

Field Exchange

April 2024 ISSUE 72

Emergency Nutrition Network



A changing world

How complex climate dynamics are affecting Somalia and beyond

Contents

3 Editorial

Views

- 4 Human milk: A win-win-win for health, sustainability, and economics?
- 7 Youth power vs Big Food
- 9 Measuring consumer demand to improve diets in Bangladesh and Burkina Faso

Original Articles

- 12 Cambodia: Impacts of the nutrition transition on urban and rural mothers and children
- 16 Promoting infant and young child feeding in Lebanon: Lessons learned from programming
- 19 Special focus: Wasting patterns in Somalia
 - 19 Part 1: An introduction to Somalia
 - 20 Part 2: Methods
 - 21 Part 3: Spatial variation in wasting and potential drivers
 - 23 Part 4: Temporal variation of wasting
 - 24 Part 5: Discussion
- 25 Food-based recommendations for improving complementary feeding in Zimbabwe

27 Creating a national nutrition information platform: Learnings from Bangladesh

30 Mozambique: Behaviour change interventions increase production of vitamin A rich foods

Research Snapshots

33 Niger: An integrated preventive and curative health package for nutritional status

33 Use of mid-upper arm circumference measurement for children with disabilities

34 Nutritional intervention in Mozambique: Policies and progress?

34 Relationship of maternal short stature with coexisting forms of malnutrition in Pakistan

35 *The Lancet Countdown* on health and climate change: The 2023 report

35 Ethiopia: Are ultra-processed foods a barrier to appropriate complementary feeding?

36 Preventing child wasting in Africa's drylands through a food systems lens

36 Seasonality in the African drylands: 15 years of evidence

37 Unravelling community clustering in Chad

37 "I go to sleep on an empty stomach": Older people in humanitarian nutrition

38 Learning from the implementation of the Child Nutrition Program

38 Ghana: Sustained growth effects of early lipid-based nutrient supplements

39 Donor aid: Does it target newborns and stillbirths proportionately? malnutrition?

39 Resources: Ages and stages reference package

40 Nutritional care for children with feeding difficulties and disabilities

40 Treating growth faltering in infants under six months: Critical research gaps

41 The case for a Global South-centred model in global health

41 School-age children and adolescent nutrition status in South Asia: A scoping review

Report Summaries

42 WHO guideline for complementary feeding of infants and young children 6–23 months of age

42 Climate action and nutrition: Pathways to impact





Dear readers,

A warm welcome to the 72nd issue of Field Exchange. As we publish this issue, we are conscious of many current crises where conflict is fuelling malnutrition: in the Democratic Republic of Congo, Ethiopia, Gaza, South Sudan, Sudan, Ukraine, and Yemen, to name just some. Where conflict is present, lack of access can severely limit humanitarian assessment and response, across all sectors including nutrition, exacerbating already difficult situations. These, in turn, are continually compounded by the effects of climate change and an increasing humanitarian funding gap.¹ We greatly respect the continued efforts of all those working in such challenging circumstances to protect health and nutrition services and the lives of civilians caught up in humanitarian emergencies. Responding to such crises often necessitates innovative approaches – we welcome contributions to Field Exchange from those of you interested in sharing your programming experiences so that others can benefit from your learning. We recognise this alone cannot exact change, but we hope that in this way Field Exchange can continue to do what we can to support those experiencing crises.

In this edition, we revisit the topic of breastfeeding. Specifically, **Smith et al (page 4)** explore the value of human breastmilk, highlighting a triple win for health, environmental, and economic goals. As a predominantly dairy-based product, commercial formula milk has a significant impact on greenhouse emissions, which can be estimated using the 'Green Feeding Tool'. In addition, another research-based tool, the 'Mothers Milk Tool', illuminates the hidden economic value that breastfeeding contributes to society through mothers' unpaid care work. This article explores these two innovations to uncover breastfeeding's critical contribution to sustainable health and development goals.

Two further articles focus on infant and young child feeding. Our first (**Jomaa et al, page 16**) zooms in on Lebanon, where consistent efforts to improve breastfeeding and complementary feeding practices still run into challenges. Hearing from Action Against Hunger staff working in country, the authors disentangle existing knowledge gaps and cultural barriers to optimal practice and highlight how greater efforts are needed to support complementary feeding within high-risk, low-resource settings. In Zimbabwe, diet frequency and diversity of children aged 6–23 months also remains poor. **Burns et al (page 25)**, writing about the multi-sectoral 'Amalima Loko' programme, show that a menu of locally available, predominantly indigenous foods can be used to develop feasible food-based recommendations for young children. The outcome? – a successful alternative to food transfers that could provide a blueprint for other settings.

On the theme of food systems, the article from **Thurman et al (page 9)** considers how generating consumer demand for healthier diets can drive positive change in food systems, but de-



Visiting a participant woman's pumpkin kitchen garden in Murrebue, Mozambique, 2020

© Alice Costa

tails how this is currently constrained by a lack of clear metrics. The authors describe their approach to developing common indicators (and trialling them in Bangladesh and Burkina Faso) and hope that these can inform longer-term efforts to develop a set of quality metrics that can measure programme efforts to generate consumer demand for nutritious diets.

Also taking a food systems perspective, **Fry and Sigh's article (page 12)** looks at changes in the food environment in urban and rural Cambodia, where traditional diets are being replaced with snack foods and sugar-sweetened beverages. Analysis of household survey data shows urban households procured more food from street vendors, markets, and mini marts. Interestingly, higher consumption of more processed unhealthy foods wasn't necessarily replacing the consumption of healthier foods. Yet, disentangling these patterns from household economics and regional development is tricky.

We also feature an extended piece from Somalia. In this special five-part article, **Luc et al (page 19)** delve into the spatial and temporal relationship between child wasting and food insecurity in Somalia. Some of the findings challenge key assumptions about that relationship. Results showing community-level clustering of wasting and food insecurity suggest the importance of capturing community-level drivers to support locally appropriate interventions and outcomes. Analysis of seasonal variation in child wasting showed two seasonal peaks that varied across livelihood zones and did not coincide with periods associated with the highest food insecurity. Results suggest that the assumption of food security as the

primary causal factor of wasting might bias modelling crises and responses.

Building on the themes explored in the Somalia article, we selected three papers from the recent Acute Malnutrition in Africa's Drylands series.² **Venkat et al (page 36)** highlight the importance of a nuanced understanding of seasonality in the region. Contrary to popular opinion, the primary peak in wasting incidence appears to occur in line with peak temperature and not in the preharvest period. In Chad, geospatial analysis showed that the distribution of child wasting and food insecurity were clustered (**Luc et al, page 36**). Significantly, communities with high wasting prevalence were not the same as those with highest food insecurity. **Fracassi et al (page 36)** explore efforts to prevent wasting in Africa's Drylands through a food systems lens. They found some common strengths between the eight countries studied (multistakeholder governance, existing policy frameworks, and costed interventions on social value chains and social transfers). The weaknesses – vulnerabilities from livelihoods, environment, and seasonality – need to be better addressed in policy and programme implementation.

As always, this is just a brief rundown of the rich content that features across the breadth of this issue. We have more original articles and summaries to explore. Happy reading!

Anne, Nicky, Phil, and Tom

¹ Global Humanitarian Assistance Report 2023

² https://journals.sagepub.com/toc/fnba/44/2_suppl

Want to write for us?

We have more details on submitting an article for Field Exchange on our website <http://www.enonline.net/fex/writeforus>

Not yet a Field Exchange subscriber?

Please visit our website for more details on how you can join our community <http://enonline.net/subscribe/fex>



Human milk: A win-win-win for health, sustainability, and economics?



A mother feeds her child during a sensitisation on nutrition demonstration in Malawi

© WFP/Badre Bahaji



Julie Smith
Honorary Associate
Professor and ARC Future
Fellow at The Australian
National University



Alessandro Lellamo
Independent Consultant



Tuan Nguyen
Technical Advisor at Alive &
Thrive East Asia Pacific, FHI
360 Global Nutrition



Bindi Borg
Independent consultant



Roger Mathisen
Director of Alive & Thrive
East Asia Pacific and the
Global Nutrition Innovation
Incubator at FHI 360



Thomas Stubbs
Field Exchange Coordinator
at Emergency Nutrition
Network (ENN)

The full research and development teams for the Mothers' Milk Tool¹ and the Green Feeding Tool² are listed below.

As well as being foundational for good nutrition and health, breastfeeding has broader importance. Breastfeeding's nutritional, immunological, developmental, emotional, and – as we articulate here – economic and environmental significance cannot be overstated amidst the sustainable development challenges of the 21st century.

Breastfeeding is so uniquely adaptable to changing disease environments that it is commonly referred to as 'the first vaccination'. Amidst emergencies or disasters and rising food insecurity, breastfeeding provides immediate and safe nutrition and care for infants and young children.

What we know:

Breastfeeding is important for health, but until now its broader environmental and economic significance has been in the shadows.

