

Empowering global nutrition with digital technology: Proceedings of the 8th annual International Summit on Nutrition and Health

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Introduction

Digital technologies increasingly influence all aspects of human life worldwide, including food, nutrition, and health. Technological breakthroughs often promise great improvements in scientific understanding, industrial advancements, and human and planetary wellbeing. However, the necessary validation (for safety and efficacy) and practical implementation of novel technologies are rarely straightforward. During the COVID-19 pandemic, the use of digital technologies expanded in healthcare and research: examples include the widespread adoption of telecommunications platforms for online working, digital apps and smart devices, novel therapeutics, and advances in supply chain management (1). COVID-19 has also highlighted the importance of good general health, underpinned by good nutritional status, in mitigating the risk of communicable disease (2). Both food and health systems have been put under huge additional strain during this time, both financially and in terms of systemic capacity. Consequently, there has been a sharp exacerbation in food insecurity and malnutrition risk worldwide.

To discuss the role of digital technology in global nutrition, the NNEdPro Global Institute for Food, Nutrition and Health (NNEdPro) and the International Academy of Nutrition Educators (IANE), in collaboration with BMJ Nutrition, Prevention and Health (BMJ NPH) hosted the 8th annual International Summit on Nutrition and Health (the Summit). NNEdPro is an interdisciplinary think-tank, training academy and knowledge

network established in 2008. Headquartered in Cambridge, UK, with 12 regional networks across six continents, NNEdPro is committed to ending all forms of malnutrition through research, education and advocacy (3). This editorial provides a narrative overview of the proceedings of the Summit.

Format

The Summit is an annual scientific event that brings together professionals, educators, students and researchers from around the globe to showcase leading research and build alliances to implement innovative solutions that address complex nutrition and health challenges (4). The Summit was held entirely online and consisted of 10 live satellite events (beginning on July 12th) that led up to the Summit main event (on July 23rd 2022). The theme was *Empowering global nutrition with digital technology*, the concept for which was born out of discussions at the 7th Summit in 2021 (the theme then was *Advancing research, policy and practice to promote resilient and sustainable food and health systems in the year of action on nutrition*). At the 8th Summit, 3 core sub-themes were chosen to allow exploration of digital technology and nutrition in the context of:

- (i) Health systems
- (ii) Food systems
- (iii) Practical implementation in clinical practice and research.

The structure of the 8th Summit was as follows:

- i. Ten satellite events (between 12th and 22nd July 2022) (**Box 1**):
 - a. Seven of these were led by the NNEdPro regional networks and showcased work relevant to the summit's main theme and to the needs of their regions.
 - b. The other 3 satellite events were an exploration of digital technology in relation to specific topics of interest: nutrition and COVID-19, medical and healthcare nutrition education, and cardiometabolic disease research.

- ii. The main day event (23rd July 2022). This consisted of 3 sessions each covering one of the core sub-themes.
- iii. Abstract submissions and poster presentations.
- iv. Awards in recognition of individual contributions and achievement.

- 1) Brazil and Mexico regional networks
- 2) Central, South East & East Asia, and Australia & New Zealand regional networks
- 3) The UK & Ireland regional network
- 4) Middle East and Pan-Africa regional networks
- 5) India & South Asia regional network
- 6) The USA and Canada regional networks
- 7) Switzerland & Non-Mediterranean Europe and Italy & Mediterranean Europe regional networks
- 8) Nutrition and COVID-19, led by the NNEdPro Nutrition and COVID-19 task force.
- 9) Medical and healthcare nutrition education, led by the Nutrition Education Policy in Health Practice (NEPHELP) team.
- 10) Cardiometabolic disease research: from digital data science to human intervention studies, in combination with key collaborators.

Box 1. Overview of satellite events.

A pandemic in the digital age

The COVID-19 pandemic has been the foremost global health concern in recent years and has caused unprecedented disruption to health systems, food systems, and beyond. In response to the pandemic, many countries restructured their health services, implemented restrictive measures, and declared states of emergency. In hospitals, the risk of malnutrition was exacerbated by multiple factors, not least staff shortages, restricted visiting for relatives, and the physical barrier of personal protective equipment. In the community, some components of nutritional status (specifically healthy weight and adequate micronutrient status) were found to be modifiable protective factors against the worst outcomes in COVID-19. Unfortunately, this fact has not been promoted by public health officials to the same extent as some other public health measures. The pandemic forced several industries into a standstill and many people lost their jobs, meaning food and nutrition insecurity was sharply exacerbated in many countries. In many cases the most socioeconomically vulnerable populations were the worst affected (5). Some

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governments provided financial support schemes for those permanently or temporarily out of work. Whilst of protective value in the acute crisis, such schemes are likely to have prolonged economic effects that may, along with other social, economic and political challenges, hinder efforts to stop the rise of hunger, and community malnutrition.

Simultaneously, there was a great collective effort from the healthcare service and research industries, with an enormous proliferation of new medical knowledge informing the global response to the virus (6). Our current era of civilisation is often referred to as the digital age and since the start of the pandemic several digital technologies have been accelerated into regular use. These include telecommunications for virtual clinic consultations, digital wearable devices for recording biometric data, and novel mRNA vaccines. In health service management, research, and policy spaces, as in most other service industries, there has been a shift towards remote, online working. Whilst this physically isolated many individual workers, in many cases it also increased the breadth of geographical collaborations. Many of these technological changes were temporary, whilst some remain and are likely to be adopted into regular practice. Countless others are in development. Of interest to the delegates of the Summit, some have the potential to positively impact nutrition on an international scale.

