



From minding the gap to closing the gap

**Science to transform maternal and newborn survival and stillbirths
in sub-Saharan Africa in the Sustainable Development Goals era**

Workshop report

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Executive summary

A report published in 2009 by the African Science Academy Development Initiative (a collective of 7 African academies of science) entitled *Science in action: Saving the lives of Africa's mothers, newborns, and children* reviewed the status of maternal, newborn and child health in Africa and highlighted evidence-based ways to save lives.^{1,2} Following on from this report, the African Academy of Sciences and the Academy of Medical Sciences organised a workshop in 2018 at which participants discussed the rate of progress in the SDG era, how to improve implementation of proven interventions, novel solutions, and ways to support investment in science and research leadership in Africa.

With only just over a decade to meet the SDGs, there is an ongoing burden of 5.4 million deaths globally, including newborns (2.5 million), stillbirths (2.6 million), and maternal (0.3 million). Africa, with only 13% of the world's population, carries more than half of this burden with 2.3 million deaths per year. Based on current trends, most sub-Saharan African countries won't meet the SDG target of 12 or fewer newborn deaths per 1,000 births and are also at risk of missing targets for maternal mortality reduction.

To close these gaps, there are four Grand Challenges to address, and science and research is crucial in accelerating implementation and developing innovations.

1. <https://resourcecentre.savethechildren.net/node/1911/pdf/1911.pdf>

2. <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1000294#ack>

Grand Challenges

Grand Challenge 1: Better care during pregnancy

Current status: Only just over half of women in Africa get antenatal care sessions at least four times during pregnancy. Recent World Health Organization (WHO) guidelines recommend the minimum number of sessions during a pregnancy be increased to eight.

Implementation science: Workshop participants agreed research is needed in how to operate the new WHO eight-visit antenatal care package, especially in what are the best ways to deliver antenatal care in different settings. Some aspects of antenatal care could be delivered in primary care or community settings or through novel approaches such as group antenatal care. Research could determine whether vaccines used in high-income countries, such as those for flu and human papillomavirus (HPV) could be successfully deployed in lower income countries. Ultrasound and biomarkers have the potential to accurately date fetuses and more accurately predict high-risk pregnancies for in utero referral.

Discovery science: A greater focus on screening in pregnancy is needed. Better and more affordable diagnostics for a wide range of conditions, including anaemia, diabetes, syphilis, HIV, tuberculosis (TB) and hepatitis could all improve outcomes. Innovations to integrate screening would be valuable; combined tests already exist for HIV with syphilis but could include others. New maternal vaccines such as one for Group B Streptococcus would reduce stillbirths, maternal deaths, neonatal deaths and potentially preterm births. Vaccines that remain effective from the time of manufacture until use without stringent temperature requirements are also needed. Encouraging the use of minimally invasive post-mortems could provide improved data particularly regarding infectious causes of stillbirths, reduce stigma and anxiety for mothers, and prevent subsequent stillbirths..

Grand Challenge 2: Better care at birth

Current status: Improving the quality of care at birth generates a triple return on investment, by reducing maternal and newborn deaths, and also stillbirths. Although now half of births in Africa are in hospitals, there are over 600,000 intrapartum stillbirths in the continent each year, where the death occurs during labour. Almost all of these are preventable with timely, high-quality care at birth.

Implementation science: Participants highlighted an urgent need to identify new labour monitoring systems, following the WHO's decision to stop recommending the use of the partograph. Improved monitoring of high rates of stillbirths is key for accountability and could be included in perinatal audits. More research on the use of clinical audits, feedback and medical dashboards could help spread best practice. Better implementation of the basics, such as handwashing and keeping newborns warm (e.g. with kangaroo care) could have high impact. Maternity waiting homes in places where access to emergency care is difficult and mHealth initiatives may play positive roles. Postpartum haemorrhage (PPH) deaths could be significantly reduced with wider use of tranexamic acid (TXA).

Discovery science: More research on oxytocin analogues misoprostol and carboprocin to prevent PPH in different settings was suggested.

Grand Challenge 3: Better postnatal care for women and their newborns

Current status: Post-natal care (PNC) is a major gap in the continuum of care with much lower coverage than for antenatal care and care at birth. However this is a crucial time for risk of mortality for new mothers and their babies, and also for establishing healthy behaviours such as breastfeeding or family planning.

Implementation science: Improved understanding of when, where and how women want family planning advice and resources could have a significant impact. Better training, including the use of web-based resources that focus on some high-impact postnatal interventions that are missing from medical textbooks, could help. Ensuring the basics are done well at home and in community healthcare settings is vital. Wider use of simple models, decision algorithms and basic technologies could improve outcomes.

Discovery science: Women should be asked what services they want, and solutions must be context-specific. Addressing deficiencies in data on the causes and prevalence of health problems is important. Disaggregated data is most useful. Different aspects of care need to be considered together to inform the development of integrated care plans. Improved diagnostic technologies for conditions including sepsis, pneumonia, TB and Zika are also required for PNC, especially at community primary care facilities.

Grand Challenge 4: Better hospital care of sick newborns

Current status: More than 80% of newborn deaths in 2016 had preventable, treatable causes. Strategies such as UNICEF's Strategy for Health 2016–30 and the WHO's Every Newborn Action Plan have been developed to provide guiding principles to address the problem.

Implementation science: More research is needed on the capabilities of hospitals and their operational contexts linked to data-based minimum levels of clinical care for small and sick newborn babies in resource-poor hospitals. Better data and norms/standards for human resources can help improve staff recruitment. Comprehensive care packages need to be more specifically defined for the care of newborns with prematurity and asphyxia encephalopathy. More work is needed on algorithms to better treat newborns with seizures related to encephalopathy. Participants discussed a data repository to compare different treatments for jaundice.

Discovery science: Research on point-of-care diagnosis of sepsis in newborns, ideally using samples other than blood, is needed, as well as lower cost simpler blood culture and tests for antimicrobial resistance (AMR), and diagnostics for jaundice. Innovative devices for newborn care that are robust and have interoperability such as continuous positive airway pressure (CPAP) machines, infusion pumps, apnoea monitors, pulse oximeters etc. are a key gap. Simpler, cheaper ways to determine gestational age would be beneficial as would low-cost surfactants.

Cross-cutting issues

Closing the gap for African research leadership: Sub-Saharan Africa carries a disproportionate burden of diseases yet only about 1% of published papers are led by Africans. Promising young African scientists find it hard to get exposure to research and research training, and to obtain funding. Research infrastructure more generally is lacking. Women are poorly represented, both in research leadership and across African science. Efforts to identify, nurture and mentor promising African scientists should start at school, with, for example, improved science education, research clubs, science camps and awards schemes. Research should be better integrated into the training of healthcare professionals, through specific research modules and mentorship. Providing support for regional research training programmes, such as through the AAS, could help. Wider use of online tools could help African researchers gain funding. The experiences of the European & Developing Countries Clinical Trials Partnership offer useful insights.