What this adds:

Two new resources – the Mothers' Milk Tool and the Green Feeding Tool (Smith et al., 2023a; 2023b) – switch on the light by calculating the environmental costs and economic losses of not breastfeeding. Launched by the Australian National University and Alive & Thrive, with the support of the FHI 360 Global Nutrition Innovation Incubator, these tools are an important step forward in filling vast data gaps. This article explores how, by enabling breastfeeding, we contribute not only to health but also to environmental and economic goals, making this an investable solution for multiple sectors.

The nutrient balance of breastmilk is 'precision engineered' via evolutionary processes for optimum child growth and development. The publicity around artificial intelligence is a relevant reminder that breastfeeding women provide a dynamic fluid capable of its own form of 'machine learning'. Infant saliva transfers chemicals to a mother's body that adjusts milk composition based on the evolving needs of the child – just one of the many complex ways that breastfeeding and human milk adapt to nourish the child.

The protection goes beyond the infant. Breastfeeding also reduces women's reproductive cancers and type 2 diabetes, as well as a host of non-communicable diseases. Breastfeeding also helps child spacing through its hormonal effects. In the age of biohacking, 3D-printed drugs, and personalised nutrition, it is ironic that a natural, essential, and universal practice of the past provides such a tailored and personalised health solution in today's world. It is, in short, a uniquely potent, broad-spectrum 'health food system'.

With adequate societal and familial support, most women can breastfeed. When a biological mother cannot breastfeed, wet nursing, milk sharing, and donor milk from human milk banks can be acceptable alternatives. However, the food industry has succeeded in marketing manufactured substitutes – commercial milk formula (CMF) – as a globally acceptable "next best" product.

Despite its unique superiority, fewer than half of infants aged 0–6 months are exclusively breastfed globally. Regionally, South Asia has the highest prevalence (61%), yet just one in three infants are exclusively breastfed in the Middle East and North Africa. We must do more to restore breastfeeding as a universal practice.

Where health arguments might not gain traction, can we advocate for breastfeeding through an additional lens?

Sustainability

The global food system accounts for a third of greenhouse gas emissions, and CMF is among the high emission foods at the centre of the problem – meat and dairy.

CMF products, including infant and follow-on formula milk, are predominantly dairy based. The dairy industry requires vast amounts of land and produces a significant amount of greenhouse gas emissions. Each kilogram of CMF produced is responsible for generating between 11 and 14kg of carbon dioxide (equivalent) greenhouse gas over the full product life cycle, including emissions from milk production and powder manufacture, transport, and feeding equipment and sterilisation. A kilogram

¹ <https://nceph.anu.edu.au/research/projects/valuing-breastfeeding-through-mothers-milk-tool>

² <https://nceph.anu.edu.au/research/projects/green-feeding-tool>

of CMF requires well over 5,000 litres of water, with associated water pollution, and waste from packaging and feeding bottles also harms the environment.

“Feeding an infant fully for six months with CMF instead of breastfeeding is estimated to generate between 226 and 288kg of CO₂”

CMF was introduced decades ago to improve nutrition for infants that were not breastfed. Now, with billions of dollars used globally to increase demand and sales, in 2020 CMF products generated around US\$55 billion annually in sales; at least US\$2.6–3.5 billion is invested by industry to market these products to a wide population (Baker et al., 2023). Since health facility and household use of CMF is far beyond medical necessity, might we reduce its contribution to our increasingly unbalanced carbon equation?

There are two routes to mitigating the environmental impacts of products with high carbon footprints: decarbonising production processes or reducing demand/consumption. For CMF, we highlight research (Long et al., 2021) showing that reducing consumption would far exceed the greenhouse gas emission reduction from decarbonising the production process of CMF products while simultaneously improving the health of infants, mothers, and nations. In fact, rather than reducing emissions at all, decarbonisation may assist CMF marketing by ‘greenwashing’ these products, which would instead work to increase overall CMF emissions.

“The high prevalence of CMF use generates significant greenhouse gas and environmental impacts. By contrast, breastfeeding substantially mitigates emissions...”

Regarding the decarbonisation route, the United Nations Clean Development Mechanism (CDM) is currently the largest carbon offset scheme arising from the 2015 Paris Agreement. It allows countries to fund greenhouse gas emissions-reducing projects in other countries and claim the saved emissions as part of their own efforts to meet their agreed emissions-reduction targets. CDM projects must fulfil specific criteria to receive funding and are required to demonstrate greenhouse gas emission reductions while contributing to sustainable development as defined by the host country.

However, measures promoting low-carbon diets that reduce the consumption of meat and dairy are not currently considered under the CDM. Nor are interventions that reduce CMF production and consumption. Strong evidence exists for the feasibility and effectiveness of key interventions to protect, support, and promote breastfeeding.

Adjusting CDM funding criteria to include these key breastfeeding interventions is an important action that would support countries to implement such measures, as well as going some way toward addressing gender equality issues.

To provide a basis for developing a new CDM methodology to include interventions aimed at increasing exclusive breastfeeding and reducing CMF feeding in carbon-offset calculations, Smith et al. (2023a) developed a ‘Green Feeding Tool’. This digital tool calculates both the carbon and water footprints of CMF at country and global levels. The estimation is based on available data on feeding practices of children under six months of age, as well as studies of the greenhouse gas emission and water use impacts of CMF.

As a next step, the Green Feeding Tool team will advocate for the tool’s incorporation into existing carbon offset schemes and footprint calculators. As well as providing a resource to support governments and other stakeholders to mitigate climate impacts, the tool can support progress toward the World Health Assembly’s Global Nutrition Targets for breastfeeding. The Green Feeding Tool complements the Mothers’ Milk Tool described below.

The economy

There are three main aspects to the economic value of breastfeeding:

First, a ‘micro’ approach to valuing it is to quantify the financial and human costs of higher rates of stunting, wasting, cognitive losses, and infectious disease and non-communicable diseases that result from insufficient breastfeeding. The Cost of Not Breastfeeding Tool assesses these costs in monetary and mortality terms (Walters et al., 2019).

Second, there is the ‘macroeconomic’ value of breastfeeding – productivity in the form of the uniquely valuable food and nutrition for infants and young children provided by breastfeeding women or, against this, the ‘lost milk’ in countries with low breastfeeding rates.

Third, there are the ‘investments’ – maternal and societal – needed for breastfeeding. Women and families invest time, energy, and skills so that children are breastfed (Smith and Forrester, 2013). Societal investments include, for example, adequate paid maternity leave, which demonstrably improves breastfeeding rates and the health of both mother and child. Investments to counter the influence of CMF industry marketing and reform maternity care practices are also needed (Sanghvi et al., 2022). The World Breastfeeding Trends Initiative Costing Tool estimates the cost of investing in such measures at project, programme, or country levels (Holla-Bhar et al., 2015).

Existing tools address the first and third of these aspects, and the Mothers’ Milk Tool (Smith et al., 2023b) fills a gap on the macroeconomic aspect. The tool shines a light on the economic value contributed to society by women’s unpaid care work through breastfeeding infants and young children. The tool is built on 50 years of research and a breakdown of the methods employed can be found in the original paper.

The Mothers’ Milk Tool shows the substantial quantities of human milk produced by breastfeeding mothers and provides estimates of its monetary value to countries. It also shows the value that can be lost if mothers are taken for granted or left unsupported in their efforts on breastfeeding. The authors reiterate that current national accounting practices – specifically, the measurement of gross domestic product



A mother breastfeeding her child in Malawi

(GDP) – count CMF production in GDP but do not count human milk production.

But why does this matter? Well, by not assigning a monetary value to something, it is seen as “worthless” in economic terms. This makes it harder to advocate for and assign appropriate policies and investments to enable women to breastfeed without hardship. To illustrate the importance of this mismeasurement of economic “value”, Nobel prize-winners Amartya Sen and Joseph Stiglitz observe that human milk needs to be included in conventional GDP for policymakers to have less biased visibility of what is valuable.

By providing macroeconomic estimates for around 140 countries, the Mothers’ Milk Tool highlights that considering women’s breastfeeding capabilities in economic terms is both justifiable and feasible. It also fills a gap in the calculations of GDP. For individual mothers, it provides calculations highlighting the importance of the unpaid care work of breastfeeding infants and young children.

“The Mothers’ Milk Tool uses a price of USD 100 per litre to place a monetary value on the amount of human milk produced by breastfeeding women each year.”

An important element of the tool is its estimates of how much breastmilk the world’s women produce each year. This underpins calculations of the monetary value. The unit price of human milk that the tool applies to calculate this value is very conservative. It uses the price of fresh human milk exchanged within a not-for-profit milk bank network in Norway’s public health system – about USD 100 a litre. This may not extrapolate to other country settings. For example, a cost analysis from Italy estimated the average cost of supplying pasteurised donor milk to be USD 245 per litre (roughly USD 7 per ounce).

