




Closing the gap: data-based decisions in food, nutrition and health systems: proceedings of the Fifth International Summit on Medical and Public Health Nutrition Education and Research

Celia Laur ^{1,2}, Jørgen Torgerstuen Johnsen ¹, James Bradfield ^{1,3}, Timothy Eden,^{1,4} Sucheta Mitra,¹ Sumantra Ray^{1,5,6}

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For numbered affiliations see end of article.

Correspondence to

Dr Celia Laur, NNEdPro Global Centre for Nutrition and Health St John's Innovation Centre, Cambridge CB4 0WS, UK; c.laur@nnedpro.org.uk

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ABSTRACT

Introduction Like many of the biological sciences, nutrition has rapidly become a science which relies heavily on data collection, analysis and presentation. Knowledge gaps exist where data does not, and so the fifth annual International Summit on Medical and Public Health Nutrition Education and Research was held to address the theme of 'Closing the Gap: Data-based Decisions in Food, Nutrition and Health Systems'.

Setting Homerton College, University of Cambridge, Cambridge in July 2019.

Key findings Data-driven decision making is more likely to lead to positive change in areas such as malnutrition, food insecurity and food production. These decisions must be informed by multiple stakeholders from various backgrounds in multisectorial collaboration. Case examples presented at the Summit contribute to the International Knowledge Application Network in Nutrition 2025, which aims to help identify and close gaps in nutrition and healthcare.

Conclusions Formation of international networks are required to advance nutrition research, identify gaps and generate high-quality data. These data can be used to adequately train healthcare professionals resulting in positive impact on clinical and public health. Strengthening collaboration between existing networks will be essential in sharing data for better health outcomes.

INTRODUCTION

To make informed decisions regarding food and nutrition that impact our health systems, we need high-quality, reliable data in multiple forms, including: source data and metadata, data analysed into information and information synthesised into intelligence. In some cases, this means increasing our access and use of existing data. In other cases, reliable data may not be available or is not being used effectively. This gap in use of data-based decisions is in both food and health systems. The aim of this manuscript is to demonstrate the importance of making sure that data is

available and used effectively to support decisions that impact the health and resilience of a population, including food and nutrition security, as discussed at the fifth International Summit on Medical and Public Health Nutrition Education and Research. The Summit was held at Homerton College, University of Cambridge, Cambridge on 10–11 July 2019, hosted by the Need for Nutrition Education/Innovation Programme (NNEdPro) and its Global Centre for Nutrition and Health.

The NNEdPro Global Centre is an interdisciplinary think-tank, training academy and knowledge network anchored in Cambridge, UK. Our work includes developing adaptable and scalable models for nutrition education, combining clinical/public health knowledge with leadership training to aid implementation in healthcare settings, globally. Our annual Summit is an opportunity to bring together potential change makers from various countries, professions, and sectors all interested in the dynamic interfaces between Nutrition and Health. The inaugural Summit in 2015 began as an introduction joining these interfaces, encouraging collaboration and setting the stage for next steps.¹ The 2016 event set global priorities leading to the 2017 event on how to implement changes for sustained impact.^{2–3} 2018 was dedicated to 'Nutrition as a Hard Science,' which inspired the focus on the need for the use of high-quality data in 2019.^{4–5} The 2019 theme was 'Closing the Gap: Data-based Decisions in Food, Nutrition and Health Systems'. Speakers for the event were invited based on their expertise, with topics chosen to demonstrate the breadth of factors to consider, ranging from practical case examples through to complex methodology. Details of the event are provided in