Collaborating across subjects and sectors: Biomedical scientists seeking to improve maternal and newborn survival and reduce stillbirths may make greater progress by working more with those in different sectors. Clinicians, engineers, educationalists and funders all have valuable perspectives. Likewise, participants suggested that future workshops and meetings might benefit from the presence of researchers from other fields, including social scientists, economists and engineers.

Gender: Female representation in African science could be improved through gender sensitive strategic planning of research at university level. More women are needed on science committees at all levels, and this requires intentional change. More visibility of women and access to female role models and mentors in science and programmes are key to supporting younger female researchers. Mother- and baby-friendly policies in the workplace could help, as well as re-entry support for research careers after maternity leave.

Networks: The lack of an overarching umbrella network of organisations working on maternal and newborn health initiatives in Africa was highlighted. Participants discussed carrying out a 'research network mapping' exercise to improve understanding of the current networks, coordination and funding opportunities. Setting up such a network was also discussed.

Bridging the science-policy gap: Doing research does not, in itself, save lives. Scientists who want to reduce maternal and newborn deaths and stillbirths in sub-Saharan Africa must engage with politicians and administrators. Policymakers can drive change more easily when they have access to accurate and concise information. They are more likely to drive change if they are involved in identifying problems and choosing research questions. Presenting the economic advantages alongside the life-saving benefits of new policies and systems may smooth the path to change.

Key next steps

At the conclusion of the workshop, a number of key next steps were agreed by the workshop participants that would help close the gaps identified:

Priorities for research from Africa: Participants proposed using the ideas discussed and generated at the workshop to draw up lists of implementation and discovery research priorities. It was suggested that this process should be open to those who attended the meeting and also to experts who were unable to attend, and that a transparent, online system for the ranking of priorities should be adopted. This will help to inform upcoming funding opportunities. The use of the Child Health and Nutrition Research Initiative (CHNRI) approach to research priority setting was also proposed. It was agreed that a further meeting on this area was necessary to identify these priorities.

Research leadership in Africa: Participants proposed carrying out a mapping exercise to identify existing hubs of researchers and networks as a means to improve coordination and funding of research and avoid duplication. This would also help to identify key gaps by topic e.g. stillbirths, or funding by level e.g. PhD, postdoctoral etc.

Research to policy: Participants felt those in the field should be working to enable more dialogue between policymakers and African academics on maternal and newborn survival and stillbirths. This could be achieved through providing clear policy briefs on key issues to policymakers in Africa as part of efforts to improve outcomes, especially regarding the SDG targets and key actions in various African contexts. In order to effectively target this policy work, there was a commitment made by the AMS and AAS to explore a future policy workshop in 2019 to set out a pathway forward.



Status of maternal and newborn health in Africa

It is estimated that in 2018 there were around 5.9 million deaths under the age of five globally, of which 2.5 million occurred in the first month of life.³ Over 300,000 women died as a result of complications related to pregnancy.⁴ An estimated 2.6 million stillbirths occur annually. Most of these deaths are preventable.

These numbers are huge, but they in fact represent significant progress. Between 1990 and 2015, the global maternal mortality rate fell by 44% and the child mortality rate declined by 53%.⁵ These improvements were achieved, in part, through the impetus generated by the United Nations' Millennium Development Goals (MDGs). To build further on these achievements, the SDGs aim to reduce global maternal mortality to less than 70 per 100,000 live births by 2030. The Sustainable Development Goal (SDG) targets for newborn deaths and those up to the age of five years are 12 or fewer per 1,000 live births and 25 or fewer per 1,000 live births respectively in all countries.

Worldwide figures can mask major regional disparities. Sub-Saharan Africa is home to around 13% of the world's population, yet suffers an estimated 66% of global maternal deaths, 41% of global stillbirths and 40% of global newborn deaths. Each year, in developing regions, more than 45 million women receive either inadequate antenatal care, or none at all, and more than 30 million women deliver their babies outside of a healthcare facility.⁶

Of the approximately 300,000 women who die as a result of pregnancy globally each year, 200,000 die in Africa. The main causes are haemorrhage, hypertension and sepsis infection. Nearly half of deaths under the age of five are newborns,⁷ meaning they die within 28 days of birth. Substantial progress has been made, with the number of newborn deaths falling from around 5 million in 1990 to 2.5 million in 2017.⁸ However the decline of 51% for newborn deaths has been slower than that for under-fives, which dropped by 62% globally during the same period.⁹

Of the 2.5 million global annual newborn deaths, approximately 1 million occur in Africa. Projections suggest that on current trends, sub-Saharan Africa won't meet the SDG target of 12 or fewer newborn deaths per 1,000 births until 2050. Leading causes include complications¹⁰ related to preterm birth (35%), infection, especially pneumonia and sepsis (23%) and injuries during delivery (24%).

While the MDGs focused on relative reductions, the SDGs are based on absolute targets. National targets are generally more meaningful than those averaged across the globe. For instance, more than 100 countries have already hit the SDG target of 12 or fewer newborn deaths per 1,000 live births, while some 40 countries need to more than double their rate of progress to achieve it, and most of these are in Africa. About 20 African countries are yet to set a newborn death target. More clarity and guidance is needed about how to set these targets. Different countries in the region also have widely varying conditions and capacities, and there are major variations even within countries.

3. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)31593-8/fulltext?code=lancet-site](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31593-8/fulltext?code=lancet-site)

4. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)00838-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00838-7/fulltext)

5. http://www.who.int/gho/publications/mdgs-sdgs/MDGs-SDGs2015_chapter4.pdf

6. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)30293-9/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)30293-9/fulltext)

7. <https://data.unicef.org/topic/child-survival/neonatal-mortality/>

8. <http://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality>

9. <http://www.who.int/news-room/fact-sheets/detail/newborns-reducing-mortality>

10. http://www.who.int/maternal_child_adolescent/data/causes-mortality/en/index1.html

While some countries in sub-Saharan Africa have among the highest rates of maternal and newborn deaths, and stillbirths, they also have the opportunity to save the greatest number of lives if effective interventions can be implemented. Similarly, while the region has a major science gap (in 2008 it produced only around 1.1% of published scientific articles¹¹), it also has the greatest opportunity to improve its research output.

There is, as yet, no precise road map of how the tremendous burdens of maternal, and newborn mortality, and stillbirth in sub-Saharan Africa, can be tackled. What is clear, however, is that it is a multi-faceted problem that cannot be tackled by any one profession or sector working alone. Each country must also be able to build research and implementation capacity. Policymakers, administrators, funding agencies, clinicians, bioengineers and educationalists all have important roles to play at national, regional and international levels. Scientists who want to improve maternal and newborn health (MNH) in sub-Saharan Africa must consider how they can collaborate more effectively with those focused on other parts of the MNH jigsaw to achieve their common goals.

Researchers certainly can make crucial contributions. They can generate clearer, more accurate information about the causes of these unnecessary tragedies, providing better foundations for proposed solutions. Scientists are well placed to inform ways to better use and implement existing evidence-based methods and tools. They can help further by developing novel, more effective approaches to diagnosis and treatment. With commitment and the right approach, their efforts can make major contributions to improving maternal and newborn survival, and preventing stillbirths, in sub-Saharan Africa in the SDG era.

