Next Generation
MARCH Centre
Report and Strategy
2018–2022

Improving women’s, children’s and adolescents’ health worldwide
The good news is that there is currently more potential for impact than ever before and the Sustainable Development Goals vision boldly reaches beyond survival. New data shows that long-term health is particularly influenced by vulnerable moments in the lifecycle: fetal and newborn health, early childhood, and adolescence. Targeting and investing in these key lifecycle moments has the potential to yield major returns for individuals, public health, and for future generations.

In an uncertain and ever-changing world, we need evidence and facts now more than ever and our School is committed to producing high quality, policy-relevant research. This report is the first time that the scope of the MARCH Centre’s relevant research has been systematically examined, highlighting the breadth and depth of the Centre, whilst also setting out a remit of future priorities.

To progress further and faster, we need more investment in research leadership, especially in Africa. We are especially delighted to see hotspots of research around the Medical Research Council sites in The Gambia and Uganda, which we hope will expand to develop the next generation of research leaders from within Africa.

Foundational to all our work are the School’s many partnerships with UN agencies, healthcare professionals, NGOs and with funding agencies in the UK and beyond. We hope that the priorities outlined in this document for the next generation of research for women’s, children’s and adolescents’ health will be funded, and rapidly lead to health improvements around the world and for future generations.

Key findings include:

Across disciplines: MARCH is one of the largest group of researchers worldwide (>200) working across multiple disciplines on the health of adolescents, women, and children. Many studies involve a range of fields including epidemiology, economics, health systems, and the social sciences.

Around the world: MARCH researchers lead on over 145 studies on every continent, with the highest density in Africa, where the burden is also highest. Many studies are multi-country and more than 10 research efforts are intentionally global in reach. Strength comes from juxtaposing high income and low and middle-income country research.

Through the lifecycle and beyond survival: MARCH has strong linkages and works synergistically with many other centres on conditions that run through the lifecycle such as infections, nutrition, chronic conditions, mental health, and violence.

Beyond health into other sectors: Education, humanitarian emergencies, violence and climate change all impact health through the lifecycle, and MARCH researchers are rapidly expanding their inter-sectorial evaluations, particularly for child development and adolescent health.

Impact beyond publications: Exemplified by the leading role of MARCH Centre staff in high-profile The Lancet series, influencing UN targets, and as part of major multi-partner efforts to bring evidence to action. MARCH massive open online course has had over 26,000 participants in more than 130 countries.
Vision
To improve women’s, children’s, and adolescents’ health worldwide.

Values
We are committed to:
- Research excellence.
- Relevance to policy and programmes, especially in the highest burden settings.
- Raising the next generation of research leaders to improve the health of women, children and adolescents.

People
MARCH Centre members include more than 200 researchers spanning a range of expertise, from anthropology to zoonoses, including clinical care, lab science and social sciences. Particular strengths are in epidemiology, demography and health systems, as evidenced in the many multi-country complex evaluations in which MARCH Centre members are involved.

Our Centre is organised according to three interconnected themes:

A. Adolescents and young people
   - Building the next generation of researchers with hundreds of MSc & PhD students & more than 26,000 people enrolled in our free online course (MOOC)

B. Births
   - Wanted and safe

C. Children
   - Survive and thrive

Each theme is coordinated by two academic leaders, working with a student liaison, providing centre members a forum to work together, maximising the unique multidisciplinary strengths of LSHTM.

Approach:
MARCH strengthens research excellence and evidence-based policy by promoting communication and collaboration in and outside of LSHTM, between researchers and policymakers in high, middle and low-income settings. We cover all parts of the research pipeline including:

Description:
Observational epidemiology, high-quality national and global estimates and social science theory and analyses to inform action

Discovery:
Understanding infections, genetic and epigenetic risks, and delineating risks for adverse outcomes, especially during the crucial windows of pregnancy, first two years after birth and adolescence.

Development:
Innovations in diagnostics, devices, and strategies such as improving quality of care.

Delivery:
Intervention and health systems research, including complex evaluation with economic and policy analysis.
Women, children and adolescents in the SDG era

Of the 17 new Sustainable Development Goals (SDGs) there is just one on health (Goal 3). In the Millennium Development Goal (MDG) era 3 of the 8 goals were health related, assuming that better health led to economic development, with women’s and children’s health holding a privileged position. Many national and global leaders across the world have re-stated the centrality of the health of women, children and adolescents at the heart of the SDG agenda. Adolescents in particular, relatively absent from the MDGs, have now been included in the United Nation’s Global Strategy for Women’s, Children’s and Adolescents’ Health (2016-2030), with three objectives aligned to the SDGs as follows:

**Survive:**
- Ending preventable stillbirths, maternal, newborn, child and adolescent deaths. In total these are around 10 million deaths each year.

**Thrive:**
- Promoting health and wellbeing by ending malnutrition, ensuring universal access to sexual and reproductive healthcare and rights, interventions for a healthy start and early childhood development, universal health coverage, and a reduction in pollution-related deaths and illness.

**Transform:**
- Aims to ensure an enabling environment for women, children and adolescents by eradicating extreme poverty and all violence against women and girls, ensuring access to quality, equitable education, clean water and adequate sanitation and hygiene, and legal identity (including birth registration). Transformation requires monitoring and accountability systems and scientific research. The end vision is a ‘grand convergence’ in health, giving all women, children and adolescents an equal chance to survive and thrive, wherever they live. To achieve this vision requires country leadership, resource mobilisation, promoting enabling laws and policies, as well as supporting cross-sector collaboration and harmonised monitoring frameworks.

Evidence gaps highlighted in the Global Strategy

Research across the lifecycle especially for vulnerable points in the lifecycle including fetal and newborn health, early childhood, and adolescence.

- Improvement of data collection and use, especially to address gaps in data to track the many indicators in the SDGs and to define and measure universal health coverage.
- More focus on humanitarian and fragile settings where there is a disproportionate and increasing proportion of the global burden of disease.
- Innovation and evaluation of linkages between sectors to improve women’s, children’s and adolescents’ health.

When I worked in Ghana in the mid-1990s I loved the Adinkra symbol “Sankofa” which means “look to your past to go forward”. This second MARCH report marks around a decade since the Centre launched, and I have been Director for about half that period. For the first time we have undertaken a evidence-based review of our history, and importantly our research to understand our strengths and also gaps and opportunities. For impact in 5-10 years, what shifts do we need to make now, given the time lag from research idea to policy and practice?

The health burden related to reproductive, maternal, newborn, child and adolescent health remains one of the largest in global health, with almost 10 million deaths each year. We face the challenge of going beyond working on one point in the lifecycle, or one condition or research discipline alone, and the even greater challenge of going beyond the health sector.

Looking back at our history

Our School has had more than a century of transforming health around the world, with a strong record of research, policy impact and leadership development. In the early days, the School’s research focus was on infections, in particular malaria, and vaccines, on water, sanitation and hygiene (WASH), and on chronic disease including seminal studies on smoking and exercise. As well as topic specific research, the School has led innovations in research methods including randomised controlled trials, pragmatic evaluation designs and novel survey methodologies.

At the heart of this research was attention to children’s health, especially nutrition, and to women’s health, with decades of research leadership in family planning and maternal mortality measurement. More recently we have developed strengths in “global gap issues” that also reflect the most vulnerable points in the lifecycle including: fetal and newborn health, early child development and adolescent health.

Looking forward at research

This report will take you on a journey through LSHTM’s research around the world by our A, B and C themes (summarised according to focus on Survive, Thrive, or Transform), then through conditions that affect health all throughout the lifecycle and by different sectors. By systematically reviewing our current research, compared to global burden we have identified priorities and gaps, setting a vision for the next generation of research and for research leadership across the globe.

Policy impact for over 100 yrs for womens & childrens health at LSHTM

Founded in 1899 with a focus on:
- Infections especially malaria
- Water & Sanitation, Hygiene
- Research methods (e.g. randomised controlled trials)

70 years of maternal and child health, and for nutrition
30 years for maternal mortality, sexual and reproductive health
10 years for adolescent health
5 years for newborn health, stillbirths and for child development

*Since the MARCH Centre launched in 2009, researchers have published thousands of papers, often with major policy influence & impact, including many The Lancet series*
Adolescents and Young People ...healthy transitions

Young people are crucial to the future of all societies, and demographic changes including improved child survival mean that the proportion of adolescents and young people aged 10-24 is growing in some parts of the world, with a total of 1.2 billion worldwide. Ensuring that young people’s needs are met and helping them to reach their potential is essential for health and wellbeing now and in the future.

Transition to adulthood is a part of the lifecycle that presents unique opportunities to promote health and positive social change. Adolescence is crucial for physical, emotional, and cognitive development, with impacts stretching into adulthood.

Environmental exposures, decisions made and habits formed (e.g. choices about smoking, alcohol, nutrition, and sexual practice) can have a profound effect on both an individual’s health through the lifecycle, and the health and wellbeing of those around them. Deprivations during childhood may also be amplified or ameliorated.

In MARCH we have been actively involved in providing evidence for policy, working closely with The Lancet Commission on Adolescent Health and Wellbeing on Adolescent Health and contributing to WHO’s Global Accelerated Action for the Health of Adolescents (AA-HA!). We tackle the major health challenges for adolescents and young people, and promote young people’s inclusion in political and social decision making by putting participatory approaches at the heart of our research.

Survive and thrive

The leading causes of mortality among adolescents are mostly preventable, and include infections such as HIV/AIDS, injuries, non-communicable diseases including mental health and pregnancy complications. At LSHTM we have world-leading research on aspects of all of these. Some examples are given here.

Infectious diseases:

We undertake projects to evaluate vaccine safety, uptake and effectiveness for infections with high mortality rates among adolescents, including malaria, meningococcal and pneumococcal infections, human papilloma virus (HPV) and Ebola virus disease. For example, the START trial of school-based treatment to reduce malaria transmission in Uganda using intermittent preventive treatment (IPT), and the Dose Reduction Immunobridging and Safety Study (DoRIS) trial in Tanzania which is assessing whether one dose of HPV vaccine produces a similar immune response as the standard three doses.

HIV/AIDS:

Young people are less likely to undergo HIV testing, and those who test positive have poorer HIV-related outcomes than adults. Evidence-based strategies are needed to improve early diagnosis, access to treatment and adherence. LSHTM staff lead studies to provide such evidence, including the ZENITH trial - the first trial to show that community-based support significantly improved viral suppression among 6-15 year olds in Zimbabwe. The PopART cluster randomised trial in South Africa and Zambia and the CHIEDZA trial in Zimbabwe are investigating community-based interventions supporting the whole HIV care cascade, with the UNITAID STAR project investigating how to increase HIV self-testing. We also co-lead the BREATHE trial which is evaluating whether Azithromycin reduces mortality among 6-16 year olds living with HIV-associated chronic lung disease in Zimbabwe and Malawi.