The exchange price in Norway reflects a not-for-profit rather than a market-based value. Its milk banks mostly use screened but unpasteurised milk, which is what the Mothers’ Milk Tool is measuring at country level. Norwegian society places a high value on breastfeeding and breastmilk in regard to child development and health services. Only Norway counts mothers’ milk in its food supply (Smith et al., 2022), and the Mothers’ Milk Tool uses a similar algorithm.

The tool estimates that the world loses USD 2.2 trillion in value every year (almost 10% of US GDP and 12% of China’s GDP in 2022) to a lack of breastfeeding. This is because 38.2% of breastmilk is currently ‘lost’ (Table 1). Lost milk provides an indicator of the vulnerability and potential food insecurity of children in emergencies.

Users of the tool have endorsed it for training health professionals and building mothers’ confidence about the importance of their efforts. The tool has also been endorsed as a tool

Country	Year	Total production, current breastfeeding rates (million litres)	Potential production of breastfeeding (million litres)	% of breastmilk lost*
Australia	2010	50.8	143.2	64.5
Brazil	2019	425.4	1,212.9	64.9
Canada	2009	54.5	169.8	67.9
India	2017	8,737.6	10,200.0	14.3
Indonesia	2017	1,210.7	1,886.8	35.8
Ireland	2013	4.4	24.1	81.7
Kenya	2014	450.9	599.1	24.7
Nepal	2019	221.3	230.3	3.9
Nigeria	2018	2,150.4	2,997.1	28.3
Norway	2018/19	10.7	25.3	57.8
Philippines	2017	574.5	826.0	30.4
UK	2011	58.0	314.3	81.6
USA	2018	604.5	1,686.1	64.1
Viet Nam	2013/14	423.3	672.6	37.1
Global	2022	35,556.0	57,490.5	38.2

* Breastmilk lost is the total production compared to amounts if 98% of children born each year were breastfed in line with WHO infant and young child feeding recommendations.

for advocacy to policymakers for greater investment in breastfeeding protection, promotion, and support. National accountants also see it as useful to informing policymakers about the non-monetary productive sector of the economy. Mothers have been inspired and boosted by it, with testimonials available on YouTube.³

Conclusion

Both tools can be used to strengthen advocacy for policies and programmes supporting mothers to meet their individual breastfeeding goals, as well as cost savings to health systems and society from doing so. Such policies include more supportive maternity care practices, adequate

maternity leave, and more supportive work environments, as well as more rigorous laws or regulations preventing exploitative marketing of CMF to health professionals and the public. These tools also highlight the need for adequate data to monitor and measure how infants and young children are being fed as the basis for suitable policies and programmes to be put in place where needed.

For more information, please contact Julie Smith at julie.smith@anu.edu.au

³ <https://nceph.anu.edu.au/news-events/events/measuring-and-valuing-womens-productivity-mothers-milk-tool>

References

Baker P, Smith J, Garde A et al. (2023) The political economy of infant and young child feeding: Confronting corporate power, overcoming structural barriers, and accelerating progress. *The Lancet*, 401, 10375, 503–524.

Holla-Bhar R, Iellamo A, Gupta A et al. (2015) Investing in breastfeeding – the world breastfeeding costing initiative. *International Breastfeeding Journal*, 10, 8.

International Labour Organization (2022) Care at work: Investing in care leave and services for a more gender equal world of work. ilo.org.

Long A, Mintz-Woo K, Daly H et al. (2021) Infant feeding and the energy transition: A comparison between decarbonising breastmilk substitutes with renewable gas and achieving the global nutrition target for breastfeeding. *Journal of Cleaner Production*, 324.

Sanghvi T, Homan R, Forissier T et al. (2022) The Financial Costs of Mass Media Interventions Used for Improving Breastfeeding Practices in Bangladesh, Burkina Faso, Nigeria, and Vietnam. *International Journal of Environmental Research and Public Health*, 19, 24.

Siregar A, Pitriyani P, Walters D et al. (2019) The financing need for expanded maternity protection in Indonesia. *International Breastfeeding Journal*, 14, 27.

Smith J & Forrester R (2013) Who Pays for the Health Benefits of Exclusive Breastfeeding? An Analysis of Maternal Time Costs. *Journal of Human Lactation*, 29, 547–55.

Smith J, Borg B, Iellamo A et al. (2023a) Innovative financing for a gender-equitable first-food system to mitigate greenhouse gas impacts of commercial milk formula: Investing in breastfeeding as a carbon offset. *Frontiers in Sustainable Food Systems*, 7.

Smith J, Iellamo A, Nguyen T et al. (2023b) The volume and monetary value of human milk produced by the world’s breastfeeding mothers: Results from a new tool. *Frontiers in Public Health*, 11.

Smith J, Lande B, Johansson L et al. (2022) The contribution of breastfeeding to a healthy, secure and sustainable food system for infants and young children: Monitoring mothers’ milk production in the food surveillance system of Norway. *Public Health Nutrition*, 25,10, 2693–2701.

Walters D, Phan L & Mathisen R (2019) The cost of not breastfeeding: Global results from a new tool. *Health Policy and Planning*, 34,6, 407–417.

Youth power vs Big Food



Natasha Lelijveld
Senior Nutritionist at
Emergency Nutrition
Network (ENN)



Catharine Fleming
Lecturer in Public Health
at the School of Health
Science, Western Sydney
University



Cristina Alvarez
Nutrition Specialist,
School-age Children and
Adolescents, at UNICEF
Headquarters



Leah Richardson
Senior Technical Associate
at ENN



Emily Keats
Assistant Scientist at Johns
Hopkins Bloomberg School
of Public Health

Fixing food systems is a win-win for addressing malnutrition and mitigating climate change. To date, efforts to transform food systems have failed to prioritise healthy and sustainable diets for children and adolescents. As articulated by the Innocenti Framework (Raza et al., 2020), the diets of children and adolescents are shaped by food systems in ways that make them uniquely susceptible to exploitation by commercial companies.

Commercial actors do have opportunities to drive positive change in societies; however, a substantial number of them are contributing to avoidably high levels of ill health, planetary damage, and inequities. These actors include large, multinational food companies, also known as 'Big Food', who promote and sell unhealthy foods (such as those that are highly processed or high in sugar or salt). Many of these companies lobby in national policy environments, promote globalisation, and drive market economies, for the benefit of their own profits rather than global health. While the commercial determinates of health affect everyone, young people are especially at risk.

What we know:

Current food systems are failing young people (defined as ages 10–24 years for the purpose of this article). Food systems often overlook young people's nutritional needs and fail to provide the quantity, frequency, and quality of food that they require to grow and develop.

What this adds:

This article builds upon a blog post published by the authors in November 2023.¹ It describes six reasons to be hopeful about the role of youth in fixing food systems and provides more detail through key examples.

Today, adolescents make up 1.3 billion of the world's population, the largest cohort in history. Many low- and middle-income countries (LMICs) currently have a 'youth bulge', a large population of adolescents and young people. This should be a demographic gift for national economies. However, the demographic dividend is being exploited by Big Food² to make larger profits from the sale of unhealthy foods, at the expense of the nutritional status of young people and planetary health.

While we know that malnutrition is prevalent among adolescents, current data systems are poorly equipped to monitor the nutritional status of this age group (Lelijveld et al., 2022). Without the ability to monitor, national governments don't know the scale of the problem and they cannot set targets for improvement.

There are many reasons to be concerned about the negative influences of Big Food on the diets of young people, but there are also reasons for hope! Here are six:

Young people are empowered by knowledge and skills

Adolescents are knowledge-seeking and do understand the importance of good nutrition. In a study across 18 countries, adolescent participants discussed how nutrition was a high priority for them (Fleming et al., 2020). Young people valued health and wellbeing with an understanding that they need to consume a quality diet to ensure they stay healthy. They also called for better integration of nutrition education in their schools, seeking more opportunities to learn and to develop the practical skills needed to eat healthily.

When armed with knowledge on 'why' and skills for 'how-to', young people can make good food choices. Research from Brazil (Inácio et al., 2022) found that educating young people on food choices and meal preparation and overcoming obstacles to healthy eating had positive impacts on their self-efficacy in preparing healthy meals and reduced their consumption of ultra-processed foods.

Ultra-processed foods are pervasive throughout global food systems and consuming them in large quantities contributes to rising levels of childhood obesity, increases the risk of developing non-communicable diseases like diabetes and heart disease, and has detrimental impacts on environmental sustainability. In Chile, qualitative research (Fretas et al., 2021)

showed that, even at young ages (8–9 years), when simple concepts like 'taking care of the planet' were used to communicate with children, they could link environmental sustainability to the food they eat through 'green actions' such as recycling and eating less meat. They also demonstrated concerns around animal suffering and had positive perceptions of using simple eco-labels to distinguish between foods that were 'better' or 'worse' for the environment. By connecting nutrition-related knowledge and skills to benefits for health, wellbeing, and environmental sustainability, we can maximise their impact by tapping into the different priorities, concerns, and aspirations that resonate with young people and galvanise their commitment to change.