Context

In 2009 a report entitled *Science in action: Saving the lives of Africa's mothers, newborns, and children* was published by seven African science academies and the US National Academies of Sciences, Engineering and Medicine, and was launched at the 50th Anniversary of the Ghana Academy of Arts and Sciences. It was then published as a series of papers in PLoS. Based on multi-country analyses and consultations with 60 scientists and policymakers from nine countries, it reviewed the status of maternal, newborn and child health, and highlighted evidence-based solutions, priority interventions and gaps to save lives in sub-Saharan Africa.

As a follow-up, a workshop on science to transform maternal and newborn survival and stillbirths in sub-Saharan Africa in the SDG era was held in Nairobi, Kenya, on 4-5 September 2018. The meeting, organised by the African Academy of Sciences (AAS) and the UK Academy of Medical Sciences (AMS), attracted some 65 scientists, clinicians, policymakers and funders from 15 countries.

Keynote speakers set the scene, then participants reviewed current trends, highlighted ways to accelerate the implementation of existing evidence-based tools, identified innovative solutions and discussed ways to support the growth of African research leadership for maternal and newborn health. To facilitate discussion, parallel sessions focused on four Grand Challenges for maternal, newborn health and prevention of stillbirths:

1. Better care during pregnancy.
2. Better care at birth.
3. Better postnatal care for women and their newborns.
4. Better hospital care of sick newborns.

There was a Spark Session consisting of eight presentations on specific research projects or innovations. Short overviews of these presentations are provided in each of the following Grand Challenges sections (see Spark Session Box 1-4). Ways to promote the uptake of policies to improve outcomes for mothers and babies in the region were also discussed.

This report summarises the key themes discussed at the workshop. The views presented within it are those of the workshop's participants, and do not necessarily represent those of the AMS or the AAS.

11. <http://unesdoc.unesco.org/images/0018/001899/189958e.pdf>

Grand Challenge 1: Better care during pregnancy

Current status

The leading cause of maternal death is haemorrhage, which accounts for 27% of the global burden, followed by hypertensive disorders (14%) and sepsis (11%).¹² The causes of antepartum stillbirths remain largely unknown due to a lack of death registrations¹³ and under-investigation. Infections and fetal growth restriction are leading causes with congenital abnormalities accounting for about 5%.¹⁴ When seeking to work out how best to target limited resources it is important to bear in mind that some single outcomes can be the result of multiple exposures, and single exposures can cause a number of outcomes. For example, Group B Streptococcus infection is a major killer of newborns, but it also causes post-birth infections in mothers.

Only just over half (52%) of women in Africa are attended by any form of healthcare provider at least four times during pregnancy.¹⁵ In 2016 the WHO published new antenatal care guidelines including 49 recommendations, based on nutritional interventions, maternal and fetal assessments, preventative measures, interventions for common physiological symptoms and health system interventions.¹⁶ These included increasing the minimum number of contacts women should have during pregnancy from four to eight, better focused contacts in the third trimester, and early ultrasound for gestational ageing. Workshop participants pointed out that such care packages rely on women presenting for antenatal care early, and suggested more work is needed on how to reach those who do not attend available services.

Implementation science

Where and how to deliver antenatal care: Workshop participants highlighted the importance of evidence-based, context-specific care packages in low- and middle-income countries (LMICs). Different aspects of antenatal care may best be delivered in primary care or community settings, depending on local circumstances. Group antenatal care may provide cost-effective solutions in some settings. More research that identifies the best ways to deliver antenatal care in different settings could drive more efficient targeting of resources. There is also a need for research to identify groups of pregnant women who are missed or receive suboptimal care. More innovative use of mHealth technologies and SMS could increase coverage and improve adherence to antenatal care.

Education: Improved education has a number of roles to play, especially in relation to healthcare providers and mothers. It was felt that community healthcare workers and nurses could be encouraged to learn relevant midwifery skills as part of efforts to provide and support antenatal care in the community. Care must be taken in choosing which competences should be passed on as, for example, previous efforts to do this in Niger led to community healthcare workers adopting existing ineffective local practices rather than deploying new, evidence-based knowledge to drive improvements. Once skills have been acquired, mentoring has been shown to improve these skills, and the knowledge and confidence of healthcare providers. Wider use could support and sustain improved outcomes. Counselling could also play a role, however more evidence is needed on up-to-date ways to provide it beyond expensive one-to-one sessions. It was also noted that broader education of religious leaders, male partners and wider family members about how to improve antenatal care would also help in some settings.

12. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(14\)70227-X/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(14)70227-X/fulltext)

13. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)00837-5/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00837-5/fulltext)

14. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(15\)00837-5/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(15)00837-5/fulltext)

15. <https://data.unicef.org/topic/maternal-health/antenatal-care/>

16. <http://apps.who.int/iris/bitstream/handle/10665/250796/9789241549912-eng.pdf;jsessionid=70C7F740DF4B85A066F79E3EEF623CED?sequence=1>

Nutrition: Another aspect of broader education concerns nutrition. The wider and more effective teaching of children and adolescents about the importance of diet, including key nutrients, could drive a range of improved outcomes, including reducing maternal and newborn deaths and morbidity. Such efforts must take account of local traditions and food availability.

Non-communicable diseases (NCDs): Diabetes and cardiac conditions, including hypertension, are important causes of morbidity and mortality during pregnancy. The wider use of pulse oximetry, especially alongside blood pressure and haemoglobin measurements, could significantly contribute to the improved identification of some NCD-related harms. There is some evidence that this could be done affordably at different levels of healthcare provision.

Infectious diseases:

Syphilis: In 2007 the WHO launched a major initiative to eliminate mother-to-child transmission of syphilis. Progress has been made, however research suggests that globally, in 2012, an estimated 930,000 cases of maternal syphilis caused 350,000 adverse pregnancy outcomes, including 143,000 early fetal deaths and stillbirths.¹⁷ This burden could be reduced by greater use of syphilis screening and subsequent appropriate treatment in sub-Saharan Africa.

HIV: Great progress in the prevention of primary HIV infection, elimination of mother-to-child transmission and sustaining patients with antiretroviral therapy has led to reductions in mortality and transmission rates. Self-testing for HIV has been shown to be successful in Malawi. Research could determine whether this approach could be applied to other infectious diseases. In view of a high burden of HIV in some settings in sub-Saharan Africa, it is also important to consider TB during pregnancy. It can lead to serious consequences for both mother and child, and diagnosis can often be delayed because pregnancy can affect symptoms.¹⁸ A greater focus on TB in antenatal care could improve diagnosis and treatment.

Malaria: As it is endemic in the region and a cause of stillbirth and preterm birth and fetal growth restriction, screening for malaria is now affordable and accessible.

Other infectious diseases: A greater focus on whether vaccines, such as those for flu and HPV already in use in high-income countries (HICs), could also be used successfully in LMICs may also drive improved outcomes.