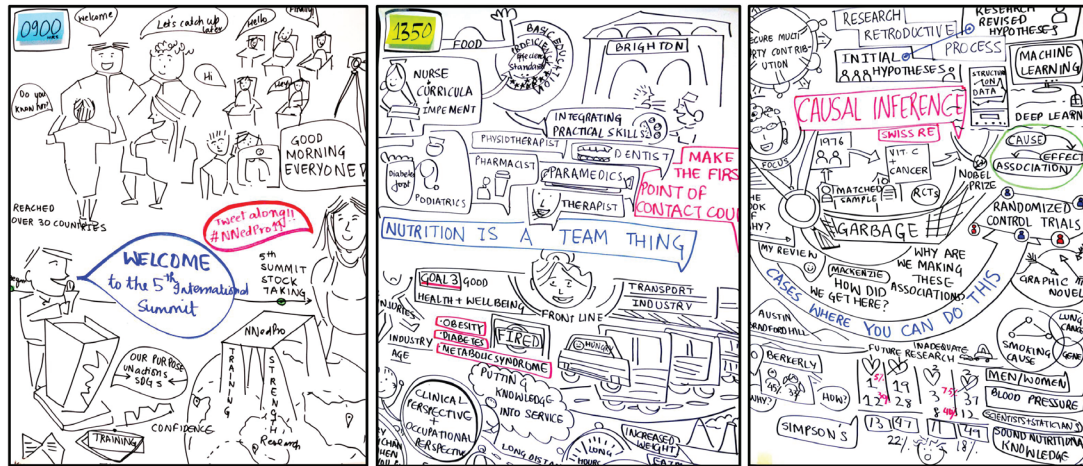


Figure 1 The Summit and Global Strategy Day were attended by Siddhi Gupta, an artist who provided a visual representation of the presentations and discussions. Representations from three sessions are provided. Credit: Siddhi Gupta.

online supplemental file 1, and a visual representation of three sessions is provided in figure 1.

A GLOBAL SYSTEMS PERSPECTIVE ON DATA-DRIVEN DECISIONS

Malnutrition, in all its forms, includes both overnutrition (eg, obesity) and undernutrition (eg, wasting, stunting, underweight), vitamin and mineral insufficiencies/deficiency, and resulting diet-related non-communicable diseases (NCDs).⁶ Malnutrition affects every country and has an enormous impact on health and economies.⁷ Although stunting and wasting are in decline overall, there is significant increase in food insecurity, overweight and obesity.⁷ This shift has created a ‘double burden of malnutrition’, where undernutrition coexists with obesity and diet-related NCDs in the same country, population, household or individual.^{8–9} This double burden has become the ‘new normal’ in many countries, irrespective of its economic development. Furthermore, breastfeeding and anaemia rates have stagnated despite ongoing development, research and policy targets to prevent and optimise them.⁷

To combat malnutrition, the world committed to the United Nations (UN) Sustainable Development Goals (SDGs) to end malnutrition by 2030, particularly through SDG 2: Zero Hunger.¹⁰ Seeing that the progress to tackle all forms of malnutrition remained slow pre-SDGs, the UN proclaimed the UN Decade of Action on Nutrition (2016–2025), referred to as the Nutrition Decade, to increase nutrition investment and implement policies and programmes to improve food security and nutrition within the framework agreed at the Second International Conference on Nutrition held in November 2014.¹¹ Lina Mahy, from the World Health Organization (WHO), presented on the global work conducted within the Nutrition Decade and the importance of building nutrition capacity among health workers. To tackle overnutrition and undernutrition, and food insecurity, nutrition must

be mainstreamed in the health system as well as in our food system.

To further explore SDGs, an essay competition was held with the theme: ‘Utilising the SDGs to curb malnutrition’. The winner was Dr Bhansali, a general practitioner and recent graduate of the fourth annual NNEdPro Cambridge Summer School in Applied Human Nutrition, held immediately prior to the Summit. His essay highlighted that malnutrition transcends age, gender, culture and postcode. It suggested nutrition education for members of society who are held as ‘responsible,’ such as doctors and mothers, so that they can train others within the community. Crucially, they can provide this training from the perspective of a member of that community, and thus bring intricate knowledge of local culture and barriers. Culinary Medicine UK¹² and NNEdPro’s Mobile Teaching Kitchens¹³ were two examples used to describe the development of local champions. The runner up was Mohammad Sayeem, another Summer School graduate, who used Bangladesh as a case study to highlight the need for a multisectorial approach to finding effective solutions. Both entries highlighted the need for an open data and information exchange culture.

