactions involving an organisation in which a member of the Board may have an interest are conducted at arm's length and in accordance with LSTM's financial regulations and normal procurement procedures.

36. Foreign, Commonwealth and Development Office (FCDO) Funding (Formerly DFID)

Included within UK central government and other bodies income (note 7) and implementation research consultancy income (note 8) are the following DFID funded research projects, together with their income for the year:

	Group Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000
Sustainable Insecticides for Public Health	8,297	8,793
CNTD Global Programmes including Ascend	3,474	3,403
CouNTDown	1,220	1,307
READ-It	914	931
Next generation snakebite therapies	793	1,104
ReBuild	669	49
Reducing Maternal and Neonatal Deaths in Kenya	663	1,056
LIGHT RPC	620	-
FIEBRE	330	548
TDDAP	198	208
Stronger Health Partnerships for Stronger Health Systems	135	-
Monitoring/evaluation services Royal Society-DFID Capacity Building Africa Initiative	106	110
LQAS Survey South Sudan 2	88	-
K4D	56	46
Implementation/evaluation of novel tools in malaria control programmes	20	53
Integrated control of schistosomiasis and intestinal helminths	5	-
UKPHS	-	104
PBO study: Impact of LLINs	-	61
Capacity strengthening	-	7
Other smaller funding	64	73
	<u>17,652</u>	<u>17,854</u>

37. Impact of decision to leave the European Union

On 23 June 2016 the UK voted to leave the European Union and this took effect 1 January 2020. In 2020 the EU and the UK reached an agreement on their new partnership and these new rules took effect on 1 January 2021. With 10 months experience the key issues impacting LSTM to date have been :

- *more complex import documentation, with small increase in costs*
- *Added complexity to employing EU staff*
- *Ability to apply for EU research and capital funding*
- *Increased difficulty attracting EU students and staff*

However, the following concerns have not at this time materialised : increased currency volatility, decline in stock markets; decline in general macro-economic position and consumer confidence; GDPR data risks.

38. Consolidated Reconciliation of Net Funds

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
Net funds/(debt) 1 August 2020	36,496	(2,963)
Movement in cash and cash equivalents	5,904	18,955
Other non-cash changes	767	767
Net funds/(debt) 31 July 2021	43,167	16,759
Change in net funds	6,671	19,722

Analysis of net funds/(debt):	Group Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2020 £'000
Cash and cash equivalents	52,154	46,250	25,797	6,842
Borrowings: amounts falling due within one year				
Obligations under finance leases	453	426	453	426
Forward contracts	(499)	(40)	(448)	11
	(46)	386	5	437
Borrowings: amounts falling due after more than one year				
Obligations under finance lease	9,033	9,368	9,033	9,368
	9,033	9,368	9,033	9,368
Net funds/(debt)	43,167	36,496	16,759	(2,963)

39. Post Balance Sheet Events

The impact on the Group from the COVID-19 pandemic has been considered by the Trustees and there are no related adjusting or non-adjusting events since 31 July 2021.

The financial statements include a pension provision of £9,206,000. This balance, and the £52,000 credit in the year, are based on a mandated calculation used across the sector. Subsequently, on 1st October 2021, the Universities Superannuation Scheme (USS) 2020 valuation was signed and filed with The Pensions Regulator, effective this date. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event. The revised calculation would result in an increase in the expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out/unwound over the next 17 years.

The LSTM Group has unrestricted general reserves of £27.6m, reflecting a strong balance sheet and total net assets of £55.3m. The estimated cash outflows in relation to the revised provision calculation, are scheduled to occur over 17 years. The cash outflows in the next 5 years total £6.4m, and with the exception of 2019/20 which was impacted by COVID-19, LSTM has a history of positive operating surpluses, with the total net surplus over the last 5 years including 2020/21 of £14.0m. Therefore LSTM does not consider that the 2020 valuation impacts the preparation of these financial statements on the going concern basis.





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Financial Statements 2020-2021



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Report to the Members of the Board of Trustees

1. Constitution and Organisation

The Liverpool School of Tropical Medicine (LSTM) was formally inaugurated on 22 April 1898 and incorporated on 30 January 1905 as the Incorporated Liverpool School of Tropical Medicine. LSTM was registered as a charity on 11 October 1963. LSTM is a company limited by guarantee and holds no share capital and is governed by a Board of Trustees.

The Incorporated Liverpool School of Tropical Medicine changed its name on 30 November 1992 to Liverpool School of Tropical Medicine.

The Secretary of State for Business, Innovation and Skills, by an Order of Parliament, under section 129 of the Education Reform Act 1988, designated LSTM as a Higher Education Institute (HEI) on 19 July 2013. LSTM receives direct funding from the Office for Students (OfS) and UK Research and Innovation (including Research England).

2. Memorandum of Association

LSTM’s Memorandum and Articles of Association was amended by special resolution and adopted at the AGM on 24 November 2017. Its main objects are:

To engage in, promote and encourage research, study and instruction in connection with the origin, character, alleviation, prevention and cure of every or any type of tropical disease which is now or may hereafter become known in any part of the world where such disease either manifests itself or has effects; and to advance and encourage learning and the practice of all sciences and arts allied with or which may be usefully studied in connection with the matters aforesaid, and to collect and circulate information with regard to such diseases, sciences and arts.

3. Statement of Public Benefit

LSTM is a registered charity subject to regulation by the OfS and the Charity Commission under the Charities Act 2016. LSTM reports annually on the ways in which it has delivered charitable purposes for public benefit.

The Board of Trustees, in reviewing LSTM’s activities in this regard, has taken into account the Charity Commission’s guidance on public benefit. The Board is satisfied that the activities of LSTM as described in these Reports and Financial Statements, and detailed in the Annual Report, fully meet the public benefit requirements.

4. Vision and Mission

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.

5. Objectives

The year ending 31 July 2021 completes the 4th year of the LSTM strategic plan 2017-2023. This 6-year strategic plan to 31 July 2023 takes LSTM up to its 125th anniversary in 2023. LSTM continues to experience an ongoing transformation and growth. LSTM’s success is dependent on the quality, commitment, and ability of its staff and a continuing favourable research climate for global health issues. Work on the development of the next strategic plan is now commencing, to be launched at the beginning of our anniversary year.

Undoubtedly COVID-19 has continued to impact LSTM, its subsidiaries and many of the communities, both overseas and in the UK, that we work with. LSTM, in partnership with the others in the Liverpool City Region, has mobilised the major concentration of infectious diseases expertise within the city to address the major research issues that COVID-19 poses globally. LSTM has had a central role in the response to COVID-19, extending from many staff working as clinicians to advice to governments. The LSTM COVID-19 multi-faceted response has brought researchers together from across all disciplines, such as pharmacologists, immunologists, clinicians and health systems researchers to work in partnership with multiple institutions and industrial organisations. This successful activity across the whole research pipeline, demonstrates the ability of the organisation to work flexibly and rapidly to changing circumstances which is critical to its success.

LSTM has had an exceptionally productive and stable cohort of senior academic and administrative staff leading the sustainable growth of the organisation over the last two decades. Further strategic appointments continue to enhance the exceptional research community within LSTM and will ensure that this momentum is maintained.

Our major strategic goals for the 2017-2023 period are:

- Strengthen the translational impact of our activities
- Expand our teaching portfolio
- Plan for growth

These 3 goals are expanded into 10 actions throughout this strategic cycle. We will:

1. Expand significantly our teaching portfolio in line with market demand
2. Identify, attract, retain and develop internationally competitive leaders in translational research
3. Align our research portfolio with global infection priorities
4. Ensure that our research focus covers the T1-T4 translational continuum
5. Ensure that our learning and teaching developments and research activities are aligned and integrated
6. Accelerate transition of research outputs into health impact
7. Enable genuine interdisciplinary activity

8. Enable effective global partnerships with multiple stakeholders in teaching and research
9. Consolidate and enhance our relationships with major funders
10. Provide the environment that supports the above

LSTM management undertakes regular monitoring and evaluation under the supervision of the Board of Trustees to ensure that the items are contemporary and are followed up each year. LSTM does not expect COVID-19 to impact the achievement of these goals and in fact, the Pandemic has played to LSTM’s strength as a world leader in managing infectious diseases.

Operating and Financial Review

6. The Nature, Objectives and Strategies of the Charity

LSTM continues to focus itself as a global leader in its field. Through the added strength and reach of its partnership working, both in the UK and overseas, our group turnover has achieved £210m in 2020/21 (£134m excluding gifts in kind). The organisation focuses on providing high quality scientific evidence and translating our scientific discovery into policies and practices and working collaboratively in over 70 countries to fulfil our mission of improving the health of the world’s poorest people. Supporting the Sustainable Development Goals remains central to LSTM’s mission.

LSTM is a centre of excellence in research and postgraduate teaching. Our multidisciplinary approach to global health research allows us to translate research innovation and scientific breakthroughs from laboratory research into effective interventions for those most in need, working in partnership with researchers and academic organisations in Low- and Middle-Income Countries. LSTM and IVCC’s combined research portfolio has now reached £617 million and staff numbers and the estate continue to grow, without accessing any borrowing.

We intend to remain at the cutting edge of innovation in research and intervention by attracting the best researchers from around the world to address some of the biggest problems in global health today and to attempt to break the cycle of poor health and poverty. Providing unrivalled, relevant, learning opportunities to students within the UK and across the world is also key, offering students the opportunity to excel in their careers in public health, medicine and academia and to set them on their paths to be global health leaders.

LSTM is now four years into the strategic planning period 2017-2023, and leading up to the celebration of the 125th anniversary of LSTM, the mission, and the values to which LSTM aspires, remain fundamentally unchanged. LSTM, and its subsidiary companies, are an increasingly visible part of the local Liverpool economy around which new initiatives can be seeded, benefitting both LSTM and the region in which it is embedded.

LSTM has always had a strong translational element to its activities and translational research is well embedded in many parts of LSTM, including within its subsidiary IVCC. Our focus continues in this area to ensure our activities are

relevant and have an increased beneficial impact on global health. Because of our focus on the whole translational research trajectory, LSTM and IVCC are ideally placed to work with partners to support the implementation of effective knowledge innovations across a broad range of disease areas. We excel in a co-ordinated and multi-disciplinary approach to strengthen capacity for delivering large scale operational and translational research and operate as a centre of excellence in research synthesis for evidence-informed policy and practice. In terms of demographic changes in resource poor setting, there is now an overlap between non-communicable diseases and infectious diseases, and LSTM is adapting to this changing environment.

LSTM continues to grow and develop its postgraduate and CPD courses to meet the needs of our academic community. A new Global Health MSc programme complements globally renowned courses in tropical and infectious diseases and helps to achieve our aim of providing high quality education for medical, public health and humanitarian students and professionals. The forced rapid and successful development of online platforms has enabled LSTM to provide a blended learning approach to meet the flexible demand for the course, which during the pandemic, has provided a strong platform.

Despite being an international organisation, a local focus is essential for the continued growth and health of LSTM. Multi-sectoral partnerships have been strengthened; LSTM engages successfully with the largest number of funders and industrial partners and is a key player in the local Knowledge Quarter initiative and Liverpool Health Partners. The new Liverpool University Hospitals NHS Foundation Trust is a key partner and there are growing and strong relationships with Liverpool City, Liverpool City Region, the Liverpool Combined Authority and the innovation network within the North West.

LSTM submitted its first full submission as an independent HEI to the Research Excellence Framework (REF) 2021 in March 2021. Despite the challenges of a global pandemic, a high quality submission was achieved, testament to the commitment and support of all involved. Outcomes of REF will not be available until March 2022 but LSTM is aiming to improve upon the results achieved from the 2014 return where LSTM took overall 24th place out of 128 institutions and 6th place out of 128 on impact according to the Times Higher Education (THE) analysis.

LSTM has continued to support and review its approach to equity and inclusion throughout 2020/21, working at dismantling barriers to inclusion and progression, creating an inclusive environment and reviewing our historical and cultural impact from our approaches to education and research. LSTM also recognises its role in safeguarding and protecting beneficiaries, research participants, patients and communities with whom we have contact through our work and in protecting any vulnerable staff, students, volunteers and other representatives. A tremendous amount of progress has been made in this area during the year and LSTM, IVCC and the rest of the Group now has a designated safeguarding officer who is the first point of contact for safeguarding enquiries or for raising concerns. We endorse and support the principles of the Universal Declaration of Human Rights, (UN, 1948); the UN Convention on the Rights of The Child, (UNICEF, 1989); the Declaration on the Elimination of Violence Against Women, (UN, 1993) and the UN Global Compact (UN, 1997).

7. Financial Performance

Principal Risks and Uncertainties

The full scope of principal risks is monitored and mitigated within the institution's risk register and include measured and mitigated risk around sources of income, particularly : Financial growth targets, student numbers/income, grant income overhead contribution and over dependency on specific funders/major clients, and the impact of Brexit and COVID-19.

Other key financial risks include the following:

- Liability to finance the deficit on the University Superannuation Scheme (USS):** On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. This has been disclosed in these financial statements as a post balance sheet event. Under the new valuation there is a considerable increase in the deficit provision that LSTM will be required to make for the coming year. It is anticipated there will be considerable discussion in the sector about the ability of HELs to manage these increased liabilities. This increase is offset by the requirement to repay the deficit over 17 years. As a result of LSTM's strong balance sheet and its significant cash and investments reserves, there is no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.
- Exposure to foreign exchange fluctuations on US\$ or Euro denominated grant income:** this is mitigated through hedging receipts in US\$ and Euros through forward exchange contracts.
- Brexit:** Following the UK's changed relationship with the EU effective 1 January 2021 LSTM is monitoring the impact this is having on operations and costs. The main impact to date has been on an increase in paperwork, and LSTM has also seen an increase in construction costs in particular, but this is likely also a factor of the pandemic.
- Failure to maintain the pipeline of research grants and consultancy:** Research grants and consultancy income of £106.2m (excluding gifts in kind, see notes 7 and 8) is 9.7% higher than in 2019/20, reflecting a recovery following a small decline in 2019/20 primarily due to the pandemic. This income represents 79.9% of the total LSTM Group income (excluding gifts in kind) of £132.9m. The principal risk to research income growth is the accessibility and success of research grant applications and this is mitigated through risk monitoring. Brexit has not had the feared impact of accessibility to EU grants and LSTM has been able to apply for EU funding. LSTM has demonstrated success in applying for COVID-19 grants since the pandemic started, and this can only help in increasing LSTM's prominence and reputation in this field. The unexpended balance of live grants and applications at 31 July 2021 was £250m and the application pipeline was £105m, compared to £276m and £118m respectively at 31 July 2020.
- Research turnover growth:** This is fundamental to the organisation with a target to increase income by over 30% (excluding subsidiary companies) within the strategic plan period ending in 2022/23. Sensitivity analysis shows that a reduction of 20% on the turnover from major funders has little effect on the bottom line of LSTM if sensibly managed due to a related reduction in expenses. However, any significant

change in funding policy from LSTM's major donors could have a major effect in the longer term. Following a small drop in 2019/20 due to COVID-19, research turnover growth continued to grow during 2020/21.

- Improvement to the research infrastructure:** This is perceived as a direct contributor to the quality and timescale for achieving high quality scientific results and attracting additional funding to LSTM. In fact, quality of facilities separates LSTM from other UK institutions and contextualises LSTM as a global player. Investment in laboratories is fully supported by the Board of Trustees and in 2020/21 LSTM invested £1.2m in new laboratory based cutting edge equipment. This investment is enabled by the generation of surpluses and capital funding from Research England/Office for Students, the Wolfson Foundation and others.

Financial Performance in the year

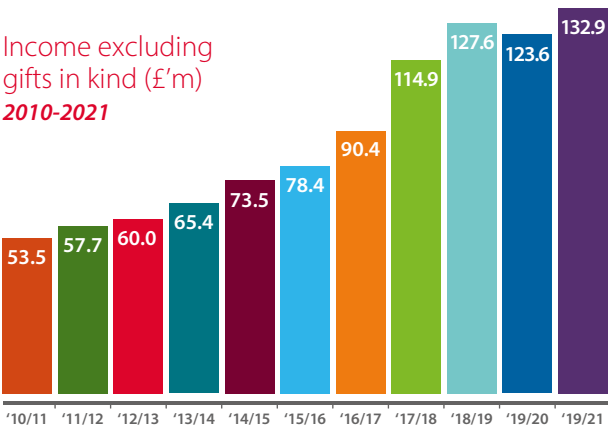
LSTM Group has reported total comprehensive income of £6.7m (2020 : £9.7m surplus). The surplus in the previous year was primarily due to a credit of £12.6m to decrease the Universities Superannuation Scheme (USS) pension deficit provision based on the 2018 scheme valuation. In the current year, there has been only a negligible movement on the USS pension provision, but since the financial year end the 2020 valuation has been signed and the impact of this is reflected in these financial statements as a post balance sheet event. In addition the surplus reflects £3.0m additional Research England COVID-19 funding and a £1.9m net unrealised revaluation of investments and endowments as markets bounced back after the initial impacts of the start of the COVID-19 pandemic.

These financial statements report the results of LSTM's activities for the year ended 31 July 2021 and have been produced in accordance with the Statement of Recommended Practice: Accounting for Further and Higher Education 2019 (2019 SORP) and in accordance with Financial Reporting Standards (FRS102). The results for the year include a number of accounting entries which influence the final comprehensive income of £6.7m in 2020/21. Stripping out these adjustments LSTM made an underlying operating surplus of £2.7m in the year, and the Group an operating surplus of £4.4m in the year, as shown in the table below.

	LSTM	Group
	£'000	£'000
Total comprehensive income for the year	5,665	6,718
USS pension deficit funding credit	(52)	(52)
Unrealised gain on revaluation of investments and endowments	(2,438)	(1,857)
Foreign exchange movements in relation to hedged currencies	(459)	(459)
Underlying operating surplus for the year	2,716	4,350

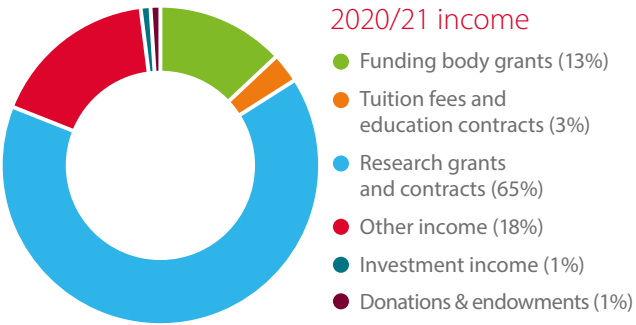
Income

LSTM's reported group income fell by 7.8% in the year but excluding gift in kind income (which decreased by 26%) income actually increased by 7.6%.