To better understand the experiences of young people living with HIV, we are working with a longitudinal cohort of adolescent girls living with HIV in Zambia, using ethnographic and participatory methods and evaluating a support group intervention. The Empower study, designed by the LSHTM-led STRIVE consortium assesses whether it is feasible, acceptable and safe to offer oral pre-exposure prophylaxis (PrEP) as part of a prevention package that addresses gender-based violence, stigma and HIV in young women aged 16-24 in South Africa and Tanzania.

The STRIVE consortium’s work on the structural drivers of HIV also includes a 3-country qualitative study using mapping and participatory photovoice methodology to investigate the impact of alcohol availability and advertising on the lives, communities and HIV risk of young people in India, South Africa and Tanzania.
**Sexual and reproductive health and family planning:**

Improving uptake of contraception prevents unintended pregnancy which reduces pregnancy complications and unsafe abortions. LSHTM staff lead projects including evaluating the use of mobile phones to increase use of contraception in Bolivia, Tajikistan, Palestine and Bangladesh, and the use of an online service to improve uptake of contraception in the UK. LSHTM is evaluating Adolescents 360, a Population Services International (PSI) intervention which aims to increase the use of modern contraceptives among adolescent girls living in Ethiopia, Nigeria and Tanzania.

**Nutrition:**

LSHTM collaborates on the Olympic Regeneration in East London (OREL) study which aims to understand how the food environment around home and school influences food behaviours during the transition from early to later adolescence. The GAP study (Growth in Adolescence: Potential for Improving Health and Development) in Malawi focuses on describing current prevalence of adolescent stunting, cognitive function, body composition and physical activity.

**Mental health:**

Over half of mental health problems start in adolescence, and prevention and early diagnosis and treatment is essential to enable young people to thrive. LSHTM studies include a recently completed trial in Bihar, India which showed significant improvements in school climate and mental health outcomes through a whole-school intervention led by a lay health worker.

Rates of self-harm are high and rising in young people. In collaboration with the Institute of Psychiatry, King’s College London and Childline, we are piloting an online decision aid to help young people who self-harm decide where to get support that best suits their current needs.

**Disability:**

Conducted with the LSHTM International Centre for Evidence in Disability, a recently completed cluster-randomised trial of a smartphone-based visual impairment screening tool among Kenyan schoolchildren, found that training teachers to conduct eye exams using the smartphone increased referrals to hospital for visual impairment.

**Improving health services:**

“The Sickle Cell Life” project works with young people aged 13-21 with sickle cell disease to improve understanding of their experiences and priorities, with the aim of improving transitions between paediatric and adult health services. It is a longitudinal, participatory, qualitative project in several UK sites, working with young people, carers, and clinicians. The Dialogue, Evidence, Participation and Translation for Health (DEPTH) research group works on improving participation in health research and practice.

**School-based interventions:**

We will expand our current research in the education sector in the UK and low and middle-income settings to design and evaluate interventions going beyond health information to modify the whole school environment, to improve health and examine how health education can be better integrated with academic education.

**Resilient healthcare systems:**

Compared with other populations, adolescents and young people have low, inequitable levels of access to health care. More attention is needed if this age group are to benefit equitably from investments in universal health coverage. We will help design and evaluate resilient healthcare systems catering to the needs of adolescents and young people, understanding and improving transitions between paediatric and adult healthcare.

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**Keeping girls in school and delaying marriage:**

The STRIVE-funded Samata programme is designed to improve the quality of the adolescent girls from marginalised communities in Karnataka, South India, by supporting girls to complete secondary school, delay marriage, and prevent entry into sex work.

LSHTM also leads a portfolio of studies investigating the impact of ‘DREAMS’- layered interventions promoting health for adolescent girls and young women, evaluating how the programme changes empowerment and sexual health in Kenya, South Africa and Zimbabwe.

**Sports-based interventions:**

Sport presents an opportunity to engage young people in discussions on a range of issues, including health. The STRIVE-funded programme, Parivartan for Girls, is a demonstration project engaging girls aged between 12 and 16 from a slum in Mumbai to coach and mentor girls in Kabaddi, the traditional Indian contact sport, helping challenge social norms limiting girls’ access to public spaces.

**WASH:**

Studies to improve Water and Sanitation Hygiene (WASH) facilities include support of the Indian and Tanzanian national sanitation campaigns and designing Myanmar’s national handwashing strategy. We are also involved in studies to help girls improve menstrual hygiene in Uganda and The Gambia, and with girls and young women with disabilities in Nepal.

**Gender-based violence:**

The LINEA Project (Learning Initiative on Norms, Exploitation and Abuse) aims to inform primary prevention among adolescent girls in LMICs by investigating the social norms and other social factors contributing to (and protecting against) child sexual exploitation worldwide. In the UK, we collaborate on Project Respect which aims to prevent dating and relationship violence among UK secondary school students.

**Innovative, participatory research methodologies:**

Young people are often excluded from decision-making that directly affects their lives. Ethical research with young people aims to take account of their voices and experiences throughout the research process. Many interventions are imposed on young people and even well intentioned health messaging can imply that young people are reckless and irresponsible, contributing to negative stereotyping. Our research will continue to develop and maintain positive working relationships with young people and ensure young people are involved in projects about them. “Nothing about us without us”.

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**Research Gaps**

1. School-based interventions eg. Service provision models for menstrual hygiene
2. Systems including health system (e.g. models of adolescent friendly services)
3. Innovative participatory research methodologies and behavioural research

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**What is our next generation of research?**

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**Transform**
Births ...that are wanted and healthy

The Birth theme addresses reproductive, maternal and newborn health as well as the prevention of stillbirths. We cover programmes related to preconception, family planning, pregnancy, care at birth, and the postnatal period.

Pregnancies planned:

Family planning offers enormous benefits, empowering girls and women to choose when, and how many children to have. This improves the health and survival of mothers and children, acting as a powerful lever for education and against poverty. Yet, globally, 220 million women continue to have an unmet need for family planning, 97% of whom live in LMICs. Far too many women die of pregnancies that they did not want to have, either through unsafe abortion or during childbirth. Around 450,000 of the six million child deaths that happen each year could be prevented if contraception was used to space pregnancies.

Maternal health now:

There are an estimated 303,000 maternal deaths each year, almost all in low and middle-income countries, and almost all avoidable. Many women have a complication during childbirth and survive, but then suffer from long-term disabilities. Increasing attention is being given to maternal morbidity and linked conditions such as postpartum depression, which affect a substantial number of women worldwide.

Ending preventable stillbirths:

A woman can go through the entire nine months of pregnancy with a live baby kicking that then dies during labour. A stillbirth has a profound impact on the woman and her family; yet such deaths are rarely counted, which means stillbirths remain neglected in policy terms. Of the 2.6 million stillbirths annually, most result from preventable conditions such as maternal infections, non-communicable diseases, and obstetric complications.

Every Newborn:

Each year 135 million babies enter the world, yet their chances of surviving and thriving depend very much on where they happen to be born. Almost half (2.6 million) of all under-five deaths now occur in the first month of life, a disease burden that is more than 40 times that of child HIV. Beyond survival, neonatal conditions also have important implications for child development, as fetal health is key to improving long-term health throughout the life course, reducing stunting, and preventing non-communicable diseases.

B Targets in this Generation

Enable 120 million more women & girls to use contraceptives by 2020 (FP2020)

- SDG 3.7: By 2030, ensure universal access to sexual & reproductive health care services, including for family planning, information & education, & the integration of reproductive health into national strategies & programmes

- SDG 3.8: Universal health coverage to be achieved by 2030

- SDG 5: achieve gender equality, empower all women, and gender-based violence

B Targets in this Generation

Quality, Equity, Dignity

For every woman at birth, everywhere.

SDG 3.1: By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births

SDG 3.2 & Global Strategy: By 2030 all countries to reduce neonatal mortality & stillbirth rates to at least as low as 12 per 1,000 live births

SDG 3.8: Universal health coverage to be achieved by 2030
Causes of maternal death:

including through bio-data. better understand risks and outcomes, network (Pregnancy Care Integrating others on the MRC-funded PRECISE are working with King’s University and preterm birth, is pre-eclampsia. We deaths, as well as stillbirths and Another leading cause of maternal 31% if administered within 3 hours.

bleeding were reduced by 19% with acid. The randomised placebo
diverted geographical settings to test the effect of intravenous tranexamic acid. The randomised placebo-controlled trial found that deaths from bleeding were reduced by 19% with the use of tranexamic acid, and by 31% if administered within 3 hours. Another leading cause of maternal deaths, as well as stillbirths and preterm birth, is pre-eclampsia. We are working with King’s University and others on the MRC-funded PRECISE network (Pregnancy Care Integrating Translational Science Everywhere), to better understand risks and outcomes, including through bio-data.

Maternal obesity:

Using data on 81,000 women from 27 countries in sub-Saharan Africa, researchers at LSHTM found that maternal obesity increased the risk of early neonatal death, highlighting the need for women with obesity to deliver in health facilities that can provide emergency neonatal care.

Infections in pregnancy:

Group B Streptococcus (GBS) infection has been recognised for over 40 years as an important cause of neonatal deaths, especially in the USA. Research conducted by LSHTM found that 21.7 million women carry GBS during pregnancy and estimated that more than 100,000 stillbirths and neonatal deaths worldwide could be prevented by the development of a vaccine against GBS, and that GBS is an important and under-recognised cause of maternal sepsis, especially in the postnatal period. The MARCH Centre team is working with WHO and other agencies to develop a value proposition for GBS maternal vaccination.

Other research at LSHTM highlight the linkages between survive and thrive. For example, a randomised trial in the Gambia is studying the effect of early kangaroo mother care on survival amongst preterm and low birth weight babies. Each Baby Counts is a project with the Royal College of Obstetricians and Gynaecologists in the UK, seeking to understand to the causes of intrapartum-related deaths and disability. The ABAaNa study is following a cohort of infants affected by neonatal encephalopathy in Uganda, to examine both mortality and morbidity after brain injury around the time of birth. There are also many examples of child development studies that start from birth, as highlighted later in this report.

Morbidity and near-miss maternal complications: Innovative LSHTM-led research on severe obstetric complications has led to the development of international guidance for audits of near-miss complications as a starting point to understanding deficiencies in quality of care. Research in West Africa has also highlighted the devastating long-term health, psychological, economic, and social consequences for women experiencing near-miss complications.

Beyond newborn survival

MARCH led the first estimates of impairment after neonatal conditions, and these input into the Global Burden of Disease. Retinopathy of prematurity is an example of a very preventable disability leading to blindness that could be prevented with improved quality of care, and systematic follow-up of at risk newborns.

Quality of care in the UK:

We work with the Royal College of Obstetricians and Gynaecologists on the National Maternity and Perinatal Clinical Audit as a framework for continuous monitoring and quality improvement. A multi-centre quality improvement project, also in UK, is evaluating a bundle of interventions to reduce obstetric injury.

