

Workshop Report

Global Nutrition and Health Workshop



9 June 2017

BEIS Conference Centre, London, UK

This report summarises the outcomes of MRC's Global Nutrition and Health workshop, held on the 9 June in London. It draws on the research presentations and subsequent discussions, the conclusions from break-out groups and open general discussions, as well as answers to a pre-workshop survey.

Background

As an outcome of the [OSCHR strategic review of nutrition research](#), the MRC has identified three main pillars of activity to maintain strengths in nutrition research: building a UK research base, developing a global nutrition and health strategy, and engaging with the food industry.

To refine activities in global nutrition and health research, the MRC held a scoping workshop and information event. Delegates were largely UK-based global nutrition researchers ([Annex 3](#)).

The aims of the workshop were the following:

1. To help the MRC prioritise scientific areas in global nutrition research;
2. To provide an opportunity to discuss challenges and rewards of working in/with Low and Middle Income Countries (LMICs);
3. To inform the community about MRC's strategy for Global Health Research and the activities of MRC Global Health Group;
4. To inform the community about funding opportunities in global health, especially under the Global Challenges Research Fund (GCRF);
5. To consult the delegates on their longer-term strategic vision for global nutrition research and how best to shape future funding opportunities to achieve such vision;
6. To launch the [Confidence in Global Nutrition and Health Research](#) funding call.

Priorities in Global Nutrition and Health Research

Tackling global nutrition problems must be founded on an in-depth understanding of the links between nutrition and health, and of the factors that determine nutritional patterns. Such understanding must rely on a holistic approach to nutrition research, requiring strong interactions between disciplines such as health and medical sciences, food production and supply systems, and social sciences.

Delegates started by highlighting the most pressing global nutrition problems, with respect to relevance and scale of health challenges. With this in mind, delegates identified the areas in global nutrition research that must be prioritised to tackle health problems in the short and medium terms and to inform strategies to create long-term impact in global nutrition.

The most pressing nutrition-related health problems identified were:

- Malnutrition and micronutrient deficiencies-related conditions: stunting, wasting, growth faltering, impaired cognitive and behavioural development, impact of childhood malnutrition in later life.
- The rise of Non-Communicable Diseases (NCDs) in some LMICs.
- The emerging problem of the double burden of overweight and micronutrient deficiencies that can co-exist in the same population and even the same individuals.

In order to tackle such problems, delegates agreed that the following research areas must be prioritised:

1. Mechanistic understanding:

Nutritional adequacy in health and disease must be informed by basic/mechanistic research on the interplay between nutrition, health and disease. This echoes some of the recommendations of the OSCHR review: research should aim to establish the links between diet, general health and diseases including infections, inflammation, NCDs, and respective co-morbidities. Detailed mechanistic insights are necessary to: (i) advance understanding of underlying causes and consequences of malnutrition; (ii) understand the effects of nutrition on general physical and mental health and cognition; (iii) establish causality between nutrition and disease susceptibility, progression and outcome; (iv) establish how nutrient uptake is affected by general health (e.g. gut health and function, iron uptake and anaemia, gut microbiome and early microbial colonisation, and pathogenic organisms in the gut), disease status (such as infections), and lifestyle (e.g. physical activity).

However, unexpected observations and failed nutritional interventions (as exemplified in Dr Ann Prentice's talk, [Annex 2](#)) have exposed the risks of extrapolating nutritional evidence generated in western populations to world-wide settings, without considering genetic and epigenetic make-up or life history of the populations and individuals concerned. These observations stress the need for research into the inheritable bases for individual and population responses to nutrition and reach through to molecular level understanding and mechanisms. Researchers suggested that studies in migrant populations (originally from LMICs that are currently living in high income countries) may pave the way for understanding the genetic and molecular bases for population-specific responses to nutrition.

2. Nutrition through the life course:

Current nutritional guidelines are largely based on evidence generated in healthy adults and lack evidence for pregnant and lactating women, children, adolescents or the elderly. A life course perspective in global nutrition research must be undertaken to inform nutritional adequacy in health and disease at these key life stages.

There is extensive evidence demonstrating the importance of the first 1000 days of life (from conception to the 2nd birthday) in determining health outcomes and resilience to disease throughout life. Further research in this area is needed, but delegates also agreed that the focus should be extended to encompass pre-conception maternal health up to early childhood. For example, research into strategies to prevent childhood malnutrition through promoting healthy food habits amongst women, and adequate baby feeding practices and behaviours. In addition to prevention and treatment of acute malnutrition, more research is needed into the reversibility of childhood malnutrition effects: early childhood is a particularly critical period as it may present a window of opportunity to mitigate some of the life-long consequences of childhood malnutrition, such as susceptibility to NCDs in later life.