The main contributing factors to the increase in income are:

- An increase in income from research grants and contracts, excluding gifts in kind (12% and 15% higher in LSTM and Group respectively). This is partly due to a catch up from the prior year due to the impact of COVID-19, which delayed activity on some projects during the last 4 months of last year.
- A 20% increase in funding body grants, primarily related to an additional grant of £3m from Research England, for specialist institution status.
- Higher endowment and donation income was offset by a reduction in other income, primarily related to lower Well Travelled Clinic (WTC) activity.



Operating expenditure

LSTM's and the Group's reported total operating expenditure fell by 6% and 5% respectively (excluding gifts in kind expenses rose by 24% and 15% respectively), again a "bounce back" after the COVID-19 impact in 2019/20. The main elements of the change in operating expenditure are:

- The prior year reflected the release of £12.6m in relation to the USS Pension deficit provision, the movement on the provision is negligible in 2020/21.
- An increase in LSTM and Group other operating expenses (excluding gifts in kind), largely reflecting the increase in research activity/income.

Capital expenditure

Capital investment expenditure for the year was £2.4m (2020: £0.7m). Of this total, the largest components were building projects, IT capital projects and research equipment.

LSTM is currently investing in 2 large building projects – in Liverpool the development of Pembroke House as a bespoke teaching and learning space, and in Malawi, the Creator building, a research development working in partnership with Wellcome Trust and the University of Liverpool. The buildings are due to be completed in 2022 and 2023 respectively.

These investments have been funded through capital grants from Research England and OfS and internal funding and exclude other grant funded purchases bought as part of ongoing research projects.

Cash flow, financing and balance sheet

During the year LSTM generated net cash inflows from operating activities of £13.0m (2020: £4.2m outflow). These net inflows reflect mainly:

- A £6.8m increase in creditors, reflecting increased research activity
- The £5.7m surplus for the year

There was also a £8.0m inflow following transfer of investments to a subsidiary.

The net overall change in cash for LSTM for the year was an inflow of £19.0m (2020: £0.1m inflow).

Group net cash inflows from operating activities was £19.3m (2020: £15.2m outflow). The inflow is primarily a result of working capital movements, particularly a large decrease in debtors in IVCC and an increase in creditors. The outflow from investing activities of £13.0m (2020: £8.5m inflow) largely reflects reinvestment of surplus cash in investments following a more cautious approach in the prior year during the start of the COVID-19 pandemic.

The overall net change in cash for the year for the Group was an inflow of £5.9m (2020: £7.1m outflow).

Cash and cash equivalents at the year-end were £52.2m, representing 5 months of total operating expenditure (excluding pension provision movement, depreciation and gifts in kind expense). The majority of this cash represents research project working capital and is therefore not available for non-research operational or capital investment purposes.

Total Group net assets increased by £6.7m from £48.6m to £55.3m. This increase was principally driven by the operating surplus in the year and unrealised gains on investments and endowments.

Group Investments and endowments increased by £16.7m in the year due to reinvestment of cash following sales of some investment assets in the prior year and due to the rebound in market valuations from the relative low level at July 2020 early on in the pandemic.

Group Creditors due within one year increased by £7.3m, following the decrease in the prior year which reflected a catch up of expenditure with partners on research grants after previous large grant receipts in advance.

Key Performance Indicators

To measure performance and progress against the 6 year strategic plan LSTM uses a range of key performance indicators (KPIs), some of which are also part of LSTM's statutory reporting to Office for Students (OfS).

Underlying operating surplus/(deficit) in the year

£'000	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
Underlying operating surplus/(deficit)	4,350	(428)	3,882	4,392	1,827

LSTM monitors the underlying operating surplus or deficit after excluding accounting entries, as calculated earlier. Having achieved surpluses the last few years, 2019/20's results were negatively impacted by COVID-19. In 2020/21 activity has largely been able to resume and LSTM has also benefitted from £3m of exceptional funding from Research England.

Overall financial health

%	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
General reserves as a % of income (excluding gifts in kind)	20.8%	20.4%	12.6%	26.7%	29.5%

In recent years general reserves have been impacted by movements on the USS pension provision in particular. However, general reserves have remained strong over the last few years, under-pinned by a strong balance sheet.

Research income growth

£'m/%	2020 /21	2019 /20	2018 /19	2017 /18	2016 /17
Research & consultancy income £'m (excluding gifts in kind)	106.2	96.9	100.9	93.2	71.1
% change	9.6%	-3.9%	8.2%	31.1%	18.5%

8. Student Numbers

LSTM's Education revenue is directly linked to the number of postgraduate taught and postgraduate research students recruited each academic year. In 2020/21, 87 home, 12 EU students and 42 overseas students (total of 141) attended the School's Masters programmes. This represents an overall 12% increase in student numbers from the previous year of 125 students. The increase is due to several factors: increased demand from the intercalating Home market to study LSTM related programmes during the COVID-19 pandemic as well as heightened interest and capacity by students to study LSTM's topical programmes amidst a global pandemic.

LSTM also teaches three professional diplomas, the Diploma in Tropical Medicine and Hygiene (DTMH), Diploma in Tropical Nursing (DTN), and Diploma in Travel Health (DTH). Whilst these programmes are not credit bearing, like the Masters programmes, DTMH and DTN do attract Office for Students (OfS) funding. In 2020/21 a total of 112 students studied on these programmes comprising 82 Home, 21 EU and 9 Overseas. This does represent a 36% decrease in numbers from 2019/20 where we had 174 students.

The decrease is directly attributable to COVID-19 as we had to cap student numbers due to social distancing restrictions. Furthermore, as these are clinical programmes, many of the intended participants of the programmes were directly involved in the COVID-19 response and needed to defer their study due to professional commitments as well as travel related restrictions for overseas students. In spite of all the COVID-19 challenges for these markets, we have managed to run successful cohorts of students, albeit with reduced capacity. Participants on these programmes have expressed appreciation to LSTM for running these programmes and adapting the delivery model where necessary to accommodate COVID-19 related challenges.

LSTM also delivers a portfolio of non-credit bearing short CPD courses that do not attract OfS funding. Due to the COVID-19 pandemic and space limitations on our campus, we were unable to offer these programmes with the exception of several students who were deferred from a previous year. International students were unable to travel to the UK for a short period of time due to COVID-19 but in previous years, these short and intensive campus-based programmes were very popular with students. We therefore had a total of 11 students on these types of programmes compared to 128 in 2019/20.

In 2020/21, 136 students were enrolled on postgraduate research degrees (PhD, MPhil and MD) with 69 students registered off site. LSTM's track record in supporting PGR candidates has translated into success in the latest competition for MRC DTP/CASE studentships and has supported the award of other funded programmes with embedded PGR studentships (ARISE, LIGHT, NIHR HPRU, AMETHIST). Over the course of the year, 23 have successfully completed or are expected to complete a research degree.

9. Curriculum Developments

The new curriculum will place emphasis on scenario and simulation-led approaches that use real-world data and more immersive experiences that create more authentic contexts for learning. These will help students to learn how to deal with pressure, cope with complexity and change, and make difficult decisions in the context of ethical or moral challenges. To achieve this a newly established working group will identify scenarios to be designed into the curriculum with the intention that they will be augmented with infield video footage to bring authenticity to the learning experience. In support of the new educational approaches a specialist "Immersive Learning Environment" is being designed into one of the learning spaces in Pembroke House. This learning space will not only enable students to experience the sights and sounds of real world situations but also interact with the environment which can be targeted to develop key skills such as high pressure design making.

The development of Pembroke House will also play an important role in supporting LSTM's wider strategic vision for Education by enabling effective global partnerships with multiple stakeholders in teaching and research through high quality collaborative and interactive online learning. Each of the technologically advanced learning spaces has a slightly different focus to enable a rich mix of pedagogical approaches whilst taking into consideration the needs of our global partners.

Currently, a five-year PGR development plan has been drafted which includes an increased training and mentoring offer to students and supervisors, review of existing programmes

and delivery of new integrated MPhil- PhD and MRes-PhD programmes, and increased support and engagement with off-site students and supervisors. These activities are required to ensure that LSTM delivers an outstanding student experience with enhanced support for supervisors both on-site and off-site. It is anticipated that an improved student experience will result in LSTM attracting high-quality students in higher numbers both on- and off-site.

10. Staff and Student Involvement

An e-newsletter is regularly distributed to all members of staff. Monthly Staff Forum meetings are held at which management reports any significant developments within LSTM. Staff representatives nominated through the Staff Forum sit on the School's Management Committee and there is a student representative on the Board of Trustees. In the Education department, Town Hall meetings are held regularly so that the Education management team can report and teams from within the Department can present on current projects.

Our Student Representation system is thriving. There are two elected student representatives for each Masters and Diploma programme, who are trained at the start of their role to run regular focus groups with the students, lead on the Staff Student Liaison Committee and sit on the Boards of Studies. Their feedback, alongside the module questionnaires, also feed into the Annual Programme Monitoring as part of our quality assurance procedures. Separately, two student representatives sit on the Quality Management Committee, which oversees the quality assurance of LSTM's taught provision. More widely, we have student representation on the Equality and Inclusion Committee and are advertising for a role on the Health and Safety Oversight Committee. Students have also been engaged in discussions and focus groups around Pembroke House and teaching space development. All teaching staff are encouraged to have an 'open door' policy for students and we promote the Freedom to Speak up System so that students can contact us anonymously about concerns.

11. Fundraising

Approach to fundraising

Our fundraising efforts are predominantly focused on relationship-based fundraising with trusts, foundations, corporates, high net worth and ultra-high net worth individuals. However, a substantial part of our income in 2020/21 has come through a major public fundraising initiative, Bump It Forward, which was run via JustGiving. This initiative was launched in response to a request from LSTM staff in Sub Saharan Africa and has raised more than £230,000 from 4,700 donors, the majority of whom are new supporters of LSTM.

For major donors, we undertake detailed due diligence which is overseen by the Management Committee and the Trustees. High risk or high value donations are referred to the Trustees for a decision, ensuring that we manage risk as much as possible. External due diligence is commissioned in the cases of any significantly high value or contentious approaches.

We undertake thorough research (in line with GDPR) and manage all donor records on a secure, dedicated database.

Alumni and friends who have been asked for funding this year had all opted in to receiving fundraising communications. Public donors via the Bump It Forward campaign were able to select communication preferences via JustGiving and so only those who had opted in to receiving contact from LSTM have been added to the database.

A new CRM system will be implemented in 2021/22 to enable better management of supporter and stakeholder relationships across LSTM. Donor data will have protected viewing rights restricted to the Fundraising team and a Data Protection Impact Assessment has been completed. All data subjects will be informed before their data is moved onto the new system and will have the option to change their personal preferences or be removed.

LSTM is undertaking a major fundraising campaign in the lead up to, and including, its 125th Anniversary in 2023. This will target the public and the major donor categories highlighted above with income strategically aligned to LSTM's vision for growth. This will ensure consistency in approaches to all donors. The campaign aims to raise £25m in philanthropic funding over the next 5-7 years. An external Campaign Board is being established to help support and oversee the fundraising strategy.

Work with, and oversight of, any commercial participators/ professional fundraisers

Over the last year, we have engaged a consultancy firm to support the creation of a fundraising case for a support and brand toolkit, reflecting the institutional vision. We plan to continue their engagement for a further six months to support the successful launch of the campaign. The consultants reported to the Director of Fundraising on a regular basis and worked to pre-agreed Terms of Reference and specific aims, under the guidance of LSTM's Ethical Fundraising Policy.

Fundraising conforming to recognised standards

All members of the fundraising team are members of the Chartered Institute of Fundraising, and the Director of Fundraising holds the Advanced Diploma in Fundraising, the highest qualification awarded by the Institute. LSTM has also signed up and paid the levy to the Fundraising Regulator, by virtue of which we also sign up to their Fundraising Code of Practice.

Monitoring of fundraising carried out on our behalf

We don't currently actively encourage volunteer fundraising on behalf of LSTM but do occasionally have a number of individuals who wish to undertake sponsorship events on our behalf. Several of the Trustees have been very supportive in engaging their contacts on behalf of LSTM and it is anticipated that this will expand to involve the new Campaign Board, when appointed. In all these cases, the leads are passed on to the Fundraising team and we liaise with the individuals involved, and ensure that donations can be collected in a secure and compliant way.

Fundraising complaints

Any complaints received by the Fundraising Regulator, or directly to LSTM, will be immediately referred to the Director and the Chair of the Board of Trustees, and an action plan promptly developed in responding to them. Safeguarding issues will be referred to LSTM's Safeguarding Lead.

Protection of the public, including vulnerable people, from unreasonably intrusive or persistent fundraising approaches, and undue pressure to donate

LSTM does not currently undertake any public (cold/non-opt-in) campaigns utilising telephone, door-to-door or ‘chugging’ (street fundraising). Any mass-participation fundraising campaigns are marketed through reputable platforms such as JustGiving and Crowdfunder.co.uk or via direct communication with individuals who have opted in to receive such communications. Contacts who have opted in to receive fundraising communications may be included in email or direct mail campaigns, based on their communications preferences.

All donors on the database have opted in to receiving our communications and their data is stored in line with GDPR 2018.

12. Taxation

LSTM’s activities do not fall to be charged to corporation tax, given that income and gains are applied for and used exclusively for charitable purposes. LSTM’s subsidiaries fall under the scope of corporation tax, except for IVCC, which has charity status. Due to the continued growth of LSTM, a tax strategy is updated and issued annually (available on the website). HMRC have changed their method of operations and LSTM no longer have an appointed customer compliance manager within HMRC. However, LSTM continue to comply with all relevant regulations and to contact HMRC as relevant on specific issues.

13. Employment of Disabled Persons

LSTM welcomes applications for employment from disabled persons and appoints on the basis of merit alone. The organisation works to the social model of disability and provides adjustments and additional support in the workplace so that all staff can operate effectively in their roles. We work to ensure all staff have opportunities for progression and development. Where an existing employee becomes disabled, every effort is made to ensure that the necessary support mechanisms are put in place to assist continued employment. We are currently reviewing our support for applicants and employees with disabilities and developing an Adjustment Passport to provide assurance and clarity for colleagues with reasonable adjustments when transitioning roles or line managers, as well as working to establish a Staff with Disabilities Network.

14. Disability Statement

In accordance with the Equality Act 2010 and Public-Sector Equality Duty, LSTM is committed to creating an inclusive and accessible environment. This includes making improvements to physical environment such as installing lifts, ramps, wheelchair-accessible toilets and clear signage, as well as providing mandatory training on disability awareness. In addition, we take care to ensure that internal and external communications are inclusive and accessible.

We have committed to accepting the accessibility regulations as good practice, and as part of our commitment to the Public Sector Equality Duty. We are working on ensuring that our external pages are all accessible and are building capacity to ensure that internal documents are all checked for accessibility

before publication, including mandating that all policies are accessibility-checked prior to publication.

15. Equality at LSTM

LSTM’s vision is based on fostering an inclusive culture for staff and students which goes above and beyond the specific legal responsibilities we have towards those employees with protected characteristics. We are in the process of developing our Inclusion Strategy with both leadership and grassroots engagement, which will establish our guiding objectives and approaches for the period 2021-2024. We are changing our language from discussion of ‘equality and diversity’ to ‘equity and inclusion’, to shift the focus towards differentiating support for colleagues and students who may face more barriers to inclusion than others. We are transforming our Equality Impact Assessment process to ensure that policymakers are considering equity impacts at the initial stages of designing their policy and encouraging substantial stakeholder engagement to ensure that a wide variety of perspectives are embedded into policy development. Social mobility questions are being added to HR’s staff and student data collection process as part of understanding and improving our diversity demographic

We are developing our training programme, with a focus on becoming a more inclusive organisation – this includes updating our Race in the Workplace training module, and also active bystander and microaggression training, which will be led by an external expert and be provided to all staff across LSTM.

Gender Equity

Athena SWAN is a charter mark for Higher Education Institutions, aimed at progressing gender equality within academia and academic institutions. We have an active Athena SWAN Self-Assessment team, representative of a diverse range of roles and seniority from across LSTM, who are responsible for looking at barriers to gender equality at LSTM; we currently hold a bronze award and we are preparing a submission for the silver award by April 2022. The assessment will also look at the intersectionality of gender with other protected characteristics, such as ethnicity, and provide an action plan that LSTM will look to progress over the next few years.

We have published our mandatory Gender Pay Gap (GPG) report (March 2021), and also opted to analyse our Ethnicity Pay Gap, which is not currently a statutory requirement, with targeted actions to reduce our Gender Pay Gap. Actions to address the Ethnicity Pay Gap are more complex (the gaps do not show clear trends), and will form part of our race equity review and action planning. Gender Pay Gaps are generally reported a year later than the snapshot date on which the relevant data is collected (31st March each year), and we have sought this year to report more proactively – therefore this year LSTM is publishing two Gender and Ethnicity Pay Gap reports.

Our Gender Pay Gap (median) has reduced from 13.4% (2018) to 11.1% in 2020 (reported in Spring 2021) and at the time of writing we are also publishing our second Gender and Ethnicity Pay Gap report (2021-22), which relates to data from a snapshot date of 31st March 2021 and shows a further reduction of the median gender pay gap to 8.7%. We have established a target for us to lower our median gap to 5.55% or less by 2026, and eliminate the gap in its entirety by 2028 – a target we are well on track to achieve. Our key actions to address the gap are to increase male recruitment into our lower-graded roles, and

to improve the proportion of female employees in our fourth (highest) quartile.

We are reviewing our support for students and staff who may experience sexual harassment and ensuring that our offer is in line with the recent recommendations from the recent Office for Students Statement of Expectations – this is sitting with our Safeguarding Oversight Committee, with input from our Equity & Inclusion Committee as required.