Maternal and newborn healthcare:

In India, the Maternal Healthcare Markets Evaluation (MET) team is studying various aspects of quality of maternal healthcare in the public and private sector, and in Uganda evaluating social franchising for maternal health. In Senegal MET is evaluating a private sector initiative to improve the supply chain for family planning products.

In Tanzania, researchers are studying the effects of a quality management approach linking communities and health facilities, and in Ethiopia with IDEAS (Informed Decisions for Actions in maternal and newborn Health), researchers are evaluating the quality of community-based newborn care within the context of a national initiative aimed at improving newborn survival.

Measurement improvement:

Under the Every Newborn measurement improvement plan funded by the Children’s Investment Fund Foundation, a multi-country study is observing 20,000 births in Tanzania, Bangladesh and Nepal to compare what actually happens with what is recorded in delivery registers, and with what women recall. This will enable validation of metrics that may be possible to use in routine systems for oxytocin administration, resuscitation, kangaroo mother care and other high-impact interventions. To advance measurement of care for small and sick newborns, we are working with WHO and partners to define content of care, assess what is already measured through health facility assessments and consider what could be collected in high and middle-income countries.

Mental health:

The PRIME consortium aims to integrate services for depression, alcohol use disorder and psychosis into primary care through districts mental health care plans in Ethiopia, India, Nepal, South Africa, and Uganda. This work benefits women in the perinatal period but also mental health of women and adolescents, by increasing access to care for mental illness and through this reducing stigma and disability.
Sexual and reproductive health:
LSHTM has a long tradition of conducting high-quality research on sexual and reproductive health. Researchers are exploring the effect of mobile phone interventions such as text message information and reminders on uptake and continuation of contraception. We are also conducting analyses of unmet need for family planning in relation to HIV status and analyses of unmet need for family contraception. We are also conducting reminders on uptake and continuation of mobile phone interventions such as text message information and reminders on uptake and continuation of contraception.

Population dynamics:
The PopDev programme has been exploring the impact of reproductive health and population dynamics on poverty and economic growth, especially in the least developed countries. In Burkina Faso, the research is focusing on household productivity, family planning, and reproductive health.

Violence against women:
LSHTM has one of the world’s leading research centres on violence against women andidence. In collaboration with other researchers, they have produced landmark research published in The Lancet Series on Violence Against Women and Girls and in the WHO’s Global and Regional Estimates of Violence Against Women. Ongoing projects include a qualitative investigation of integrating mHealth interventions into perinatal home visiting programmes to reduce intimate partner violence in the USA, and a cluster randomised trial of an intervention designed to reduce violence and increase consistent condom use amongst female sex workers in India.

Health systems:
With strong expertise in the analysis of health systems, researchers at LSHTM are studying maternal healthcare within the context of the broader health system. One project is seeking to learn from health systems strengthening in maternal and newborn health in China to inform accelerated progress for saving lives in Africa. In India, researchers are assessing the nature of competition for maternal health services within the vibrant health sector, and evaluating private sector approaches, such as social franchising, seeking to improve the quality of maternal healthcare.

Family planning, abortion and post abortion care:
We will expand our work on family planning, abortion and post-abortion care to research new family planning methods that are longer lasting and with fewer side effects, as well as to understand and optimize medical abortion methods and safety standards. We will also continue to research innovative delivery methods for family planning services that overcome socio-cultural and legal barriers such as services for unmarried women and adolescents.

Pre-conception and antenatal care:
We will continue to research models of preconception care that are cost-effective and feasible in low and middle-income countries. We will expand our research on innovation for non-communicable diseases and infections, including diagnostics and maternal immunisation. We will also expand work to test new approaches to antenatal care, including the WHO 8 visit package, and innovative service delivery models such as group antenatal care.

Research Gaps
1. Supply and Demand e.g. new family planning methods & Innovative service delivery to overcome socio-cultural & legal barriers esp for adolescents, unmarried women
2. Gender based violence Larger scale context specific interventions
3. Innovative measurement e.g. including improved programme metrics & supply/logistics, and behaviour change

What is our next generation of research?
1. Preconceptual care e.g. cost-effectiveness & feasibility in low & middle-income countries
2. Antenatal care e.g. innovation for non-communicable diseases & infection diagnostics & interventions
3. Birth & early postnatal care e.g. innovations in devices & systems
4. Systems research e.g. to transform routine programme measurement, including for high quality & respectful care, financing models

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Better quality of care around the time of birth:
We will continue to advance innovations (diagnostics and devices) to improve intrapartum and newborn care including comprehensive care for small and sick newborns. We will also expand work on innovative service delivery models, human resources and family-centred care as well as evaluating quality improvement programmes in health facilities.

Health system and programme measurement:
We will continue to research the financing and organisation of sexual and reproductive health, and maternal and newborn care services, with a focus on both public and private sector providers. We will also continue to focus on improved programme measurement, especially using routine facility-based data, including to track skilled attendance, coverage of high-impact interventions including care of small and sick newborns, referral and measurement of high quality and respectful care around the time of birth.
Despite significant progress in reducing childhood mortality, in 2016 5.6 million children still died before their fifth birthday. An African child is still 15 times more likely to die than a child from a high-income country, and by 2030 two thirds of all child deaths are predicted to be in Africa, highlighting great global inequalities.

The top causes of child deaths globally are newborn deaths, infections and injuries and chronic conditions, including congenital conditions. Many of these deaths would be prevented if every woman and child received evidence-based interventions, especially in early infancy. A quarter of children under five are stunted, accounting for over a fifth of child deaths and millions of lost developmental potential. Stunting reflects chronic undernutrition effects that can last a lifetime and include impaired brain development, lower IQ, weakened immune systems, and greater risk of non-communicable diseases like diabetes and cancer later in life. By ensuring a healthy start in life, we can help children reach their developmental potential and ensure a healthy entry into adulthood.

We address the major health concerns facing children and have an integrated approach to child health that focuses on the well-being of the whole child. The School excels at generating research evidence from bench to bedside – as well on systems and policies, which provides the right environment for positive changes to develop. It is vital that research helps children thrive as well as survive – achieving their full physical, cognitive and social potential.

**FIEBRE** study will determine the infectious cause of acute febrile illness in children in Mozambique, Malawi, Zimbabwe, Myanmar and Laos, and investigate new diagnostic tests to improve case management. PERFORM is a multicentre study in both Europe and the Gambia also aimed at developing new biomarkers to differentiate between bacterial and viral infections. LSHTM researchers are also involved in the development and evaluation of diagnostic test for syphilis and neglected tropical diseases and the electronic clinical decisions support tools based on integrated Management of Childhood Illness (IMCI).

LSHTM has led the development and evaluation of tools for preventing major childhood infections including vaccines, insecticide treated nets and drugs for prophylaxis. The School’s Distance Learning for Health Systems (CHAMPS) aims to provide accurate, timely and reliable data on the causes of death of stillbirths and children under five to improve health outcomes and quality of life. MARCH members also developed the first systematic estimates of the burden of Group B Streptococcus infection and are now working with WHO and others on a value proposition for new maternal vaccines against Group B Streptococcus.

**PERFORM** trial of mass drug administration of azithromycin to children in Malawi. **PROVE** trial of mass drug administration of azithromycin for prevention of infectious causes of prematurity and newborn deaths and stillbirths. Setting the key role of MARCH researchers in shaping the plan and targets, we are actively involved in a number of studies and leading work on improved metrics for routine use in countries. There is an urgent need to support the implementation and scale up of interventions, which we know are effective for the prevention of neonatal deaths.

LSHTM research in this area includes randomised controlled trials of early kangaroo mother care for hospitalised neonates weighing less than 2000g in the Gambia, the PregANZ trial of azithromycin during labour to reduce neonatal deaths in Burkina Faso and the Gambia and effectiveness evaluations of community interventions such as simplified antibiotics. In India, the National and State Health Missions of Jharkhand and the civil society organisation EKJut are collaborating with LSHTM to assess the effects of scaling up participation in upscaling actions, with over 36,000 women’s groups to improve maternal and newborn health across the state of Jharkhand.

**NEST 360:** Newborn Essential Solutions and Technologies (NEST) 360 addresses the gap for sustainable, life-saving, neonatal care technologies in Sub-Saharan Africa. NEST was one of four finalists in the MacArthur Foundation’s first 100&Change competition and involves: (1) Innovation with biomedical engineers in RICE University and across Africa to design and optimize a package of affordable technologies for comprehensive newborn care and empower biomedical innovators and clinicians as the next generation of leaders in systems change for neonatal care. (2) Development of a sustainable distribution system. (3) Measurement of health-systems processes in Malawi before, during and after implementation to understand the effectiveness in Southern Tanzania, whilst linking to a wider network of African countries.

**Challenges:**
- **SDG 3.2:** By 2030, end preventable newborn & children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births & under-5 mortality to at least as low as 25 per 1,000 live births
- **SDG 3.3:** By 2030, end preventable deaths of newborns & children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births & under-5 mortality to at least as low as 25 per 1,000 live births
- **SDG 4.1:** By 2030, ensure all girls and boys complete primary schooling
- **SDG 4.2:** By 2030, ensure allGirls and boys complete secondary schooling
- **SDG 4.3:** By 2030, ensure all girls and boys achieve a minimum standard of education
- **SDG 4.4:** By 2030, substantially increase access to pre-primary education
- **SDG 4.5:** By 2030, achieve gender parity in primary and secondary education
- **SDG 4.6:** By 2030, by 2030, substantially reduce gender disparity in terms of access to and completion of secondary and vocational training
- **SDG 4.7:** By 2030, ensure fair and inclusive participation in economic and political life at all levels
- **SDG 4.8:** By 2030, promote the least developed countries’ sustainable development efforts
- **SDG 4.9:** By 2030, build effective, accountable and inclusive institutions at all levels
SURVIVE

Nutrition: Undernutrition contributes to around a third of all under 5 child deaths worldwide. 190 million children under five are stunted (chronically malnourished) and 17 million have severe acute malnutrition (SAM), accounting for around 500,000 deaths per year. Many LSHTM researchers consider nutrition-related exposures and outcomes, and there is a dedicated Nutrition Group focusing on nutrition and food-related problems that affect human development and well-being at national and global levels. Current child-focused work includes developing and evaluating approaches to improving the treatment of acute malnutrition, particularly among infants under six months, and researching the consequences of early life acute malnutrition for chronic diseases in later life.

HIV exposed uninfected children: Successful scale-up of prevention of Mother-to-Child Transmission of HIV has resulted in substantial reductions in the number of infants infected with HIV. As a result, over one million babies born every year have had in-utero exposure to HIV and antiretroviral medicines. Several LSHTM researchers are focusing on the health and development of these HIV-exposed uninfected (HEU) infants: studies in South Africa and Zambia are exploring the neurodevelopment of HEU children, including novel neuroimaging, and are investigating the long-term outcomes of maternal HIV exposure. HIV-exposed and infected children still need support: the CHIDO trial in Zimbabwe is exploring early childhood development, parenting, economic resilience, retention in HIV care and care outcomes among HIV-exposed and infected infants aged 0-2 years.