Case examples of data-driven decisions

Data-driven outcomes should be the cornerstone of helping to drive and deliver public health policies and nutrition interventions to address the challenges faced on the global stage. An example of this at the level of food security and promotion of diet diversity targeting specific unmet population needs, was showcased by the research team at Millets and Nutritional Enhancement Traits for Iron bioavailability (MillNET_i), a UK Research and Innovation Global Challenges Research Fund programme on biofortified millets in Ethiopia and The Gambia. This collaborative working group, under the umbrella of Cambridge Global Food Security, is a virtual centre at the University of Cambridge seeking to address public health needs in Ethiopia and The Gambia. Iron-deficiency

anaemia is a highly prevalent nutritional deficiency in these regions with adverse health effects on cognitive/motor development and function as well as increasing risk of maternal and child death.^{14 15} The project has focused on developing methods and techniques viable in the area to improve nutritional iron status combining the expertise in crop genetics, social sciences and knowledge exchange. Introducing a biofortified crop (commonly consumed pearl millet) with higher levels of iron and zinc, which can be used for flour and grains, is helping to enhance iron availability, absorption and subsequently improve nutritional status and health outcomes. The team widely emphasised the importance of stakeholders in the public, private and third sectors to engage and help evolve policy and deliver sustained and equitable impact.

A further example of data-driven outcomes and knowledge translation addressing regional nutritional issues was delivered by Dr Buckner who showcased the work by NNEdPro Teaching Kitchens, delivering workshops in urban slum areas of Kolkata, India.¹³ This work aimed to address inequities by creating a grassroots project that empowered locals to produce nutritionally balanced meals with local and affordable ingredients. This initiative targeted not only the improvement of nutritional status but also breaking educational and social barriers to disseminate information and culinary practices following the model of 'See one, Do one, Teach One'. A grassroots approach to ensure local empowerment was emphasised, with the future ambition of developing the model to create an income stream vital for sustainability. Data from

physical and cognitive assessments, as well as knowledge, attitude and practice questionnaires to measure changes in education during and after the workshops, may help to drive and influence future projects enabling expansion in different environments and other cohorts which experience malnutrition and high levels of homelessness. This approach allows the evaluation of targets centred on seven nutrition-sensitive SDGs through rigorous data collection in a manner that is potentially scalable.

A final case example referred to the importance of sharing high quality data among like-minded groups. Preceding the Summit, NNEdPro held its annual Global Strategy Workshop. Stakeholders and representatives from global collaborators and affiliated institutions gathered to discuss how to work together as an international network to advance nutrition education and research in support of our mission around global capacity building in nutrition. The main topics of discussion were ways to strengthen research, implementation of solutions and educating professionals, and addressing inequities by taking stock of the role that a global think-tank can play to complement the approaches of other actors in the second half of the UN Nutrition Decade from 2020 to 2025. Key points of this discussion are provided in [table 1](#).

These case examples are all contributing to the International Knowledge Application Network in Nutrition 2025 (I-KANN-25), supported by the Laboratory of the Government Chemist. I-KANN-25 seeks to create a global network to identify gaps in nutrition knowledge, then develop and deliver high impact technology-based

Table 1 Key points from the global strategy workshop group discussions

Breakout discussion groups	Key points
Strengthening research	<ul style="list-style-type: none"> ▶ There is a lot of specialist knowledge within NNEdPro, however, there is a lack of dissemination of key messages across all audiences. ▶ Improvement is needed in science communication; we need to take research and communicate it in a way that is easy for all to understand and apply. ▶ Need to increase connection with those in psychology, anthropology, culture, genetics, and other relevant fields. ▶ How can we apply what we know more efficiently?
Implementing solutions and educating professionals	<ul style="list-style-type: none"> ▶ Keep educating key professionals in nutrition as this is still a strong need. ▶ Further consider the 'patient' and care partner perspective by increasing collaboration with individuals with lived experience. ▶ Continue to engage health system stakeholders in every part of the planning and implementation of a new initiative. ▶ Build strategic partnerships, such as with lifestyle medical doctors, while always following the evidence. ▶ Increase signposting to existing services, websites, and knowledge pathways, to help build a community of practice. ▶ Continue to engage with health managers and policy makers.
Addressing inequities	<ul style="list-style-type: none"> ▶ There are opportunities to support key populations that are underserved in the healthcare system, while making sure support is provided in an equitable way. ▶ There are many challenges with this work, including limitations of resources and funding. ▶ Further exploration of the Mobile Teaching Kitchen model is needed, with careful consideration of how to adapt to other cultures in an equitable way.

NNEdPro, Need for Nutrition Education/Innovation Programme.

nutrition education to healthcare providers within a sustainable framework. I-KANN-25 has four main steps: (1) Assess and identify knowledge gaps; (2) Collate and synthesise evidence; (3) Develop and deliver education and training interventions and (4) Evaluate and assess delivery methods and healthcare impact. The overall aim is to improve global health and nutrition, and reduce hunger, disease and malnutrition through open access knowledge sharing, including contributions and utilisation by user communities across the NNEdPro Regional Networks which include six continents.