Opportunities for the digital empowerment of global nutrition

In this context, many discussions at the Summit included examples of 'low hanging fruit': digital technologies that could impact nutrition research, practice and design in health systems and food systems. The accuracy and ease of dietary assessment using traditional methods is suboptimal and novel personal device-based digital apps, such as MyFood24 (7), show promise for improving this. Similarly, various 'smart' devices, wearables, and applications have been developed to facilitate interventions in clinical nutrition and dietetics. This is powerful as diet and lifestyle change is notoriously difficult to maintain in the long term. One example discussed was a digital intervention to support behaviour change that is already being used within the English NHS to empower individuals with obesity and type 2 diabetes to achieve and maintain healthy weight loss (8). It is important that robust clinical trials continue to be done to validate such devices in research and practice.

At the local level, specifically in rural communities, advances in digital audio-visual recording technology have been exploited to empower underrepresented voices by recording local knowledge about diet, culture

and lifestyle, and also to facilitate education regarding nutrition and health (9). In more resource-rich environments, an area of great and growing interest is precision nutrition (including but not limited to nutri-genetics, genomics and transcriptomics) to empower individual health. It is hoped that precision nutrition approaches, i.e. where dietary choices are tailored according to an individual's genotypic and phenotypic features, are one day scientifically robust enough for regular use in practice, and accessible for all populations.

At the macro level, the expansion of use of online digital platforms is enabling international and multisector data collection, sharing and collaborative data-driven research. Digital repositories of health data, such as the UK Biobank, allow high-resolution biomedical research to be undertaken on both common and rare diseases by research teams internationally (10). Some of these (including UK Biobank) include dietary and lifestyle data but many do not. Large-scale administrative health record data holds great potential for population-level research but the quality and completeness of nutrition and dietary data is currently suboptimal in most routinely collected clinical datasets. Indeed, digital technologies to improve dietary assessment could transform the quality of dietary data in such databases in the future. Other sources of relevant large-scale data, such as from insurance-companies and supermarkets, are not greatly utilised for health research at present but represent possible avenues of future opportunity. Given the major social and economic disruption across the world currently, innovative data sources are required to enable more meaningful and impactful research on food and nutrition (in) security.

Ensuring digital safety, quality, and equity

Any new technology introduced into clinical practice requires robust validation to ensure safety and efficacy. Ideally, this should be in the form of randomised controlled trials wherever possible. Selecting appropriate outcomes for such trials can be particularly challenging in nutrition and dietetics research. The sincere and active involvement of patients and the public should be central to ensuring the relevance, acceptability, and ethics of all new technologies in these domains.

Whilst novel digital technologies could positively impact the health of many people, it is vital to anticipate, seek and recognise their (likely and actual) limitations on a case-by-case basis. It is widely anticipated that, in most cases, new technologies are unlikely to entirely supersede the clinical skills and judgement of healthcare professionals,

especially in clinical settings. Rather, novel technologies should inform and facilitate clinicians to improve the quality, efficiency, and personalisation of care. Furthermore, they should empower patients and communities to achieve better health. The scientific and healthcare communities must also recognise, and more importantly mitigate for, the fact that digital technologies are likely to reflect the prejudices and biases, both conscious and subconscious, that exist in the minds of their designers and wider society. This is especially important in the development and application of artificial intelligence algorithms (11).

Concluding remarks

The world's health and food systems are in a major transition period in the wake of unprecedented global forces. Great disruption has led to a heightened risk of malnutrition and nutrition-related disease for many. Expansion of existing digital technologies has allowed scientific collaboration and dissemination of information at an unprecedented scale and rate. Novel technologies are numerous and varied, but only a few are likely to have a significant and lasting impact on nutrition practice, research, and education. It is important to understand both the positive impact of novel technologies and their potential harm. Nonetheless, the presentations and discussions at the Summit highlighted some early successes, some promising areas of interest, and some key gaps and targets for continued collective efforts. At the current trajectory, it seems certain that digital technologies will remain central to global health and food systems long into the future. It is the responsibility of funding bodies to allocate resources towards tackling the unyielding global threats of malnutrition, food and nutrition insecurity. Furthermore, it is the responsibility of researchers, clinicians, and regulatory bodies to ensure novel digital technologies are developed with rigour and implemented with care to ensure the maximal benefit to patients, the public, and the planet.

When considering the impact of technologies, we also need to think about resourcing more broadly. This can refer to both human resources, including capability and capacity, as well as financial resources, including infrastructure. Therefore, at the 9th International Summit in 2023 we have chosen to examine the theme of Sustainable resourcing for all in food and nutrition security: Creative solutions for healthy & resilient populations. A key sub-theme within this will be the role of innovative financing, which is of utmost necessity for food and nutrition security as we face global crises of unprecedented proportions. At the 9th Summit, we will explore

insights from leading experts and reflect on learnings from all previous summits to distil an action plan for the sustainable resourcing of work to protect and improve global nutrition into the future.

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