Early childhood development: The SPRING trial is testing the effects of locally adapted ‘Care for Development’ stimulation and care module for community health workers on children’s development in Pakistan and India. The EN-SMILING study is following up a cohort of newborn infants exposed to resuscitation, kangaroo mother care (KMC) or treatment for bacterial infections in Tanzania, Bangladesh and Nepal, to understand how these interventions affected their developmental outcomes.

MARCH researchers led the evaluation of the Saving Brains, Grand Challenges Canada child development intervention portfolio with an investment of 43 million dollars (CAD) in 108 grants to innovating teams based in 23 low and middle-income settings, with the aim of developing sustainable and scalable ways to promote and nurture healthy brain development in the first 1,000 days of life. This has led to many insights, and a series of papers on how to increase the scalability of future early childhood development interventions, especially for contacts to improve nurturing care.

Disability: We work closely with the LSHTM International Centre for Evidence in Disability on a variety of projects, as summarised on page 36 of this report.

Reproductive development: Leading the first “Evolutionary Demography Group” in the UK, LSHTM academics are investigating the impact of family & early stress on reproductive development in both girls and boys and also exploring the impact of extended family members on child health and mortality.

TRANSFORM

Data to drive health system transformation: The Every Newborn Measurement Improvement Roadmap was led by LSHTM with WHO. As part of this we coordinate two large multi-country studies: EN BIRTH a facility-based observational study of 20,000 births in Bangladesh (with icddr,b), Tanzania (with Ifakara Institute) and Nepal (with UNICEF) to validate indicators of coverage and quality of care; EN-INDEPTh population based research to randomly compare household survey modules to assess capture of pregnancy outcomes especially stillbirths. This is in partnership with the INDEPTH network sites in Uganda, Bangladesh, Ethiopia, Ghana and Guinea-Bissau. LSHTM researchers have both led and contributed to numerous publications and reports describing global neonatal epidemiology. This includes work on neonatal cause of death, low birth weight, congenital abnormalities (e.g. neural tube defects) and infections (e.g. Group B Streptococcal disease).

Reducing child sexual exploitation and abuse: The LINEA project (Learning Initiative on Norms, Exploitation and Abuse) is a multi-pronged project that explores how social norm theory can be used to reduce child sexual exploitation and abuse.

Hospital care of small and sick newborns and ill children: Our focus will continue to be on researching innovative diagnostics and devices for the hospital care of ill children and neonates. We will expand our work on preventing and addressing the growing problem of antibiotic resistance by researching new antimicrobials and antimicrobial medication and focusing on innovative approaches to human resources and service delivery.

Innovative programme and research methods: We will continue to research innovative programme and research methods. Specific areas of development include quality of care in health facilities with a focus on development and validation of new technologies such as diagnostic tests and mobile health technologies, as well as implementation research aimed at evaluating packages of care especially in the first 1000 days of life and information and intervention gaps for children aged 5-10.
Mapping burden compared to research

Figure 1: Variation of burden of disease by country in terms of combined DALYs per capita for maternal conditions, newborns, children and adolescents (10–20 yrs) with inset map showing stillbirth rates by region

Highest rates of DALYs:
1. Mali
2. Central African Republic
3. Lesotho
4. Pakistan
5. Guinea-Bissau

Highest rates of stillbirth:
1. South Sudan
2. Central African Republic
3. Nigeria
4. Chad
5. Mali
6. Guinea-Bissau
7. Zimbabwe
8. Somalia
9. Haiti
10. Djibouti

Note: Disability-adjusted life years (DALYs) based on IHME for GBD 2015 (Institute of Health Metrics and Evaluation), and regional stillbirth rates based on Lancet Stillbirth series 2016.
Top ten countries with the most research studies currently linked to the MARCH Centre

1. Tanzania
2. Malawi
3. India
4. UK
5. Uganda
6. Zimbabwe
7. Burkina Faso
8. South Africa
9. Ethiopia
10. Bangladesh

At least 10 research studies are global in scope:
- The Vaccine Confidence Project
- HPV Vaccine 1-dose Consortium
- Supporting Rotavirus Vaccine Optimisation
- Every Newborn Action Plan Measurement Improvement Roadmap
- Group B Streptococcus Burden for Pregnant Women, Stillbirths and Children and Maternal Immunisation Value Proposition
- Stillbirth Estimates for 195 Countries
- Low Birth Weight Estimates for 195 Countries
- Early Child Development: Implementation Realities
- Secondary Data Analysis for Generating new Evidence (SAGE) project of the Maternal Healthcare Markets Evaluation Team (MET)
- Minimum Initial Service Package (MISP) for Sexual and Reproductive Health Interventions in Humanitarian Crises Settings

Note: Data from online survey for LSHTM staff during 2018, not including studies that are global.

At least 10 research studies are global in scope and not mapped

Figure 2: Variation of number of studies by country in the London School of Hygiene & Tropical Medicine that are relevant to the MARCH centre (total N = 145)
Figure 3: Research studies currently linked to the MARCH centre according to A B and C Themes

Adolescents

Number of Studies

No studies reported

> 10

5 – 10

< 5

16

B

13

51

14

8

10

33

Births

Number of Studies

No studies reported

> 10

5 – 10

< 5

Children

Number of Studies

No studies reported

> 10

5 – 10

< 5
MARCH multi-country, multidisciplinary research

**DREAMS Impact Evaluation**
Bill & Melinda Gates Foundation (2011-2013)
3 countries involved

LSHTM leads a portfolio of studies to evaluate the impact of DREAMS - a PEPFAR-led partnership to reduce HIV incidence among young women. In DREAMS districts in Kenya, South Africa and Zimbabwe, we measure impact and determinants of HIV risk and seek lessons for replication of this complex, multi-sectoral program.

**STEP-UP**
DFID, Population Council (2011-2013)
5 countries involved

The STEP-UP research programme consortium is generating policy-relevant research to promote an evidence-based approach for improving access to family planning and safe abortion in Bangladesh, Ghana, Kenya, India and Senegal.

**WOMAN Trial**
21 countries involved

The WOMAN trial tested whether tranexamic acid can become an essential tool for fighting post-partum bleeding. 20,060 patients across 21 countries took part in the trial.

**EVERY NEWBORN ACTION PLAN**

**MAMI (Management of Acute Malnutrition in Infants)**
ENAP led research on the Management of At-Risk Mothers & Infants aged under 6months (MAMI) across different health-care systems in Europe, linking sophisticated new genomic and proteomic approaches to clinical phenotyping.

**IDEAS (Informed Decisions for Action in maternal and newborn health)**
Bill & Melinda Gates Foundation (2010-2016, then 2017-2020)
3 countries involved

IDEAS aims to improve the health and survival of mothers and babies through generating evidence to inform policy and practice in Ethiopia, Nigeria and India.

**Vaccine Confidence Project**
EU, Medical Research Council, GlaxoSmithKline, European Centre for Disease Prevention and Control, National Institute for Health Research

The purpose of the project is to monitor public confidence in vaccines by building an information surveillance system for early detection of public concerns around vaccines, conducting population surveys and in-depth qualitative research; applying a diagnostic tool to determine the drivers of vaccine reluctance and refusal; and, to provide analysis and guidance for early response and engagement with the public to ensure sustained confidence in vaccines and immunisation. The Vaccine Confidence project has also developed a Vaccine Confidence Index (VCI) as a tool for mapping confidence globally.

Integrating with conditions that affect health throughout the lifecycle

Historically, LSHTM led lifecycle research has focused on parasites and the agents of infections, but there is a growing evidence base for human lifecycle, or life course, epidemiology defined as:

“The study of long-term biological, behavioural, and psychosocial processes that link adult health and disease risk to physical or social exposures acting during gestation, childhood, adolescence, and earlier or adult life or across generations.” (Kuh and Ben-Shlomo, 2004)

MARCH is centred on this human lifecycle, with a focus on the lifecycle stages that are most vulnerable to health risks yet are also crucial points where interventions may have lifelong effects on health and social capital. These stages include:

- Birth and pregnancy
- Childhood (particularly the first 1000 days)
- Adolescence

One important aspect of lifecycle research is the recognition of co-morbidities, and co-exposures, as well as the measurement of all relevant outcomes - for example mother and baby. There are many opportunities for prevention, and innovations in diagnostics, immunisations and devices as well as health systems, with multiple returns on investment.

Adolescents and young people - Lifecycle conditions

- Infections: such as HIV, STIs
- Nutrition: including the onset of obesity
- Chronic disease: may have risk factors that start in the adolescent period
- Mental health conditions: such as depression and schizophrenia are most commonly present during this period of the lifecycle
- Sexual and reproductive health: the risks associated with sexual activity

Co-morbidity and interactions between these exposures are common: e.g. chronic conditions and mental health

Children - Lifecycle conditions

- Infections: which may be transmitted from mother to baby e.g. HIV or new infections such as pneumonia, diarrhoea and malaria, which remain major causes of deaths and can be prevented by immunisation
- Nutrition: both stunting and the onset of obesity. At least one third of stunting starts in-utero.
- Chronic diseases: these are an increasing issue, including congenital conditions
- Childhood development and disability: often poorly measured, yet crucial for human capital.

Co-exposures: these conditions often occur together especially for the poorest children, and vicious cycles are common: e.g. acute infections lead to and exacerbate under-nutrition which in turn increases the risk of more infections

Births and pregnancy - Lifecycle conditions

Infections: may affect women and are a leading cause of stillbirths, fetal growth restriction and preterm birth. Key infections in pregnancy include malaria, Group B Streptococcus, HIV, and sexually transmitted infections (e.g. syphilis) which may be transmitted from mother to baby.

Fetal growth restriction (FGR): Each year at least 10.6 million babies are born with a low birth weight and with FGR. Additionally, around 15 million babies are born preterm each year. Babies who are both preterm and with FGR are at the highest risk of death and long-term ill-health. Increasing evidence on the Developmental Origin of Health and Diseases (DOHaD) (see below) underlines the need for more research on optimising fetal health.

Chronic diseases: such as hypertension and diabetes are now a major cause of maternal mortality, but also cause stillbirths, FGR and preterm birth.

Brain injury and disability: Newborn brain injury, for preterm babies or hypoxic insults, is a major cause of severe long-term disability yet is largely preventable.

Co-exposures are common and the greatest risks are for a baby with multiple exposures, such as already with growth restriction, then exposed to infection, and then hypoxic insults at birth. This highlights a need to focus on multiple exposures to avoid misleading results. Research on one organism or one nutrient at a time and one exposure at a time may lead to misleading results.