Young people are excellent changemakers

Young people can influence the health behaviours of their families and wider communities. Research from Ethiopia (Trübswasser et al., 2021) found that adolescents were confident in their ability to identify solutions to the challenges within their food environments. They desired more opportunities for involvement in nutrition research and programming and to influence decision making in their schools, households, and wider communities. 'Children for Health' is one organisation that harnesses young people's motivation and aspirations for food system transformation by encouraging children to be agents of change. They have created storybooks, posters, recipe books, and teaching guides to positively impact community food choices, breastfeeding practices, and hygiene practices. Their Rainbow Flower is a training tool that aims to promote more participatory methods of health education and to put empowerment principles for children and adolescents into practice.

In many settings, children and adolescent girls do a lot of the cooking at home. An ongoing study in Malawi is looking to reduce salt intake for adolescents and their families through a school-based, experiential learning intervention, following a pilot study review that found adolescent girls can be very influential on the diets of the whole household.

¹ <https://www.anh-academy.org/community/blogs/youth-power-vs-big-food-6-reasons-to-be-hopeful>

² https://www.researchgate.net/publication/343509732-Fast_food_consumption_among_young_adolescents_aged_12-15_years_in_54_low_and_middle-income_countries

Young people can also be changemakers at all levels of society. When over 700 adolescents from 18 countries were asked to identify specific actions to improve food systems, they provided concrete suggestions for change at all levels of their community, from “me and my family” to the wider community, industry, and government (Fleming et al., 2023). One of the four key areas in which young people sought change within their food systems was ‘inclusion’. They wanted to share their views across diverse platforms, including through traditional media (newspapers, television) and social media channels, during workshops, open forums, meetings and conventions, and at schools. In turn, they wanted to feel listened and responded to by government and other relevant organisations. To ensure that they are heard and acknowledged, young people made six recommendations to better position themselves as changemakers (Box 1).

Young people have agency, redefining food systems to work for them

Agency is a key pillar of food security, alongside availability, access, utilisation, stability, and sustainability. Adolescents, just like adults, can re-define food systems that work for them. When agency is enhanced, young people’s diet quality and nutrition improve.

The power of young people is increasingly being recognised, with representation at the World Food Forum, the 2021 UN Food Systems Summit, and as a key part of the Scaling Up Nutrition civil society network.

The global activation of the youth voice has shown that young people are acutely aware of the influence of multinational corporations on their food supply (Fleming et al., 2023).

Young people are reshaping food systems through social movements

Many young people are turning to social movements and other less traditional means of civic and political participation to challenge the influence of corporations. An article on Food-tank.com³ lists 20 youth organisations that are transforming food systems, such as Act4Food, a collective of global youth activists demanding a seat at the table to change food for good.

In Ghana, young people were central to the ‘Advocating for Health’ (A4H) project, which aimed to use scholar activism and advocacy to create a favourable environment and stakeholder buy-in for fiscal policies on food and drink products. This led to enactment of a sugar-sweetened beverage tax in 2023.

Fostering collective solidarity through shared goals, young people are also harnessing the power of social media, such as this powerful video⁴ by ‘Bite Back’, a youth-led organisation in the UK that exposes the powerful effect of advertising on food choices. This was instrumental in the development of a ban of junk food advertising online and before 9pm on TV in the UK from 2023.

Big Food might be powerful, but they are not infallible

Young people and wider society can take back some power by exploiting ‘cracks’ in corporate power,⁵ including vulnerable corporate reputations and conflicts within industry alliances.

The dietary practices of young people can be positively influenced by regulation, such as sugar taxes, restricting TV marketing, and limiting advertising in and around schools. Some LMICs already have strong policy frameworks in place to support adolescent nutrition, as outlined in case studies from Malawi and Bangladesh (Lelijeld et al., 2023).

Adolescents are calling for change (Fleming et al., 2023) through the regulation of food production and mechanisms to hold food producers accountable:

“Corporations cutting down on the profits they are making to make healthy food more affordable”

– contribution from a young person (aged 14 years) during a youth food systems workshop in Sydney, Australia

They also agree that marketing impacts their dietary choices and want governments to act by regulating marketing of unhealthy food and drinks. They are aware of, and can identify, tactics used by advertising companies to influence their food attitudes, preferences, and dietary habits. In Canada, research showed that adolescents identify teen-targeted advertisements according to their themes and their use of celebrity endorsements, special offers, music, and language (Elliot et al., 2022). Alongside regulation of unhealthy foods, youth have called for more intentional promotion of healthy foods, which would tip the scale toward healthier lifestyles:

Young people particularly desire better regulation in the digital space – across social media, apps, and gaming applications. They want stronger rules around the types of marketing they see, and for those rules to be enforced and monitored, and for digital platforms to be held

“I would end junk food marketing. This would take the spotlight off unhealthy food and create a food system with a bias towards health, where companies prioritise... healthy products”

– contribution from a young person (aged 17 years) in the UK during a focus group discussion

accountable when they break them. They also highlighted the need to regulate the ‘gimmicks’ (or creative and convincing elements) used by marketing agencies, with a particular emphasis on a need to prevent dishonest and misleading marketing, including the use of health claims to sell unhealthy products.

Young people’s nutrition is becoming more visible

UNICEF recently launched the Adolescent Data Portal, which features a focused selection of key indicators on health and nutrition, education, protection, and transition to work. Similarly, the Population Council houses an Adolescent Data Hub with data from across 127 LMICs.

Save the Children’s Adolescent Health and Nutrition Index, launched in 2023, tracks key indicators for adolescent health, nutrition, gender equality, and adolescent empowerment in 75 LMICs against the finance and wider legal and policy environment. Presenting these components together provides context for the status of adolescent health and nutrition across settings where adolescents, their communities, and their governments face distinct challenges. For example, in some countries strong policy frameworks for adolescent health and nutrition may be undermined by absent or inadequate financing for implementation, while in others policies, systems, and programmes to support adolescents may be lacking, despite adequate financing mechanisms. Encouraging to note is that the first of Save the Children’s recommendations to governments to meet the needs of adolescents is to partner with adolescents and young people, particularly girls and other groups impacted by gender inequality and discrimination. This should involve establishing and institutionalising mechanisms for young people’s safe and meaningful participation in decision making, as well as providing the financial and technical resources for them to do so.

The Demographic and Health Survey programme, which collects representative health and nutrition data in more than 90 countries, has recently changed the way adolescent nutrition indicators are reported. Now, instead of including adolescent girls with adult women, data for girls and boys aged 15–19 years is disaggregated and classified using age-appropriate references (Wrottesley, 2023).

Box 1 Recommendations to ensure that young people are heard (in nutrition)

1. Listen to adolescents
2. Leverage social media, including dedicated spaces on platforms for adolescent voices
3. Allow for adolescents to drive change through participating in school and/or through community-level action
4. Meaningfully engage adolescents in the policy development process
5. Ensure that co-design occurs from conception to completion of nutrition interventions
6. Continually measure youth involvement and outcomes throughout the intervention process

³ <https://foodtank.com/news/2021/08/youth-organizations-transforming-food-systems/>

⁴ <https://www.youtube.com/watch?v=TLf2gOrL1iM&t=1s>

⁵ <https://gh.bmj.com/content/6/2/e003850>

Conclusion

In summary, young people can be powerful changemakers for themselves and others. Companies are not invincible. Many young people are already acutely aware of the current issues facing food systems and the need to make choices for their and the planet's health. Arming more young people with knowledge can make them even more powerful. They deserve, and are entitled to, have their voices heard and their visions realised. At the same time, we are getting better at measuring and monitoring change. So, while Big Food propels food system-related climate change and is a huge contributor to the poor health and nutrition of young people, there are reasons for hope.

For more information, please contact Natasha Lelijveld at natasha@ennonline.net

References

Elliot C, Truman E & Stephenson N (2022) Food marketing and power: Teen-identified indicators of targeted food marketing. *International Journal of Environmental Research and Public Health*, 19, 13, 7815.

Fleming A, De Oliveira J, Hockey K et al. (2020) Food and me. How adolescents experience nutrition across the world. A companion report to The State of the World's Children 2019. researchdirect.westernsydney.edu.au.

Fleming A, Sharma D, Brunacci K et al. (2023) Fix my food: An urgent call to action from adolescents on how they experience and want to see change in their food systems. *Journal of Human Nutrition and Dietetics*, 36, 6, 2295–2309.

Fretas G, Sepúlveda A, Corvalán et al. (2021) Children's perceptions about environmental sustainability, food, and nutrition in Chile: A qualitative study. *International Journal of Environmental Research and Public Health*, 18, 18, 9679.

Inácio MLC, Pereira F, Fernandes L et al. (2022) Food and nutrition education using intuitive method and NOVA food classification: Implications for food practices of children and adolescents intuitive method in food and nutrition education. *American Journal of Health Promotion*, 36, 7, 1170–1182.

Lelijveld N, Benedict R, Wrottesley S et al. (2022) Towards standardised and valid anthropometric indicators of nutritional status on middle childhood and adolescence. *The Lancet Child & Adolescent Health*, 6, 10, 738–746.