Ultrasound: Ultrasound is useful to accurately date the fetus, and help distinguish between prematurity and fetal growth restriction. It can also be used to identify abnormalities such as breech presentation, determine placenta location, and identify multiple pregnancies. Impact will depend on the availability of technology at a primary healthcare level, training in its correct use and most importantly the capacity of the system to then respond to screening for at-risk pregnancies and change outcomes. Fears over the use of technology for gender selection are less of a concern in Africa than in some Asian countries.



17. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(16\)30135-8/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(16)30135-8/fulltext)

18. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4241224/>

Discovery science

Improved diagnostics: The development of simpler, more accessible ultrasound technologies that could be used more widely, including by community health workers, could improve outcomes. There is a need for non-invasive tests for anaemia, such as those based on pulse oximetry. This would make screening more accessible and reduce costs as patients would no longer need to travel to clinics to have their blood taken. The development of more affordable pulse oximetry technology, alongside the wider use of existing technology, could improve the identification of NCD-related harms. Simple and effective NCD screening tools for use more generally, such as for diabetes, are required. More information is also needed about specific glucose cut-off levels for use in local communities, as extrapolation from HICs where ethnicities differ is not appropriate.

The development of improved point-of-care diagnostics involving panels of tests that don't require blood to be processed in a lab, for example, indices of serum lactate for sepsis and placental growth factor, could significantly contribute to the quick and accurate diagnosis of these conditions. Another example is a portable device called the MinION used for DNA and RNA sequencing, made by Oxford Nanopore Technologies, and being used to identify viral pathogens in Madagascar.

Improved diagnostics for conditions including syphilis, HIV, TB, Group B Streptococcus, hepatitis, malaria and flu, could all improve outcomes for mothers and their offspring. There is also a need for vaccines that remain effective from the time of manufacture until the point of administration without stringent temperature requirements, which may be difficult to keep to in low-income settings.

Screening tests need to be made simpler and cheaper while remaining accurate and robust. Workshop participants also noted that they would only have impact if there were treatments available for the conditions being tested for.

Post-mortems: Encouraging the use of minimally invasive post-mortems could provide improved data on the causes of death, particularly for stillbirths, and could therefore help drive improved outcomes. It would also reduce stigma and anxiety for mothers and help prevent subsequent stillbirths.

Box 1: Spark Session Box

Combined syphilis and HIV rapid diagnostics

A 2014 WHO guideline set out a goal of eliminating mother-to-child transmission of HIV and syphilis. Researchers from South Africa have been testing the use of two devices (SD Bioline made by Abbott and Chembio DPP HIV-Syphilis Assay made by Chembio Diagnostic Systems) that provide diagnosis of HIV and syphilis from a single pinprick blood sample. The test could be done at the first antenatal visit to reduce adverse outcomes including stillbirths, newborn deaths, low birth weight and congenital syphilis cases. The assays have been shown to be rapid, easy-to-read, reliable and cost-effective. They also meet WHO sensitivity and specificity targets.

Collaborative community-based technology to improve maternal and child health

This Senegal-based project has three components: better organisation and management of health services at a community level; mHealth apps for use at community and health facility levels for the registration and tracking of pregnant women; and a telemedicine platform to provide remote assistance for healthcare professionals, especially for the treatment of high-risk pregnancies. The aim is to increase demand, access and use of maternal health services, in order to improve maternal and child health. The system has highlighted differences in service demand, such as far fewer women attending postnatal care than other phases of care, despite many deaths in the week after birth.

Grand Challenge 2: Better care at birth

Current status

Although now half of births in Africa are in hospitals, there are over 600,000 intrapartum stillbirths in the continent each year, where the death occurs during labour and almost all of these are preventable with timely, high-quality care at birth. Many societies and healthcare systems have paid relatively little attention to stillbirths, leaving the affected parents without the care and support they need. In 2018, the WHO asked countries to report stillbirth data for the first time.

Improving the quality of care at birth generates a triple return on investment, as it can reduce maternal and newborn deaths and stillbirths. In February 2018, the WHO issued a guideline that includes 56 evidence-based recommendations to promote uncomplicated labour and childbirth, irrespective of the setting. It emphasises the importance of women having positive childbirth experiences.

Implementation science

Skilled attendance at birth: It is vital to ensure midwives are sufficiently skilled to deal with postpartum haemorrhage (PPH) and other common complications of childbirth. Two markers of low skill levels among medical workforces attending births are high rates of fresh stillbirths (those believed to have occurred within 12 hours of delivery) and of PPH. Fresh stillbirths data are recorded in almost all hospitals but the data are rarely collated or used. Improved monitoring of stillbirths might help make the case to invest in more midwives. Task shifting, for example with non-physicians doing C-sections, has been shown to be cost-effective but some participants made the point that this is not always appropriate in every context.

Do the basics better: There is a danger of over-emphasising high-tech, novel solutions. Simple things like handwashing, keeping newborns warm and kangaroo care make a big difference, but are far from universally implemented. Studies show effective antimicrobials are not always available and antifungals are often given at the wrong dose. Examples of programmes designed to improve basic birth skills include Helping Babies Breathe, a curriculum of initial neonatal resuscitation techniques devised by the American Academy of Pediatrics, and the Essential Steps in the Management of Obstetric Emergencies (ESMOE) training programme, developed for doctors in South Africa. Finding ways to better implement these may have the most impact, especially in resource-poor settings.

Systems for ensuring quality and accountability: Clinical audits, feedback and medical dashboards can drive better quality services and improved outcomes. Systems that have been proven to work could be implemented more widely. Feedback from mothers can help health systems deal with issues that need addressing. Further research on where adequate monitoring is and isn't being done, and which systems perform best, could contribute to the reduction of avoidable deaths around the time of birth. Mentorship could be used more widely to spread and sustain good management practices.

Access to emergency care: The lack of effective emergency care around the time of birth is a major contributor to maternal and newborn deaths. One way to ensure access to emergency care in places where transport is difficult is through maternity waiting homes. Women can move into one when they are around 36 weeks pregnant. They are provided with food, accommodation and often advice on things such as breastfeeding and family planning. They are close to medical facilities; ensuring care is on hand in the event of an emergency. There may be scope for implementation research on scaling these up in different settings. Workshop participants highlighted that in Nigeria, for example, emphasis is placed on discussions with local communities and transport associations to promote the availability of emergency transportation.

Community engagement: Various ways of working with communities can improve birth outcomes. It was pointed out that part of providing respectful, positive experiences of birth is facilitating companionship during labour. Workshop participants said that wards should ideally be built to allow for this, and medical professionals should be trained to accept the role of companions, whether male or female.

mHealth initiatives could be implemented more widely to encourage community engagement and support those close to giving birth. Improved community engagement might also increase the proportion of pregnant women attending medical facilities to give birth, and therefore reduce deaths and morbidity.

Discovery science

Monitoring labour: A partograph or partogram is a chart used to plot the progress of labour against time, and can be used to identify delays and other abnormalities that might indicate problems for mothers and babies. In 2018, the WHO stopped recommending its use due to a lack of evidence that it was beneficial,¹⁹ and suggestions of improper use such as filling it in after birth and concerns that its use may lead to unnecessary interventions.²⁰ However, it has been noted that the partograph is simply a screening tool and no screening tool is effective unless it is correctly interpreted and responded to. The WHO is working on alternatives; however this may take some time. Workshop participants highlighted an urgent requirement to identify whether new labour monitoring systems that include tracking the vital signs of mothers and babies are needed, and what those should look like. In the meantime, it is better to continue using the existing tool, which is the partogram, rather than nothing.