Infants

- Infections: Malaria, syphilis, HIV Group B Strep, Zika
- Nutrition: Under-nutrition and overweight (obesity) Micronutrient deficiencies
- Chronic Conditions: Diabetes, hypertension Pre-eclampsia
- Hypoxic stress around birth

DOHAD

- Maternal deaths 0.3 million
- Stillbirths 2.6 million
- Neonatal deaths 2.6 million
- Stunting (esp after FGR) 15 million
- Low birthweight 15 million
- Long term risk of non-communicable disease (DOHAD) 0.3 million

Developmental Origin of Health and Diseases (DOHaD) has grown out of increasing quantities of data regarding fetal exposures (marked by poor fetal growth and low birth weight) that lead to long-term ill health consequences, including non-communicable diseases such as hypertension and diabetes. LSHTM and MARCH Centre researchers have been involved in this research in many domains for decades and see new opportunities to link work between MARCH and other centres and units at the School for greater research impact.

Intergenerational impact

Epigenetics through the lifecycle:

Innovative studies have shown that peri-conceptual maternal and paternal exposures may have life-long impact on health. For example, research led by MRC Unit The Gambia & MRC International Nutrition Group (ING) suggests that maternal diet at the time of conception leaves detectable changes on a child’s DNA throughout life.
Infections through the lifecycle

LSHTM researchers have led decades of research on the effect of infections on health through the lifecycle, and the School’s Centres on Malaria, Vaccines, Tuberculosis and Diagnostics all work closely with MARCH in several areas.

Infections during pregnancy and labour can have a devastating impact on the fetus and newborn. For example, malaria, syphilis and STIs are important, preventable causes of stillbirths, fetal growth restriction and preterm birth. LSHTM researchers have played leading roles in innovations for the prevention of malaria and re-invigorated the need for the follow-up care of affected children and their transition into adolescence to preterm births. Future research and innovation have been pivotal in the development of a third complementary approach – seasonal malaria chemoprevention. The last decade has witnessed increased investment in malaria research and enormous progress in reducing child deaths in many countries using these approaches, yet much remains to be done. Progress is fragile and increasingly threatened by the emergence and spread of Artemisinin resistance in malaria parasites, as well as insecticide-resistance in the mosquitoes that transmit malaria. LSHTM researchers continue to play a major role in the development and testing of new insecticides, antimalarial drugs and vaccines to counter this threat, and the development and evaluation of approaches to eliminating malaria.

Research at LSHTM has also led the way in building evidence on the impact of malaria amongst primary school children and young adolescents, especially in Senegal. Whilst continued research is needed to protect the gains made in child survival, it is also time to address the impact of malaria infection on child development to ensure that all children can thrive and reach their full potential.

Malaria disproportionately affects women and children and is still an important cause of under-five mortality in malaria-endemic countries, accounting for around 300,000 deaths annually of children under five years. Malaria infection in pregnancy can contribute to malaria anaemia in the mother, increasing the risk of maternal mortality and of fetal growth restriction, a leading cause of stillbirths and preterm births.

A key intervention for addressing malaria in pregnancy is intermittent preventive treatment in pregnancy (IPTp) but IPTp is limited by widespread resistance to sulphadoxine-pyrimethamine, and the development of new drugs suitable for use in pregnant women is urgently needed. LSHTM researchers continue to play a major role in the development and evaluation of approaches to eliminating malaria.

Malaria control in children rests on two key platforms: (1) prevention of infection through use of insecticide-treated bednets; and (2) effective care through prompt access to Artemisinin-combination therapy. Trials led by LSHTM have been pivotal in the development of a third complementary approach – seasonal malaria chemoprevention. The last decade has witnessed increased investment in malaria control and enormous progress in reducing child deaths in many countries using these approaches, yet much remains to be done. Progress is fragile and increasingly threatened by the emergence and spread of Artemisinin drug-resistance in malaria parasites, as well as insecticide-resistance in the mosquitoes that transmit malaria. LSHTM researchers continue to play a major role in the development and testing of new insecticides, antimalarial drugs and vaccines to counter this threat, and the development and evaluation of approaches to eliminating malaria.

Infections through the lifecycle

Malaria

Vaccines

The School’s Vaccine Centre covers research from basic sciences through to implementation. School researchers have led on the development and evaluation of key vaccines against major causes of death and disability throughout the lifecycle. Examples include large clinical trials on childhood vaccines against major childhood killers such as pneumococcal, meningococcal disease and malaria - notably in The Gambia and in Kenya. Multi-country research on HPV vaccines in adolescence to prevent cervical cancers is ongoing.

MARCH researchers published the first comprehensive burden estimates of Group B Streptococcus (GBS) infection as a cause of maternal cases, as well as stillbirths and neonatal/early infant deaths and disability. Current research includes work on prevention, including value proposition for maternal GBS immunisation, and on maternal immunisations more broadly.

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Antibiotic resistance

Antimicrobials, including antibiotics, have played a major role in the reduction in mortality and morbidity from severe bacterial infections, however rising levels of antimicrobial resistance (AMR) now pose a major threat to global health. LSHTM has a dynamic Antimicrobial Resistance Centre which is leading work from bench to bedside on many aspects of AMR, and MARCH Centre members are working with the AMR centre and other partners on studies in the UK and around the world. St George’s Medical School is a key partner leading on the NeoAMR multi-site study to repurpose older antibiotics and test new options.

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Research at LSHTM has also led the way in building evidence on the impact of malaria amongst primary school children and young adolescents, especially in Senegal. Whilst continued research is needed to protect the gains made in child survival, it is also time to address the impact of malaria infection on child development to ensure that all children can thrive and reach their full potential.

“Lack of an integrated approach to HIV treatment has resulted in gaps in the care of affected children.”
Nutrition is a major determinant of health throughout the lifecycle and is key to enabling both individuals and communities to not only survive but, importantly, to thrive. Malnutrition in all its forms contributes to 45% of all under 5 child deaths worldwide. Some have particularly high case fatality: severe wasting for instance affects around 17 million children globally and causes over 500,000 deaths per year. MARCH Centre researchers are working on nutrition-related projects throughout the lifecycle.

**Births**

The MRC International Nutrition Group at LSHTM have been working in the Gambia for over 70 years. Their research showed that the season at conception, which affects available foods and maternal diet during pregnancy, leads to epigenetic changes which can have profound and long-lasting effects on child health. The group also works on several key aspects of child malnutrition including early growth and development, iron, infection and anaemia.

LSHTM research on the Management of At-Risk Mothers & Infants aged under 6 months (MAM) is developing early-life interventions to better support breastfeeding and address other risk-factors for mortality and morbidity in nutritionally vulnerable infants, their carers and their families.

**Children**

LSHTM staff contribute technical expertise into international initiatives like ‘No Wasted Lives’, which aims to build knowledge about the prevention and treatment of acute malnutrition. LSHTM has also previously played a key role in the International Malnutrition Task Force and LSHTM PhD students lead innovative projects like the ComPAS study, which explores a novel approach combining and simplifying the treatment of severe and moderate malnutrition.

**Adolescents and young people**

Whilst nutrition interventions have the biggest impact in early life, there is increasing realization of a second window of opportunity to improve health and development during the adolescent growth spurt. This has both short and long-term benefits, including that girls grow up to be optimally nourished women before they become pregnant, enhancing the life chances and health of both the mother and her infant. Several LSHTM led research projects are following up long-term outcomes in later childhood and adolescence of adverse in utero exposures, eg. maternal undernutrition resulting in low birth weight in India.

**Chronic conditions through the lifecycle**

Chronic conditions, including non-communicable diseases (NCDs), are a leading cause of global mortality with over 80% of chronic disease deaths occurring in low and middle-income countries. Co-morbidity is common, especially with mental health conditions and some long-term infections such as HIV/AIDS and tuberculosis are now also classified as chronic conditions. These conditions are a major driver of health care costs and universal health care is key to protecting the world’s poorest families.

The Centre for Global Chronic Conditions at LSHTM is working with MARCH Centre researchers through the lifecycle to develop a comprehensive approach to understanding the epidemiology and evolution of chronic conditions in women, children and young people, and informing responses to them.

**Births**

Increasingly chronic conditions such as diabetes, hypertension, and heart disease contribute to maternal morbidity and mortality and are important risk factors for stillbirths and premature births. NCDs for women in pregnancy are a driver of low birth weight, and through fetal programming affect long-term ill health and can lead to NCDs in later life. The PRECISE (Pregnancy Care Integrating Translational Science Everywhere) network is examining hypertensive disease of pregnancy through bio data in three large pregnancy cohorts. Women of reproductive age are also vulnerable to breast, endometrial, cervical and ovarian cancers.

**Children**

Chronic conditions such as congenital conditions, asthma, diabetes, and cancers are now major causes of mortality and morbidity worldwide, and in middle-income countries are the second leading category of DALYs in children after neonatal conditions. The World Asthma Phenotypes Study (WASP) aims to better understand and characterise different sub-types (phenotypes) of asthma and to identify new causes and new treatments. Five centres are involved in the study in the UK, New Zealand, Brazil, Ecuador and Uganda.

**Adolescents and young people**

Up to a third of young people suffer from chronic conditions, notably mental disorders. These can have long-term physical, psychological, educational and social impacts, and accessing and adhering to treatment can often be more challenging for young people. In addition, leading risk-factors for NCDs in terms of tobacco and alcohol use, lack of exercise, and poor nutrition are typically initiated during adolescence, setting the stage for later ill health. The younger an individual starts smoking and drinking, the greater the risk of addiction and chronic disease later in life.

**LSHTM research showed that the season at conception leads to epigenetic changes which can have profound and long lasting effects on child health.**
Disability and child development through the lifecycle

More than a billion people, about 15% of the world’s population, live with some form of disability, and 80% live in poverty. Disability is explicit in seven Sustainable Development Goals (SDGs) targets and is further supported by the SDG emphasis that ‘no one should be left behind.’ Throughout the life course there are key moments of risk for disability, notably birth and early childhood. Girls and women with disabilities worldwide face human rights abuses in sexual and reproductive healthcare settings due to both their gender and disability.

To advance policy and programme relevant research, at LSHTM we follow a two-track approach where disability-inclusive initiatives are mainstreamed in MARCH research and we work alongside disability-specific initiatives led by the International Centre for Evidence in Disability (ICED). Together we aim to support women, children, and adolescents with disabilities to thrive and transform their lives. Some relevant examples include:

Zika:
MARCH researchers have been engaged in diverse complementary activities related to care of children and families affected by congenital Zika virus syndrome (CZVS). MARCH researchers worked with WHO coordinating the ‘WHO toolkit for the care and support of people affected by complications associated with Zika virus’, being piloted in Honduras.

Early intervention for cerebral palsy and autism:
Building on previous work at the ICED and a modular ‘Getting to Know Cerebral Palsy’ parent intervention for children with cerebral palsy in Uganda and Ghana, we are now adapting this intervention to improve community care of children with CZVS in Rio De Janeiro and Salvador, Brazil, with funding from the Wellcome Trust and DFID. A linked mixed method study is focusing on the social and economic impact of CZVS on families and at societal level in Brazil.

Caregivers of children with developmental challenges like autism need support. MARCH Centre members and leading Ethiopian researchers are adapting WHO’s Parent Skills Training for caregivers of children with developmental disorders in Ethiopia.