Lelijveld N, Wrottesley S, Samnani A et al. (2023) Policies to prevent all forms of malnutrition among adolescents: Case studies from Bangladesh and Malawi. <https://www.ennonline.net/policies-to-prevent-all-forms-of-malnutrition-among-adolescents-case-studies-from-bangladesh-and-malawi>

Raza A, Fox E, Morris S et al. (2020) Conceptual framework of food systems for children and adolescents. *Global Food Security*, 100436.

Trübsswasser U, Baye K, Holdsworth et al. (2021) Assessing factors influencing adolescents' dietary behaviours in urban Ethiopia using participatory photography. *Public Health Nutrition*, 24, 12, 3615–3623.

Wrottesley S (2023) Adolescent-specific reporting of nutritional status. <https://www.ennonline.net/adolescent-specific-reporting-of-nutritional-status>

Views Measuring consumer demand to improve diets in Bangladesh and Burkina Faso

© WFP/Bangladesh/Saikat Moulumder



Shaneeka Thurman
Former Senior Advisor for Nutrition-Sensitive Social and Behaviour Change at USAID Advancing Nutrition



Amelia Giancarlo
Former Project Officer at USAID Advancing Nutrition



Abigail Conrad
Former Senior Advisor for Research and Learning at USAID Advancing Nutrition



Lisa Sherburne
Former Director for Social and Behaviour Change at USAID Advancing Nutrition



Silvia Alayon
Former Director for Measurement at USAID Advancing Nutrition



Alyssa Klein
Former Technical Advisor for USAID Advancing Nutrition

A woman buys seasonal fruits at a market in Bangladesh

What we know:

Consumer demand is a core component of food systems, influencing what producers grow, what markets sell, and what households decide to prepare and serve. Increasing consumer demand for healthy diets can transform food systems, improving access to safe, affordable, and nutritious foods, but it is particularly challenging for lower-income consumers.

What this adds:

We identified a need for better metrics of consumer demand for healthy diets among lower-income consumers in low- and middle-income countries, learning from our experiences in Bangladesh and Burkina Faso. We need a shared understanding of consumer demand that focuses on standardised, user-friendly metrics along the programme impact pathway, allowing programme staff to easily analyse and apply any findings.

Economists define consumer demand as the quantity of a good that consumers are willing and able to purchase at various prices during a given period (Sullivan & Sheffrin, 2003). While there is no common definition of consumer demand for healthy diets, it can be influenced by the food environment: availability, affordability, convenience, and desirability (Turner et al., 2018).

USAID Advancing Nutrition conducted a desk review of efforts to increase consumer demand for healthy diets among rural, low-income consumers. We found gaps and differences in how programmes measure such demand. This lack of clear metrics limits how programmes can adapt activities and build a strong evidence base by comparing efforts across different interventions. We applied behavioural theory to determine and test a set of programme-level metrics that practitioners can use to track and evaluate consumer demand generation across programmes. We then worked with

two programmes to test those metrics, in Bangladesh and Burkina Faso.

Understanding the gaps

To understand existing knowledge gaps for estimating consumer demand for nutrient-rich foods among public sector nutrition implementers, we first reviewed published literature and programme reports.

We identified three factors within personal food environments that influence consumer demand. Food product attributes (e.g., colour, taste, odour, quality, safety), consumer attributes (e.g., attitudes, beliefs, taste preferences, agency to make decisions), and vendors (e.g., trusted relationships with consumers).

We also identified a wide range of metrics that could be used to assess activities that aim to generate consumer demand. Private sector actors measure demand for nutrient-rich foods using production and sales. Some report the amount of product produced, while others report the amount of prod-

Figure 1 The behaviour change wheel^a

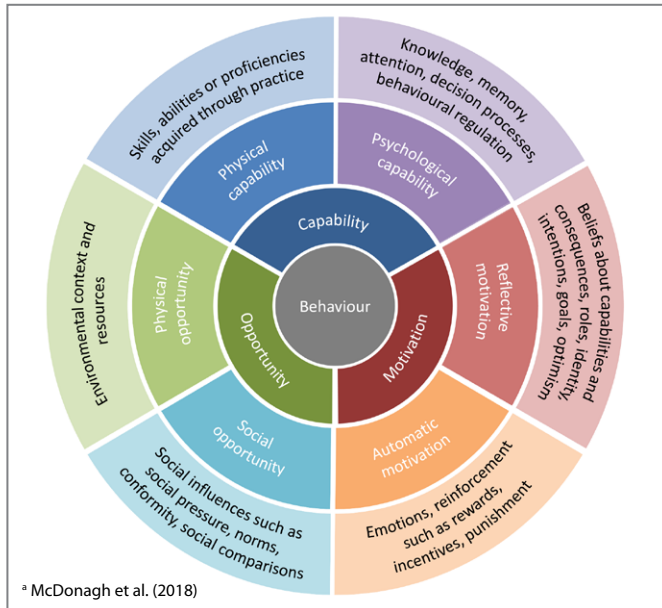
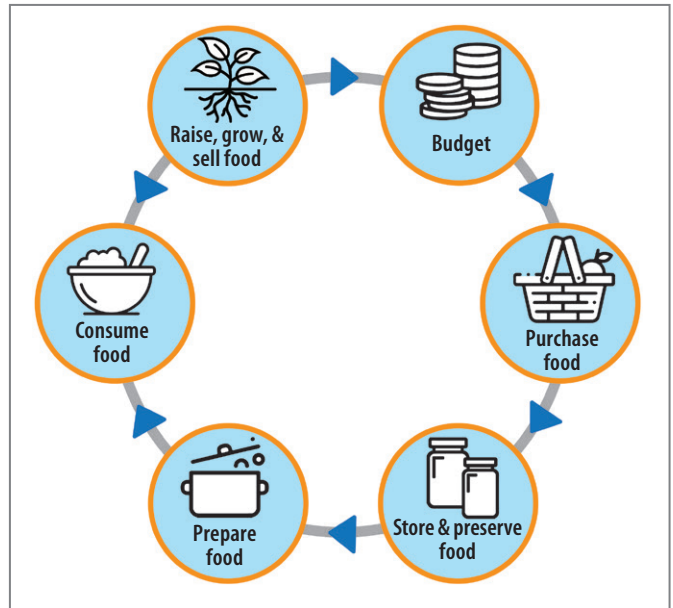


Figure 2 Household nutrition-sensitive agriculture behavioural clusters



uct sold to retailers or sales to end-consumers. These metrics offer a simple, real-time gauge of product availability, focusing on the motivation of private sector actors (profit potential). However, this focus makes it difficult to accurately interpret the pathway to demand. We also cannot identify the person in the household who consumes or purchases food (e.g., a child aged under 2 years or a woman of reproductive age).

Our research findings suggested that public sector partners measure demand generation through food consumption-level indicators (such as minimum dietary diversity) (Kim et al., 2016; Sherburne et al., 2018) and frequency of intake of a particular nutrient-rich food (Kim et al., 2019). As with production and sales metrics, these consumption metrics do not capture the pathway to demand in resource-challenged settings – where the nutrient-rich foods consumed may reflect only what is available and affordable, rather than also what is desired.

Metrics that capture the full pathway of demand generation are lacking in both the private

and the public sector. These would tell programmers *why* consumers can or cannot practise a behaviour, and would include multiple factors such as access, social approval, and perceived skill in food preparation. Programmes that try to “generate demand” require incremental metrics to understand overall impact, barriers and enablers, and where and how to adjust programming. A common, comprehensive set of metrics would enable stakeholders to consistently measure demand generation efforts, compare approaches, and build evidence on what works to increase consumer demand for nutrient-rich food. Therefore, we developed and tested a set of programme-level metrics that quantify the foundational elements of consumer demand.

Developing common indicators of consumer demand

To guide the development of metrics, we first reviewed 3 central theories and behaviour change models. Of these, the ‘behaviour change wheel’ (Figure 1) – which is based on the Capability-Opportunity-Motivation to Behaviour (COM-B)

model (Michie et al., 2011) – was selected. ‘Capability’ is divided into physical strength, skills, and psychological ability. ‘Opportunity’ is split into the environment and social opportunities. ‘Motivation’ is seen as automatic and reflective of brain processes through plans and evaluations.

We defined consumer demand in the context of the personal food environment – availability, affordability, convenience, and desirability – coupled with how economists define demand (the quantity of a good that consumers are willing and able to purchase at various prices during a given period). To put this into behavioural terms, we began by looking at household behavioural clusters related to nutrition-sensitive agriculture (Figure 2).

To ensure that metrics are useful to programmes that work to generate consumer demand, we chose “repeat purchase of a nutrient-rich food or diet” (depending on the programme) as the behaviour focus. This situates the behaviour between market-based approaches and consumers. “Discuss and decide” was included as a supporting step in the pathways as these actions are necessary for purchase in many households. To focus on consumers who are most vulnerable to poor nutrition outcomes, we defined the consumer demand behaviour as “Low-income consumers regularly purchase nutrient-rich foods.”