Race Equity

Our BAME Staff Network is active and has a representative on the School Equity & Inclusion Committee. We have developed an internal Race Equity Advisory Panel (REAP), in collaboration with the Network, which is tasked with identifying areas of activity with regard to race inequity within LSTM. The REAP have commissioned an external consultant who will be working with LSTM to identify barriers to inclusion for minoritised ethnic colleagues and students, and a focused action plan which will provide us with initiatives and actions to become a leading anti-racist Higher Education Institution.

LGBTQ+ Equity

Our LGBTQ+ Staff and Student network have a representative on our Equity & Inclusion Committee, and LSTM has signed up to the Stonewall Global Diversity Champions charter. This will support us in our work to ensure that our LGBTQ+ staff and students are as safe as possible whilst travelling overseas (particularly relevant for many of the countries that LSTM currently works in), and in developing our Trans Equality policy and support for managers of colleagues who are transitioning.

16. Transparency Arrangements

The Board of Trustees conducts its business through a number of committees. Each committee has terms of reference, which have been approved by the Board. Full minutes of all meetings are available from the Secretary to the Board at: Liverpool School of Tropical Medicine, Pembroke Place, Liverpool, L3 5QA

The Secretary to the Board maintains a register of financial and personal interests of the Board members. The register is available for inspection at the above address.

17. Planned Maintenance Programme

LSTM’s management, through the Building Steering Group, review the funding available for maintenance and identify an appropriate budget to deliver a prioritised planned maintenance programme for the year. All buildings are maintained to a high standard and LSTM scores highly in the sector in this regard.

18. Endowments

LSTM holds endowment funds from the following:

Andrew Campbell Prize, Corlett Prize, David Haddock Prize, John Hay Prize, Jephcott Prize, Jervis Prize, Toosey Prize, White Waller Prize, W. Glynn Williams Prize, Blacklock Medal, Holt Medal, Milne Medal, Cicely Williams Medal, Yorke Medal, William Hesketh Leverhulme Scholarship, Joseph P. Caplan Bursary, Jean Clayton Fellowship, Mildred Ellerker Award,

Gatsby, Sir Eric Griffith-Jones Memorial Fellowship Fund, Thomas Mark Fund, Kenneth Newell Bursary, Rhodes-Gilles Fund, Gwendolen Clayton Memorial Scholarships, David Smith Fund, A. M. Browne Bursary, Katherine Elliot Fund, Annie Evans Fund, Mamco Selab Scholarship Fund, Professorial Fund.

19. “Brexit”

On 23 June 2016 the UK voted to leave the European Union. In January 2020 the EU and the UK reached an agreement on their new partnership, and these new rules took effect from 1st January 2021. With 10 months experience the key issues impacting LSTM to date have been as follows :

- More complex import documentation, with small increases in costs
- Added complexity to employing EU staff
- Increased difficulty attracting EU students and staff
- Availability of consumables and associated price increases

However, the following concerns have not at this time materialised : increased currency volatility; decline in stock markets; decline in general macro-economic position and consumer confidence; GDPR data risks

20. Post balance sheet events

The ongoing impact on the Group from the COVID-19 pandemic has been considered by the Trustees and there are no related adjusting or non-adjusting events since 31 July 2021.

The financial statements include a pension provision of £9,206,000. This balance, and the £52,000 credit in the year, are based on a mandated calculation used across the sector. Subsequently, on 1st October 2021, the Universities Superannuation Scheme (USS) 2020 valuation was signed and filed with The Pensions Regulator, effective this date. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out over the next 17 years.

21. Professional Advisers

LSTM’s current professional advisors are:

Financial Statement & Funding Auditors:

Grant Thornton UK LLP
Royal Liver Building, Liverpool, L3 1PS

Bankers:

The Royal Bank of Scotland plc
1, Dale Street, Liverpool, L2 2PP

Internal Auditors:

RSM Risk Assurance Services LLP
3, Hardman Street, Manchester, M3 3HF

Solicitors:

Brabners LLP
Exchange Flags, Liverpool, L2 3YL

22. Members

The Board of Trustees are also the nominated directors under the Companies Act 2006 and their term of office is for three years. The members who served on the Board during the year were as follows:

Name	Date of appointment retirement* re-appointment **	Status of appointment	Capacity and Committees Served
Jim McKenna	November 2020 As Trustee and as Chair from February 2021	Elected	Chair of the Board of Trustees Nominations & Governance Remuneration Finance & Investment
Sue Russell LLB (Hons)	November 2019** Elected Vice Chair November 2019 then Acting Chair of LSTM March -November 2020	Elected	Joint Vice Chair of the Board of Trustees Chair of Audit Nominations & Governance Remuneration
John O'Brien, B.Comm, FCA	November 2020**	Elected	Hon Treasurer Chair of Finance & Investment Nominations & Governance Remuneration
Professor David Lalloo MB, BS, MD, FRCP, FFTM, RCPS (Glasg)	January 2019	Ex Officio/staff	Director of LSTM Nominations & Governance Finance & Investment
Mark Allanson	November 2019**	Elected	Trustee Remuneration
Joanne Dodd BA ACA	August 2019	Elected	Trustee Deputy Treasurer Finance & Investment
Lynne Elliott MPhil MBA PGCE BSc (Hons)	August 2020	Elected	Student Trustee
Jeremy Lefroy MP	November 2018** November 2019 elected Vice Chair	Elected	Joint Vice Chair of the Board of Trustees IVCC Board Member
Dr Julian Lob-Levyt CBE	November 2018**	Elected	Trustee Remuneration
Prof Nyovani Madise	August 2019	Elected	Trustee
Eileen Thornton, CBE, MEd, BA, FCSP, DipTP	November 2020** Interim Chair of Audit Committee March 2020 to November 2020	Elected	Trustee Audit Committee
Professor Stephen Ward BSc, PhD	November 2018**	Ex Officio / staff	Deputy Director of LSTM
Andrew Wright	March 2019	Elected	Trustee
Robert Einion Holland FCCA, MBA	June 2001	Non- member	Secretary to the Board

23. Statement of Corporate Governance and Internal Controls

The Liverpool School of Tropical Medicine is a company limited by guarantee and currently has 63 members, 12 of whom make up the Board of Trustees. Members meet at the Annual General Meeting where they elect the Board of Trustees, effectively the company board of directors. It is the Board's responsibility to bring independent judgement to bear on issues of strategy, performance, resources and standards of conduct.

LSTM operates under the following principal governance arrangements:

- LSTM Memorandum and Articles of Association, incorporating the instrument and articles of government.
- Committee of University Chairs – The Higher Education Code of Governance September 2020
- UK Charity Legislation
- Equality Challenge Unit – Governing bodies, Equality and Diversity and the Equality Act 2010.

And with due regard to best practice within - The UK Corporate Governance Code.

The Board of Trustees conducts its business through a number of formal committees, delegating the day-to-day management of LSTM to the Director of LSTM. The Trustees comply with the requirements of the Companies Act and of the Charities Act as to keeping financial records, the audit of accounts and the preparation and transmission to the Register of Companies. The Trustees also ensure that annual reports, annual returns and annual statements of account are completed by LSTM. Proper records of all proceedings at general meetings, meetings of Trustees, committees and all professional advice obtained are kept by the Secretary to the Board for the Chairman of the Board.

The Board is provided with regular and timely information on the overall financial performance of LSTM together with other information such as performance against funding targets, proposed capital expenditure, quality matters and personnel related matters such as health and safety and environmental issues. The Board of Trustees meet, as a minimum, on a termly basis and retain authority to request and conduct extraordinary meetings.

All Board members are able to take independent professional advice in furtherance of their duties at LSTM's expense and have access to the Secretary and Clerk who are responsible to the Board of Trustees for ensuring compliance with all applicable procedures and regulations. The appointment, evaluation and removal of the Secretary are matters for the Board of Trustees as a whole. Formal agendas, papers and reports are supplied to members in a timely manner prior to Board meetings. Briefings are also supplied on an ad-hoc basis.

The Board has a strong and independent non-executive membership and no individual or group dominates its decision-making process. The Board considers that each of its non-executive members is independent of management and free from any business relationships, which could materially interfere with the exercise of the independent judgement. There is a clear division of

responsibility in that the roles of the Chair, Deputy Chairs, and Director are separate.

Each committee chair, deputies and members receive delegated responsibility from the Board of Trustees. The Board of Trustees has also approved terms of reference for each committee.

- Audit Committee
- Finance and Investment Committee
- Nominations & Governance Committee
- Remuneration Committee

Collectively, these set out governance principles and arrangements for ensuring that LSTM is committed to maintaining the highest standards of corporate governance and are appropriate for the size and complexity of our organisation.

Appointments to the Board of Trustees

Any new appointments to the Board are a matter for consideration of the Board as a whole. The Board of Trustees has a Nominations & Governance Committee comprised of 4 members which is responsible for the selection and nomination of any new member for the Board's consideration. Ahead of, and during appointment, it is incumbent upon LSTM to ensure that "fit and proper persons" checks are in place to notify LSTM and the Chair of the Board of Trustees if there are any declarations that may require intervention.

Members of the Board of Trustees are appointed for a term of office of three years. Retiring Trustees shall be eligible for re-election subject to paragraph 5.5, 5.5.1 and paragraph 5.5.2 of the Articles (November 2017).

The Board of Trustees appoint four members as "Board Champions" who have career experience in Equality and Inclusion, PREVENT duty, GDPR and Safeguarding and these act as conduits across the organisation and lead on engagement activity. The Board is responsible for ensuring that appropriate training is provided as required to its members.

Members are expected to promote LSTM's values and protect its reputation by discharging their duties and principles as set out in the code of conduct. The code of conduct provides clear guidance on what is expected of staff, students, volunteers, trustees and other representatives, as well as providing examples of conduct that will always be unacceptable.

Patron

LSTM is honoured to have Her Royal Highness The Princess Royal KG KT GCVO as Patron. She succeeded her father, HRH the Duke of Edinburgh, in 1991. LSTM has enjoyed Royal Patronage since 1932 when HM King George VI became LSTM's first Patron.

President & Vice-Presidents

LSTM's President and Vice-Presidents are distinguished individuals drawn from the field of academia, business and politics and are committed to assisting LSTM in fulfilling its mission. They willingly give their help and advice and support in approaches for charitable donations.

Audit Committee

The Audit Committee has a maximum of 7 members and is comprised of at least 2 members of the Board (Chair and Deputy), 1 IVCC Board member and at least 1 co-opted independent member. The Committee operates in accordance with written terms of reference approved by the Board of Trustees. The Committee is comfortable that the Board representation is sufficient given the additional expertise of the co-opted members.

The Audit Committee meets on a termly basis and provides a forum for reporting by LSTM's internal and financial statements auditors who have access to the Committee for independent discussion without the presence of LSTM management.

LSTM's internal auditor team provide LSTM with independent advice and assurance in regard to the adequacy of systems of internal control, risk management controls and governance processes in accordance with an agreed plan of input and report their findings to management and the Audit Committee. Management is responsible for the implementation of the agreed recommendations and internal auditors undertake periodic follow up reviews. LSTM is able to ensure that such recommendations have been implemented. Management actions are reported to Management Committee alongside a summary of all reports received. The Audit Committee also advises the Board of Trustees on the appointment of internal and financial statements auditors and their remuneration for both audit and non-audit work.

Finance and Investment Committee

The Finance and Investment Committee has a maximum of 7 members and is comprised of at least 2 members of the Board. The Committee operates in accordance with written terms of reference approved by the Board of Trustees.

The Finance and Investment Committee advise the Board on financial policy, provide oversight, monitor and approve relevant returns to OfS/UKRI, HESA and other stakeholders and review in depth annual financial statements, management accounts, cashflows, budgets and the performance of the investment portfolio.

Remuneration Committee

Throughout the year ended 31 July 2021, LSTM's Remuneration Committee comprised the Chairman, Treasurer, and 2 other Board members. The Committee's responsibility is to review the remuneration policy for all staff and to make recommendations on the remuneration and benefits of the Director and other senior members of staff in LSTM.

Internal Control

The Board of Trustees is ultimately responsible for LSTM's system of internal control and for reviewing its effectiveness. However, such a system is designed to manage, rather than eliminate, the risk of failure to achieve business objectives & can provide only reasonable, not absolute, assurance against material misstatement or loss.

The Board of Trustees has delegated to the Director of LSTM as Accountable Officer, the day-to-day responsibility for

reviewing the adequacy of the system of internal control and making any appropriate amendments. The Director is also responsible for reporting to the Board any material weaknesses or breakdowns in internal financial control.

The Board of Trustees is of the view that there is a formal on-going process for identifying, evaluating and managing LSTM's significant risks that have been in place and operational for the year ended 31 July 2021. The Board regularly review this risk framework and the approach to internal control is risk-based. The process continues to be embedded with the adoption of a prioritised corporate risk register to include timescales and responsible officers. The process is now embedded within all levels of LSTM and covers business, operational, compliance and financial risk procedures.

Value for Money

LSTM strives to apply value for money considerations to all its processes and activities, and this is supported by strong awareness and vigilance across the senior management team. The Audit Committee receives an annual report on LSTM's value for money activity from a dedicated committee established several years' ago. The committee is made up from a cross section of the organisation. In addition, each internal audit review undertaken and submitted to the Audit Committee makes specific observations and judgements concerning the value for money demonstrated. The report for the year ended 31 July 2021 detailed the progress made against the 7 Value for money objectives for the year and sets out the objectives for the year to 31 July 2022.

Risk Management

A comprehensive risk management framework, defined in LSTM's Risk Management Policy, assists the management of LSTM in the identification of the key risks inherent in the delivery of its strategy. This is overseen by the Audit Committee in order to gain the necessary assurances on the efficacy of the framework and relay them to the Board of Trustees.

The Board of Trustees, through the Audit Committee, evaluates the risks inherent in all major plans and proposals, including the identification of the steps that would be required to mitigate, eliminate and control such risks. The Risk Register is reviewed by the Audit Committee on a routine basis and is presented to the Board of Trustees at each meeting.

The ongoing impact of COVID-19 upon the sector and in the areas of business continuity and disruption has led to the Board seeking increased review and assurance of its key strategic risks. The Board's assurance oversight and increased access to strategic risk reviews provides insight into the response from the Management team to the outbreak of COVID-19. The Board has been provided with assurance of enhanced internal management controls around business continuity and recovery and it continues to mitigate COVID-19 impact through its Management Team, where response and recovery planning provide further assurance to the Board that responsible and timely management of stakeholder funding and investment continues to support sustainable operations.

Statement by the Trustees on performance of their statutory duties in accordance with S172(1) of the Companies Act 2006

The Board of Trustees of LSTM consider, both individually and collectively, that they have acted in ways that they believe in good faith to be most likely to promote the success of the Group for the benefits of its members as a whole (having regard to the stakeholders and other matters set out in s172(1) of the Act) in the decisions they made during the year ended 31 July 2021.

The LSTM Board of Trustees comprises largely non-executive members, with three executive directors and a student representative. There are 3 full board meetings each year plus meetings of several sub-committees, which are also attended by various senior staff. The AGM is open to all staff and students.

Other than the executive members of the Board, trustees are not remunerated, and they join the LSTM Board to contribute their skill and expertise to help LSTM to achieve its vision and mission, as detailed in section 4 of this report. The Board of Trustees has a terms of reference that is reviewed annually and Board members receive regular external training on the duties of trustees of a charity. There is also a code of conduct and members are required to declare any conflicts of interest at every meeting.

The Board's key stakeholders have been identified as the following :

- *Members*
- *Students*
- *Employees*
- *Funders*
- *Local, national and international governments*
- *Research partners*

The Board engage with each of these groups throughout the year through face-to-face meetings, surveys, seminars and written correspondence to promote LSTM's mission.

Key decisions made by the Board this year include:

Approval of the 2021/22 annual budget: This year's budget was approved by the Board following a comprehensive review of our strategic priorities and risks to our business. Due to COVID-19 the budget reflects ongoing difficulties in student recruitment and for research grants operating overseas. The recent grant cuts to ODA funding have also been factored in.

Appointment of the Chair of LSTM: After a rigorous search, selection and interview process, the Chair of the LSTM Selection Committee made a recommendation to the Board of Trustees to appoint Jim McKenna as a Trustee and later as Chair, which was supported at the 121st AGM.

Communications Strategy: The Board of Trustees welcomed the LSTM Communications Strategy, which sets out LSTM's coordinated approach to comms, its ambitions to engage with stakeholders and our commitment to developing platforms to support improved engagement.

Capital approvals: The Board approved 2 major projects in 2019/20; the renovation of Pembroke House into a major teaching resource hub with state-of-the-art facilities and investment in a major overseas research and teaching facility in Blantyre, Malawi which will complement the existing

buildings at the Malawi, Liverpool Wellcome Trust Centre. Both projects continued to be given detailed oversight by the Board of Trustees during 2020/21, to ensure there is suitable financial sustainability and oversight.

Employee engagement statement

The Board of Trustees engage with employees using multiple channels, via the Director of LSTM and his senior team, through the work of the management group, ensuring that key messaging is delivered via LSTM-wide communications. Where appropriate, staff are fully engaged in strategic discussion and decision making under the delegated duties of Committees. LSTM welcome the feedback of staff, involvement in focus task groups and wider staff led projects. The Board of Trustees are presented with executive summaries of management committee's agreed actions and are fully briefed by the Director on all activity in relation to staff engagement.

There is also positive engagement by many staff through the various Board committees, where employees often present research activity updates to Board members. The Audit Committee works with HR staff in relation to equality and inclusion and the effectiveness of the HR processes. The Remuneration Committee, in addition to considering the remuneration of senior staff, received information and discusses overall reward policy and strategy including the gender and ethnicity pay gap.

LSTM wide engagement includes a monthly staff forum (SSF), attended by the Director, chaired by the management committee member for SSF and is also open to IVCC and other subsidiary company employees. Staff can also apply to work on a variety of projects/working groups addressing issues of gender equality, LGBTQ+, and as LSTM addresses key strategic issues, staff are frequently engaged through Town Hall events, surveys or focus groups. Board champions engage with Committee chairs in the areas of Equality and Inclusion, Prevent, Safeguarding and GDPR, supporting and engaging with the work of LSTM committees. LSTM regularly runs staff engagement surveys, the results of which are presented to the Board.