Getting the right drugs to control haemorrhage: Misoprostol and carbetoicin, an oxytocin analogue, are both used to treat post-birth haemorrhage. The WHO recommends the use of misoprostol by community health workers to prevent PPH in settings in which skilled birth attendants and oxytocin are unavailable.²¹ Carbetoicin is an injectable treatment available in a heat-stable form, meaning it does not require stable refrigeration. Its use is controlled because it can also be used to terminate pregnancies. Workshop participants suggested implementation research on scaling up misoprostol use by community health workers and carbetoicin use in healthcare facilities as a means of reducing deaths from post-birth haemorrhage.

mHealth: The growth of mobile phone use in sub-Saharan Africa has been rapid in recent years. At the end of 2016, there were around 420 million mobile subscribers, amounting to 43% of the region's population.²² Technology has enabled the rapid spread of mobile banking requiring only simple feature phones as opposed to more expensive smartphones in some countries. Some have seen the potential for mobile phones to bridge healthcare gaps in low-resource settings. While hundreds of programmes have been implemented, there may be scope for research that puts a spotlight on the best ways of using mobile phone technology to help improve some health outcomes for mothers and babies, by linking families to health professionals and emergency transport.

Box 2: Spark Session Box

Non-pneumatic anti-shock garment

Made of articulated segments of neoprene attached with Velcro, the garment moves blood from the lower to upper body through pressure, to deal with PPH. It can stop or slow bleeding, stabilise patients, and avoid the need for surgery. It can be used for 24–48 hours, and be cleaned with a chlorine solution. The garment has been in use in Ethiopia since 2012. Studies show the garment can successfully reduce deaths caused by haemorrhage.²³

19. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD005461.pub5/full>

20. <https://extranet.who.int/rhl/topics/preconception-pregnancy-childbirth-and-postpartum-care/care-during-childbirth/care-during-labour-1st-stage/who-recommendation-progress-first-stage-labour-diagnostic-test-accuracy-1%E2%80%9393cm/hour-cervical>

21. <https://extranet.who.int/rhl/topics/preconception-pregnancy-childbirth-and-postpartum-care/care-during-childbirth/care-during-labour-3rd-stage/who-recommendation-uterotonic-drug-choice-prevention-postpartum-haemorrhage-settings-where-skilled>

22. <https://www.gsmaintelligence.com/research/?file=7bf3592e6d750144e58d9dcfac6adfab&download>

23. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4422609/>

Grand Challenge 3: Better postnatal care for women and their newborns

Current status

The postnatal period is critical to the health and survival of a mother and her newborn. The most vulnerable time for both is during the hours and days after birth. Lack of care in this time period can result in death or disability as well as missed opportunities to promote healthy behaviours affecting women, newborns and children.

Maternal and newborn deaths in the first week after birth occur when coverage and programmes are at their lowest along the continuum of care. The fact that a significant number of women in Africa currently do not give birth in a health facility poses challenges for planning and implementing postnatal care for women and their newborns. Regardless of place of birth, mothers and newborns spend most of the postnatal period (the first six weeks after birth) at home.

Implementation science

Training and management of healthcare workers: Good quality training is required to produce the competent healthcare workers needed to improve outcomes through implementing best practice. Existing medical textbooks may not currently include high-impact postnatal interventions such as skin-to-skin contact. Greater use of newer, web-based training methods could help. Workshop participants highlighted how in some settings high staff turnover, sometimes as a result of training requirements, may undermine performance and suggested some managers and policymakers should prioritise long-term staff retention more than they do currently. Further research on the effects of human resource management and staff turnover on services could drive improvements.

Community postnatal care: Many births in sub-Saharan Africa take place at home or are assisted by unskilled attendants. Some of the most effective solutions involve ensuring the basics are done well at home and in the community. There is a need for formative research on behaviour change and the greater involvement of social scientists in devising interventions that increase the involvement of mothers and families in decision-making. For instance, encouraging mothers to wash their hands before breastfeeding can prevent infections. The provision of more non-clinical care and medical screening by community health workers may make sense, especially in settings where women are reluctant or unable to travel to medical facilities following birth. Further work could be carried out on the use of simple models, decision algorithms and simple technologies to check for signs of infection, measure blood pressure, and teach mothers about keeping babies warm, for example. There is ongoing work on the use of traditional birth attendants and community health workers to screen for postnatal depression. Workshop participants stressed the need for medical students to gain experience of primary and community care as well as hospital care.

Attendance: Postnatal care is poorly attended in many settings. Research on why this is could inform changes that might increase demand for services and improve outcomes. Workshop participants stressed the importance of asking women what care they want, and of providing context-specific options and solutions. Those from rural farming communities may be less likely to attend medical facilities during the harvest, for example. It was pointed out that most women in Nigeria take their babies to health facilities for immunisation, and that this might be an opportunity to offer them postnatal care.

More research is needed on the most effective ways to provide postnatal care when getting to medical facilities or the cost of doing so is an impediment. The idea of providing incentives to women attending postnatal care was discussed; however there were concerns about unintended consequences such as people starting to expect incentives for other areas of healthcare. Perhaps more aspects of care could be delivered at the community level. Examples of effective community peer-to-peer support for some aspects of

postnatal care could be studied and highlighted as a means to improve outcomes elsewhere. It is a research area that might benefit from the greater involvement of social scientists.

Data gaps: Making decisions about how to improve post-birth outcomes for mothers and their babies requires good quality data about the prevalence of conditions, amongst other things. Policymakers are clearly better able to implement effective, evidence-based policies when they have access to good quality, comprehensive evidence. Addressing deficiencies in data is therefore an important aspect of improving outcomes. For example, workshop participants highlighted a specific need for information on the epidemiology of Zika to inform the design of new tools and approaches in affected settings, and for the gathering of data not just on mortality and morbidity, but also on mental health and social needs.

Great efforts should be made to provide a breakdown of data and evidence on causes and magnitude of diseases by country, community, rural vs urban settings and at different socioeconomic levels to inform interventions. Better data on the content of care and quality of care could also improve outcomes.

Care packages: Continued efforts to understand the postnatal healthcare needs of women and babies, including their social and mental health, can help inform the development of context-specific care packages. Different aspects need to be integrated into a continuum of care, so that topics such as excessive bleeding, vaccination, family planning, postnatal depression and breastfeeding are considered together as part of a plan, rather than in isolation. More work including social science research is needed on how best to support mothers following stillbirth.

Workshop participants heard details of research by the Mbale Clinical Research Institute into the introduction of low-cost, simple hospital-based care packages including staff training in two areas of Uganda.²⁴ These measures led to major reductions in newborn mortality from the preterm complications, sepsis and asphyxia.