We left the decision to choose a specific type of food(s), an individual product, a category of products, or a value chain to each programme, according to where they work to generate demand. This consumer demand outcome is part of a larger pathway to answer the question: “Why is the vulnerable population not consuming food(s) promoted by the programme?”

Based on the literature and behaviour change model described above, we then prioritised the metrics for testing (Table 1).

Table 1 Prioritised consumer demand metrics¹

Behaviour	Average frequency of household purchase of <i>programme-promoted nutrient-rich food</i> in the previous month ^a % of households consuming purchased <i>programme-promoted nutrient-rich food</i> in the previous day ^{ab}
Capability	% of consumers who know where to buy the <i>programme-promoted nutrient-rich food</i> ^{ab} % of consumers who think that locally available <i>programme-promoted nutrient-rich food</i> is safe ^a
Opportunity	% of consumers who feel they were able to access <i>programme-promoted nutrient-rich food</i> in the last month ^{ab} % of consumers who paid a price that was at or below what they were expecting to pay for <i>programme-promoted nutrient-rich food</i> ^a
Motivation	% of consumers who report that family members or trusted influencers expect them to purchase <i>programme-promoted nutrient-rich food</i> ^{ab}

^a Tested in Bangladesh
^b Tested in Burkina Faso
^c We defined access as people being able to go to a market and decide whether they want to buy the food. Affordability was not included here. Affordability questions were separate, and the foods were simply not in the markets at the time of the survey.

¹ Although additional metrics were developed, this table only includes metrics that were prioritised for testing (based on a literature review and a programme document review).

Box 1 Programmes that tested consumer demand metrics for healthy diets

Led by Cultivating New Frontiers in Agriculture, the Feed the Future-funded USAID Yidgiri activity aims to strengthen market systems for the agriculture sector, sustainably improve household incomes, and enhance the nutritional status of women and children in Burkina Faso.

Led by Abt Associates, the USAID Feed the Future-funded Bangladesh Nutrition Activity aims to improve the consumption of nutritious, diverse, safe, and balanced diets by households, increase the social and economic empowerment of women and social empowerment of adolescents, and increase adoption of improved water, sanitation, and hygiene practices.

Testing metrics in Bangladesh and Burkina Faso

The most pertinent consumer demand objective of our Burkina Faso partner – USAID Yidgiri – was related to income generation among producer households (Box 1). The programme aimed to generate demand for their agricultural products, to increase incomes among these producer households.

For our Bangladesh partner – Feed the Future Bangladesh Nutrition Activity – their most relevant programme objective was the increased consumption of nutritious, diverse, and safe diets by rural households (Box 1). Increasing consumer demand for nutritious foods was a pathway to this outcome. This programme used the metrics we developed to identify whether they were adequately addressing the barriers that consumers face when purchasing foods, as well as to determine whether there were improvements in aspects of consumer demand.

We worked with both partners to incorporate consumer demand metrics into their annual programme monitoring surveys. To arrive at the list of metrics that programmes would test (Table 1), we analysed programme monitoring, evaluation, and learning plans, as well as each programme's community, market, and nutrition formative assessments. This allowed us to better understand the factors impacting consumer demand (repeat purchase of programme-promoted foods) in the programme's focus areas. Analysis of the assessments focused on identifying instances in which the core consumer demand factors were mentioned (such as “mobility to reach the market,” “product availability,” and “price”). We then worked with programme teams to determine which factors to address based on their relevance to the programme area – as indicated in formative studies – and alignment with the programmes' performance indicators.

For example, the programme in Bangladesh included questions to understand capability (knowledge of the promoted nutrient-rich foods and food safety) and opportunity (availability and affordability of promoted foods). The findings showed that capability was high in all regions, but pinpointed opportunity challenges for selected foods in selected regions.

The programme in Bangladesh also included a question about whether women believed that family members or trusted influencers expect them to purchase the promoted foods. It highlighted a need to address low perceived family support in 1 region, and to include questions about who and why in the next round of surveys.

We worked with the programmes through 4 rounds of data collection using the annual household surveys that we helped to design. In Bangladesh, surveys were completed with consumer households. In Burkina Faso, the households were producers who were also consumers. We drew our conclusions from the formative research and the implementation/testing of the metrics of consumer demand.

The way forward

“Develop consensus on the concept of consumer demand”

There are varied definitions of consumer demand and what it takes to generate or measure demand. Many programmes consider consumer demand to be met when dietary intake improves, but do not consider the intermediate steps to consumption (e.g., food choices and purchase). As a result, plans to measure these intermediate steps required additional discussion and support from teams across the programme. The concept of consumer demand must be clearly understood by all programmatic stakeholders to collect and apply monitoring and evaluation data. Although it is better for this understanding to inform programme design, we found that plans could be adjusted during implementation. Greater consensus across donors and implementers would enable programmes to better assess their efforts and compare experiences to build evidence. We offer the consumer behaviour of “repeat purchase of promoted foods” for consideration.

“Select metrics that reflect the impact pathway in the local programme context”

It is unlikely that 1 set of metrics will be applicable across all programmes to monitor the consumer demand pathway. In Bangladesh and Burkina Faso, access to the promoted nutrient-rich foods was important to measure. This showed that, in both contexts, nutrient-rich foods were simply not available in the markets. However, we also found differences. In Bangladesh, taste preferences were key to decision-making on some promoted vegetables. In Burkina Faso, the foods men and women purchased varied by urban and rural locations. Each programme pathway was developed by understanding the formative research data and being willing to broaden metrics beyond the ‘usual suspects’ of knowledge and attitudes.

We offer the metrics in Table 1 as a starting point for programmes to consider and select indicators that reflect barriers and enablers in the local context. Additional metrics may be needed in some settings. As programmes expand their work in generating consumer demand, building capacity to work with data (for decision-making) and using responsive feedback loops could increase the likelihood of developing programme impact pathways with meaningful metrics.

“Continue to test metrics to inform the development of validated indicators and indicator sets on consumer demand”

This is the first step in a process to identify and develop indicators. Such indicators can inform longer-term efforts to develop a set of quality metrics that can measure programme efforts to generate consumer demand for healthy diets.

Conclusion

Achieving broader food security and nutrition goals is facilitated by extending proven marketing practices to generate demand for nutritious foods to rural, low-income consumers. There is currently little evidence on the effectiveness of approaches to reaching lower-income consumers or improving diet quality (Nordhagen & Demmler, 2023). A key first step is measuring incremental change pathways, from production to consumption, for programmes to ascertain whether demand generation efforts are working and how to improve them.

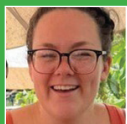
Our experience – applying a behavioural science theory to develop a set of programme-level metrics on consumer demand for nutritious foods for rural, low-income consumers – is a first step to measuring consumer demand generation plans. We hope that programmes aiming to improve diets continue to review and adapt metrics, such as those offered in this article, to understand and track the incremental pathway to consumer demand.

For more information, please contact Shaneka Thurman at shaneka.thurman@gmail.com

References

- Kim S, Rawat R, Mwangi EM et al. (2016) Exposure to Large-Scale Social and Behavior Change Communication Interventions is Associated with Improvements in Infant and Young Child Feeding Practices in Ethiopia. *PLOS ONE*, 11, 10, e0164800.
- Kim S, Nguyen P, Yohannes Y et al. (2019) Behavior Change Interventions Delivered through Interpersonal Communication, Agricultural Activities, Community Mobilization, and Mass Media Increase Complementary Feeding Practices and Reduce Child Stunting in Ethiopia. *The Journal of Nutrition*, 149, 8, 1470–1481.
- McDonagh L, Saunders J, Cassell J et al. (2018) Application of the COM-B model to barriers and facilitators to chlamydia testing in general practice for young people and primary care practitioners: A systematic review. *Implementation Science*, 13, 130.
- Michie S, van Stralen M & West R (2011) The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42.
- Nordhagen S & Demmler KM (2023) How do food companies try to reach lower-income consumers, and do they succeed? Insights from a systematic review. *Global Food Security*, 37, 1–11.
- Sherburne L, Math S, Griffiths M et al. (2018) “Grow Together” Campaign in Cambodia: A Game Changer for Children's Healthy Growth. The NOURISH Project in Cambodia: Grow Together Campaign. advancingnutrition.org.
- Sullivan A & Sheffrin S (2003) *Economics: Principles in action*. Upper Saddle River, New Jersey: Pearson Prentice Hall.
- Turner C, Aggarwal A, Walls H et al. (2018) Concepts and critical perspectives for food environment research: A global framework with implications for action in low- and middle-income countries. *Global Food Security*, 18, 93–101.

Cambodia: Impacts of the nutrition transition on urban and rural mothers and children



Hillary Fry
Registered Dietitian for Northern Health, Kitimat, Canada



Sanne Sigh
Advisor for the Multisectoral Food and Nutrition Security (MUSEFO) project, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Phnom Penh, Cambodia



A schoolgirl buying snacks during school break at a local, rural vendor, Cambodia, 2023

© Helen Keller International/Cambodia/2023

What we know:

The nutrition transition – which stems from economic and related demographic changes – is characterised by changes in food environments and increasing access to highly processed foods, which can alter the traditional dietary patterns of mothers and children.