Statement on business relationships

The LSTM Board of Trustees and its committees comprise people with a variety of skills and backgrounds. Through their networks Board members are able to foster additional benefit to LSTM through their association with our stakeholders, this brings a greater breadth of knowledge into the organisation, particularly in relation to key decisions made by the Board.

Delivering our strategy requires strong mutually beneficial relationships with all stakeholders. LSTM continuously assesses its priorities related to its major funding partners, and the Board engages on this through regular strategy updates through the committees' structure in place.

LSTM's activity within the External Relations Committee also supports a strategic approach to stakeholder engagement that contributes to objectives of the strategic plan.

Carbon reporting

LSTM is fully committed to operating in an environmentally friendly and sustainable manner and has introduced a new Environmental Policy and established an Environmental

Working Group. The group will provide coordination and guidance to LSTM for the integration of sustainability principles and practices throughout core teaching, research and operational activities.

All refurbishment and capital projects incorporate environmental and/or energy efficiency improvements whenever practicable such as replacement windows, improved insulation, LED lighting and improvements to the automated Building Management Systems.

40 solar panels were installed in 2015, producing electricity savings year on year.

There has been an improvement in recent years as a result of the energy efficiency improvements which has seen a reduction in the independently assessed energy ratings and this is evidenced in the Display Energy Certificates.

The Building Management System (BMS) manages and monitors building services and will:

- ensure that an optimal level of efficiency and comfort is achieved by continuously maintaining the correct balance between operating requirements, external and internal environmental conditions and energy usage.
- facilitate the link to our metering systems to measure utility consumption to identify usage patterns, manage these against expected or desired levels and then assist in being able to adjust, control or remove waste.

During 2020/21 LSTM Group has used 2,667,938 kWh of electricity in owned buildings.

All calculations are based on National Energy Foundation simple carbon calculation.

24. Going Concern

As detailed in the accounting policies, these financial statements are prepared on a going concern basis. Since the outbreak of the COVID-19 pandemic LSTM has taken measures to mitigate the risk and the Trustees have assessed the period to November 2022, 1 year beyond the date these financial statements are signed. The reviews were based on monthly management accounts during 2020/21, the 2021/22 budget and monthly cash flows and forecasts, which were regularly assessed by senior management and the board. These measures are continuing at the time these financial statements are signed. The forecasts show that the group has sufficient cashflows to continue to settle liabilities as they fall due.

The Board of Trustees have also taken account of the post balance sheet event in relation to the USS pension deficit provision (disclosed in note 39) and have no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.

As a result of these measures and the strong balance sheet of the Group and LSTM the Trustees are satisfied that the use of the going concern accounting principle remains applicable.

25. Strategic Reporting

As LSTM is a registered charity, the strategic report is contained in the following sections:

4 Vision and Mission

5 Objectives

6 The Nature, Objectives and Strategies of the Charity

7 Principal risks and uncertainties, financial performance in the year & key performance indicators (KPIs)

26. Responsibilities of the Governing Body

In accordance with LSTM's Memorandum and Articles of Association, the Governing Body is responsible for the administration and management of the affairs of LSTM and are required to present audited financial statements for each financial year.

The Governing Body (the Governors, also referred to as the Trustees are also the directors of LSTM for the purposes of company law) is responsible for preparing the Report of the Members of the Board of Trustees including the Strategic Report and the financial statements in accordance with applicable law and regulations.

Company law requires the Trustees to prepare financial statements for each financial year. Under that law, the Trustees are required to prepare the financial statements in accordance with United Kingdom Generally Accepted Accounting Practice (United Kingdom Accounting Standards and applicable law) including FRS 102 'The Financial Reporting Standard applicable in the UK and Republic of Ireland'. In addition, the Trustees are required to prepare the financial statements in accordance with Office for Student's ('OfS') terms and conditions of funding for higher education institutions (issued March 2019) and the terms and conditions of its funding agreement with Research England through its accountable officer. Under company law, the Trustees must not approve the financial statements unless they are satisfied that they give a true & fair view of the state of affairs of LSTM and the Group and of the surplus or deficit, gains & losses, changes in reserves & cash flows of LSTM & the Group for that year.

In preparing the financial statements, the Trustees are required to:

- select suitable accounting policies and then apply them consistently.
- make judgements and accounting estimates that are reasonable and prudent.
- state whether applicable UK accounting standards have been followed, subject to any material departures disclosed and explained in the financial statements; and
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the Group will continue in business.

The Trustees are responsible for keeping adequate accounting records that are sufficient to show and explain LSTM's transactions and disclose with reasonable accuracy at any time the financial position of LSTM and enable it

to ensure that the financial statements comply with the Statement of Recommended Practice - Accounting for Further and Higher Education, OfS terms and conditions of funding for higher education institutions (issued March 2019), the Office for Students Accounts Direction (issued October 2019) and the Companies Act 2006. They are also responsible for safeguarding the assets of LSTM and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities.

The Trustees have taken reasonable steps to:

- ensure that funds from OfS, Research England and other funding bodies are used only for the purposes for which they have been given and seek to achieve value for money in accordance with OfS' terms and conditions of funding for higher education institutions (issued March 2019) and the funding agreement with Research England and any other conditions which the funding body may from time to time prescribe;
- ensure that LSTM has a robust and comprehensive system of risk management, control and corporate governance, which includes the prevention and detection of corruption, fraud, bribery and irregularities;
- ensure that there is regular, reliable, timely and adequate information to monitor performance and track the use of public funds;
- plan and manage LSTM's activities to remain sustainable and financially viable;
- ensure that it informs the OfS of any material change in its circumstances, including any significant developments that could impact on the mutual interests of LSTM and OfS;
- ensure there are adequate and effective arrangements for the management and quality assurance of data submitted to HESA, the Student Loans Company, the OfS, Research England and other funding or regulatory bodies;
- ensure an effective framework – overseen by LSTM's academic board or equivalent – to manage the quality of learning and teaching and to maintain academic standards; and
- consider and act on the OfS' assessment of LSTM's risks specifically in relation to these funding purposes.

The Trustees are responsible for the maintenance and integrity of the corporate and financial information included on LSTM's website. Legislation in the United Kingdom governing the preparation and dissemination of financial statements may differ from legislation in other jurisdictions.

The Trustees confirm that:

- so far as each Trustee is aware, there is no relevant audit information of which LSTM's auditor is unaware; and
- the Trustees have taken all the steps that they ought to have taken in order to make themselves aware of any relevant audit information and to establish that LSTM's auditor is aware of that information.

A resolution to reappoint Grant Thornton UK LLP will be

proposed at the Annual General Meeting, under the heading "Independent Auditors", subject to the results of a tender process to be undertaken.

Signed on behalf of the Board of Trustees

Jim McKenna
Chair
1 November 2021

Statement on the System of Internal
Financial Control to 31 July 2021

As HEI Accountable Officer, I acknowledge my responsibility for ensuring that an effective system of internal financial control is maintained and operated by Liverpool School of Tropical Medicine.

The system can provide only reasonable and not absolute, assurance that assets are safeguarded, transactions authorised and properly recorded, and that material errors or irregularities are either prevented or would be detected within a timely period.

The system of internal financial control is based on a framework of regular management information, administrative procedures including the segregation of duties and a system of delegation and accountability. In particular, it includes:

- *comprehensive budgeting systems with an annual budget which is reviewed and agreed by the Board of Trustees;*
- *regular reviews by the Board of periodic and annual financial reports which indicate financial performance against forecasts;*
- *setting targets to measure financial and other performance;*
- *clearly defined capital investment control guidelines; and*
- *the adoption of formal project management disciplines, where appropriate.*

Liverpool School of Tropical Medicine has a subcontracted internal audit service, which operates in accordance with the requirements of the Audit Code of Practice. The work of the internal audit service is informed by an analysis of the risks to which LSTM is exposed and annual internal audit plans are based on this analysis. The analysis of risks and the internal audit plans are endorsed by the Board of Trustees on the recommendation of the Audit Committee. The Chair of the Audit Committee provides the Board with a report on internal audit activity in LSTM at a minimum annually. The report includes the financial statement, grant and internal auditors’ independent opinions on the adequacy and effectiveness of LSTM’s system of internal control, risk management controls and governance processes, including internal financial control. The role of the external auditors is specifically to audit the year end financial statements, but they also report on the control environment and on any control issues identified during the annual audit, and report to the Finance and Investment Committee and the Audit Committee in that regard. No significant control weaknesses or failures were reported in relation to the year ended 31 July 2021.

My review of the effectiveness of the system of internal financial control is informed by the work of the internal auditors, the Audit Committee which oversees the work of the internal auditors, the executive managers within LSTM who have responsibility for the development and

maintenance of the financial control framework and comments made by LSTM’s financial statement and grant auditors in their management letters and other reports. The audit committee report annually to the Board in November regarding any control weaknesses or failures during the past financial year; there have been no significant control weaknesses or failures in the year ended 31 July 2021.

Professor David Lalloo
MB, BS, MD, FRCP, FFTM, RCPS (Glasg)
Director
1 November 2021

Independent auditor’s report to the governing
body of Liverpool School of Tropical Medicine

Opinion

We have audited the financial statements of Liverpool School of Tropical Medicine (the ‘LSTM’) and its subsidiaries (the ‘group’) for the year ended 31 July 2021, which comprise group and LSTM’s Statement of comprehensive income, the group and LSTM’s Statement of changes in reserves, the group and LSTM’s Balance sheet, the group and LSTM’s Statement of cash flows and notes to the financial statements, including a summary of significant accounting policies. The financial reporting framework that has been applied in their preparation is applicable law and United Kingdom Accounting Standards, including Financial Reporting Standard 102 ‘The Financial Reporting Standard applicable in the UK and Republic of Ireland’ (United Kingdom Generally Accepted Accounting Practice). In our opinion, the financial statements:

- *give a true and fair view of the state of the group’s and the LSTM’s affairs as at 31 July 2021 and of the group’s and LSTM’s surplus, and its income and expenditure, gains and losses, changes in reserves and the group’s and LSTM’s cash flows for the year then ended;*
- *have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice and the Statement of Recommended Practice: Accounting for Further and Higher Education published in October 2018; and*
- *have been prepared in accordance with the requirements of the Companies Act 2006.*

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the ‘Auditor’s responsibilities for the audit of the financial statements’ section of our report. We are independent of the group and LSTM in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC’s Ethical Standard, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Conclusions relating to going concern

We are responsible for concluding on the appropriateness of the Governing body’s use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the group’s and LSTM’s ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify the auditor’s opinion. Our conclusions are based on the audit evidence obtained up to the date of our report. However, future events or conditions may cause the group and LSTM to cease to continue as a going concern.

In our evaluation of the Governing body’s conclusions, we considered the inherent risks associated with the group’s and LSTM’s business model including effects arising from macro-economic uncertainties such as Brexit and Covid-19, we assessed and challenged the reasonableness of estimates made by the Governing body and the related disclosures and analysed how those risks might affect the group’s and LSTM’s financial resources or ability to continue operations over the going concern period.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the group’s and LSTM’s ability to continue as a going concern for a period of at least twelve months from when the financial statements are authorised for issue.

In auditing the financial statements, we have concluded that the Governing body’s use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

The responsibilities of the Governing body with respect to going concern are described in the ‘Responsibilities of the Governing body for the financial statements’ section of this report.

Other information

The Governing body are responsible for the other information. The other information comprises the information included in the annual report set out on pages 2-15 other than the financial statements and our auditor’s report thereon. Our opinion on the financial statements does not cover the other information and, except to the extent otherwise explicitly stated in our report, we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Opinions on other matters prescribed by the
Companies Act 2006

In our opinion, based on the work undertaken in the course of the audit:

- *the information given in the Strategic Report and the Directors’ Report, prepared for the purposes of company law, included in the Report of the Members of the Board of Trustees for the financial year for which the financial statements are prepared is consistent with the financial statements; and*
- *the Strategic Report and the Directors’ Report included in the Report of the Members of the Board of Trustees has been prepared in accordance with applicable legal requirements.*

Matter on which we are required to report under the Companies Act 2006

In the light of the knowledge and understanding of the group and LSTM and its environment obtained in the course of the audit, we have not identified material misstatements in the Strategic Report or the Directors' Report included in the Report of the Members of the Board of Trustees.

Opinion on other matters prescribed by the Office for Student's ('OfS') accounts direction (issued October 2019)

In our opinion, in all material respects:

- *funds from whatever source administered by LSTM for specific purposes have been properly applied to those purposes and managed in accordance with the relevant legislation;*
- *funds provided by the OfS and Research England have been applied in accordance with the relevant terms and conditions, and any other terms and conditions attached to them, and*
- *the requirements of the OfS's accounts direction (issued October 2019) have been met.*

Matters on which we are required to report by exception

We have nothing to report in respect of the following matters where the Companies Act 2006 requires us to report to you if, in our opinion:

- *adequate accounting records have not been kept by LSTM, or returns adequate for our audit have not been received from branches not visited by us; or*
- *LSTM's financial statements are not in agreement with the accounting records and returns; or*
- *certain disclosures of the Governing Body's remuneration specified by law are not made; or*
- *we have not received all the information and explanations we require for our audit.*

We have nothing to report in respect of the following matters where the OfS accounts direction (issued October 2019) requires us to report to you where:

- *LSTM's grant and fee income, as disclosed in the note to the accounts, has been materially misstated*

Responsibilities of Governing Body for the financial statements

As explained more fully in the Statement of responsibilities of the Governing body set out on pages 14-15 the Governing body (who are also the directors of the charitable company for the purposes of company law) are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the Governing body determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Governing body are responsible for assessing the group's and LSTM's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis

of accounting unless the Governing body either intend to liquidate the group or LSTM or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at: www.frc.org.uk/auditorsresponsibilities. This description forms part of our auditor's report.

Explanation as to what extent the audit was considered capable of detecting irregularities, including fraud

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We design procedures in line with our responsibilities, outlined above, to detect material misstatements in respect of irregularities, including fraud. Owing to the inherent limitations of an audit, there is an unavoidable risk that material misstatements in the financial statements may not be detected, even though the audit is properly planned and performed in accordance with the ISAs (UK).

The extent to which our procedures are capable of detecting irregularities, including fraud is detailed below:

- *We obtained an understanding of the legal and regulatory frameworks applicable to the group and LSTM, and the industry in which it operates and determined which may influence the financial statements. Given the nature of its operating activities, the group and LSTM is subject to several laws and regulations where the consequences of non-compliance could have a material effect on amounts or disclosures in the financial statements.*
- *We determined that the following laws and regulations are the most significant which are directly relevant to specific assertions in the financial statements:*
 - *Those that relate to reporting frameworks being FRS102 and the Statement of Recommended Practice: Accounting for Further and Higher Education published in October 2018, the OfS accounts direction (issued October 2019), the Companies Act 2006 and the relevant tax compliance regulations.*
 - *Those that relate to the operational activities of the group and LSTM as a higher education institution and research organisation being the regulatory framework for higher education in England, data protection and bribery and corruption practices.*

- *We assessed the susceptibility of the charitable company's financial statements to material misstatements, including how fraud might occur. We performed the following audit procedures to address the risks related to irregularities and fraud:*

- *evaluation of the processes and controls in place to address the risks related to irregularities and fraud;*
- *challenge of the assumptions and judgements made by management in its significant accounting estimates;*
- *review of performance targets and conditions to research funding received and their propensity to influence efforts made by management to manage earnings;*
- *review and testing of journal entries, in particular manual journal entries, relating to management estimates and journal entries impacting the reported result for the year;*
- *consideration of the potential for fraud in revenue recognition through the manipulation of revenue from research grant funding;*
- *identifying related parties and through our data interrogation tools performed a review for any related party transactions during the year.*

- *We enquired of management, the Audit Committee and the internal auditors whether there was any awareness of instances of non-compliance with laws and regulations or whether they had any knowledge of actual or suspected fraud. We corroborated the results of our enquiries to supporting documentation such as board minute reviews.*
- *In assessing the potential risks of material misstatement, we obtained an understanding of the group's and LSTM's operations, the applicable statutory provisions and business risks that may result in risk of material misstatement, and the group's and LSTM's control environment, including the adequacy of procedures for authorisation of transactions.*
- *The engagement team's experience with similar engagements, their understanding and knowledge of the group's and LSTM's industry and their understanding of the industry and regulatory requirements were considered in assessing the appropriateness of the collective competence and capabilities of the engagement team.*

No matters relating to non-compliance with laws and regulations or relating to fraud were identified in relation to the above-mentioned laws and regulations that were identified by us as most significant.

Use of our report

This report is made solely to the university's members, as a body, in accordance with Chapter 3 of Part 16 of the Companies Act 2006. Our audit work has been undertaken so that we might state to the university's members

those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the university and the university's members as a body, for our audit work, for this report, or for the opinions we have formed.

Carl Williams
Senior Statutory Auditor
for and on behalf of Grant Thornton UK LLP
Statutory Auditor, Chartered Accountants
Liverpool
1 November 2021

Statement of Comprehensive Income

		Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
	Notes				
Funding body grants	5	16,951	16,951	14,117	14,117
Tuition fees and education contracts	6	3,737	3,737	4,101	4,101
Research grants and contracts	7	99,174	72,740	78,274	56,970
Other income	8	88,471	74,324	130,049	110,907
Investment income	9	751	525	848	289
Donations and endowment income	10	1,255	1,255	680	680
Total income		210,339	169,532	228,069	187,064
Staff costs	11	37,622	32,390	38,560	32,442
Pension deficit funding costs	23	(52)	(52)	(12,591)	(12,591)
Other operating expenses	13	166,004	131,431	188,570	154,849
Surplus on disposal of investments		(196)	385	(372)	(372)
Depreciation	17	2,041	2,022	1,911	1,893
Interest payable	14	129	129	14	14
Total expenditure		205,548	166,305	216,092	176,235
Surplus on continuing operations before other gains/(losses)		4,791	3,227	11,977	10,829
Unrealised surplus/(deficit) on revaluation of investments and endowments		1,857	2,438	(2,958)	(2,958)
Surplus on continuing operations before taxation		6,648	5,665	9,019	7,871
Taxation	15	(39)	-	24	-
Surplus for the year	16	6,609	5,665	9,043	7,871
<i>Other comprehensive income/(expense):</i>					
Change in fair value of hedging financial instruments		109	-	642	-
Total Comprehensive Income for the year		6,718	5,665	9,685	7,871
Represented by:					
Restricted endowment comprehensive income/(expense) for the year		638	638	(307)	(307)
Unrestricted endowment comprehensive income/(expense) for the year		2,150	2,150	(843)	(843)
Expendable restricted endowment comprehensive income/(expense) for the year		114	114	(98)	(98)
Unrestricted comprehensive income for the year		2,479	2,730	8,494	9,284
Restricted comprehensive income/(expense) for the year		1,228	33	1,797	(165)
Unrestricted hedging reserve comprehensive income for the year		109	-	642	-
Total Comprehensive Income in the year		6,718	5,665	9,685	7,871

The income and expenditure account is in respect of continuing activities and there were no operations that were acquired or discontinued by the Liverpool School of Tropical Medicine Group during the year or in the previous year.