As the burden of infection falls, the ageing demographic is changing (in particular in middle income countries), calling for guidance on nutritional requirements for healthy ageing. Such guidance must consider forms of food provision that are compatible with old-age health issues such as tooth decay.

3. Understanding the determinants of nutrition and dietary patterns:

Nutrition and dietary patterns are largely determined by socio-economic and cultural context. Understanding the determinants of nutrition requires highly integrative/multidisciplinary research, for example including the following areas:

- Food production, the supply chain, and linkages to human health: Short and long-term solutions to food availability problems rely on the production and supply of nutritious food (as informed by mechanistic understanding). Research must therefore focus on sustainable agriculture and farming practices (harmonized with ecosystems and prepared for climate change); on improving the understanding of environmental effects on human health through agriculture (e.g. effects of fertilizers and pesticides and health of livestock); and on the safety of food supply chains to assure food hygiene. Finally, delegates emphasised the need for more evidence on the effects of marketing, food policy and food tax on dietary patterns to address the rise in consumption of food with high caloric content and to promote consumption of nutritious food. Delegates agreed that the research community must engage with food companies (be they local or international) to tackle global nutrition problems in the long term.
- Cultural and socio-economic factors that determine dietary patterns: Although contextual factors are broad, complex and very heterogeneous across the world, delegates prioritised research into the effects of education, literacy and family dynamics on nutrition. Important areas of study include strategies to educate and empower women to make dietary choices for themselves and their children.
- Effects of epidemiological transitions on dietary patterns: Transitioning societies have seen a rise in NCDs and of the double burden of malnutrition and obesity, mainly as a consequence of urbanization, changes in lifestyle and physical activity (sedentary jobs), and increased availability of food with high caloric content and poor nutritional value.

Although such health problems are common world-wide, mechanistic research is needed to establish causes and disease aetiology in different populations. A possible approach is to focus on causes of within-country nutrition and health inequalities.

- Effects of conflicts, natural disasters, and forced migration on food availability and dietary patterns: Research into migrating populations has the potential to provide key insights into resilience and adaptation to dietary changes, as well as the net effects of environment on nutrient uptake.

4. Nutritional Interventions:

More intervention studies are needed but, as highlighted earlier, these must be: (i) informed by mechanistic evidence specific to the populations and health status of the individuals concerned; (ii) based on an understanding of the broad socio-economic context; (iii) culturally acceptable; (iv) aligned with health systems to coordinate delivery of care (when appropriate). Only then will the outcomes of such intervention studies be able to inform in-country nutrition policies and guidance.

The successes and failures of past and on-going nutritional interventions have the potential to provide invaluable information into context-specific determinants of nutrition as well as an opportunity to draw mechanistic insights. Extracting such information (and determining the outcome of the interventions in a robust way) can only be achieved through monitoring and evaluation of trials, open access and data sharing. This requires global nutrition researchers to work closely with the funders of nutritional interventions to ensure agreed standards are met.

Finally, delegates mentioned the need for long-term follow up of interventions to address life-course impact, for example effects of interventions to mitigate childhood malnutrition in adulthood, or effects of maternal interventions on health of the offspring.

5. Methodologies:

Nutrition research, both in the UK and globally, requires standardised and validated methodologies, such as objective measures of food composition (nutrient profiling, surrogate markers of nutritional value), and methods to quantify food intake (e.g. measurement of portion sizes) and to measure nutrients in vivo. Food composition data could be compiled from currently existing sources rather than starting afresh.

Health-wise, there is a need to standardize methods to measure physical parameters (e.g. child growth), and to establish and validate reliable biomarkers of nutritional status and health.

Ideally, methods and research protocols should be cost-effective and easy to implement in remote areas (e.g. bloodspots). There is also immense potential to expand the use of mobile phone technology as an affordable and easy way to improve reach of the study population and to collect and link data.