What this adds:

This article provides an exploratory comparison of the ongoing nutrition transition in urban and rural Cambodia among caregivers and their children. This provides important insights for Cambodian policymakers and programmes to optimally address these challenges and ensure the health and livelihoods of caregivers, their children, and the country.

In low- and middle-income countries (LMICs) such as Cambodia the transition from food environments based on home production to those high in processed and mass-produced foods is particularly impactful. The traditional diet in Cambodia typically contains rice, fruits, vegetables, and low-fat protein sources, but has shifted to include more ultra-processed foods. Snack food and sugar-sweetened beverage consumption has risen, particularly among children (National Institute of Statistics, 2022). While undernutrition remains a challenge, rises in diabetes and other non-communicable diseases are already emerging (Kulikov et al., 2019).

“Very little is known about the ongoing nutrition transition in Cambodia. Research investigating the impacts of the changing food environment on food gathering and purchasing remains scarce.”

Recognising this gap, the Multisectoral Food and Nutrition Security (MUSEFO) project (Box 1) conducted a study exploring the effects of the ongoing nutrition transition on purchasing and consumption patterns among Cambodian caregivers and children. This article provides preliminary results from the Nutrition Transition and Food Environment Study, investigating both urban and rural areas in Cambodia.

Our study

We used a mixed-methods design approach combining quantitative and qualitative observational data. This article presents the quantitative results from the household survey conducted between January and August 2021. Participants were from 68 villages across one urban (Phnom Penh) and two rural (Kampong Thom and Kampot) provinces of Cambodia. Participants were mothers or caregivers of a child aged 6–59 months.

To include a broader sample of the Cambodian population and to allow analysis of urban/rural differences, data presented here were gathered from: 1) beneficiary families of the MUSEFO project, who had received nutrition and

basic hygiene education using the care group approach combined with nutrition counseling during home visits, living in rural Kampong Thom and Kampot; and 2) a random sample of families who were not beneficiaries of

Box 1

Programmes that tested consumer demand metrics for healthy diets

Our data was collected within the MUSEFO project, which is a part of the Global Programme ‘Food and Nutrition Security, Enhanced Resilience’ under the Special Initiative ‘Transformation of Agricultural and Food Systems – For A Life Free of Hunger’ run by the German Federal Ministry for Economic Cooperation and Development. The project is owned by the Council for Agricultural and Rural Development, funded by the German Federal Ministry for Economic Cooperation and Development, and implemented by GIZ since 2015. The main outcomes of MUSEFO are to improve the dietary diversity of women of reproductive age, particularly pregnant and lactating women, and improve the minimal acceptable diet of 6–24-month-old children.

The National Ethical Committee for Health Research approved the study by the Cambodian Ministry of Health on 27 November 2022 (Approval No. 039). Consent was received from participants before any data were collected. Participants could withdraw their consent or refrain from answering questions without any influence on the services or support they received. After the survey, participants were compensated with a krama, a traditional garment that can be used for multiple purposes.

the project, living in Kampot, Kampong Thom, and Phnom Penh. Beneficiaries were recruited through the project and non-beneficiaries by purposive sampling in target provinces.

All study participants completed a questionnaire on a tablet, with reading and comprehension assistance from a research assistant, exploring food perceptions, gathering and purchasing practices, and the Cambodian adaptation of the Diet Quality Questionnaire (DQ-Q) developed by the Global Diet Quality Project (2023), for both caregiver and child. From the DQ-Q, a Global Diet Recommendation (GDR) 'healthy' score was calculated, measuring the consumption of healthy foods (e.g., fruits and vegetables) and a GDR 'limit' score measuring consumption of foods to limit or avoid (e.g., sugar-sweetened beverages). In both cases, a higher score indicates greater consumption. The DQ-Q is a globally applicable, valid, and reliable tool created to enable population-level diet quality monitoring (Herforth et al., 2020).

Descriptive data are presented as n (%) or mean (standard deviation). Sociodemographic factors were analysed using Chi-square with Bonferroni post hoc analysis for categorical variables, while t-tests were used for continuous variables. A p-value of <0.05 was considered statistically significant. Non-parametric continuous data (e.g., GDR scores) were analysed using the Mann-Whitney U test. GDR-Limit and GDR-healthy scores were calculated following directions described by the Global Diet Quality Project (Herforth et al., 2020). GDR-limit scores were analysed by various continuous variables using Pearson correlation and by categorical variables using t-tests. The higher the GDR-limit score, the more food is consumed in this category, and the less likely healthy eating recommendations are met.

Results

Study sample

This sample included 1,033 caregivers (97% female). Most participants (92%) were partnered and had low levels of education (7.5±4.2 years). Primary caregivers were mothers (82%), grandmothers (15%), fathers (2%), and others (2%). Participants had an average age of 34.0±10.6 years, which is older than the average age of mothers in Cambodia and with wide variation due to the inclusion of grandparents. Each of these factors was relatively consistent across rural and urban groups.

Significantly more respondents (p<0.001) living in urban areas were employed full-time (13%) and owned a small business (30%) compared to those in rural areas, at 3% and 22%, respectively (Table 1). Urban households reported a significantly higher monthly income of \$708.72 compared to \$339.30 among rural households. However, income also showed large variability within urban and rural populations. More participants lived in rural areas (n=757) compared to urban settings (n=276) in this study. This population was not balanced but does reflect Cambodia's urban/rural distribution, as it is still a predominantly rural country. None of the urban participants

Table 1 Differences in study populations

	Rural N=757	Urban N=276	p
Beneficiaries^a	374 (49%)	18 (7%)	<0.001
Province			<0.001
Kampot	361 (48%)	35 (12%)	
Kampong Thom	396 (52%)	0 (0%)	
Phnom Penh	0 (0%)	241 (87%)	
No. of children aged 6–59 months in the household	1.2 ± 0.4	1.3 ± 0.5	0.002
Job			<0.001
Care for household	402 (53%)	143 (52%)	
Small business owner	166 (22%)	82 (30%)	
Full-time employment	22 (3%)	36 (13%)	
Farming	143 (19%)	4 (1%)	
Other	24 (3%)	11 (4%)	
Monthly income (USD)	339.30±544.25	708.72±852.03	<0.001

^a Individuals receiving the MUSEFO intervention

(Phnom Penh) in this analysis were from the beneficiary group.

Key findings

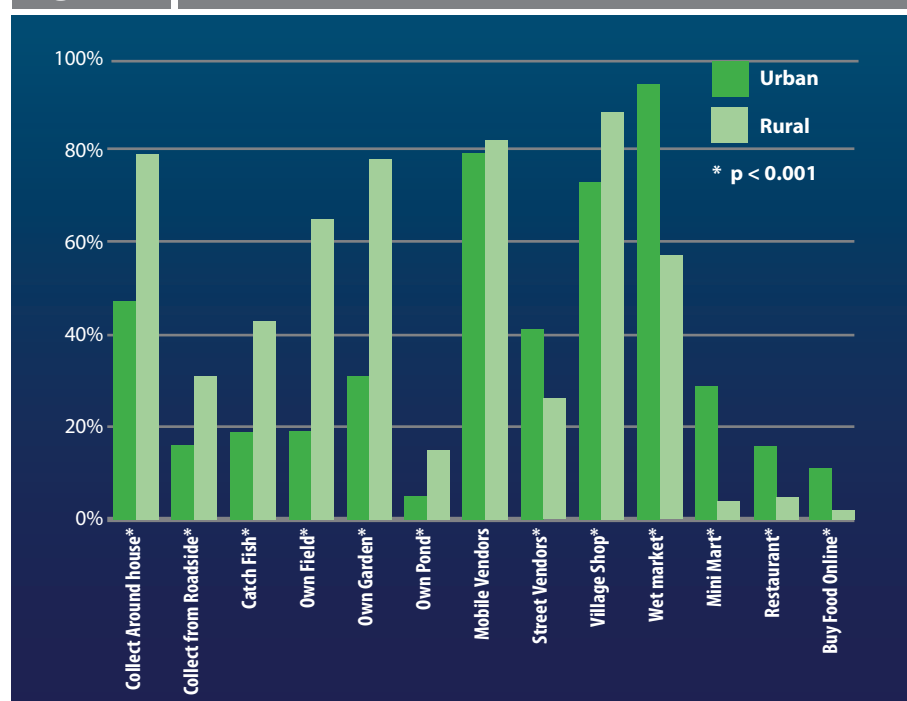
A significantly higher portion of rural versus urban households procured their food from their own or nearby sources such as their own fields (65%; 19%), gardens (78%; 31%), ponds (15%; 5%), or fishing in a nearby river/ocean (43%; 19%) (Figure 1). Significantly more urban households sourced their food from establishments such as street vendors (41%; 26%), wet markets (94%; 57%), mini marts (29%; 4%), restaurants (16%; 5%), and online (11%; 2%). Mobile vendors¹ were an equally common food source for rural and urban households (82%; 79%).