USING A DATA-DRIVEN APPROACH IN MEDICAL AND HEALTHCARE EDUCATION

According to WHO, a healthy workforce is one of the six pillars of a strong health system.¹⁶ The health workforce needs to be motivated, empowered, adequate in number and trained on the integrated delivery of nutrition interventions across the life course.¹⁶ A key action within these pillars that has received minimal attention is nutrition capacity building among health professionals.¹⁷ An increased focus on training of healthcare professionals, and collaboration among health practitioners, has potential to influence more effective translation of global and local policy to the individual level.^{18 19} However, not all countries have higher education institutions offering training in nutrition and few countries include nutrition education and counselling skills. Thirty-three per cent of higher education institutions offer nutrition science and epidemiology, and 26% of higher education in nutrition education and/or counselling skills is offered in the 80 countries, within those who provided detailed information.²⁰ Capacity development for nutrition in health systems and in the wake of universal health coverage, including the number of trained nutrition professionals with public health nutrition competencies, as well as integrating training on essential nutrition actions among all front-line workers, needs to be strengthened. The number of dedicated hours in the curriculum indicated that the quality of training may be compromised. Countries need to conduct high quality training for health workers to address all forms of malnutrition.

Medical nutrition education has a wide-reaching role in multiple diseases found in the acute clinical setting from oncology to surgical outcomes and an equally important role in primary care. Doctors remain key role models to the public in terms of trust and have the perception of being knowledgeable and empathetic.^{18 21 22} For this reason, what is known and taught to them about nutrition must be evidence based, yet there is inadequate nutrition teaching in medical schools.^{17 23} Food can be part of 'everyday business' in healthcare by improving and integrating food and nutrition training across the healthcare curriculum for doctors and nurses. People live in a challenging food environment, with social media, public opinion, professional sceptics, environmental concerns, food poverty and disparities across the population.

Nutrition needs to become a team issue that considers the roles of all multidisciplinary team members who have contact with patients and the public.

From an occupational perspective, diet and lifestyle factors are particularly crucial for shift workers, as mentioned by the SDGs as Wellness and Safety in the Workplace.¹⁰ As an example, data from the National Health and Nutrition Examination Survey (NHANES) study showed that truck drivers have lower levels of physical activity, increased body mass index, lower HDL cholesterol, increased cardiovascular disease and more mental health challenges.²⁴ These data can be used to support clinical and public health measures to support these higher risk population.²⁵

Teaching strategies for nutrigenetics and nutrigenomics

To keep up with research advancement, different strategies within medical nutrition education need to be considered, such as the inclusion of nutrigenetics and nutrigenomics. Nutrigenetics is the science of the effect of genetic variation on dietary response, while nutrigenomics looks at the role of nutrients and bioactive food compounds in gene expression.²⁶ In conjunction with the 13th Annual Congress of the International Society for Nutrigenetics and Nutrigenomics a workshop, led by Prof Kohlmeier, highlighted why and how we need to start integrating teaching and training in nutrigenomics and nutrigenetics into medical education. Medical and healthcare professionals need to understand and begin preparing for how nutrigenetics may influence and evolve nutrition advice at the individual and population levels. It was suggested to use nutrigenetics as a unifying element to make nutrition education more attractive, while also driving interest in gene research and 'applying the science of personal nutrition.'

Prof Martinez further explored precision nutrition and discussed the online modules available for nutritionists, such as one from Monash University.²⁷ There are several examples of the interactions of phenotype, genes have on food intake and effect for example, by differences in microbiota, gene mutations and influencing gene transcriptions and polymorphisms. From a clinical perspective, examples were provided on how to personalise nutrition from physical activity, food advice, optimal macronutrient intake, cholesterol levels and fat types.

Training pathways and material to up-skill nutrition and dietetics students and professionals in nutritional genomics through multidisciplinary collaboration with content area experts are needed. Unfortunately, there is only a small amount of high-quality evidence regarding optimum teaching strategies on this topic. Nutrigenetics education delivered in Eastern Europe found that most interest in this subject was from postgraduates and those in continuing education. Nutritionists appeared to have a keen interest in the potential applications, while medical students and doctors were less engaged. Approaches to help clinicians apply nutrigenetics in daily practice to improve the health of patients could garner the support

of the medical profession. All speakers indicated that this is a rapidly growing area and further integration of nutrigenetics and nutrigenomics into the medical and health-care curricula was the future.