Eye health:
Eye health is essential to children’s development and the prevention, diagnosis and treatment of visual impairments andblindness. As one in five children under 5 live in low and middle-income countries, eye health is crucial to enabling young people to thrive.

A linked early intervention programme for young children with developmental disabilities and their caregivers. This community-based participatory training supports care such as positioning, feeding, communication, learning to move, play and participating in daily activities, increasing empowerment and inclusion. A randomised controlled trial is currently underway.

Child and adolescent psycho-social outcomes:
Among adolescents aged 13-14 we recently completed a school-randomised trial ‘Strengthening Evidence based on school-based interventions for promoting adolescent health’ (SEHER) in Bihar, India, which found that a whole-school intervention led by a trained lay health worker improved school culture and psycho-social outcomes among adolescents.

Together with colleagues at University College London and the Liverpool School of Tropical Medicine, we are evaluating a comprehensive community-based multicomponent intervention on early childhood development, household economic resilience and adherence and retention in paediatric HIV care and treatment programs in Zimbabwe (Child health intervention for development outcomes- CHIDO).

Perinatal depression:
The SHARE trial is evaluating a lay-health worker delivered intervention to treat perinatal depression among mothers in Pakistan and India, using a psychological therapy based on cognitive-behavioural techniques. The primary outcome is prevalence and severity of maternal depressive symptoms at 6 months post-childbirth.

Syrian refugee mental health:
STRENGTHS (Syrian Refugees Mental Health Care Systems) aims to scale-up community-based mental health interventions in varying country contexts, whilst evaluating impact and cost-effectiveness.

We aim to support women, children, and adolescents with disabilities to thrive and transform their lives.

Mental Health through the lifecycle

Globally, mental health disorders are a leading cause of disability throughout the life course, and 80% of people with mental, neurological and substance use disorders (MNS) live in low and middle-income countries. Enabling good mental health in mothers is crucial both for the mother and her infant and can help avoid emotional and behavioural problems in childhood and adolescence. Over half of mental health problems start in adolescence, and prevention, diagnosis and treatment of mental health in adolescents is crucial to enabling young people to thrive.

Staff at LSHTM’s Centre for Global Mental Health work closely with MARCH and are involved in several mental health interventions throughout the life course. Some examples of mental health research across the MARCH A, B & C themes include:
Violence through the lifecycle

Gender-based violence occurs throughout the life course, often starting before birth, with sex selective abortions, cases of female infanticide, child abuse, maltreatment and female genital cutting during childhood. In adolescence and adulthood, as well as intimate partner violence and non-partner sexual violence, other forms of gender-based violence occur, such as forced marriage, trafficking for sexual exploitation, dowry and honour killings, sexual harassment and psychological abuse.

The MAISHA longitudinal study, is collecting information in infection (WHO, 2013). 

Children
The Gender Violence & Health Centre has a number of studies developing interventions that address violence among children, adolescents and women. LINEA, a social learning initiative on social norms around sexual exploitation among children, is currently pre-testing a pilot on reducing transactional sex in Tanzania.

The Study on Trafficking, Exploitation and Abuse in the Mekong Sub-region (STEAM) on children trafficked for sexual and labour exploitation in the Mekong region, conducted by GVHC researchers showed the high levels of physical and/or sexual violence experienced during exploitation and its adverse impact on children’s mental health. GVHC has also participated in the KNOW Violence pioneering work on integrating knowledge on violence against women and children, working towards an integration of interventions addressing violence against women and children.

Adolescents and young people:
GVHC academics are leading the Context of Violence in Adolescents (CoVAC) study examining how experience of violence in adolescence can lead to increased risk of intimate partner violence, poor mental health, and other poor health outcomes in early adulthood through four points of data collection.

The interdisciplinary LSHTM research group ‘Gender Violence & Health Centre (GVHC)’ works closely with MARCH and has world-leading expertise in violence across the lifecycle, including against women, children and adolescents, labour exploitation, and human trafficking. Future research will explore these areas:

- Deeper, to understand pathways and structural drivers
- Wider, to test interventions, especially those possible at scale
- Beyond silos, to join up with other sectors including legal and educational systems

Children

Births
It is estimated that one in three women have experienced physical and/or sexual intimate partner violence or non-partner sexual violence. Intimate partner violence (IPV) is associated with numerous adverse health outcomes, with women experiencing IPV being twice as likely to report depressive symptoms, nearly twice as likely to abuse alcohol, 16% more likely to have a low birthweight baby, and 1.5 times more likely to acquire HIV or another sexually transmitted infection (WHO, 2013).

The MAISHA longitudinal study, is collecting information on women aged 20 to 70, examining the interplay of risk and protective factors for intimate partner violence over time, especially mental health, alcohol abuse, and economic empowerment, and with a specific focus on childhood experiences.

Adolescents and young people:

There is a strong relationship between education and health. More educated individuals experience better health and students in schools with higher aggregate levels of student engagement report less harmful behaviours, including less smoking, alcohol use, drug use and violence. Healthy students attend school more regularly and do better educationally. Despite these synergies, health care and health promotion are often marginalised within education systems, reflecting a concern that these take resources away from schools’ primary mission to improve overall attainment.

What are the big research questions?
A key question is what schools can do to improve health and challenge health inequalities in the most efficient way possible? To answer this we need to know which interventions work for which outcomes for particular populations and settings. This includes building an evidence-base for interventions that goes beyond health education to modify the whole school environment to improve health. We also need to examine how health education can be better integrated with academic education so that it becomes a core part of the school curriculum.

There are many methodological challenges in this work, including the difficulty of teasing out the effects of single interventions from all the other influences on children’s lives, and identifying long-term impacts with potential life-long benefits. Integrating health interventions into the educational environment also require novel approaches to organizational and institutional behaviours, in addition to changing behaviours among adolescent populations.

What is currently being done at LSHTM to tackle these big questions?
The School is engaged in research in low, middle and high-income countries to answer the above questions. Studies include school-based trials of whole school mental health interventions in India; menstrual hygiene interventions in Uganda and The Gambia; hand hygiene and sanitation interventions in the Philippines and Tanzania; and addressing bullying, dating violence and teenage pregnancy in the UK.

A systematic review is underway to assess the evidence base for integrating health education into academic teaching, and LSHTM is a lead partner contributing to The Lancet commission on adolescent health and wellbeing, within which inter-sectoral research on education and health is a major element. We recently conducted an evaluation of the Healthy Schools London programme, and this evaluation will now be extended into the new Healthy Young London programme that includes early years settings.
Safe water, sanitary disposal of human waste, and personal hygiene is fundamental to human health and wellbeing. WASH is important throughout the lifecycle and an estimated 10% of the global burden of disease could be prevented with improvements in WASH. Infections contracted around birth contribute to at least 9% of maternal deaths globally, and many neonatal deaths annually, yet hygiene practices and conditions in birth facilities frequently remain poor.

For children, over half of diarrhoeal disease - the fourth leading cause of death in children under five years - is caused by inadequate WASH. Such infections can contribute to stunting, with effects lasting into adolescence and adult life. Through adolescence, girls are particularly at risk, as inadequate WASH access hampers effective menstrual hygiene management (MHM), with several associated health and social outcomes.

The Environmental Health Group (EHG) at LSHTM is working with MARCH Centre members on many research angles around the world and through the lifecycle. Some examples include:

**Births**

Whilst the hygiene conditions surrounding births are often poor, how to change this situation remains far from evident. EHG is working with the Soapbox Collaborative, an evidence-based trust aiming to prevent maternal and newborn infections. We have conducted formative research on transmission routes – namely, healthcare workers' hands, delivery equipment, and hard surfaces. Behavioural trials are underway in Zanzibar to improve hand hygiene, building on our earlier study in The Gambia. Needs assessments in Zanzibar and Malawi have led to a participatory training intervention for facility cleaners, which we will evaluate through a randomised controlled trial.

**Children**

EHG has led many studies examining the relationship between WASH and child gastro-enteric infection. The Sanitation trial in Maputo, Mozambique (MapSan) is a controlled, before-and-after study to estimate the health impacts of an urban sanitation intervention in informal neighbourhoods of Maputo, Mozambique, including an assessment of whether exposures and health outcomes vary by localized population density. A nested sub-study will assess whether the intervention can improve performance of the oral retrovirus vaccine by reducing environmental exposure to enteric pathogens.

EHG's novel approach to behaviour change called Behaviour Centred Design has been used to change hygiene behaviour in homes in India and elsewhere, and is being employed to design and test novel WASH interventions, as well as to support sanitation uptake in national campaigns in India and Tanzania.

**Adolescents and young people**

EHG members are investigating the relationship between WASH and MHM. A case-control study in India showed that poor menstrual hygiene practices could be associated with urogenital infections. Two further studies conducted with school girls in The Gambia and Uganda have shown that challenges related to MHM at home or at school may be associated with negative health outcomes and school absenteeism. Intervening in adolescence, girls’ health and school retention could improve well-being, future maternal and neonatal outcomes and economic potential.

**Strengths to build on for future research?**

EHG’s WASH research at LSHTM for birth, childhood and adolescence is multidisciplinary, covering microbiology, engineering science, epidemiology, social research and behavioural science. A particular strength is EHG’s work to advance intervention science that is grounded in:

- Evolutionary biology of behaviour and theories of change
- Multidisciplinary formative and evaluative research
- Design thinking, including marketing, product development and professional creativity.

Our research will continue to explore WASH risk factors associated with girls, women and children and we are working towards measuring new health outcomes across the lifecycle using novel measures, such as psychosocial stress. We also have a number of large trials, including a trial based in Ulwa, Democratic Republic of Congo, on the effect of water supply on cholera.
Climate change & agri-health

Agriculture plays a critical role in health, especially in low and middle-income countries, through the production of food and the generation of livelihoods and national incomes. Climate change has drastic effects on agricultural production, and climate events such as drought can contribute to indirect health effects such as undernutrition, mental stress and increased or altered communicable disease rates and patterns. The direct effects of climate change on health include increased mortality and morbidity rates during extreme weather events such as storms, floods and heatwaves. Children are the most vulnerable to climate change effects and are more likely to experience health problems (UNICEF). LSHTM research on agri-health and climate change across the lifecycle includes:

- **Child nutrition:** The LANSA-Pakistan (Leveraging Agriculture for Nutrition in South Asia) study examines trade-offs between work by women in agriculture and child growth in Pakistan. Mother-infant pairs have been recruited when infants were 2 to 12 weeks old and followed-up for a year, with data collected on livelihoods, nutrition and health. The results identify significant trade-offs between household income and child growth in rural farming communities.

- **Food security:** The SAHDI (Sustainable and Healthy Diets in India) study examines the health effects and environmental footprints of diets in India and the impact of future environmental changes on food security in terms of healthy and sustainable diets. Innovative analyses are uncovering tensions between health and the environmental impacts that will affect nutrition security for all.