Reproductive rights and family planning: In 2015, 64% of women of reproductive age with male partners were using contraception worldwide, while in Africa the proportion was only 33%.²⁵ It has been estimated that fulfilling unmet needs for contraception in developing regions could reduce maternal deaths by 73% and newborn deaths by 80%.²⁶ Close to 1 in 10 maternal deaths are caused by unsafe abortions in sub-Saharan Africa.²⁵ Expanding family planning provision is the most cost-effective way to reduce maternal and newborn deaths in sub-Saharan Africa. There is a need to consider the best ways to provide women with contraception to delay the first birth, and after giving birth, as part of postnatal care. Better understanding of when, where and how women want to be provided with family planning advice and resources could help improve outcomes.

Discovery science

Diagnostics: Participants discussed the need for improved diagnostics, especially technology that could be used appropriately and rapidly by health professionals at community primary care facilities for conditions including sepsis, pneumonia, TB and Zika (as previously covered).

Data: Participants noted that addressing deficiencies in data on the causes and prevalence of health problems is important. It is also crucial that this includes disaggregated data as this is most useful.

24. <http://www.un.org/en/development/desa/population/publications/pdf/family/trendsContraceptiveUse2015Report.pdf>

25. <https://populationandsustainability.org/advocacy/unmet-need-for-family-planning/>

26. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(14\)70227-X/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(14)70227-X/fulltext)

Box 3: Spark Session Box

Assessing the accuracy of methods used to record hospital interventions

Every Newborn Birth Indicator Research Tracking in Hospitals (EN-BIRTH)²⁷ is an observational study designed to assess the accuracy of routine registry and reporting documentation, as well as maternal recall, on the quality, content and safety of key maternal and newborn care interventions. It covered 20,000 births in five hospitals in Tanzania, Bangladesh and Nepal. The interventions assessed were uterotonic use for the third stage of labour, immediate breastfeeding, newborn resuscitation, kangaroo care, the treatment of neonatal infection and antenatal corticosteroid use. Data was collected by observers in healthcare facilities and fed into dashboards for real-time monitoring. The research was being written up at the time of the workshop.

Better data collection to improve newborn care

Average childhood mortality in Kenya in 2014 was 52 per 1,000, which was less than half what it was in 2003. These national averages mask intra-country variations; and disparities due to urban or rural residence, educational level, age and socioeconomic status. The quality of healthcare data recording also varies widely. For example, among wealthy Kenyan mothers, 96% of newborns are weighed and 89% of births are registered. Among poorer mothers, just 36% of newborns are weighed and 52% of births are registered. Researchers at the University of Nairobi have developed a standardised paediatric admission form based on clinical guidelines and linked to a database and data analysis tool. The system is used to generate reports that are fed back to hospital staff to help improve quality of care and of data. Fourteen Kenyan hospitals have used the system. The initial focus has been on children aged from one month to five years. A similar tool is under development for newborns.



27. https://www.researchgate.net/profile/Sojib_Bin_Zaman/publication/326069011_Innovative_data_collection_for_maternal_and_newborn_health_research_in_low-resource_settings_from_bedside_to_population_level/links/5b367b624585150d23e4fcdc/Innovative-data-collection-for-maternal-and-newborn-health-research-in-low-resource-settings-from-bedside-to-population-level.pdf?origin=publication_detail

Grand Challenge 4: Better hospital care of sick newborns

Current status

More than 80% of newborn deaths in 2016 had preventable, treatable causes. A number of high-level strategies have been developed to address the problem. The UNICEF Strategy for Health 2016–30 seeks to advocate for every child's right to health, influence government policies, strengthen service delivery and empower communities, for example.

The WHO's Every Newborn Action Plan is designed around a vision of a world in which there are no preventable deaths of newborns or stillbirths, where every pregnancy is wanted, every birth celebrated, and women, babies and children survive, thrive and reach their full potential. Adoption of these global strategies varies between countries. While such plans provide useful guiding principles, workshop participants sought to identify some specific examples of implementation and discovery science that could improve the care of sick newborns in hospitals, especially now that more than half of births in Africa are in hospital. However there has been very little focus on the care of small and sick newborns with few hospitals having a ward, or staff trained and with major gaps in equipment and quality of care.

Implementation science

Clinical care packages: To improve outcomes for small and sick newborn babies in hospital it makes sense to develop integrated packages of care for the three large drivers of newborn deaths – prematurity, asphyxia encephalopathy and infections. There are research gaps around what should constitute minimum clinical care packages for sick babies in hospitals in resource-poor settings. These should take into account things like human resources, guidelines and protocols, be low-cost and easy-to-use and cover how to maintain equipment and infrastructure. For instance, physical space is key, so what is the minimum space per baby in different settings, and is that being adhered to?

Human resources: Situational analysis research is required to better understand the capabilities of hospitals and the contexts they are operating in. For example, there was anecdotal evidence that in some Ugandan hospitals doctors are more inclined and better able to treat mothers than sick newborns. Better understanding of available human resources can help managers understand, for example, whether new staff are needed or whether existing staff can be training to fill gaps. Frequent staff rotation can undermine performance because new staff have to be trained to acquire the specialised skills to care for sick newborns and mothers in labour wards. In settings where recruiting health professionals is unaffordable or there is a failure to attract the relevant staff, task shifting among health professionals and even to non-clinical staff may be appropriate, such as the use of labour ward assistants.

Data: Poor record-keeping undermines efforts to get an accurate magnitude of the problems and review strategies to align interventions to reduce avoidable deaths and morbidities. In some settings, for example, newborn deaths are not recorded or reported. There is a need to find ways to better measure the quality of hospital interventions for sick newborns, and effective data management is key to doing so. It facilitates feedback loops to improve the quality of care.

Online records that can be cross-checked are generally more useful than paper records that remain in separate registries. Ideally systems should allow details to be inputted offline and then uploaded. Standardised national forms, such as those for birth registration, admission records and neonatal registers, are helpful. However there should be deliberate efforts to have enough human resources to ensure that staff have enough time to document events properly. For example, workshop participants learnt about the use of data clerks in some countries, and discussed the possibility of using voice-activated technologies to input data to save time.

Jaundice: Low-cost phototherapy is underused in Africa. It was felt that some form of repository or user group to collect experiences of what has been tried and evidence of what has worked in particular settings would be useful. Implementation research on scaling up evidence-based treatments might be worthwhile.

Discovery science

Asphyxia: There is a need for innovation in the care of newborns with seizures related to asphyxia encephalopathy. Approaches taken in this area include the use of low-cost cooling caps, levetiracetam (Keppra), infrared to identify problems within the brain, transfontanelle ultrasounds to identify changes in the brain, and pharmacological approaches such as the use of magnesium sulphate to protect the brains of asphyxiated babies, melatonin, erythropoietin and vasodilators like sildenafil. Continuous monitoring can make a big difference. More research is needed into the most effective approaches, as well as implementation research on scaling up treatment methods that have been shown to be effective.