Recommendations for the success of global nutrition research

To achieve success in the areas highlighted above, to ensure sustainable and equitable research partnerships and to develop research questions “with a future”, delegates made the following recommendations:

- Funders need to understand the needs of LMIC-based researchers in terms of basic resources, equipment and infrastructure.
- Investment to develop in-country capacity for future-proof research.
- Coordinated strategic efforts between UK and LMIC funders to define research priorities and broker relationships between researchers.
- Long-term financial support to maintain partnerships, and help address long-term research questions.
- Cross-country efforts towards more harmonised approaches to research governance and ethics approval.
- Re-thinking of the peer review process and membership of funding panels, to accommodate highly multidisciplinary research.

Annex 1: Workshop Delegates and Workshop Format

Workshop Delegates:

The workshop was advertised and expressions of interest were invited on the MRC website. Delegates comprised forty selected UK-based global nutrition researchers ([Annex 3](#)), selected to ensure: (i) a balance of scientific areas of expertise; (ii) experience in working in/with different LMICs; (iii) at least one representative from all the research organizations that expressed interest. Invited delegates included Prof Paul Elliott (chair), Dr Ann Prentice, Prof Caroline Fall and Prof Michelle Holdsworth (speakers), Prof Alan Dangour (representing DfID) and Dr Louisa Jenkin (BBSRC).

Workshop Format:

The workshop agenda can be found in [Annex 4](#). The first session of the workshop was held jointly with the MRC “Global Mental Health Research Workshop”. This session was chaired by **Prof Peter Piot** (London School of Hygiene and Tropical Medicine and Chair of MRC Global Health Group) who introduced MRC’s strategy for Global Health Research and the activities of MRC Global Health Group. **Dr Des Walsh** (MRC) introduced MRC’s international funding activities with particular emphasis on GCRF. **Dr Rachel Knowles** (MRC) spoke about “Ethics and Research in LMIC”. She introduced the MRC Principles (2004) and other sources of guidance and outlined characteristics of ethical research: mutual benefit to all parties, transparency, trust and consent. Dr Knowles also laid out the expectations for global health research proposals: awareness of the ethical issues, evidence that the research is relevant to health needs of the local population and adaptable to local health and social systems.

The second session was chaired by **Prof Paul Elliott** (Imperial College London and chair of MRC’s Population and Systems Medicine Board) who provided an overview of MRC’s strategic plans to develop nutrition research. This was followed by three scientific talks by **Dr Ann Prentice**, **Prof Caroline Fall** and **Prof Michelle Holdsworth** ([Annex 2](#)) and a panel discussion. Speakers focused on their global nutrition research activities and on the challenges and rewards of working in LMIC settings. Key messages were that nutritional interventions and guidance must be informed by an in-depth understanding of the biology of the populations and their cultural and socio-economic context, and that more basic/mechanistic research, as well as qualitative research, are necessary to this end. Speakers also stressed the vital importance of sustainable and equitable partnerships with in-country researchers.

The afternoon session consisted of break-out groups and an open general discussion, also chaired by Prof Paul Elliott. In a pre-workshop survey, delegates were asked the following question: “**In your opinion, what are the three key scientific priorities in global nutrition and health research?**” Responses served as a starting point for the break-out group discussions, where each group (10 delegates) was asked to discuss and agree on the priority areas that should constitute the focus of MRC’s activities in global nutrition research. At the end of the session, group chairs reported the top three priorities. Once these conclusions were noted and listed, there was a final opportunity for open discussion.

In the last session MRC staff presented funding opportunities including the “Confidence in Global Nutrition and Health Research”. Finally, there was opportunity to discuss options for the shape of future funding calls in Global Nutrition and Health Research, in particular a larger initiative in the financial year of 2018/19. Options included: (i) project or small programme grants; (ii) meaningful large programmes; (iii) network funding to encourage multidisciplinary work. Although no general consensus was achieved, delegates were largely in favour of options (ii) or a combination of (ii) and (iii). The community was reminded to take advantage of all MRC’s funding streams and that ODA applications are welcome in regular response mode.

Annex 2: Summary of Presentations

Dr Ann Prentice (MRC Elsie Widdowson Laboratory, University of Cambridge): **“Reaping the rewards of nutrition and health research in LMIC: people practicalities and partnerships”**.

Dr Prentice started by discussing unexpected observations and outcomes in nutrition research and interventions, as exemplified by the following pieces of work:

- Calcium supplementation trials in pre-pubertal children and during pregnancy in The Gambia (where diet is low in calcium) in which none of the expected benefits on pre-pubertal growth, maternal blood pressure, breast-milk calcium content and infant growth were observed but where, in follow-up studies, there were unexpected effects on maternal bone mineral content and on child and adolescent growth.
- A study of HIV-positive urban black South African women, where contrary to studies conducted among white populations, HIV infection (with or without antiretroviral therapy) did not affect vitamin D status.
- Studies on nutritional rickets in The Gambia, Kenya, Nigeria, Malawi, and Bangladesh where vitamin D deficiency was only identified in Kenya. This disease was vitamin D-independent in the remaining countries and may instead have been related to calcium and iron deficiencies.