Humanitarian crises due to armed conflict, natural disasters, disease outbreaks and other hazards are a major and growing contributor to ill health worldwide. 65.3 million people were displaced from their homes by conflict and persecution in 2015 and refugees now spend an average of 20 years away from home (UNFPA 2015).

Of the more than 100 million people in need of humanitarian assistance in 2015, one quarter were women and adolescent girls of reproductive age. Humanitarian crises have particularly debilitating effects on women and girls throughout their life course as essential public services such as healthcare, education and policing can break down, and women and girls have less of almost everything, including income and access to social services.

The LSHTM Health in Humanitarian Crises Centre (HHCC) brings together researchers across the School to focus on improving the health of populations affected by humanitarian crises through quality research, teaching, consultancy, training and dissemination of objective, evidence-based information. This includes research on the health of mothers, newborns, children and adolescents during crises.

- **Births:** 60% of all maternal deaths worldwide, take place in humanitarian and fragile contexts (UNHCR 2015). To improve maternal and newborn survival, LSHTM’s Health in Humanitarian Crises Centre, in partnership with MARCH and the Global MDSR Action Network runs a regular online seminar series devoted to discussing innovations in maternal and perinatal health among populations affected by humanitarian crises. Maternal deaths due to unintended pregnancies is a particularly under-researched area of humanitarian response.

HHCC research shows that there are many barriers to contraception usage or abortion during and after war. Studies of reproductive health policies and programmes in crisis-affected settings such as South Sudan, Georgia and Sierra Leone are a priority, as are projects that review the evidence base for key sexual and reproductive health interventions in crises, such as the Minimum Initial Service Package.

- **Children:** The highest global neonatal mortality rates (NMRs) are in settings affected by conflict, many of which have NMRs of over 40 per 1000 live births, and have the least reliable data. The Inter-agency Newborn Health in Humanitarian Settings field guide, written by HHCC and MARCH Centre members provides guidance on key interventions, measurement tools and medical commodities needed for newborn care services in a humanitarian setting, complementing the existing manual for care across the continuum of reproductive, maternal, newborn, child and adolescent health (RMNCAH) care.

Future research priorities: Focus issues include family planning and gender-based violence, incorporating technical care for pregnant women and sick newborns into standard humanitarian programming, and improving data, as well as better involving crisis-affected communities in RMNCAH-related programme design and evaluation to improve local accountability.

Humanitarian Settings field guide, written by HHCC and MARCH Centre members provides guidance on key interventions, measurement tools and medical commodities needed for newborn care services in a humanitarian setting, complementing the existing manual for care across the continuum of reproductive, maternal, newborn, child and adolescent health (RMNCAH) care.

Adolescents and young people: There is very little evidence on the effectiveness of interventions to address the outcome of gender-based violence, yet during and after any kind of crisis, sexual and gender-based violence takes a significant toll on women and particularly girls. HHCC and MARCH members are seeking to address the evidence gap through the production of guidelines on the management of sexually-transmitted diseases following rape of adolescents and children.
Implications for MARCH future research

This report highlights that MARCH is one of the world's largest groups of academics working on the health of women, newborns, children and adolescents, and collaborating across research disciplines, with 200 academics and around 150 studies in more than 100 countries. Implications from past research that are key to informing future research across our A, B and C themes, include:

**STRENGTHS**

**Interdisciplinary research through the lifecycle**

Whilst we are organized by A, B and C themes, there are studies that cover the whole lifecycle or link key areas such as sexual and reproductive health across the adolescent and birth themes, or newborn health between the birth and child themes.

*"Beyond survival" research is growing fast in all themes, for example maternal morbidity and, newborn morbidity and at-risk cases (eg for Retinopathy of Prematurity), and child disability and early child development.*

**Intersectoral linkages**

Strong track record in LSHTM of gender based violence research, with world leading group.

Water and Sanitation for Health (WASH) research led by the School’s Environmental Health Group, and particular expertise in user-centred design.

Strengths in school-based research, especially for our A theme.

Agricultural and climate effect research with strong nutrition linkages.

Particularly strong presence across Sub-Saharan Africa where the burden is highest for women’s and children’s health, with many partnerships and hotspots of activity in the MRC units in The Gambia and Uganda which are now formally part of LSHTM.

Research studies in over 100 countries, including high, low and middle-income countries and a range of contexts including more than 20 large studies in the UK.

At least 10 projects that are global in scope, with multi country impact.

**Innovative research methods, with programme relevance**

Complex trials and evaluations of complex interventions, including innovations in diagnostics, devices and health system delivery.

Burden of disease estimates, especially for perinatal outcomes.

Health systems evaluation and financing, including pay for performance and evaluation of private sector and public-private partnerships.

Improving routine programme measurement with leading experts working on validation and feasibility studies to inform health management information systems.

**Impact on policy and programmes around the world**

Strong partnerships, linking with Governments, UN and healthcare professionals and NGOs.

Growing the next generation of research leaders, especially from high-burden settings.

Increased communication outputs, media coverage and value added for MARCH members through regular engagement such as informative blog posts.

**FUTURE DIRECTIONS**

**Interdisciplinary research through the lifecycle**

Shift to more work that goes beyond focusing on one condition or exposure at a time, towards considering multiple conditions, and co-morbidities, maximizing linkages with other Centres at the School such as those working on infectious (AMR, malaria, TB, vaccines), chronic conditions, and mental health.

More cohorts to follow up longer-term health outcomes, building to more intergenerational studies.

Scope to move beyond competing discourses for disability and child development and to build linkages through the lifecycle (including with mental health), particularly for adolescents and women.

**Intersectoral linkages**

Much more must be done for women’s and children’s health research and data in humanitarian settings, which are challenging places to work and conduct research.

Potential to go further in joining up some of these intersectoral issues in our research such as WASH and education (eg. menstruation), or gender-based violence and education.

**Around the world, between high, middle and low-income settings, strength in Africa**

Continue to partner and enable African leadership, with a strategic focus on the School’s MRC units in The Gambia and Uganda, and more attention to some large Africa countries such as Nigeria and the Democratic Republic of the Congo.

More intentional approach to bi-directional, north-south learning, especially for issues that apply in high, low and middle-income settings, such as newborn care, early childhood development and adolescent health.

**Innovative research methods, with programme relevance**

Continue complex evaluation, working with LSHTM’s Centre for Evaluation to also describe and innovate on methods beyond randomized controlled trials.

Universal health coverage measurement and models for results-based financing.

Expand use of participatory research methods, building on the strengths for this in the A theme and also learning from research on Participatory Action Learning Cycles.

**Impact on policy and programmes around the world**

More staff time to work on partnerships inside and outside the School.

Increased funding for Scholarships, including PhDs and fellowships.

Consistent investment in communications and strong internal and external communications partnerships.
Innovative Information Technologies

MARCH Centre researchers have experience of using many innovative technologies for health intervention and data collection. Examples include:

Mobile Technology for Improved Family Planning (MOTIF):
This project was a collaboration between LSHTM and Marie Stopes International to develop, implement and evaluate an intervention delivered by mobile phone to support post-abortion contraception use in Cambodia. The MOTIF intervention comprised six interactive voice messages with counsellor support depending on the response. The intervention was associated with increased self-reported use of effective contraception at four months post-abortion, but not at 12 months. The majority of women were positive about the intervention as it provided support for physical and emotional issues in addition to contraception use.

Improving eye health:
LSHTM researcher Andrew Bastawrous is CEO/Co-Founder of Peek Vision, a social enterprise that aims to reduce barriers to services using Peek Acuity, a smartphone-based vision check app that can restore sight and began as a project at the LSHTM International Centre for Eye Health (ICEH). Since Peek Vision first launched, more than 100,000 children in Kenya have been screened by teachers in schools, and 5% of those screened were seriously visually impaired and referred for treatment.

The Safetext trial:
Young people have the highest rates of STIs such as chlamydia and gonorrhoea, which can have severe long-term health effects including ectopic pregnancy and fertility problems. This trial, funded by a £1.4 million grant from the National Institute of Health Research (NIHR), involved a randomised controlled trial of an intervention delivered by text message to reduce sexually transmitted infections (STI) by increasing sexual health precaution behaviours in young people.

Data collection:
As part of the EN-BIRTH and EN-INDEPTH studies, researchers are using novel data collection methods in Africa and Asia, including a customized mobile data application to maximize data capture by including time stamping, GPS tracking, real-time dashboards, and time-motion methods.

United Nations:
The UNFPA vision of ending preventable maternal deaths, unintended pregnancies, and gender-based violence has never been more relevant globally, and MARCH is making valuable contributions towards tackling these major health issues at a time of great need for quality and innovative research. I am proud to be an Honorary Fellow at LSHTM, which has a record of leading influential and policy-relevant research on sexual and reproductive health issues, like the WOMAN trial which shows a maternal mortality reduction of 31% if tranexamic acid (TXA) was given within three hours of delivery. UNFPA is currently reviewing how these results can impact our interventions and be operationalized within the work of the Maternal and Newborn Health Thematic Fund. To ensure a world where every pregnancy is wanted and every childbirth is safe, we need a major push. Now is the time, and the work of and partnerships with institutions such as LSHTM are vital to achieving this.

Dr. Natalia Kanem,
United Nations Under-Secretary-General
and UNFPA Executive Director

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Dr. Joanne Liu
International President of Médecins Sans Frontières

Recent years have brought devastating humanitarian crises: from conflicts in Syria and Yemen to a never-ending global stream of desperate, forcibly displaced people. LSHTM is building strong, undeniable evidence; damning figures, that we hope to use to shame governments into change. LSHTM has made valuable contributions on these issues, both through our shared mission to improve health, as well as our mutual belief in a common humanity.

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International President of Médecins Sans Frontières
At the heart of the SDGs is a call for a lifecycle approach to child health. There is a need for paediatricians and academics to work more closely to deliver high impact research to improve practice and informed evidence-based policy, and the International Pediatric Association is proud to collaborate regularly with LSHTM, who are leading the way in a ‘whole child’ approach to child health research. To further promote this approach LSHTM is a founding member of the Coalition of Centres in Global Child Health and continues to educate and advocate for evidence-based strategies for improved child health, survival and development globally.

Professor Zulfiqar A. Bhutta
President of the International Pediatric Association, Chair Global Child Health, Hospital for Sick Children, Toronto, Center of Excellence in Women and Child Health, The Aga Khan University & Chair of the Coalition of Centres in Global Child Health

At Wellcome our priority is to tackle the world’s biggest health problems. We value breadth and depth in the activities we support and recognize the value of MARCH as the largest group of researchers worldwide researching women’s, children’s and adolescents’ health issues. In the face of ever-changing health challenges, LSHTM continues to produce high quality, policy relevant research, including the Wellcome funded WOMAN Trial and work on Our Planet Our Health. In an uncertain world, we need more collaborative, impactful and innovative research to address global health issues, and LSHTM are leading the way with this.