Sepsis: Diagnosis of sepsis in newborns is difficult. Research on point-of-care diagnostics is needed. Collecting blood is difficult so ideally tests should use other samples such as urine and saliva. Visualisation of bacteria with the microscopes used in some low-income settings can also be difficult, for example. It was questioned whether it might be possible to produce cheaper versions of electron microscopes. It was reported that Nigerian clinicians have had some success using buffy coat smears to help them visualise bacteria. Lower cost blood cultures and AMR tests would also be beneficial.

Care of small babies: Improved clinical diagnosis of gestational age is needed, such as through a simplified prematurity score that could be used at basic facilities and by community health workers to help referrals. Lower cost, robust versions of a range of technologies could help in the care of small babies including CPAP machines, infusion pumps, apnoea monitors and pulse oximeters. There is also a need to find effective, evidence-based and easier ways to administer surfactants earlier.



Bill & Melinda Gates Foundation/Frederic Courbel

Box 4: Spark Session Box

Maternal and perinatal deaths surveillance and response

Bacterial infections are a major cause of maternal and newborn morbidity and deaths. In settings where many small babies need invasive care and are cared for in close proximity (sometimes sharing cots), infections are responsible for an even higher proportion of mortality and morbidity. Five years ago, South African researchers introduced a simple visual dashboard to highlight cases of infection on a daily and monthly basis in hospital units, with different colours representing days with and without infections. It increases vigilance, encourages collective responsibility and fosters pride in good performance. There are plans to extend its use to prematurity and asphyxia.

Newborn essential solutions and technologies (NEST360)

Malawian researchers have developed a bundle of up to 17 technologies to address the three big killers of newborns – premature birth, infections and birth-related trauma. Known as NEST, the package can be delivered at scale for US\$1.48 per birth. At the time of the workshop, eight of these were already commercially available and the rest were close to being so. The group carried out a detailed search for innovative technologies that could be used in newborn care in African settings. Examples include a CPAP machine that costs around US\$900, which is about one-sixth of the cost of existing alternatives, and a low-cost neonatal temperature monitor with a digital display and simple coloured lights to represent cold, normal and hot babies to help busy nurses.

Mother-Baby Friendly Hospital Initiative (MBFHI)

Delays in receiving lifesaving care at home, in transit and while in healthcare facilities play major roles in maternal deaths. The MBFHI seeks to provide optimal care for mothers and newborns during labour, delivery and the first week of life. Key components include respectful and supportive facility-based care for mothers and babies, early and exclusive breastfeeding, and basic essential newborn care including kangaroo care.

Progress has been made through on-site training and mentorship of healthcare workers in midwifery, leadership and communication, upgrading facilities, the identification of supply bottlenecks, encouraging improved links between community and other healthcare facilities, education on safe motherhood, community engagement days, setting up high-dependency units, safe water supplies, building waiting area shelters and improving hospital privacy.

Research leadership

The science gaps

Sub-Saharan Africa is losing out because of two significant science gaps.

Firstly, it is producing a very small proportion of the research that is published globally. Researchers in the region struggle to get published in high-impact journals. Young African scientists with potential can find it hard to get exposure to both research and research training, for example at medical school. Clinical Masters programmes often fail to offer good quality research opportunities and mentors are often missing. Workshop participants heard that there is a lack of funding for early career researchers, with many donors requiring applicants to have PhDs when it is also hard to get funding to do a PhD. Those seeking funding and doing research in Africa also often face a lack of the supportive infrastructure that those in developing countries generally take for granted.

Secondly, women are poorly represented, both across African science and in the leadership of research.

In addition, too many studies and research networks concerning subjects and trends in sub-Saharan Africa are led from the north. Many African countries are not putting health budget money into research despite having signed up to do so.

African research leadership

Efforts to identify, nurture and mentor African scientists with potential to be leaders should start early. For example, scouting for talent can start early by improving science education in schools, providing school research clubs, running school science camps and launching new awards schemes for young researchers. Later on, research needs to be better integrated into the training of healthcare professionals, by, for example, including specific modules and mentorship on research within curriculums. Providing support for regional research training programmes, such as through the AAS, could strengthen research leadership on the continent. The funding of eight African researchers by the AAS in 2017 who received about US \$100,000 each to tackle maternal, newborn and child health on the continent is a positive step.

Workshop participants discussed the wider use of online tools to help African researchers seek grant funding. They agreed that more work is needed to encourage existing research leaders to become mentors for upcoming researchers, and to build capacity to help African researchers get their research published in high-impact journals.

The experience of the European & Developing Countries Clinical Trials Partnership, which has long sought to strengthen African research capacity, offers some useful lessons. These include the need for funding to be long-term and sustainable, the potential for south-south networking to transform struggling research sites, the need to support female scientific leadership and excellence, and the importance of trying to avoid funders supporting very similar work in different centres who are working in isolation.

Biomedical scientists may not necessarily always ask the right questions or find the best answers. Those seeking to improve maternal and newborn survival and reduce stillbirths can make more progress when they join forces and involve those in different sectors. Obstetricians and paediatricians could, for example, work better together in some settings. Clinicians, engineers, politicians, educationalists, administrators and funders have valuable and different perspectives. Conversations, meetings and workshops may achieve more if they make bridges between sectors. Participants suggested that future meetings might benefit from the presence of researchers from a broader range of fields including, for example, social scientists, economists and engineers.

Gender

Greater female representation in African science could be encouraged through gender sensitive strategic research planning at universities. A key practical step is the introduction of mother- and baby-friendly policies at universities and other institutions to allow female researchers with young children to continue working. The wider adoption of programmes that identify and support promising female researchers would help, as could greater use of female role models and mentors. The appointment of more women on science committees at all levels should be supported.

Networks

Participants discussed a proposal to carry out a 'research network mapping' exercise to improve understanding of the coordination and funding of research into maternal and newborn health initiatives in Africa. The lack of an overarching umbrella network that brings together organisations in the field was highlighted and the possibility of setting one up was discussed. The aims of such a group would include better coordination of the initiation and funding of research, preventing duplication and improving best practice. Initial work would involve the establishment of the specific aims and principles underpinning such a network. It was suggested that an application could be made for a grant from the UK Global Challenges Research Fund Global Engagement Networks call. Participants suggested ongoing discussions and a review of progress, possibly at a meeting in 2019.

Bridging the policy gap

Some researchers are motivated primarily by a thirst for knowledge and a desire to crack a scientific challenge or problem. For those in the field of maternal and newborn health, however, success is primarily measured in lives saved and morbidity and disability averted. Doing and publishing research is, on its own, not enough. It is policymakers who have the power to introduce new policies and change priorities, and health managers who control budgets, and neither often read journals such as the BMJ or The Lancet.

Scientists who want to tackle the unacceptably high maternal and newborn deaths and stillbirth rates in sub-Saharan Africa must therefore find ways to bridge the gap between science and politics. This means engaging and working with politicians and administrators at international, regional, national and local levels in a variety of settings. Policymakers who recognise the urgency and importance of taking action to prevent the needless mortality and morbidity of mothers and their babies can act as champions to push for change. Their job is a lot easier if they have access to accurate, concise, non-technical information on which to base the cases they must make to bring fellow policymakers on board.