The surplus for the year and total comprehensive income for the year is attributable to the Liverpool School of Tropical Medicine. There are no non-controlling interests.

Statement of Changes in Reserves

	Unrestricted General Reserve £'000	Restricted General Reserve £'000	Unrestricted Hedging Reserve £'000	Permanent Unrestricted Endowments £'000	Permanent Restricted Endowments £'000	Expendable Restricted Endowments £'000	TOTAL £'000
GROUP							
Balance at 31 July 2019	16,044	6,208	(751)	8,873	8,019	593	38,986
Surplus/(deficit) for the year	8,494	1,797	642	(843)	(307)	(98)	9,685
Movement between reserves	678	(678)	-	-	-	-	-
Movement of cash in reserves	(63)	-	-	-	-	-	(63)
Surplus/(Deficit) from statement of comprehensive income	9,109	1,119	642	(843)	(307)	(98)	9,622
Balance at 31 July 2020	25,153	7,327	(109)	8,030	7,712	495	48,608
Surplus for the year	2,512	1,195	109	2,150	638	114	6,718
Movement between reserves	(36)	33	-	-	-	-	(3)
Surplus from statement of comprehensive income	2,476	1,228	109	2,150	638	114	6,715
Balance at 31 July 2021	27,629	8,555	-	10,180	8,350	609	55,323

	Unrestricted General Reserve £'000	Restricted General Reserve £'000	Unrestricted Hedging Reserve £'000	Permanent Unrestricted Endowments £'000	Permanent Restricted Endowments £'000	Expendable Restricted Endowments £'000	TOTAL £'000
LSTM							
Balance at 31 July 2019	15,654	619	-	8,873	8,019	593	33,758
Surplus/(deficit) for the year	9,284	(165)	-	(843)	(307)	(98)	7,871
Movement of cash in reserves	(55)	-	-	-	-	-	(55)
Surplus/(deficit) from statement of comprehensive income	9,229	(165)	-	(843)	(307)	(98)	7,816
Balance at 31 July 2020	24,883	454	-	8,030	7,712	495	41,574
Surplus for the year	2,763	-	-	2,150	638	114	5,665
Movement between reserves	(36)	33	-	-	-	-	(3)
Surplus from statement of comprehensive income	2,727	33	-	2,150	638	114	5,662
Balance at 31 July 2021	27,610	487	-	10,180	8,350	609	47,236

Company registration number: 00083405

Balance Sheets as at 31 July

		Group Year ended 31 July 2021	LSTM Year ended 31 July 2021	Group Year ended 31 July 2020	LSTM Year ended 31 July 2020
	Notes	£'000	£'000	£'000	£'000
Fixed Assets					
Tangible fixed assets	17	59,094	58,807	58,691	58,385
Investments in subsidiaries	18	-	80	-	54
		<u>59,094</u>	<u>58,887</u>	<u>58,691</u>	<u>58,439</u>
Current Assets					
Stock		81	36	94	32
Debtors	19	17,235	15,834	23,787	17,341
Investments and endowments	20	47,848	28,231	31,100	31,100
Cash at bank and in hand	29	52,154	25,797	46,250	6,842
		<u>117,318</u>	<u>69,898</u>	<u>101,231</u>	<u>55,315</u>
Creditors: amounts falling due within 1 year	21	73,242	33,702	65,933	26,819
Net Current Assets		<u>44,076</u>	<u>36,196</u>	<u>35,298</u>	<u>28,496</u>
Total Assets less Current Liabilities		<u>103,170</u>	<u>95,083</u>	<u>93,989</u>	<u>86,935</u>
Creditors: amounts falling due after 1 year	22	34,944	34,944	34,296	34,296
Provisions: pension provisions	23	9,206	9,206	9,258	9,258
Provisions: other provisions	24	3,697	3,697	1,827	1,807
NET ASSETS		<u>55,323</u>	<u>47,236</u>	<u>48,608</u>	<u>41,574</u>
Endowment Reserves					
Permanent restricted endowments	26	8,350	8,350	7,712	7,712
Permanent unrestricted endowments	26	10,180	10,180	8,030	8,030
Expendable restricted endowments	26	609	609	495	495
		<u>19,139</u>	<u>19,139</u>	<u>16,237</u>	<u>16,237</u>
Restricted general reserve	27	8,555	487	7,327	454
Unrestricted Reserves					
Unrestricted general reserve		27,629	27,610	25,153	24,883
Unrestricted Hedging reserve		-	-	(109)	-
		<u>27,629</u>	<u>27,610</u>	<u>25,044</u>	<u>24,883</u>
TOTAL FUNDS		<u>55,323</u>	<u>47,236</u>	<u>48,608</u>	<u>41,574</u>

The Financial Statements were approved by the Board of Trustees on 1 November 2021 and were signed on behalf of the Directors by :

JO'Brien
Honorary Treasurer

Professor D Lalloo
Director

Statement of Cash Flows

		Group Year ended 31 July 2021	LSTM Year ended 31 July 2021	Group Year ended 31 July 2020	LSTM Year ended 31 July 2020
	Notes	£'000	£'000	£'000	£'000
Surplus for the year		6,609	5,665	9,043	7,871
Adjustment for non-cash items :					
Depreciation	17	2,041	2,022	1,911	1,893
Deferred capital grants released to income	25	(1,622)	(1,622)	(1,912)	(1,912)
(Surplus) on disposal of investments & endowments		(196)	385	(182)	(182)
Movement on hedging reserve		109	-	642	-
Decrease/(increase) in stock		13	(4)	2	4
Decrease/(increase) in debtors		6,518	1,507	2,295	(1,869)
Increase/(decrease) in creditors		7,256	6,830	(16,911)	(477)
Increase in other provisions		1,870	1,890	654	639
(Decrease) in USS pension provision		(52)	(52)	(12,591)	(12,591)
Unrealised revaluation (gains)/losses on investments and endowments	20	(1,857)	(2,438)	2,958	2,958
Unwinding of interest on finance lease	14	129	129	14	14
Interest receivable		(1,556)	(1,330)	(1,075)	(516)
Taxation	15	39	-	(24)	-
		<u>12,692</u>	<u>7,317</u>	<u>(24,218)</u>	<u>(12,038)</u>
Cash flow from operating activities		<u>19,301</u>	<u>12,982</u>	<u>(15,176)</u>	<u>(4,167)</u>
Taxation paid		(5)	-	24	-
Net cash generated/(utilised) from operating activities		<u>19,296</u>	<u>12,982</u>	<u>(15,152)</u>	<u>(4,167)</u>
Cash flows from investing activities :					
Income from long term investments and unrestricted permanent endowments		1,552	1,326	953	394
Other interest received	9	4	4	122	122
Net expenditure from restricted endowments		-	-	(5)	(5)
Decrease/(increase) in investments		-	(26)	-	-
Purchase of tangible fixed assets	17	(2,444)	(2,444)	(747)	(747)
Payments to acquire investment & endowment assets	20	(17,344)	(5,158)	(2,545)	(2,545)
Receipt from sale of investments		2,649	10,080	9,443	6,169
Increase/(decrease) in cash in endowments		-	-	(185)	(185)
Deferred capital grants received	25	2,628	2,628	1,483	1,483
Net cash generated from investing activities		<u>(12,955)</u>	<u>6,410</u>	<u>8,520</u>	<u>4,687</u>
Cashflows from financing activities :					
Interest element of finance lease rental payment		(129)	(129)	(14)	(14)
Capital element of finance lease rental payment		(308)	(308)	(412)	(412)
Net cash used in financing activities		<u>(437)</u>	<u>(437)</u>	<u>(426)</u>	<u>(426)</u>
Increase/(decrease) in cash in the year		<u>5,904</u>	<u>18,955</u>	<u>(7,058)</u>	<u>94</u>

Notes to the Accounts

1. Company Information

The Liverpool School of Tropical Medicine (LSTM) was formally inaugurated on 22 April 1898 and incorporated on 30 January 1905 as the Incorporated Liverpool School of Tropical Medicine. LSTM was registered as a charity on 11 October 1963. LSTM is a company limited by guarantee and holds no share capital and is governed by a Board of Trustees.

The Incorporated Liverpool School of Tropical Medicine changed its name on 30 November 1992 to Liverpool School of Tropical Medicine. The registered office is at Pembroke Place, Liverpool, L3 5QA, UK.

The Secretary of State for Business, Innovation and Skills, by an Order of Parliament, under section 129 of the Education Reform Act 1988, designated LSTM as a Higher Education Institute (HEI) on 19 July 2013. LSTM receives direct funding from the Office for Students (OfS) and UK Research and Innovation (including Research England).

2. Basis of Preparation

i) Basis of Preparation

These financial statements have been prepared in accordance with the Statements of Recommended Practice (SORP) : Accounting for Further and Higher Education 2019, and in accordance with applicable United Kingdom accounting standards including Financial Reporting Standard 102 (FRS 102), ‘the Financial Reporting Standard applicable to the United Kingdom and the Republic of Ireland’ and the Companies Act 2006. LSTM is a public benefit entity and therefore has applied the relevant public benefit requirement of FRS 102. The financial statements are prepared in accordance with the historical cost convention (modified by the revaluation of current asset investments and derivative financial instruments).

The Financial statements are presented in Sterling (£).

ii) Going Concern

These financial statements have been prepared on a going concern basis. In light of the COVID-19 pandemic in late 2019/20 LSTM put in place measures to monitor the ongoing impact of the pandemic on the financial position and also the continued use of the going concern basis for accounting. These measures included weekly cash flow forecasts at the height of the lockdown (compared to usual monthly cashflow forecasts), weekly Pandemic Emergency Management Team meetings which covered both practical and financial issues, regular briefing for Board Trustees on the pandemic as it impacts LSTM, and adjustment to Tuition schedules, presentation and student numbers to continue to offer courses where practical on-line. With regard to research the 50 largest projects were reviewed initially with regard to covid risk and then all remaining projects, and specific discussions were held with key funders around continuation of projects and related funding as the pandemic has developed.

In the 2020/21 financial year, it has been possible to return to much of the activity that was delayed in 2019/20, albeit with

limited international travel possible, and ensuring LSTM premises in Liverpool and around the world were covid-secure. Therefore the COVID-19 2020/21 budget targets have been exceeded. Given the level of activity which was possible in 2020/21 and the current covid situation, reflected in the 2021/22 budget and three year forecast, the Board of Trustees consider that it continues to be appropriate to account for LSTM as a going concern.

Despite the COVID-19 pandemic, having set up monitoring procedures which will be ongoing, the Board of Trustees considers that the group and LSTM have sufficient financial resources and is confident that its future income streams will maintain these resources.

The Board of Trustees have also taken account of the post balance sheet event in relation to the USS pension deficit provision (disclosed in note 39) and have no immediate concern over LSTM's ability to fund increased repayments as a result of the latest valuation.

The Board of Trustees has a reasonable expectation that LSTM has adequate resources to continue in operation for the foreseeable future. Therefore it continues to adopt the going concern basis in preparing the financial statements.

iii) Basis of Consolidation

The Consolidated financial statements include LSTM and entities controlled, both unilaterally and jointly, by LSTM, for the financial year to 31 July 2021. Where LSTM does not exercise control over an entity and is not in a position to extract economic benefits, the results of that entity are not consolidated. A full list of subsidiaries and NGOs in which LSTM has an interest is shown in note 18.

3. Significant Judgements and Estimates

Preparation of the Financial statements requires management to make significant judgements and estimates. The items in the Financial statements where these judgements and estimates have been made include:

Judgements

i) Deferral of balances

Due to the nature of research grants, which in the majority of cases span over several years, judgement is exercised in the decision over deferral of these balances to ensure income and expenditure are accounted for in the appropriate and matching period or when performance conditions have been met.

ii) Accounting for the Liverpool Life Science Accelerator (LLSA) building

LSTM signed a lease for occupation of research space in autumn 2017 and took occupation in September 2017. The lease is for 25 years, at £400,000 a year (excluding inflationary increases) and would ordinarily be considered as an operating lease. However, LSTM has an option to purchase its share of the building within 10 years of the start of the lease, which it intends to exercise and given this option LSTM has treated the building as a finance lease since the start of this lease.

Estimates

iii) Provisions

Provisions have been set up in relation to operational receipts : Provisions have been made where cash receipts have a possibility that an element may have to be repaid or where a liability has been incurred prior to 31 July 2021 and where the amount can be reasonably calculated or estimated.

Provisions have also been set up in relation to onerous research grants : due to COVID-19 activity on some research grants has been impacted. Provisions are ascertained through the forecasting and monitoring process that the research management services team undertake on a quarterly basis with delivery teams. This process monitors progress and highlights any issues within projects which may impact receipt of income or overrun of costs, which are reflected in the financial statements as a provision where the amount can be reliably calculated or estimated.

iv) Financial Instruments

All derivatives are measured at fair value. Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at a measurement date. Where a market for a financial instrument is not active, fair value is established using a valuation technique. These valuation techniques involve a degree of estimation, the extent of which depends on the instrument's complexity and the availability of market based data. The Group previously applied hedge accounting but with effect from 1st August 2020, this has ceased.

v) Gifts in Kind

Gifts in kind include 2 material items:

a) pharmaceutical drugs gifted for mass drug administration (MDA) in several countries in Africa of £64,757,000 (2020 : £101,486,000). Given the nature of the activity this has been treated as implementation consultancy income. The valuation of the gifts is based on an estimate of the purchase cost of the drugs had LSTM had to purchase the drugs directly for the MDA programme multiplied by an estimate of the number of drugs required to treat patients. Income and expense are recorded at the point at which reliable figures are available for the number of patients treated, which is on the publication of the annual report to the funder.

b) Mosquito nets gifted for an effectiveness study in Uganda of £12,632,000 (2020 : £3,092,000). The valuation of the gifts is based on the purchase cost of the nets had LSTM had to purchase the nets directly for the study. The quantification of the number of nets included at the purchase cost as a gift in kind was based on the number of nets distributed during the financial year under the control and direction of LSTM.

vi) Accounting for the USS pension deficit

FRS 102 makes the distinction between a group plan and a multi-employer scheme. A group plan consists of a collection of entities under common control typically with a sponsoring employer. A multi-employer scheme is a scheme for entities not under common control and represents (typically) an industry-wide scheme such as the Universities Superannuation Scheme. The accounting for a multi-employer scheme where

the employer has entered into an agreement with the scheme that determines how the employer will fund a deficit results in the recognition of a liability for the contributions payable that arise from the agreement (to the extent that they relate to the deficit) and the resulting expense in the Statement of comprehensive income in accordance with section 28 of FRS 102. The trustees are satisfied that Universities Superannuation Scheme meets the definition of a multi-employer scheme and LSTM has therefore recognised the discounted fair value of the contractual contributions under the recovery plan in existence at the date of approving the financial statements.

The USS provision is calculated using an approved consistent methodology used by all members, based on the 2018 valuation, with estimates made regarding discount rate, growth of staff numbers and increase in staff salaries. LSTM's discount rate is based on advice to the USS members from Mercer. Estimates regarding growth in staff numbers and salaries reflect the LSTM 6 year strategic plan which runs from 2017 to 2023, updated for the impact of COVID-19.

Estimates made in the year are as follows:
Discount rate: 0.79% based on Mercer HEI sector analysis
Salary growth: 1.5% the first 6 years, 2.5% thereafter
Staff numbers growth: 3.0% first 6 years, 5.0% thereafter

The recovery plan following the 2018 actuarial valuation requires employers to contribute 2% of salaries for the first 2 years, and 6% of salaries thereafter, towards repaying the deficit over a period of 10 years, of which 7 remain. The current total contribution rate, including this element, is 21.1% (from 1 October 2019, previously 19.5%). Details of this provision are included in note 23 to the financial statements.

Subsequent to the financial year end the 2020 valuation has been signed and approved. Using the approved consistent methodology and using the same assumptions as above, a revised provision has been calculated and is disclosed as a post balance sheet event in note 39 of the financial statements.

4. Statement of Principal Accounting Policies

i) Income Recognition

Student fee income is stated gross of any expenditure which is not a discount and credited to the Statement of comprehensive income over the period in which students are studying. Where the amount of the tuition fee is reduced by a discount for prompt payment, income receivable is shown net of the discount. Bursaries and scholarships are accounted for gross as expenditure and not deducted from income.

Income from contracts and other services rendered is credited to the Statement of comprehensive income when the goods or services are supplied to the external customers or the terms of the contract, including performance related conditions, have been satisfied. This is generally equivalent to the sum of the relevant expenditure incurred during the year and any related contributions to overhead costs. Any payments received in advance of such performance are recognised on the balance sheet as liabilities.

Investment income is credited to the Statement of comprehensive income on a receivable basis.

Funds LSTM receives and disburses as paying agent on behalf of a funding body are excluded from the income and expenditure of LSTM where it is exposed to minimal risk or enjoys minimal economic benefit related to the transaction.

Interest on funds held on deposit is included when receivable and the amount can be measured reliably by LSTM; this is normally upon notification of the interest paid or payable by the Bank.

ii) Grant Funding

Government revenue grants including recurrent teaching and research grants from Office for Students (OfS) and UK Research and Innovation (UKRI), including Research England, are recognised in income over the periods in which LSTM recognises the related costs for which the grant is intended to compensate. Where part of a government grant is deferred it is recognised as deferred income within creditors and allocated between creditors due within one year and due after more than one year as appropriate.

Government capital grants are recognised in income over the expected useful life of the asset. Other capital grants are recognised in income when LSTM is entitled to the funds subject to any performance related conditions being met.