Dr. Jeremy Farrar
Director of the Wellcome Trust

CIFF is committed to improving the lives of children and young people in developing countries, and empowering the next generation to solve the seemingly intractable problems they face. LSHTM is a leader in producing the high-quality evidence needed to achieve this. Their strength lies in their ‘Survive, Thrive, Transform’ research, covering the lifecycle from newborn data measurement and collection tools, to ground-breaking studies on adolescent sexual health. This comprehensive approach is vital for catalysing the lasting change we seek for the health of mothers, children and adolescents worldwide.

Kate Hampton
CEO at Children’s Investment Fund Foundation (CIFF)

The International Confederation of Midwives (ICM) represents 132 Member Organisations and over 500,000 midwives globally. ICM champions the improvement of sexual, reproductive, maternal and newborn health and human rights through the strengthening of the midwifery profession. Our partnership with LSHTM is invaluable in ensuring increased uptake of evidence-based maternal and newborn care, and promoting the necessity of midwives to undertake vital academic research. LSHTM has supported midwives to become part of the next generation of change, and hosted the launch of The Lancet Midwifery Series, and as more midwives from low- and mid-resource settings pursue further education, ICM is proud to work with LSHTM to lead the way for quality maternity care.

Dr Franka Cadée
President of the International Confederation of Midwives (ICM)

Nurturing research leadership

Funders, donors and philanthropists

The School provides a stimulating, world-class training environment for over 4000 postgraduate students from around 100 countries. We view the diversity of our students and research partners as a core strength and aspire to an ethos of mutual capacity building.

Our vision is to nurture the next generation of research leaders for women’s, children’s and adolescents’ health. To achieve this, MARCH Centre members contribute to the entire portfolio of LSHTM education and engagement activities: short courses, distance learning modules, Master’s modules, research degrees, and Massive Open Online Courses (MOOC). MARCH members also play an active role in Women Leaders in Global Health, including hosting the 2018 conference.

Master’s courses

MARCH Centre members lead and contribute to many modules throughout the more than 20 Master’s courses offered by LSHTM. This content enables students to understand the health burden, critically examine interventions, and analyse strategies for integrating them into large-scale programmes. It also enables them to understand the stories behind high impact studies, Lancet series, and the current global architecture and politics of global health.

Each year we appoint MSc student liaisons for A, B and C themes and our MARCH Centre blog editor. These roles are very popular, and more than 40 students apply each year. We also hold many interactive events for students, including opportunities to network with MARCH researchers, discuss summer project opportunities, and careers events to learn about the realities of professional paths in global health on MARCH-related topics.

Since starting my MSc, MARCH has acted as my intellectual support system. It is very motivating as a student to see how the Centre collaborates with other LSHTM Centres and disciplines to shape the global body of evidence on adolescent health. I particularly enjoy that engaging with MARCH and the A Theme Leaders challenges me to seek out new publications and stay informed on current research and programming related to adolescent health.

Nisso Nurova
MARCH Centre A theme student liaison 2017-2018

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Dr. Benedict Weobong carried out his Master’s and Doctoral research degrees at LSHTM, leading programmes of work to improve the health of women, children and adolescents around the world.

In August 2016, I returned to my role as Assistant Professor at LSHTM after six months of maternity leave. Around the same time, I received one of the first ever round of career re-entry fellowships granted by the MARCH Centre through the Milby Foundation. The flexibility of this funding is unparalleled in academia and has given me time to think, plan strategically, engage broadly with leading experts, continue to be productive, and at the same time deal with the challenges of having a young family. I was able to lead or be part of five grant applications and publish more than ten articles and reports. At a stressful time of transition, this grant allowed me to say “Yes” to many opportunities that might otherwise have been impossible to coordinate with my parenting role, and empowered me to think and to plan for my long-term academic goals.

Dr Lenka Benova, LSHTM/ Antwerp University

My experience as a doctoral student researching gap issues in perinatal mental health was superb. One of the highlights was the co-supervision arrangement with a psychiatric epidemiologist from another world-renowned academic institution, which was deeply rewarding as I had access to the unique expertise of both institutions. Immediately after my graduation, I had an exciting opportunity to work with the School as a research fellow in mental health clinical trials. The experience has been phenomenal as I am now in a position to pursue my career as a public health researcher, having won a 5-year intermediate research fellowship from the Wellcome Trust/India Alliance scheme to develop a brief mHealth intervention for hazardous drinking behaviour amongst adolescents.

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Professional Diploma in Tropical Nursing

The School’s Professional Diploma in Tropical Nursing has over recent years proven an outstanding success in preparing nurses to work in low-income settings. It has grown to 130 students a year and is recommended by Médecins Sans Frontières, Save the Children, the British Red Cross and many more international agencies.

Doctoral degrees

At least 150 research degree students at LSHTM are currently conducting research on women’s, children’s and adolescents’ health, drawing on disciplines ranging from anthropology to demography, epidemiology, mathematical and statistical sciences, medicine, sociology and policy. Many research degree students become independent research leaders, leading programmes of work to improve the health of women, children and adolescents around the world.

Maternity re-entry fellowships

We aim to do as much as we can to support researchers in their longer-term careers, especially at critical points like returning to work from maternity leave. MARCH is grateful to the Milby Foundation for supporting maternity re-entry fellowships, and in 2017 the first fellowship was awarded to Dr Lenka Benova. We hope to expand these fellowships, and to find new ways to support promising young researchers.

Massive Open Online Course

An important focus for our Centre is to increase the quality and reach of public health education relevant to women’s and children’s health. We launched a free Massive Open Online Course (MOOC) “Improving the Health of Women, Children and Adolescents: from Evidence to Action” in partnership with FutureLearn. The course runs over six weeks, exploring the lifecycle including: adolescent, reproductive, maternal, newborn and child health. The course concludes by reflecting on the importance of the lifecycle construct for women, children, and adolescents in the context of the Sustainable Development Goals. The content was created by over forty MARCH Centre members working in a range of disciplines, including epidemiology, demography, anthropology, medicine and public health. Since its first run in Sept 2015, the course has had over 26,000 participants from more than 130 countries.

Figure 4: Map of Enrolments for MOOC participants up to March 2018 (note only those who report location)
Future for research leadership especially in Africa and South Asia

LSHTM has collaborated with at least 50 institutions in Africa during the last decade, with embedded research leadership development. For a number of close collaborations, notably the MRC Units in The Gambia and Uganda, and the Ifakara Health Institute in Tanzania, the School supports collaborative centre PhDs where staff from these centres can undertake PhDs at lower cost and mostly based in their home institution.

The School, with MARCH, is also part of several of “capacity strengthening consortia” with funding for PhDs, for example in biostatistics, mental health and malaria. The Wellcome Trust has been a key investor in this, including through the Bloomsbury Centre for Global Health Research. Most investments to date have focused on infectious diseases, so one of our goals is to secure funding for research and leadership training in other aspects of health for women, children and adolescents. This is called for from Southern governments and institutions, and is a priority focus for the future.

Engaging with media and the public

MARCH has a strong history of engaging with mainstream global media and our research has featured in many major news outlets including Reuters, Forbes, BBC, The Washington Post, The Guardian, The Canadian Press, Al Jazeera, Sky News, TV5, Huffington Post and The Hindu. It was estimated that our Lancet series on stillbirths reached nearly one billion people via radio, TV, print and the internet. Coverage spanned 53 countries and our research was reported on in over 1,100 unique media pieces.

Media

Public engagement

The Centre is committed to engaging members of the public in our research and we aim to create a dialogue with global communities through our public engagement activities to ensure our research is asking the right questions. Examples of our public engagement activities include:

Film screening and production

In 2016 MARCH Centre member Professor Rashida Ferrand produced a documentary film about Adolescent HIV in Zimbabwe titled “Chiedza’s Song.” The project enabled adolescents in Zimbabwe to capture their stories and the stories of others living with HIV and premiered in London to increase awareness of the issues around living with HIV infection among adolescents, and the associated clinical and psychosocial issues.

Art displays

To highlight the devastating scale of severe bleeding after childbirth (postpartum haemorrhage) and the work of the WOMAN trial, we held a public display of Dr Graham Tydeman’s art installation ‘Blood Clock’. The clock is designed to illustrate the problem of postpartum haemorrhage in a striking way, both telling the time and counting deaths, and is built using materials from maternity wards.

Young Scientists Scheme

MARCH Centre members have been involved in the LSHTM Young Scientists Scheme, which offers students aged 14-18 from London state schools the opportunity to see and experience first-hand how biomedical research is conducted, and aims to inspire the next generation of public and global health researchers.
Adolescents and young people

MARCH research on preventing HIV in African adolescents has substantially influenced the HIV policies of international organisations such as UNICEF, UNESCO and WHO, and HIV programmes in African countries. In particular, scale-up of voluntary medical male circumcision in adolescents and young people and findings on knowledge and attitude change through sexual health education have been widely implemented.

Births

Postpartum haemorrhage is the leading cause of maternal mortality worldwide causing a death every four minutes. MARCH Centre researchers led the WOMAN (World Maternal Antifibrinolytic) trial of 20,000 women, showing a mortality reduction of 31% if tranexamic acid was given within three hours. These findings led to WHO policy change in under than a year. LSHTM academics have worked with UCL and others on WHO recommendations regarding participatory learning and action cycles with women’s groups for maternal and newborn health (2014).

Children

Research coordinated by LSHTM provided the first estimates of the burden of Group B Streptococcus (GBS), an infection commonly carried by pregnant women, and found that a maternal vaccine could prevent more than 100,000 stillbirths and child deaths worldwide. This research was featured in many mainstream news outlets and has helped inform the development of several vaccines.

Countdown to 2030 using data for accountability

LSHTM has worked with Countdown to 2015 since the start in 2005 to improve data for accountability for reproductive, maternal, newborn and child health, including coverage, systems and financing. LSHTM has led the tracking of donor flows towards the health-related MDGs and SDGs, helping to hold donors accountable for their aid commitments.

A decade of high impact and influential research

In 10 years MARCH has published thousands of papers, including several influential The Lancet series. We have been involved in hundreds of studies around the globe and our research has influenced United Nations policy and uptake on a range of issues.

This is exemplified in our leadership of a number of influential The Lancet series and commissions including:

Maternal Health Series (2016)
which helped to influence WHO guidelines on respectful maternity care, and more attention to over-medicalisation, “too much too soon”.

Ending Preventable Stillbirths Series (2016)
which documented one of most neglected issues in global health, leading to a target in the Global Strategy and WHO starting to systematically collect stillbirth data for the first time.

Every Newborn Series (2014)
which provided the basis for the Every Newborn Action Plan and linked SDG target, which was the first ever on newborn survival. MARCH researchers previously led the first national estimates for WHO of stillbirths, preterm birth, low birth weight, neonatal causes of death and childhood disability after neonatal illnesses.

Adolescent Health Commission
which is ongoing for the next decade and led by the University of Melbourne in close partnership with several LSHTM academics.

Other specific examples of policy impact include:

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MARCH through the lifecycle

Adolescents and young people – healthy transitions

Births – wanted and safe

Children – survive and thrive