Hydration education and research

A mini-symposium chaired by Prof Del Rio, in conjunction with NNEdPro hydration expert Pauline Douglas, emphasised the importance of hydration, specifically dehydration, and how many adults worldwide do not meet current fluid intake requirements. To address the challenges of dehydration, the need to move beyond education was suggested, such as by considering behaviour change strategies for staying hydrated, including habit creation, prompts and goal setting.

Research strategies in hydration were discussed, including the additional benefits that could be achieved if specific phytochemicals are taken into account. For example, research is underway aimed at tackling existing critical public health problems, such as urinary tract infections and antibiotic resistance, considering the strategic addition of cranberry polyphenols to the hydration provided by cranberry juice. More specifically, the use of plant natural compounds have been used to combat antibiotic resistance, and cranberry proanthocyanins may be used to potentiate the action of antibiotics by affecting bacteria adhesion, motility or communication in animal models.²⁸

DATA AND THEORY OF RESEARCH DISCUSSING CAUSAL INFERENCE

Data quality was a key consideration throughout the Summit. While randomised controlled trials (RCTs) are often considered the gold standard in establishing causal links between nutrition and health outcomes, there are situations where RCTs are not practical, feasible, or ethical,²⁹ leaving researchers with observational data. Challenges and insights were discussed regarding quality when using observational data to establish structural relationships in nutrition research. Challenges included, but were not limited to, the inherent characteristics of participants (eg, omics infrastructures, sociodemographic and adherence to specific diets or lifestyle behaviours) and outcomes (eg, multifactorial nature and interrelationships) in consideration, which can act as cofounders. Methodological and reporting issues were highlighted, such as time lag between dietary change and outcomes, unreliable measurement tools, publication and reporting bias, which all impact the quality of the available data.

With these challenges, there is a need for Findable, Accessible, Interoperable and Reusable (FAIR) data in nutrition research.³⁰ To meet this need, the speakers proposed building a consortium of medical scientists and statisticians to implement causal inference tools and design and analyse observational studies and clinical trials that allow for control of confounding and bias with extraction of causal inference pathways from existing

literature. These pathways could be tested on open data sets to monitor real-world trends predicting and mitigating diet related health risks in a more prompt and precise manner. A visual presentation of this session is provided in figure 1.

CONCLUSIONS

A key outcome from the Summit highlights that the nutrition community needs to push the field forward as a hard science with clinical and public health impact,⁵ and support healthcare personnel to have adequate nutrition knowledge, while continuing to advance high-quality research. To drive this forward we need high-quality data that is FAIR.³⁰ This data is crucial to making informed decisions regarding food and nutrition that impact our health systems and reduces malnutrition.

Linked with the outcomes of the 2019 Summit, the 2020 Summit events will be held virtually along with a webinar series in September under the theme: a 2020 evaluation of global knowledge networks in the UN Decade of Action on Nutrition (2016–2025). The 2020 Summit will provide an opportunity to take stock and prioritise key actions needed towards strengthening nutrition and health capacity worldwide in line with the global goal of ending malnutrition by 2030. Specifically, the focus will be on strengthening the collection, curation and utilisation of food and nutrition data as a priority within the second half of the UN Nutrition Decade, in order to aid action in pursuit of the 2030 targets.

Author affiliations

¹NNEdPro Global Centre for Nutrition and Health, St John's Innovation Centre, Cambridge, UK

²Women's College Research Institute, Women's College Hospital, Toronto, Ontario, Canada

³Clinical Sciences and Nutrition, University of Chester, Chester, UK

⁴Imperial College Healthcare NHS Trust, London, UK

⁵University of Cambridge, Wolfson College, Cambridge, UK

⁶School of Biomedical Sciences, Ulster University, Ulster, UK

Twitter Celia Laur @Celia_Laur; NNEdPro @nnedpro and Timothy Eden @DrTimothyEdenRD

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ORCID iDs

Celia Laur <http://orcid.org/0000-0003-4555-1407>

Jørgen Torgerstuen Johnsen <http://orcid.org/0000-0001-8041-9968>

James Bradfield <http://orcid.org/0000-0002-1010-2372>

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