Grants (including research grants) from non-government sources are recognised in income when LSTM is entitled to the income and performance related conditions have been met. Income received in advance of performance related conditions being met is recognised as deferred income within creditors on the balance sheet and released to income as the conditions are met.

iii) Expenditure and Irrecoverable VAT

All expenditure is accounted for on an accruals basis and has been classified under headings that aggregate all costs related to that category. Where costs cannot be directly attributed to particular headings they have been allocated to activities on a basis consistent with use of resources. Grants are reflected in the Balance sheet when a constructive obligation exists, notwithstanding that they may be paid in future accounting periods.

Irrecoverable VAT is charged as a cost against the activity for which the expenditure was incurred.

iv) Donations and Endowments

Non exchange transactions without performance related conditions are donations and endowments. Donations and endowments with donor imposed restrictions are recognised in income when LSTM is entitled to the funds. Income is retained within the restricted reserve until such time that it is utilised in line with such restrictions at which point the income is released to general reserves through a reserve transfer.

Donations with no restrictions are recognised in income when LSTM is entitled to the funds.

Investment income and appreciation of endowments is recorded in income in the year in which it arises and as either restricted or unrestricted income according to the terms or other restrictions applied to the individual endowment fund.

There are four main types of donations and endowments identified within reserves:

- 1. *Restricted donations - the donor has specified that the donation must be used for a particular objective.*
- 2. *Unrestricted permanent endowments - the donor has specified that the fund is to be permanently invested to generate an income stream for the general benefit of LSTM.*
- 3. *Restricted expendable endowments - the donor has specified a particular objective other than the purchase or construction of tangible fixed assets and LSTM has the power to use the capital.*
- 4. *Restricted permanent endowments - the donor has specified that the fund is to be permanently invested to generate an income stream to be applied to a particular objective.*

v) Gifts in Kind

Gifts in kind are recognised within research grant income and other income, and within operating expenses, where performance conditions have been met and when a fair value can be reasonably estimated. Fair value is estimated using market values at the date of the gift but where the date of the gift cannot be accurately determined it is estimated when information has been collected and verified.

vi) Accounting for Retirement Benefits

The two principal pension schemes for LSTM's staff are the Universities Superannuation Scheme (USS) and the University of Liverpool Pension Fund (ULPF). ULPF is a defined benefit scheme and USS changed from a defined benefit scheme to a hybrid scheme on 1 October 2016, providing defined benefits (for all members) as well as contribution benefits. LSTM also participates in the National Health Service Pension Fund, which is a defined benefit scheme. All three schemes are externally funded and contracted out of the State Second Pension (S2P). Each fund is valued every three years by professionally qualified independent actuaries.

Both the USS and ULPF are multi-employer schemes for which it is not possible to identify the assets and liabilities related to LSTM's members due to the mutual nature of the scheme and therefore these schemes are accounted for as defined contribution retirement benefit schemes.

LSTM participates in the Universities Superannuation Scheme. The assets of the scheme are held in a separate trustee-administered fund. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis. As required by Section 28 of FRS 102 "Employee Benefits" LSTM therefore accounts for the scheme as if it were a defined contribution scheme. As a result, the amount charged to the Statement of comprehensive income represents the contributions payable to the scheme. Since LSTM has entered into an agreement (The Recovery Plan) that determines how each employer within the scheme will fund the overall deficit, LSTM recognises a liability for the contributions payable that arise from the agreement (to the extent that they relate to

the deficit) with related expenses being recognised through the Statement of comprehensive income.

vii) Defined Contribution Plan

A defined contribution plan is a post-employment benefit plan under which LSTM pays fixed contributions into a separate entity and will have no legal or constructive obligation to pay further amounts. Obligations for contributions in defined contribution pension plans are recognised as an expense in the Statement of comprehensive income in the periods during which services are rendered by employees.

The assets of the three main LSTM pension schemes are held in separate trustee-administered funds. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis.

As required by Section 28 of FRS 102 "employee benefits", LSTM therefore accounts for the schemes as if they were a wholly defined contribution scheme. As a result, the amount charged to the Statement of comprehensive income represents the contributions payable to the schemes.

viii) Employment Benefits

Short term employment benefits such as salaries and compensated absences are recognised as an expense in the year in which the employees render service to LSTM and the Group. Any unused benefits are accrued and measured as the additional amount LSTM and the Group expects to pay as a result of the unused entitlement.

ix) Holiday Pay Accrual

The liability for untaken staff holiday entitlement at 31 July 2021 is accrued. The accrual is based on actual hours untaken at 31 July and valued using an estimate made of average salaries within LSTM. A 50% weighting factor is applied to acknowledge the limited probability that such a pay-out would be required for 100% of staff - LSTM is a going concern and 100% pay-out would only likely be required in the event of a wind up of an organisation.

x) Foreign Currency

Transactions in foreign currencies are translated at the exchange rate ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are translated at the exchange rate ruling at the balance sheet date. Foreign exchange differences arising on translation are recognised in the Statement of comprehensive income. Non-monetary assets and liabilities that are measured in terms of historical cost in a foreign currency are translated using the exchange rate at the date of the transaction. Non-monetary assets and liabilities denominated in foreign currencies that are stated at fair value are retranslated at the exchange rate ruling at the dates the fair value was determined.

The assets and liabilities of foreign operations, including goodwill and fair value adjustments arising on consolidation, are translated to the Group's presentational currency,

Sterling, at foreign exchange rates ruling at the balance sheet date. The revenues and expenses of foreign operations are translated at an average rate for the year where this rate approximates to the foreign exchange rates ruling at the dates of the transactions. Exchange differences arising from this translation of foreign operations are reported as an item of Other Comprehensive Income. Exchange differences arising from a monetary item receivable from or payable to a foreign operation, the settlement of which is neither planned nor likely in the foreseeable future, are considered to form part of a net investment in a foreign operation and are recognised directly in Reserves.

xi) Finance Leases

Leases in which LSTM assumes substantially all the risks and rewards of ownership of the leased asset are classified as finance leases. Leased assets acquired by way of a finance lease and the corresponding lease liabilities are initially recognised at an amount equal to the lower of their fair value and the present value of the minimum lease payments at inception of the lease.

Minimum lease payments are apportioned between the finance charge and the reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate of interest on the remaining balance of the liability.

xii) Operating Leases

Rentals under operating leases are charged to the Statement of comprehensive income on a straight line basis over the lease term.

xiii) Fixed Assets

Fixed assets are stated at cost less accumulated depreciation and accumulated impairment losses.

Where parts of a fixed asset have different useful lives, they are accounted for as separate items of fixed assets.

Land and Buildings

Costs incurred in relation to land and buildings after initial purchase or construction are capitalised to the extent that they increase the expected future benefits to LSTM.

Freehold land is not depreciated as it is considered to have an indefinite useful life. Freehold buildings are depreciated on a straight line basis over a period of 50 years.

Leasehold buildings are depreciated on a straight line basis over 50 years.

No depreciation is charged on assets in the course of construction.

Fixtures and Equipment

Fixtures and equipment, including computers and software, costing less than the de minimus per individual item is recognised as expenditure. All other equipment is capitalised.

Capitalised equipment (including computer and other equipment) is stated at cost and depreciated over 4 years.

Depreciation methods, useful lives and residual values are reviewed at the date of preparation of each Balance Sheet.

xiv) Investments

Endowment asset investments and current asset investments are included in the Balance sheet at market value. Investments in the subsidiary undertakings are stated at cost, adjusted by any necessary impairment.

LSTM's treasury management policy is for all endowments to be invested in a portfolio of long term investments, while working capital balances and revenue reserves are invested short term with interest received credited to the Statement of comprehensive income. The investment objective is to achieve maximum return with minimum risk.

Non-endowment investments are held as current assets as they are available to be drawn down on demand.

xv) Stock

Stock is held at the lower of cost and net realisable value, and is measured using an average cost formula. Where necessary provision is made for obsolete, slow moving and defective stocks.

xvi) Cash and Cash Equivalents

Cash includes cash in hand, deposits repayable on demand and overdrafts. Deposits are repayable on demand if they are in practice available within 24 hours without penalty.

Cash equivalents are short term, highly liquid investments that are readily convertible to known amounts of cash with insignificant risk of change in value.

xvii) Debtors

Trade and other debtors are recognised at the settlement amount due after any trade discount offered, less any impairment. Prepayments are valued at the amount prepaid net of any trade discounts due.

xviii) Creditors

Creditors are recognised where LSTM has a present obligation resulting from a past event that will probably result in the transfer of funds to a third party and the amount due to settle the obligation can be measured or estimated reliably. Creditors are normally recognised at their settlement amount after allowing for any trade discounts due.

xix) Provisions, Contingent Liabilities and Contingent Assets

Provisions are recognised in the Financial Statements when:

- (a) LSTM and the Group has a present obligation (legal or constructive) as a result of a past event;*
- (b) it is probable that an outflow of economic benefits will be required to settle the obligation; and*
- (c) a reliable estimate can be made of the amount of the obligation.*

The amount recognised as a provision is determined by discounting the expected future cash flows at a pre-tax rate that reflects risks specific to the liability.

A contingent liability arises from a past event that gives LSTM a possible obligation whose existence will only be confirmed by the occurrence or otherwise of uncertain future events not

wholly within the control of LSTM. Contingent liabilities also arise in circumstances where a provision would otherwise be made but either it is not probable that an outflow of resources will be required or the amount of the obligation cannot be measured reliably.

A contingent asset arises where an event has taken place that gives LSTM and the Group a possible asset whose existence will only be confirmed by the occurrence or otherwise of uncertain future events not wholly within the control of LSTM and the Group.

Contingent assets and liabilities are not recognised in the Balance sheet but are disclosed in the notes.

xx) Financial Instruments

Basic financial instruments are initially recognised at transaction value and subsequently measured at their settlement value.

Derivative financial instruments are recognised at fair value using a valuation technique with any gains or losses being reported in the Statement of comprehensive income. Outstanding derivatives at the reporting date are included under the appropriate category depending on the nature of the derivative.

LSTM and the Group hold derivative financial instruments in the form of foreign currency sterling forward currency contracts. Derivatives are initially recognised at fair value on the date the derivative contract is entered into and are subsequently re-measured at their fair value at the balance sheet date. Changes in the fair value of derivatives are recognised in the surplus or deficit as appropriate, unless they are included in a hedging arrangement.

The Group previously applied hedge accounting but with effect from 1st August 2020, this has ceased.

Changes in the fair value of derivatives designated as cash flow hedges, and which are effective, are recognised directly in total funds. Any ineffectiveness in the hedging relationship (being excess of cumulative change in fair value of the hedging instrument since inception of the hedge over the cumulative change in the fair value of the hedged item since inception of the hedge) is recognised in the surplus or deficit.

The gain or loss recognised in Other comprehensive income is reclassified to the Statement of comprehensive income when the hedge relationship ends. Hedge accounting is discontinued when the hedging instrument expires, no longer meets the hedging criteria, the forecast transaction is no longer highly probable, the hedged debt instrument is derecognised or the hedging instrument is terminated.

xxi) Taxation

LSTM and IVCC are non-exempt charities within the meaning of Part 3 of the Charities Act 2011, therefore are charities within the meaning of Para 1 of schedule 6 to the Finance Act 2010 and accordingly, LSTM is potentially exempt from taxation in respect of income or capital gains received within categories covered by section 478-488 of the Corporation Tax Act 2010 (CTA 2010) or section 256 of the Taxation of Chargeable Gains Act 1992, to the extent that such income or gains are applied to exclusively charitable purposes.

LSTM is registered for VAT. Irrecoverable VAT on inputs is included in the costs of such inputs. Irrecoverable VAT allocated to fixed assets is included in their cost.

Some of LSTM's subsidiary entities are trading companies and are liable to Corporation Tax in the same way as any other commercial organisation.

xxii) Reserves

Reserves are classified as restricted or unrestricted. Restricted endowment reserves include balances which, through endowment to LSTM are held as a permanently restricted fund which LSTM must hold in perpetuity.

Other restricted reserves include balances where the donor has designated a specific purpose and therefore LSTM is restricted in the use of these funds.

The Board of Trustees approved a strategic plan covering a six year period to 31 July 2023. This plan anticipates LSTM's general reserves being augmented by the end of the period. The Board has targeted for cash reserves to represent a minimum of 6 months pay expenditure.

5. Funding Body Grants

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Recurrent teaching grants	1,331	1,331	1,502	1,502
Recurrent research grants	10,919	10,919	8,271	8,271
Specific grants	3,606	3,606	2,962	2,962
Release of deferred capital grants (note 25):				
<i>Buildings</i>	474	474	711	711
<i>Equipment</i>	621	621	671	671
	<u>16,951</u>	<u>16,951</u>	<u>14,117</u>	<u>14,117</u>

6. Tuition Fees and Education Contracts

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Masters fee income	1,408	1,408	1,322	1,322
PhD fee income	515	515	559	559
Fee income from diplomas	545	545	974	974
Fee income from short courses	7	7	43	43
Training and other courses	929	929	824	824
Fee income from University of Liverpool	333	333	379	379
	<u>3,737</u>	<u>3,737</u>	<u>4,101</u>	<u>4,101</u>

Total grant and fee income is also split as shown below:

Grant income from the OfS	1,331	1,331	1,502	1,502
Grant income from other bodies	15,620	15,620	12,615	12,615
	<u>16,951</u>	<u>16,951</u>	<u>14,117</u>	<u>14,117</u>
Fee income for taught awards (exclusive of VAT)	2,295	2,295	2,684	2,684
Fee income for research awards (exclusive of VAT)	1,435	1,435	1,350	1,350
Fee income for non-qualifying courses (exclusive of VAT)	7	7	67	67
	<u>3,737</u>	<u>3,737</u>	<u>4,101</u>	<u>4,101</u>
	<u>20,688</u>	<u>20,688</u>	<u>18,218</u>	<u>18,218</u>

7. Research Grants and Contracts

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Research Councils	12,684	12,684	10,313	10,313
UK based charities	27,457	27,457	15,199	16,363
UK Central Government and other bodies	20,782	14,174	21,444	12,940
UK industry and commerce	810	810	814	694
European Union	7,587	7,463	5,409	5,313
Other overseas bodies	29,758	10,122	24,748	11,171
Other	96	30	347	176
	<u>99,174</u>	<u>72,740</u>	<u>78,274</u>	<u>56,970</u>

Included within LSTM is £3,009,000 (2020 : £1,164,000) allocated to LSTM by IVCC, a UK registered charity under the control of LSTM. This income has been recognised as non-EU based charities income of £1,320,000 (2020 : £264,000), UK government income of £1,689,000 (2020 : £875,000) and UK other income of £ Nil (2020 : £25,000), by being matched against the related charitable expenditure incurred by the Group. IVCC allocates funding to research institutions on a competitive basis as validated by its External Scientific Advisory Committees.

Also included in UK based charities income are amounts relating to gifts of mosquito nets of £12,632,000 (2020 : £3,092,000). In accordance with FRS 102 the income has been shown above and offsetting costs are included in Other Operating Expenses (note 13).

Details of the estimates and judgements made in relation to these gifts are given in note 3 v.

8. Other Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Diagnostic lab	331	331	302	302
Travel health related activities	523	-	847	-
Implementation research consultancy	19,695	5,166	21,633	4,538
Gifts in kind: Pharmaceutical drugs for MDA programme	64,757	64,757	101,486	101,486
Forward currency contracts	459	459	669	669
Health authority contracts	216	216	185	185
Health authority funded posts	399	399	370	370
Non-funding council releases of deferred capital grants (Note 25)	528	528	530	530
Other	1,563	2,468	4,027	2,827
	<u>88,471</u>	<u>74,324</u>	<u>130,049</u>	<u>110,907</u>

Gifts in kind relate to gifts of pharmaceutical drugs for a mass drug administration programme (MDA) in various countries in Africa. In accordance with FRS 102 the income has been shown above and offsetting costs are included in Other Operating Expenses (note 13).

Details of the estimates and judgements made in relation to these gifts are given in note 3 v.

9. Investment Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Dividend income and interest receivable	747	521	726	167
Other interest receivable	4	4	122	122
	<u>751</u>	<u>525</u>	<u>848</u>	<u>289</u>

10. Donations and Endowment Income

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Endowment income	805	805	227	227
Unrestricted donations	38	38	111	111
Restricted donations	412	412	342	342
	<u>1,255</u>	<u>1,255</u>	<u>680</u>	<u>680</u>

11. Staff Costs

	Group Year ended 31 July 2021 Number	LSTM Year ended 31 July 2021 Number	Group Year ended 31 July 2020 Number	LSTM Year ended 31 July 2020 Number
The number of persons (including senior post holders) employed at 31 July each year, expressed as full-time equivalents, was:				
<i>Academic contracts</i>				
Teaching staff	10	10	11	11
Research staff	139	139	129	129
Teaching and research staff	65	65	64	64
Clinicians	18	18	15	15
<i>Non-academic contracts</i>				
Other	469	324	431	310
	701	556	650	529

The increase in other staff in the Group largely reflects an increase in staff in CeSHHAR Zimbabwe.

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Staff costs for the above persons were:				
Salaries	29,916	25,333	30,461	24,992
Social security costs	2,854	2,585	2,783	2,482
Pension costs	4,809	4,429	4,768	4,420
Restructuring costs	61	61	226	226
Accrued but untaken holiday costs	(18)	(18)	322	322
<i>Staff costs before adjusting for pension provision costs</i>	37,622	32,390	38,560	32,442
Pension deficit funding costs	(210)	(210)	(12,945)	(12,945)
<i>Total staff costs</i>	37,412	32,180	25,615	19,497

The pension provision costs represent the commitment by LSTM to fund the underlying deficit on the USS hybrid pension scheme. Under FRS 102 these amounts need to be provided for. The total provision at 31 July 2021 is £9,206,000 (see note 23).