One example of how scientists can provide the much needed evidence to bring about change can be seen in the work of the European Parliamentary Forum on Population & Development to advance universal sexual reproductive and health rights. The group publishes intelligence briefings that set out key information and statistics on subjects such as prematurity, sexual and reproductive health and rights, which parliamentarians can then use in their efforts to push for change.

Policymakers should be engaged at the best possible time according to local context. In many cases, the practicalities of policy engagement will require consideration when thinking about which research questions to ask and how to design studies to answer them. Policymakers are more likely to be persuaded of the need for change if they are involved in identifying the problem and agree on the need for research. They should follow the progress of research and be involved in dissemination of the research findings once studies are concluded. It would be better to provide robust evidence through larger studies conducted in multiple centres than from small single pilot studies, for example.

Research evidence that indicates the need for changes that are highly disruptive to existing policies can cause resistance. It may be that presenting economic advantages, such as to productivity, alongside the life-saving benefits of new policies and systems might smooth the path to change.

Workshop participants learnt that the AAS is regularly asked for policy briefs by the African Union. There was a feeling at the meeting that more work on policy briefings on subjects related to maternal and newborn survival and stillbirths could be productive.

Annex I: Steering Committee

Co-chairs:

- Professor Joy Lawn FMedSci, Professor of Maternal, Reproductive and Child Health, Director of MARCH center, London School of Hygiene & Tropical Medicine, UK
- Professor Charles Mgone, Vice-Chancellor, Hubert Kairuki Memorial University, Tanzania

Members:

- Dr Irene Agyepong, Public Health Physician, Dodowa Health Research Center of the Research and Development directorate, Ghana Health Service, Ghana
- Professor Chinyere Ezeaka, National President of the Nigerian Society of Neonatal Medicine, University of Lagos, Nigeria
- Professor Sir Brian Greenwood FMedSci, Professor of Clinical Tropical Medicine, London School of Hygiene & Tropical Medicine, UK
- Professor Liz Molyneux, Professor of Paediatrics, University of Malawi (Retired), UK
- Dr Pius Okong, Chairman of the Health Service Commission, Uganda
- Professor Bob Pattinson, Director of the Maternal and Infant Health Care Strategies Research Unit, South African Medical Research Council, South Africa
- Professor Marleen Temmerman, Director of The Centre of Excellence in Women and Child Health, Aga Khan University, Kenya

Annex 2: Attendees

Name	Organisation
Dr Timothy Abuya	Population Council, Kenya
Dr Bose Adeniran	Federal Ministry of Health, Nigeria
Dr Oniyire Adetiloye	JHPIEGO/Maternal and Child Survival Program, Nigeria
Dr Dahabo Adi	Kenya Field Epidemiology Programme
Dr Moses Aloba	African Academy of Sciences
Dr Justus Barageine	Uganda Christian University, Uganda
Dr Anne-Marie Bergh	University of Pretoria, South Africa
Dr Rachel Brown	Academy of Medical Sciences
Dr Samba Cor	Ministry of Health, Senegal
Ms Elaina Davis	Department of Health & Social Care, UK
Dr Sylvia Deganus	Emergency Obstetric and Newborn Care (JHPIEGO), Ghana
Dr Zelalem Demeke	Clinton Health Access Initiative, Ethiopia
Dr Diawo Diallo	Institut Pasteur de Dakar
Dr Gorgui Sene Diallo	Africare, Senegal
Dr Aissa Diarra	Laboratoire d'Etudes et de Recherche sur les Dynamiques Sociales et le Développement Local, Niger
Dr Queen Dube	University of Malawi, Malawi
Ms Akaco Ekirapa	Department for International Development, UK
Dr Angela Etyang	Aga Khan University, Kenya
Professor Chinyere Ezeaka	University of Lagos, Nigeria
Dr Caroline Harris	Medical Research Council, UK
Mr Alex Hulme	Academy of Medical Sciences
Professor Grace Irimu	University of Nairobi, Kenya
Dr Farouk Jega	Pathfinder International, Nigeria
Dr Tom Kariuki	African Academy of Sciences
Dr Racheal Kimani	Mount Kenya University, Kenya
Ms Mary Kinney	Save the Children, South Africa
Dr Ranmini Kularatne	University of the Witwatersrand, South Africa
Dr Catherine Law CBE FMedSci	University College London, UK
Professor Joy Lawn FMedSci	London School of Hygiene & Tropical Medicine, UK
Professor Address Malata	Malawi University of Science and Technology, Malawi
Dr Andrew Mbewe	World Health Organization, Nigeria
Ms Sheila Mburu	UK Collaborative on Development Research, UK
Professor Charles Mgone	Hubert Kairuki Memorial University, Tanzania
Dr Placid Mihayo	Uganda Ministry of Health, Uganda

Name	Organisation
Professor Florence Maureen Mirembe	Makerere University, College of Health Sciences, Uganda
Professor Liz Molyneux	University of Malawi (Retired)
Dr Angela Muriuki	Save the Children
Dr Christine Musyimi	Africa Mental Health Foundation, Kenya
Mrs Lillian Mutengu	African Academy of Sciences
Mr Meshack Mutua	African Academy of Sciences
Dr Charles Mwansambo	Health Services, Malawi
Professor Victor Mwapasa	College of Medicine, Malawi
Dr Osman Nafissa	Eduardo Mondlane University, Mozambique
Dr Victoria Nakibuuka	St. Francis Hospital Nsambya, Uganda
Professor Grace Ndeezi	Makerere University, Uganda
Dr Tom Nyirenda	EDCTP, Cape Town, South Africa
Dr Eric Ogola	Jaramogi Oginga Odinga University, Kenya
Professor Angela Okolo	University of Benin, Benin
Dr Pius Okong	St. Francis Hospital Nsambya, Uganda
Dr Peter Olupot-Olupot	Mbale Regional Referral Hospital, Uganda
Dr Judy Omumbo	African Academy of Sciences
Dr Ayo Palmer	Westfield Clinic Trust, The Gambia
Professor Bob Pattinson	University of Pretoria, South Africa
Dr Gloria Quansah Asare	Ghana Health Service, Ghana
Dr Rachel Quinn	Academy of Medical Sciences
Dr Niaina Rakotosamimanana	Institut Pasteur de Madagascar
Dr Natasha Rhoda	University of Cape Town, South Africa
Ms Holly Rogers	Academy of Medical Sciences
Dr Garba Safiyanu	UNICEF, Nigeria
Dr Nahya Salim	Muhimbili University of Health and Allied Sciences, Tanzania
Dr Estelle Sidze	African Population and Health Research Center, Kenya
Dr Issiaka Sombié	West African Health Organisation, Burkina Faso
Professor Marleen Temmerman	Aga Khan University, Kenya
Mr Anthony Thuku	African Academy of Sciences
Professor Nynke van den Broek	Liverpool School of Tropical Medicine, UK
Professor Peter von Dadelszen	King's College London, UK
Professor Peter Waiswa	INDEPTH Network, Uganda
Dr Fred Were	University of Nairobi, Kenya
Ms Angeline Yalwala	African Academy of Sciences



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