These unexpected outcomes and findings on nutritional requirements for health underscored the risks of applying nutritional evidence generated in Caucasian populations to world-wide settings. Adequate nutritional guidelines and interventions in any given setting must be underpinned by mechanistic research on the biology and wider context of the populations concerned. Dr Prentice also stressed the need for robust methodologies and standardized protocols that are essential for rigorous research.

Finally, she emphasized that the success of global nutrition research relies on strong partnerships with LMIC-based researchers. These require engagement with local communities to maximize the design and acceptability of research, and are critical to build in-country research capacity for the future. Fostering such partnerships requires time and priming, and Dr Prentice welcomed MRC's pump-priming initiative in global nutrition and health research.

Prof Caroline Fall (MRC Lifecourse Epidemiology Unit, University of Southampton): **“Foetal nutrition and life-long health – research in India”**.

Prof Fall discussed the importance of maternal diet and early life nutrition as determinants of health outcomes in later life, in particular with respect to vulnerability or resilience to NCDs. Research in this area has become increasingly more complex in transitioning societies where undernutrition (due to poverty and general deprivation) co-exists with overnutrition (due to rapid urbanizations and changes in lifestyle).

Prof Fall drew from her past and on-going work, especially cohort studies, to illustrate these issues:

- The Pune Maternal Nutrition study (rural India): women consuming a diet with higher amounts of leafy vegetables, fruit and milk during pregnancy had babies with higher birth weight.
- The SARAS study: a randomised controlled trial in Mumbai (India), where an improved quality diet at least from 3 months prior to conception, reduced the prevalence of gestational diabetes and led to increased birth size. Children are being followed up for growth, metabolism and cognitive function.

- The on-going emphasis study: epigenetic mechanisms linking maternal nutrition with health in children, using the SARAS cohort and The Peri-Conceptional Multiple Micronutrient Supplementation Trial cohort in The Gambia.
- The Healthy Life Trajectory Initiative (Helti) in LMICs with rising NCDs: interventions in India, South Africa and China from pre-conception to early infancy, with outcomes on NCDs and cognition.
- The Consortium on Health Orientated Research in Transitioning Societies (COHORTS) which strengthens the collaboration amongst the largest and longest running birth cohorts to produce evidence on early origins of chronic diseases.

Prof Fall also discussed the main barriers to adequate maternal and children's nutrition, which encompass deficits in the production and supply chain and high food costs, but also societal and family constraints. Overcoming these barriers requires more qualitative research in nutrition behaviour and links between nutrition, agriculture, environment and markets.

Finally, she highlighted the most pressing needs in global nutrition research: sustained funding for the viability of long-term projects; build-up of in-country capacity, while preventing brain drain; and better methodologies, technical resources and databases.

Professor Michelle Holdsworth (The University of Sheffield): **“Nutrition research priorities – lessons from Africa”**.

Prof Holdsworth presented the “SUNRAY study” aimed at developing a nutrition research roadmap for sub-Saharan Africa. This comprised a systematic review of publications co-authored by African researchers, with respect to scientific topics and research teams. In parallel, there was a stakeholder consultation (3 regional workshops and in-depth case studies in 6 countries involving around 200 stakeholders from 40 countries) on priorities for nutrition research and research environments. The main messages were the following:

- Most studies were focused on treatment rather than prevention, and few studies were based on interventions; there was little interest on wider determinants of nutrition; despite high number of publications, there was duplication of focus.
- Less than half of publications had African researchers as first authors; however research teams tended to cluster around non-African institutions, and the cross-Africa networks were underdeveloped.
- Stakeholders identified interventions to improve nutrition as key research priorities. Such interventions must be undertaken at the community, behavioural and food security levels.
- Improving the research environment for global nutrition requires: alignment of funding with African priorities; capacity development; enhanced communication of information in nutrition research and better governance.
- African researchers welcome sustainable partnerships with researchers in high income countries that draw on complementary competencies.