	Group Year ended 31 July 2021		Restated Group Year ended 31 July 2020	
	Number of Key Management Personnel	Number of Other Staff	Number of Key Management Personnel	Number of Other Staff
£100,000 - £105,000	1	4	1	3
£105,001 - £110,000	1	3	2	7
£110,001 - £115,000	1	3	-	2
£115,001 - £120,000	-	5	-	6
£120,001 - £125,000	-	5	-	2
£125,001 - £130,000	1	1	1	1
£130,001 - £135,000	-	1	-	2
£135,001 - £140,000	1	1	1	-
£140,001 - £145,000	-	1	-	2
£145,001 - £150,000	-	1	-	2
£160,001 - £165,000	-	-	-	1
£165,001 - £170,000	-	1	-	-
£170,001 - £175,000	-	1	1	1
£175,001 - £180,000	1	-	-	-
£180,001 - £185,000	-	1	-	1
£205,001 - £210,000	1	-	1	-
£240,001 - £245,000	1	-	1	-
£255,001 - £260,000	1	-	1	-
£265,001 - £270,000	-	1	-	-
£270,001 - £275,000	-	-	-	1
	9	29	9	31

12. Key Management Personnel

Key management personnel are those persons having authority and responsibility for planning, directing and controlling the activities of the school. The figures below include compensation paid to key management personnel.

	Group/LSTM Year ended 31 July 2021 Number	Group/LSTM Year ended 31 July 2020 Number
The number of key management personnel including the director was:	9	9

Key management personnel include the Director. In 2020/21 and 2019/20 all key management personnel earned a salary of over £100,000 (see salary bandings note 11).

Key management personnel's total emoluments were made up as follows:

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Salaries	1,464	1,387
Social security costs	191	167
Pension Contributions	160	167
Total emoluments	1,815	1,721

Remuneration specifically for the Director, David Lalloo is as follows :

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Salaries	256	256
Social security costs	34	34
Pension Contributions	4	37
Total emoluments	294	327

The pension contributions of the Director and key management personnel are in respect of employer's contributions to the USS and NHS pension schemes and are paid at the same rate as for other employees.

The members of the Board other than the Director and the staff members did not receive any payment from LSTM other than the reimbursement of travel and subsistence expenses incurred in the course of their duties.

The total expenses paid to or on behalf of trustees was £1,704 (2020 : £1,961). This represents travel and subsistence expenses incurred in attending meetings and events in their official capacity.

Senior staff pay

LSTM is a world leading research institution. We benchmark our rates of pay and HR practices against the higher education sector in general, and our key comparator group is Russell Group institutions. This reflects where we need to be in order to attract and retain the most talented people in our predominantly research field, particularly against global and national competition.

Average earnings in higher education are higher than the average for both the public and private sector and have grown faster than in the wider economy.

The Director's pay is linked to a pay scale. Incremental progression is not automatic, however any pay awards are based on consideration of an individual's contribution, supported by evidence of exceptional performance. Determinations of pay for senior executive staff are made by the Remuneration Committee, the members of which are Board trustees, and which is chaired by the Chair of the Board; however, the Deputy Chair presides over discussions of the director's pay. The remuneration Committee adopts the CUC's Higher Education Senior Staff Remuneration Code and publishes a separate annual report. Due to COVID-19 the Remuneration Committee did not meet in July 2020 as the decision was made for there to be no increase in salaries in August 2020 for senior staff as a result of the pandemic. The Committee met in autumn 2021 but Senior Management Group staff have again decided not to take an increase in August 2021.

David Lalloo's level of remuneration since he became director was determined taking account of the analysis of benchmark information to reflect the relevant market position. He took office in January 2019 and the first determination of contribution and his reward was due to take place before the end of the 2019/20 financial year. However, as the decision was made for there to be no annual increase in senior management group salaries at August 2020 and August 2021, this review has been delayed.

Median salary info

The FTE salary of David Lalloo as Director, expressed as a multiple of the median salary of all LSTM UK staff is 6.80 (2020 : 6.96).

The FTE total remuneration of David Lalloo as Director, expressed as a multiple of the median total remuneration of all LSTM UK staff is 5.87 (2020 : 6.73).

The basis of the calculation is as follows:

- All staff costs are grossed up to reflect amounts payable on a full time equivalent basis.
- Total remuneration includes employer pension payments, bonus payments and allowances.
- Salary details for atypical and agency staff have been excluded due to difficulties in obtaining the data from third parties.

Overseas activities

LSTM's business is such that a substantial amount of overseas activities are carried out by all staff, which includes senior post-holders and higher paid staff. It is not believed appropriate to account for this expenditure in a separate note.

13. Other Operating Expenses

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Research grants and contracts	66,607	45,276	58,583	39,928
Implementation research consultancy	16,535	3,821	18,875	3,457
Gifts in kind: Pharmaceutical drugs for MDA programme	64,757	64,757	101,486	101,486
Gifts in kind: Mosquito nets	12,632	12,632	3,092	3,092
Gifts in kind : Experimental drugs	14	14	-	-
Forward currency contracts	110	-	152	-
Premises costs	3,270	3,270	3,071	3,071
Academic and related expenditure	709	708	1,930	2,082
Administrative and central services	1,370	953	1,381	1,733
	166,004	131,431	188,570	154,849

Other operating expenses include:	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
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Financial statements auditor's remuneration

Financial statements audit	119	68	84	41
Audit related assurance services	-	-	7	7
Taxation compliance services	9	9	9	2
Taxation advisory services	14	14	11	7

Other auditor's remuneration

Internal audit	30	30	26	26
Research grant audit services	14	14	-	-
Component auditors	19	-	26	-

14. Interest Payable

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Finance lease interest for Accelerator Building	129	129	14	14
	129	129	14	14

15. Taxation

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Tax charge/(credit) in year	39	-	(24)	-
	39	-	(24)	-

16. Surplus on Continuing Operations for the Year

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Surplus for the year before gift aid	6,609	5,665	9,043	7,871
Surplus generated by subsidiary undertakings and transferred to LSTM under gift aid	-	-	-	-
Surplus for the year	6,609	5,665	9,043	7,871

17. Tangible Fixed Assets

Group	Leasehold Buildings £'000	Freehold land and buildings £'000	Fixtures & Equipment £'000	TOTAL £'000
Cost or valuation				
At 1 August 2020	14,223	57,269	5,281	76,773
Additions	-	985	1,459	2,444
Disposals	-	-	(473)	(473)
At 31 July 2021	14,223	58,254	6,267	78,744
Depreciation				
At 1 August 2020	1,033	12,877	4,172	18,082
Charge for the year	344	1,071	626	2,041
Eliminated in respect of disposals	-	-	(473)	(473)
At 31 July 2021	1,377	13,948	4,325	19,650
Net book value at 31 July 2021	12,846	44,306	1,942	59,094
Net book value at 31 July 2020	13,190	44,392	1,109	58,691
Financed by Funding body capital grants	-	6,430	1,188	7,618
Financed by government capital grants	1,504	17,379	-	18,883
Financed by other grants and LSTM	11,342	20,497	754	32,593
	12,846	44,306	1,942	59,094

The amount for freehold land and buildings includes a value for land of £3,907,000 which is not depreciated.

The net book value of tangible fixed assets include £10,057,000 (2020 : £8,772,000) in respect of assets held under finance lease. Depreciation of the finance lease asset was £218,000 (2020 : £189,000).

	Leasehold Buildings £'000	Freehold land and buildings £'000	Fixtures & Equipment £'000	TOTAL £'000
LSTM				
Cost or valuation				
At 1 August 2020	13,871	57,269	5,191	76,331
Additions	-	985	1,459	2,444
Disposals	-	-	(473)	(473)
At 31 July 2021	13,871	58,254	6,177	78,302
Depreciation				
At 1 August 2020	954	12,877	4,115	17,946
Charge for the year	337	1,071	614	2,022
Eliminated in respect of disposals	-	-	(473)	(473)
At 31 July 2021	1,291	13,948	4,256	19,495
Net book value at 31 July 2021	12,580	44,306	1,921	58,807
Net book value at 31 July 2020	12,917	44,392	1,076	58,385
Financed by Funding body capital grants	-	6,430	1,188	7,618
Financed by government capital grants	1,504	17,379	-	18,883
Financed by other grants and LSTM	11,076	20,497	733	32,306
	12,580	44,306	1,921	58,807

The amount for freehold land and buildings includes a value for land of £3,907,000 which is not depreciated.

The net book value of tangible fixed assets include £10,057,000 (2020 : £8,772,000) in respect of assets held under finance lease.
Depreciation of the finance lease asset was £218,000 (2020 : £189,000).

18. Investments in Subsidiaries

	LSTM Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2020 £'000
Investments in subsidiary companies	80	54

LSTM owns 100% of the issued ordinary £1 shares of LSTM Consulting Limited, a company incorporated in England and Wales. Its principal business activity is carrying out technical assistance on health issues in tropical countries. LSTM Consulting Limited has interests in the following companies and NGOs :

- LATH Nigeria (Dormant NGO)
- LATH Umoyo, Malawi (Dormant) - 50%
- LSTM Kenya - 100%
- LSTM Consulting USA - 100%
- LMS (Dormant) - 100%
- LATH South Sudan (NGO)

LSTM owns 100% of the issued ordinary £1 shares of Liverpool International Health Ventures Limited, a company incorporated in England and Wales. Its principal business activity is being a vehicle to remunerate employees of fellow group companies and a holding company for the following :

- Well Travelled Clinics Limited (WTC)
- Liverpool International Health I.P. Limited (LIHIP)

LSTM owns 100% of the issued ordinary £1 shares of EchiTab Study Group (UK) Limited, a company incorporated in England and Wales (Dormant).

LSTM is the sole member of IVCC, a company and registered charity incorporated in England and Wales. IVCC is a company limited by guarantee and holds no share capital. Its principal business activity is to carry out research into controlling vector-borne diseases such as malaria and dengue.

LSTM owns 99% of the issued ordinary 10 Rupee shares of Liverpool School of Tropical Medicine India Private Limited, a company incorporated in India. Authorised and issued share capital has been increased in the year.

LSTM also has an interest in the following, which are all NGOs:

- LSTM Malawi	Consolidated in LSTM Group Financial Statements
- CeSHHAR Zimbabwe (Charity)	
- LSTM DRC	Not consolidated due to negligible activity
- Liverpool Initiative for Health Development (Nigeria)	
- LSTM Sierra Leone	
- LSTM Uganda	

LSTM Tanzania was closed during the year

19. Debtors : Amounts falling due within 1 year

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Trade debtors	1,749	1,328	1,419	1,315
Amounts owed by subsidiary undertakings	-	-	-	120
Deferred taxation	-	-	34	-
Balances due on research grants and contracts	13,022	12,310	20,494	14,320
Prepayments and accrued income	1,693	1,628	1,553	1,483
Forward currency contracts	771	568	287	103
	17,235	15,834	23,787	17,341

A bad debt provision of £155,000 (2020 : £270,000) has been recognised against debtors of LSTM and the Group.

20. Investments and Endowments

	Group Investments Year ended 31 July 2021 £'000	Group Endowments Year ended 31 July 2021 £'000	Group TOTAL Year ended 31 July 2021 £'000	Group TOTAL Year ended 31 July 2020 £'000
Cost at 1 August 2020/2019	13,387	12,500	25,887	32,200
Additions	14,653	2,691	17,344	2,545
Disposals	(384)	(2,069)	(2,453)	(9,072)
Cost at 31 July 2021/2020	27,656	13,122	40,778	25,673
Unrealised revaluation reserve at 1 August 2020/2019	2,835	2,378	5,213	8,385
Unrealised revaluation in the year	172	1,685	1,857	(2,958)
Unrealised revaluation reserve at 31 July 2021/2020	3,007	4,063	7,070	5,427
Market value at 31 July 2021/2020	30,663	17,185	47,848	31,100
Represented by:				
Fixed interest stocks (listed)	11,508	2,580	14,088	14,301
Equities (listed)	3,415	12,384	15,799	13,573
Other	15,740	2,221	17,961	3,226
	30,663	17,185	47,848	31,100
Represented by:				
Fellowships and scholarship funds	-	8,061	8,061	7,531
Prize funds	-	145	145	131
Other funds	30,663	8,979	39,642	23,438
	30,663	17,185	47,848	31,100

Investments include bank deposits of greater than 3 months duration of £14,258,000 (2020 : £72,000).

	LSTM Investments Year ended 31 July 2021 £'000	LSTM Endowments Year ended 31 July 2021 £'000	LSTM TOTAL Year ended 31 July 2021 £'000	LSTM TOTAL Year ended 31 July 2020 £'000
Cost at 1 August 2020/2019	13,387	12,500	25,887	29,139
Transfer of investments at cost to IVCC	(7,668)	-	(7,668)	-
Additions	2,467	2,691	5,158	2,545
Disposals	(383)	(2,069)	(2,452)	(5,797)
Cost at 31 July 2021/2020	7,803	13,122	20,925	25,887
Unrealised revaluation reserve at 1 August 2020/2019	2,835	2,378	5,213	8,171
Transfer of revaluation reserve to IVCC	(345)	-	(345)	-
Unrealised revaluation in the year	753	1,685	2,438	(2,958)
Unrealised revaluation reserve at 31 July 2021/2020	3,243	4,063	7,306	5,213
Market value at 31 July 2021/2020	11,046	17,185	28,231	31,100
<i>Represented by:</i>				
Fixed interest stocks (listed)	4,077	2,580	6,657	14,301
Equities (listed)	3,415	12,384	15,799	13,573
Other	3,554	2,221	5,775	3,226
	11,046	17,185	28,231	31,100
<i>Represented by:</i>				
Fellowships and scholarship funds	-	8,061	8,061	7,531
Prize funds	-	145	145	131
Other funds	11,046	8,979	20,025	23,438
	11,046	17,185	28,231	31,100

Investments include bank deposits of greater than 3 months duration of £2,072,000 (2020 : £72,000).

21. Creditors: Amounts falling due within 1 year	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Unexpended balances of research grants and contracts	58,521	26,906	54,221	20,403
Trade creditors	882	700	287	176
Amounts owed to subsidiary undertakings	-	96	-	-
Other taxation and social security	867	856	950	896
Holiday accrual	672	672	690	690
Accruals and deferred income	10,986	3,310	8,546	3,548
Forward currency contracts	272	120	247	114
Short Term element of finance lease liability (note 32)	453	453	426	426
Short term element of deferred capital grants (note 25)	589	589	566	566
	73,242	33,702	65,933	26,819

22. Creditors: Amounts falling due after 1 year	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Long term element of deferred capital grants (note 25)	25,911	25,911	24,928	24,928
Long term element of finance lease liability (note 32)	9,033	9,033	9,368	9,368
	34,944	34,944	34,296	34,296

23. Pension Deficit Provision	Group/LSTM USS Year ended 31 July 2021 £'000
At 31 July 2018	6,623
Increase in provision during the year (staff costs, see note 11)	15,081
Increase in provision during the year (interest costs)	145
Total increase in provision during the year	15,226
At 31 July 2019	21,849
Decrease in provision during the year (staff costs, see note 11)	(12,945)
Increase in provision during the year (interest costs)	354
Total decrease in provision during the year	(12,591)
At 31 July 2020	9,258
Decrease in provision during the year (staff costs, see note 11)	(210)
Increase in provision during the year (interest costs)	158
Total decrease in provision during the year	(52)
At 31 July 2021	9,206

The obligation to fund the past deficit on the Universities Superannuation Scheme (USS) arises from the contractual obligation with the USS to fund deficit payments in accordance with the deficit recovery plan. In calculating this provision, management have estimated future staff levels within the USS scheme for the duration of the contractual obligation and salary inflation. Key assumptions are set out below.

The provision at 31 July 2021 is based on the sector-mandated model which reflects the latest valuation at 31 March 2018.

Management has assessed future employees within the scheme and salary payment over the period of the contracted obligations to calculate the value of the provision, and has made the following assumptions.

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
Discount rate	0.79%	1.71%
Salary growth	1.5% 1st 6 years, then 2.5%	1.5% 1st 6 years, then 2.5%
Staff numbers growth	3.0% 1st 6 years, then 5.0%	3.0% 1st 6 years, then 5.0%

Sensitivity analysis

As set out in the accounting policies, there are some critical judgements made in estimating the obligation to fund the USS deficit. The sensitivity of the principal assumptions used to measure the USS deficit provision are set out below:

Change in assumptions at 31 July 2021	Approximate impact £'000	
0.5% pa decrease in discount rate	187	Increase in provision
0.5% pa increase in discount rate	(180)	decrease in provision
0.5% pa increase in salary inflation over duration	184	Increase in provision
0.5% pa increase in salary inflation year 1 only	45	Increase in provision
0.5% increase in staff changes over duration	182	Increase in provision
0.5% increase in staff changes year 1 only	44	Increase in provision

Approval of 2020 valuation

On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out/unwound over the next 17 years.

24. Other Provisions

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 31 July 2019	1,173	1,168
Net movement of provisions in the year	654	639
At 31 July 2020	1,827	1,807
Net movement of provisions in the year	1,870	1,890
At 31 July 2021	3,697	3,697

Other provisions comprise primarily provisions for issues in meeting project deliverables on research grants of £1,859,000, partly due to COVID-19 (2020 : £1,106,000), provisions for costs relating to the Liverpool Life Sciences Accelerator (LLSA) research space of £927,000 (2020 :£128,000) and a provision for the negative assets for the subsidiary intellectual property company of £335,000 (2020 : £293,000).

Information regarding settlement of the amounts provided for is anticipated in the next year.

25. Deferred Capital Grants

	Group/LSTM Funding Council Year ended 31 July 2021 £'000	Group/LSTM Other Funding Year ended 31 July 2021 £'000	Group/LSTM TOTAL Year ended 31 July 2021 £'000
At 1 August 2020			
Buildings	5,605	19,411	25,016
Equipment	478	-	478
Cash received			
Buildings	1,297	-	1,297
Equipment	1,332	-	1,332
Released to Statement of comprehensive income			
Buildings	(474)	(528)	(1,002)
Equipment	(621)	-	(621)
At 31 July 2021	7,617	18,883	26,500

Deferred capital grants are shown in Creditors and are split between Creditors : < 1 year and Creditors : > 1 year as follows :

Creditors < 1 year	589
Creditors > 1 year	25,911
	26,500

At 1 August 2019			
Buildings	5,445	19,941	25,386
Equipment	537	-	537
Cash received			
Buildings	871	-	871
Equipment	612	-	612
Released to Statement of comprehensive income			
Buildings	(711)	(530)	(1,241)
Equipment	(671)	-	(671)
At 31 July 2020	6,083	19,411	25,494

Deferred capital grants are shown in Creditors and are split between Creditors : < 1 year and Creditors : > 1 year as follows :

Creditors < 1 year	566
Creditors > 1 year	24,928
	25,494

26. Endowment Reserves

	Group/LSTM Permanent Endowment Restricted Year ended 31 July 2021 £'000	Group/LSTM Permanent Endowment Unrestricted Year ended 31 July 2021 £'000	Group/LSTM Expendable Restricted Year ended 31 July 2021 £'000	Group/LSTM TOTAL Year ended 31 July 2021 £'000
At 1 August 2020				
- Capital value	7,383	6,527	543	14,453
- Accumulated income	272	202	(49)	425
- TOTAL	7,655	6,729	494	14,878
Reclassification between restricted and unrestricted	(559)	559	-	-
Drawdown of endowment capital	-	-	(48)	(48)
Appreciation of endowment assets investments (realised)	255	367	48	670
Appreciation of endowment assets investments (unrealised)	760	822	103	1,685
Income for the year	185	123	12	320
Transferred to statement of comprehensive income	(196)	(123)	-	(319)
At 31 July 2021				
- Capital value	7,955	8,275	597	16,827
- Accumulated income	145	202	12	359
- TOTAL	8,100	8,477	609	17,185
Representing:				
Fellowship and scholarship funds	7,452	-	609	8,061
Prize funds	145	-	-	145
Other funds	503	8,477	-	8,980
Investments	8,100	8,477	609	17,185
Cash relating to endowments	250	1,703	-	1,954
Reserves	8,350	10,180	609	19,139
	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000	Year ended 31 July 2020 £'000
At 1 August 2019				
- Capital value	7,386	7,557	623	15,566
- Accumulated income	217	202	(44)	375
- TOTAL	7,603	7,759	579	15,941
Reclassification between restricted and unrestricted	553	(559)	-	(6)
Drawdown of endowment capital	-	-	(44)	(44)
Appreciation of endowment assets investments (realised)	268	54	93	415
Depreciation of endowment assets investments (unrealised)	(824)	(525)	(130)	(1,479)
Income for the year	147	128	56	331
Transferred to statement of comprehensive income	(92)	(128)	(61)	(281)
At 31 July 2020				
- Capital value	7,383	6,527	543	14,453
- Accumulated income	272	202	(49)	425
- TOTAL	7,655	6,729	494	14,878
Representing:				
Fellowship and scholarship funds	7,106	-	494	7,600
Prize funds	130	-	-	130
Other funds	419	6,729	-	7,148
Investments	7,655	6,729	494	14,878
Cash relating to endowments	57	1,301	1	1,359
Reserves	7,712	8,030	495	16,237

27. Restricted General Reserve

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 31 July 2019	6,208	619
Surplus/(deficit) from Statement of comprehensive income	1,797	(165)
Transfer from general unrestricted reserve	(678)	-
At 31 July 2020	7,327	454
Surplus/(deficit) from Statement of comprehensive income	1,228	33
At 31 July 2021	8,555	487

The reserves of IVCC and CeSHHAR Zimbabwe are considered to be restricted due to their status as charities/Private voluntary organisations (PVOs) and their objects being narrower than those of the group. In addition, at 31 July 2021 donations where there is a restriction over how they are used were transferred to this reserve from the general reserve.

28. Financial Instruments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
The carrying value of the Group and LSTM's financial assets and liabilities are summarised by category below:				
Financial assets				
Financial assets at fair value through surplus or deficit:				
Listed investments and endowments	47,848	28,231	31,100	31,100
Financial assets that are debt instruments measured at amortised cost:				
Trade, research and other receivables	15,646	14,454	22,962	16,734
Cash and cash equivalents	52,154	25,797	46,250	6,842
Financial assets measured at fair value through surplus or deficit				
Forward currency contracts	771	568	287	103
	116,419	69,050	100,599	54,779
Financial liabilities				
Financial liabilities measured at amortised cost				
Trade, research and other payables and accruals	69,718	30,353	63,054	24,127
Finance lease liability	9,486	9,486	9,794	9,794
Financial liabilities measured at fair value through surplus or deficit				
Forward currency contracts	272	120	247	114
	79,476	39,959	73,095	34,035

The Group previously applied hedge accounting for certain transactions entered into to manage the cash flow exposures of US dollar research income, but this practice ceased with effect from 1 August 2020. Foreign currency forward contracts are held to manage the exposure to fluctuations in US dollar and Euro rates and are designated as cash flow hedges.

Cash flows on both the US dollar and Euro research income and the foreign currency forward contracts are at regular intervals, based on predicted project related cash flows. The forward contracts had a mark to market valuation as at 31 July 2021 amounting to an asset of £499,000 (2020 : £40,000 asset). During 2020/21 a gain of £110,000 (2020 : gain of £642,000) was recognised in the cash flow hedge reserve for changes in the fair value of the forward contracts and a gain of £349,000 was recognised in income for the year (2020 : a gain of £517,000). No amounts of ineffectiveness were recognised in 2019/20.

The foreign currency forward contracts are not traded in active markets. These have been fair valued using observable forward exchange rates corresponding to the maturity of the contracts.

The Group's income, expense, gains and losses in respect of financial instruments are summarised below:

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Financial assets				
Total interest income for financial assets at amortised cost	4	4	122	122
Fair value gains and (losses)				
On financial assets measured at fair value through income and expenditure	349	459	517	669
On financial assets measured at fair value through the hedging reserve	109	-	642	-

29. Cash and Cash Equivalents

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
At 1 August 2020	46,250	6,842
Cashflows	5,904	18,955
At 31 July 2021	52,154	25,797

30. Pension and similar obligations

LSTM and the Group's employees belong to two principal pension schemes, the Universities Superannuation Scheme (USS) and University of Liverpool Pension Fund (ULPF) although a small number of staff belong to the National Health Service Superannuation Scheme (NHSSS) and WTC Pension scheme. All schemes apart from the WTC scheme are defined benefit schemes, which are externally funded and contracted out of the State Earnings-Related Pension Scheme.

The defined benefit funds are normally valued every three years by a professionally qualified independent actuary using the projected unit method, the rates of contribution payable being determined by each fund's trustee on the advice of the actuary. In the intervening years the actuary reviews the progress of the scheme. Pension costs are assessed in accordance with the advice of the actuary, based on the latest actuarial valuation of the scheme, and are accounted for on the basis of charging the cost of providing pensions over the period during which the institution benefits from the employee's services. The total group pension cost for the year was £4,809,000 (2020 : £4,768,000).

Universities Superannuation Scheme (USS)

LSTM participates in the Universities Superannuation Scheme. The scheme is a hybrid pension scheme, providing defined benefits (for all members), as well as defined contribution benefits. The assets of the scheme are held in a separate trustee-administered fund. Because of the mutual nature of the scheme, the assets are not attributed to individual institutions and a scheme-wide contribution rate is set. LSTM is therefore exposed to actuarial risks associated with other institutions' employees and is unable to identify its share of the underlying assets and liabilities of the scheme on a consistent and reasonable basis. As required by Section 28 of FRS 102 "Employee benefits", LSTM therefore accounts for the scheme as if it were a wholly defined contribution scheme. As a result, the amount charged to the statement of comprehensive income represents the contributions payable to the scheme. Since LSTM has entered into an agreement (the recovery plan) that determines how each employer within the scheme will fund the overall deficit, LSTM recognises a liability for the contributions payable that arise from the agreement (to the extent that they relate to the deficit) and therefore an expense is recognised.

The total contributions charged to the Statement of comprehensive income is £3,911,000 (2020 : £3,845,000).

Deficit recovery contributions due within one year are £1,125,000 (2020 : £406,000).

The latest available completed actuarial valuation of the USS Retirement Income Builder (defined benefit) is at 31 March 2018 (the valuation date), which was carried out using the projected unit method.

Since the institution cannot identify its share of USS Retirement Income Builder (defined benefit) assets and liabilities, the following disclosures reflect those relevant for those assets and liabilities as a whole.

The 2018 valuation was the fifth valuation for the scheme under the scheme-specific funding regime introduced by the Pensions Act 2004, which requires schemes to adopt a statutory funding objective, which is to have sufficient and appropriate assets to cover their technical provisions. At the valuation date, the value of the assets of the scheme was £63.7 billion, and the value of the scheme's technical provisions was £67.3 billion indicating a shortfall of £3.6 billion and a funding ratio of 95%.

The key financial assumptions used in the 2018 valuation are described below. More detail is set out in the Statement of Funding Principals

Pension increases (CPI)	Term dependent rates in line with the difference between the Fixed Interest and Index Linked yield curves, less 1.3% p.a.
Discount rate (forward rates)	Years 1-10 : CPI + 0.14% reducing linearly to CPI - 0.73% Years 11-20 : CPI +2.52% reducing linearly to CPI +1.55% by year 21 Years 21+ : CPI +1.55%
The main demographic assumption used relates to the mortality assumptions. These assumptions are based on analysis of the scheme's experience carried out as part of the 2018 actuarial valuation. The mortality assumptions used in these figures are as follows:	
Mortality base table	2018 Valuation Pre retirement 71% of AMC00 (duration 0) for males and 112% of AFC00 (duration 0) for females. Post retirement 97.6% of SAPS S1NMA "light" for males and 102.7% of RFV00 for females.
Future improvements to mortality	CMI_2017 with a smoothing parameter of 8.5 and a long term improvement rate of 1.8% p.a for males and 1.6% for females

The current life expectancies on retirement at age 65 are :

	2021 valuation	2020 valuation
Males currently aged 65 (years)	24.6	24.4
Females currently aged 65 (years)	26.1	25.9
Males currently aged 45 (years)	26.6	26.3
Females currently aged 45 (years)	27.9	27.7

A new deficit recovery plan was put in place as part of the 2018 valuation, which requires payment of 2% of salaries over the period 1 October 2019 to 30 September 2021 at which point the rate will increase to 6%. The 2020 deficit recovery liability reflects this plan. The liability figures have been produced using the following assumptions :

	2021	2020
Discount rate	0.79%	1.71%
Pensionable salary growth	Years 1 - 6: 1.5% Years 7 - 16: 2.5%	Years 1 - 6: 1.5% Years 7 - 16: 2.5%

Approval of 2020 valuation

On 1st October 2021 the latest valuation of the scheme (the 2020 valuation) was signed and approved. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event in note 39 to the financial statements. The revised calculation would result in an increase in expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out over the next 17 years.

University of Liverpool Pension Fund (ULPF)

LSTM participates in the University of Liverpool Pension Fund (ULPF), a defined benefit scheme in the UK. The final salary section of the Fund is closed to new entrants with effect from 31 July 2011 and from 1 August 2011 new members are eligible to join the CARE section of the Fund. A full actuarial valuation was carried out at 31 July 2018 and the preliminary results have been updated to 31 July 2021 by a qualified actuary, independent of the scheme's sponsoring employer.

The contributions made by the employer over the period have been £199,000 (2020 : £211,000). The employer currently pays contributions at the rate of 16% of pensionable pay. Member contributions are payable in addition at the rate of 7.5% of pensionable pay for Final Salary members and 6.5% of pensionable pay for CARE members.

The assumptions which have the most significant effect on the result of the valuation are those relating to the rate of return on investments (i.e. the valuation rate of interest) and the rates of increase in salary and pensions. In relation to the past service liabilities the financial assumptions were derived from market yields prevailing at the valuation date. It was assumed that the discount rate would be 1.7% per annum (2020 : 1.5%) and salary increases would be 2.85% per annum (2020 : 2.55%). The valuation was carried out using the projected unit method.

At the valuation date the market value of the assets of the scheme was £620.1m (2020 : £533.3m) and the value of the past service liabilities was £517.6m (2020 : £511.2m) leaving a surplus of £102.5m (2020 : £22.2m).

During the year, LSTM contributed to 48 employees within this scheme (2020 : 52 employees). There was a total of 45 LSTM active members in this scheme at 31 July 2021.

National Health Service Superannuation Scheme (NHSSS)

LSTM participates in the National Health Service Superannuation Scheme (NHSSS), a defined benefit scheme which is a statutory, unfunded, multi employer, defined benefit scheme in which LSTM is unable to identify its share of the underlying liabilities and assets and is accounted for on a contributions basis.

The contributions made by the employer over the financial year have been £318,000 (2020 : £364,000), equivalent to 14.38% of pensionable salaries.

There were a total of 39 LSTM active members in this scheme at 31 July 2021.

31. Contingent Liability

A composite cross guarantee structure exists between Liverpool School of Tropical Medicine, Well Travelled Clinics Limited, Liverpool International Health Ventures Limited, Liverpool International Health I.P. Limited, IVCC and LSTM Consulting Limited. The aggregate amount outstanding under this agreement at the balance sheet date was £609,352 (2020 : £531,361).

32. Finance Lease Commitments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Amounts due in less than one year	453	453	426	426
Amounts due between one and five years	1,953	1,953	1,896	1,896
Amounts due in more than five years	7,080	7,080	7,472	7,472
	9,486	9,486	9,794	9,794

LSTM signed a lease for occupation of 2 floors of research space in the LLSA in autumn 2017 and took occupation in September 2017. The lease is for 25 years, at £400,000 a year. LSTM has an option to purchase its share of the building within 10 years of the start of the lease, and given this option LSTM has treated the building as a finance lease since 2017/18.

33. Operating Lease Commitments

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2020 £'000
Amounts due in less than one year	105	45	125	41
Amounts due between one and five years	83	81	161	114
	188	126	286	155

34. Capital Commitments

	Group/LSTM Year ended 31 July 2021 £'000	Group/LSTM Year ended 31 July 2020 £'000
5% retention on building works	-	233
	-	233

The building work was completed to LSTM's satisfaction during the year to 31st July 2021 and the retention payment was made before the end of the financial year.

35. Related Party Transactions

The Group has taken advantage of the exemptions included in FRS 102 section 33 in not disclosing the transactions with other group companies as all such transactions have been eliminated on consolidating the group results for the year.

Due to the nature of LSTM's operations and the composition of the Board of Trustees (being drawn from local public and private sector organisations), it is inevitable that transactions will take place with organisations in which a member of the Board may have an interest. All transactions involving an organisation in which a member of the Board may have an interest are conducted at arm's length and in accordance with LSTM's financial regulations and normal procurement procedures.

36. Foreign, Commonwealth and Development Office (FCDO) Funding (Formerly DFID)

Included within UK central government and other bodies income (note 7) and implementation research consultancy income (note 8) are the following DFID funded research projects, together with their income for the year:

	Group Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000
Sustainable Insecticides for Public Health	8,297	8,793
CNTD Global Programmes including Ascend	3,474	3,403
CouNTDown	1,220	1,307
READ-It	914	931
Next generation snakebite therapies	793	1,104
ReBuild	669	49
Reducing Maternal and Neonatal Deaths in Kenya	663	1,056
LIGHT RPC	620	-
FIEBRE	330	548
TDDAP	198	208
Stronger Health Partnerships for Stronger Health Systems	135	-
Monitoring/evaluation services Royal Society-DFID Capacity Building Africa Initiative	106	110
LQAS Survey South Sudan 2	88	-
K4D	56	46
Implementation/evaluation of novel tools in malaria control programmes	20	53
Integrated control of schistosomiasis and intestinal helminths	5	-
UKPHS	-	104
PBO study: Impact of LLINs	-	61
Capacity strengthening	-	7
Other smaller funding	64	73
	17,652	17,854

37. Impact of decision to leave the European Union

On 23 June 2016 the UK voted to leave the European Union and this took effect 1 January 2020. In 2020 the EU and the UK reached an agreement on their new partnership and these new rules took effect on 1 January 2021. With 10 months experience the key issues impacting LSTM to date have been :

- *more complex import documentation, with small increase in costs*
- *Added complexity to employing EU staff*
- *Ability to apply for EU research and capital funding*
- *Increased difficulty attracting EU students and staff*

However, the following concerns have not at this time materialised : increased currency volatility, decline in stock markets; decline in general macro-economic position and consumer confidence; GDPR data risks.

38. Consolidated Reconciliation of Net Funds

	Group Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2021 £'000
Net funds/(debt) 1 August 2020	36,496	(2,963)
Movement in cash and cash equivalents	5,904	18,955
Other non-cash changes	767	767
Net funds/(debt) 31 July 2021	43,167	16,759
Change in net funds	6,671	19,722

Analysis of net funds/(debt):	Group Year ended 31 July 2021 £'000	Group Year ended 31 July 2020 £'000	LSTM Year ended 31 July 2021 £'000	LSTM Year ended 31 July 2020 £'000
Cash and cash equivalents	52,154	46,250	25,797	6,842
Borrowings: amounts falling due within one year				
Obligations under finance leases	453	426	453	426
Forward contracts	(499)	(40)	(448)	11
	(46)	386	5	437
Borrowings: amounts falling due after more than one year				
Obligations under finance lease	9,033	9,368	9,033	9,368
	9,033	9,368	9,033	9,368
Net funds/(debt)	43,167	36,496	16,759	(2,963)

39. Post Balance Sheet Events

The impact on the Group from the COVID-19 pandemic has been considered by the Trustees and there are no related adjusting or non-adjusting events since 31 July 2021.

The financial statements include a pension provision of £9,206,000. This balance, and the £52,000 credit in the year, are based on a mandated calculation used across the sector. Subsequently, on 1st October 2021, the Universities Superannuation Scheme (USS) 2020 valuation was signed and filed with The Pensions Regulator, effective this date. HEIs have been issued with a revised calculation model and the revised provision is disclosed as a post balance sheet event. The revised calculation would result in an increase in the expense in relation to the provision of £23,958,000 and would increase the provision to £33,164,000. The provision is to be paid out/unwound over the next 17 years.

The LSTM Group has unrestricted general reserves of £27.6m, reflecting a strong balance sheet and total net assets of £55.3m. The estimated cash outflows in relation to the revised provision calculation, are scheduled to occur over 17 years. The cash outflows in the next 5 years total £6.4m, and with the exception of 2019/20 which was impacted by COVID-19, LSTM has a history of positive operating surpluses, with the total net surplus over the last 5 years including 2020/21 of £14.0m. Therefore LSTM does not consider that the 2020 valuation impacts the preparation of these financial statements on the going concern basis.





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