In addition to the need for improved methodologies, Prof Holdsworth stressed how research planning needs to consider the complexities of the nutrition landscape: the double burden of undernutrition and obesity at the societal and individual level; the diversity of populations and heterogeneity of socio-economic status within and across African countries; and the level of existing research capacity and infrastructure.

Annex 3: Workshop Delegates

Dr Nasima Akhter	Durham University
Mr Robert Akparibo	The University of Sheffield
Professor Stephen Allen	Liverpool School of Tropical Medicine
Dr Inka Barnett	University of Sussex
Professor Jeff Brunstrom	University of Bristol
Dr Emilie Combet	The University of Glasgow
Professor Alan Dangour	DfID / London School of Hygiene and Tropical Medicine
Dr Delan Devakumar	UCL
Professor Hal Drakesmith	MRC Human Immunology Unit, University of Oxford
Professor Louise Dye	University of Leeds
Professor Suzanne Filteau	London School of Hygiene and Tropical Medicine
Professor Paul Elliott (chair)	Imperial College London
Dr Nita Forouhi	MRC Epidemiology Unit, University of Cambridge
Professor Caroline Fall	MRC LEU & University of Southampton
Professor Gary Frost	Imperial College London
Professor Keith Godfrey	MRC LEU & University of Southampton
Dr Carolyn Greig	University of Birmingham
Professor Paula Griffiths	Loughborough University
Professor Paul Haggarty	University of Aberdeen
Professor Marion Hetherington	University of Leeds
Professor David Hodson	University of Birmingham
Professor Michelle Holdsworth	The University of Sheffield
Dr Angus Hunter	University of Stirling
Professor Susan Lanham-New	University of Surrey
Dr Georg Lietz	Newcastle University
Professor Ian Macdonald	University of Nottingham
Professor Adrian Martineau	Queen Mary University of London
Dr Sophie Moore	King's College London
Dr Victoria Moran	University of Central Lancashire
Professor Michael Muller	University of East Anglia
Dr Helen Nabwera	Great Ormond Street Hospital
Dr Ana Namburete	University of Oxford
Prof Peter Piot (chair)	London School of Hygiene and Tropical Medicine
Dr Ann Prentice	MRC EWL, Cambridge/ MRC Unit The Gambia
Dr Revati Phalkey	University of Nottingham
Dr Luigi Sedda	Lancaster University
Dr Matt Silver	MRC Unit The Gambia
Prof Parveen Yaqoob	University of Reading
Mr Giacomo Zanello	University of Reading

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Dr Ana Antunes-Martins	MRC
Dr Mariana Delfino-Machin	MRC
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Dr Louisa Jenkin	BBSRC
Dr Rachel Knowles	MRC
Dr Des Walsh	MRC

Annex 4: Workshop Agenda

GLOBAL NUTRITION AND HEALTH WORKSHOP 9 June 2017, BEIS Conference Centre, London

9:30-10:00	Registration and coffee
10:00 – 10:20	<i>Introduction and perspectives on global mental health and nutrition</i> Prof Peter Piot, LSHTM and Chair of MRC Global Health Group
10:20-10:40	<i>Global Challenges Research Fund</i> Dr Des Walsh, MRC
10:40-11:00	<i>Ethics and research in LMICs</i> Dr Rachel Knowles, MRC
11:00 -11.15	Coffee break
	<i>Research Talks</i> Chair: Prof Paul Elliott
11:15-11.35	<i>Reaping the rewards of nutrition and health research in LMIC: people, practicalities and partnership</i> Dr Ann Prentice , MRC Elsie Widdowson Laboratory
11:35-11:55	<i>Fetal nutrition and lifelong health - research in India</i> Prof Caroline Fall, University of Southampton
11:55-12:15	<i>Challenges of conducting research to prevent diet related non-communicable diseases in an African context</i> Prof Michelle Holdsworth, The University of Sheffield
12:15-12:45	<i>Panel Q and A</i>
12:45-13:30	Lunch Break
13:30-14:30	<i>Break-out groups</i> Chair: Prof Paul Elliott
14:30-14:45	<i>Feedback from break-out groups</i>
14:45-15:15	Coffee Break
15:15-16:00	Open Discussion: <i>Prioritisation of research areas in global nutrition and health</i>
16:00-16:20	<i>“Confidence in Global Nutrition and Health Research” pump-priming institutional awards, guidelines for applicants and Q&A</i> Dr Ana Antunes-Martins/ Dr Des Walsh, MRC
16:20-16:30	Wrap up and close