GDR-limit scores were significantly positively correlated with household income for

both caregivers and children among rural participants – as household income increased, consumption of foods in the 'limit' category also increased (Table 2). Rural caregivers and children from households identified as earning below the poverty line had significantly lower GDR-limit scores. This may provide evidence that disposable income is more likely to be allotted to snacks and sweets or, in the context of Cambodia's rates of malnutrition, poverty could simply indicate lower overall intake of all foods. This relationship was also not seen for urban households above or below the poverty line, reinforcing the hypothesis that wealth may have less of an effect due to already greater

¹ Mobile and street vendors sell fresh produce, sugar-sweetened beverages, and snacks. However, street vendors more commonly have access to refrigeration and may also sell cooked or prepared food.

Figure 1 Sources of food procurement among urban versus rural households



access/exposure to various food sources – particularly unhealthy food sources brought with a nutrition transition.

Further analysis showed that GDR-limit scores were significantly ($p < 0.001$) positively correlated with GDR-healthy scores among both caregivers (0.233) and children (0.297) for both rural and urban participants. This suggests that less nutritious foods may not replace nutritious foods in this setting but are instead consumed in addition to healthier foods. Regardless, our data show significant consumption of energy dense foods with high sugar and salt content among Cambodian caregivers and children, which warrants concern for future rates of non-communicable diseases.

GDR-limit scores were significantly positively associated with the number of food sources commonly used by the household among urban caregivers and children, and rural children. However, this was not true for rural caregivers (Table 2). The importance of dietary diversity is demonstrated here – greater variety in food sources likely means greater variety in food, which is captured in the GDR-limit score calculations. A similar pattern of greater variety in urban areas and less variety among rural participants has been seen mid-nutrition transition in other Southeast Asian countries (Lipoeto et al., 2012).

Caregiver age was only observed to be significant for rural caregiver GDR-limit scores, but not for urban caregiver GDR-limit scores or child GDR-limit scores in either setting. This may indicate that rural caregivers are younger and have unhealthy food preferences, have less experience in selecting appropriate foods for themselves, and/or exhibit less traditional dietary influence.

Although some differences were seen among rural caregivers and children, scores were not as impacted by the source of food as urban participants, whose scores were significantly associated with where they tend to procure food (Tables 3a and 3b). Among our urban participants, wet markets, raising animals, and collecting food from around the house all were associated with higher GDR-limit and GDR-healthy scores. This is likely explained by the source's provision of food in both the

limit and healthy categories (e.g., beef from the limit category; chicken from the healthy category). Catching fish and owning a pond were both associated with higher GDR-healthy scores among rural children and caregivers, as both increase access to foods included in the 'healthy' category, such as fish.

Conclusion and lessons learned

A nutrition transition occurs alongside urbanisation. Urban areas in Cambodia have greater access to supermarkets and modern retailers, exposure to marketing, and a changing workforce with higher household incomes that support the purchase of convenience and ultra-processed foods (Consortium for Improving Complementary Foods in Southeast Asia, 2023). This was reflected in our results, with urban participants identifying similar food sources and less reliance on household production of food. While rural households rely more on traditional food sources, mobile vendors – where salty snacks, sweet treats, and ultra-processed foods tend to be sold – were significant sources of food, although they were not associated with a higher GDR-limit score in this sample.

The diet of urban households included in this study was more often related to, and potentially influenced by, where food is sourced. Diet scores in rural households was significantly associated with income. With low incomes in rural areas and more limited choices in regard to food sources, it would be expected that income would have a significant influence on diet.

Overall, GDR-limit scores increased as GDR-healthy scores increased in both urban and rural participants. The general concern that, during a nutrition transition, salty snacks, sugar-sweetened beverages, and other ultra-processed foods replace nutrient-dense foods has not happened. Instead, it appears that a greater overall intake includes all foods among this sample. It is still likely, though, that this impacts how income is spent and could still contribute to micronutrient deficiencies (Bose et al., 2018). Further, with already rising rates of non-communicable diseases such as diabetes in Cambodia, the described intake of highly processed, energy-dense foods high in sugar and salt, par-



A young boy drinking a sugar sweetened beverage. Cambodia, 2023

© Helen Keller International/Cambodia/2023

ticularly among children, raises concern regarding the future health of Cambodians (National Institute of Statistics, 2022).

One limitation of this study is the potential for observation bias, given that survey questions were administered with assistance from Khmer-speaking research assistants. These research assistants may have introduced their own biases by mistranslating participant answers and/or their presence may have affected participant response due to social norms. However, this did improve study accessibility for those who could not read or write, which in turn minimised selection bias, as well as reducing any translation errors. Participants were not informed about their compensation with a Krama prior to the interview, also reducing selection bias. A further limitation of the study is the mixed sample of beneficiaries and non-beneficiaries of the MUSEFO project and an uneven distribution of these within the urban and rural settings. The beneficiaries had received education on basic hygiene, home farming, and nutrition. However, the inclusion of urban and rural participants beyond the beneficiary sample allowed us to gather data from a more representative Cambodian sample and include a potential "future" vision of how food environment and consumption might change in rural areas with increasing access and availability (as Phnom Penh, the capital, is further along in its nutrition transition).

The study is unable to interpret trends in dietary patterns and nutritional transition, as no baseline or follow-up data are presented, but it does provide a current snapshot of dietary intake and the food environment in Cambodia.

Together, these results show that the food environments in urban and rural Cambodia both include increasingly industrialised (processed) food sources, but to different degrees. This data provides a novel, cross-sectional view of the state of the nutrition transition in Cambodia and provides valuable insights into areas requiring attention from programmes and policies.

For more information, please contact Hillary Fry at hillarylfry95@gmail.com

Table 2 GDR-limit scores of urban and rural caregivers and children

Caregiver/HH characteristics	Caregiver GDR-limit score				Child GDR-limit score			
	Urban (n=276)	p	Rural (n=757)	p	Urban (n=276)	p	Rural (n=757)	p
Income	0.063	0.3	0.099	0.006	0.02	0.7	0.087	0.016
Below the poverty line	2.0±1.4	0.8	1.4±1.2	0.002	2.0±1.6	0.2	1.4±1.2	<0.001
Not below the poverty line	1.9±1.3		1.8±1.2		1.7±1.4		1.9±1.3	
Caregiver age	-0.1	0.08	-0.113	0.002	0.005	0.9	0.015	0.7
Youngest child's age	-0.127	0.034	-0.004	0.9	0.26	<0.001	0.262	<0.001
Number of food sources	0.155	0.01	0.019	0.6	0.123	0.04	0.107	0.003

Table 3a

Urban and rural child GDR-limit and GDR-healthy scores based on where food is sourced

	Urban (n=276)							Rural (n=757)						
	n (yes)	Child GDR-limit score			Child GDR-healthy score			n (yes)	Child GDR-limit score			Child GDR-healthy score		
		Yes	No	p	Yes	No	p		Yes	No	p	Yes	No	p
Collect around house	129 (47%)	2.0±1.7	1.6±1.2	0.018	2.1±1.6	1.6±1.6	0.016	598 (79%)	1.9±1.3	1.5±1.2	<0.001	2.2±1.5	2.0±1.6	0.3
Collect on roadside	43 (16%)	1.9±1.9	1.8±1.3	0.6	1.9±1.6	1.8±1.6	0.9	232 (31%)	1.8±1.4	1.8±1.2	0.8	2.3±1.5	2.1±1.5	0.08
Catch fish	51 (19%)	1.8±1.7	1.8±1.4	0.9	1.8±1.5	1.8±1.6	0.9	327 (43%)	1.9±1.3	1.7±1.2	0.1	2.5±1.6	1.9±1.4	<0.001
Own fields	51 (19%)	1.9±1.5	1.8±1.4	0.4	2.4±1.8	1.7±1.5	0.003	491 (65%)	1.8±1.3	1.7±1.2	0.4	2.2±1.5	2.1±1.5	0.4
Food garden	85 (31%)	1.8±1.6	1.8±1.4	0.8	2.0±1.7	1.7±1.5	0.2	587 (78%)	1.8±1.2	1.8±1.4	0.8	2.2±1.5	1.8±1.5	0.003
Raise animals	58 (21%)	2.2±1.6	1.7±1.4	0.02	2.3±1.7	1.7±1.5	0.015	627 (83%)	1.8±1.3	1.7±1.2	0.1	2.2±1.5	1.9±1.5	0.09
Own pond	15 (5%)	2.1±1.2	1.8±1.5	0.2	2.1±1.9	1.8±1.6	0.4	113 (15%)	1.7±1.2	1.8±1.3	0.6	2.6±1.5	2.0±1.5	<0.001
Mobile vendors	217 (79%)	1.8±1.5	1.7±1.4	0.5	1.9±1.5	1.7±1.8	0.5	624 (82%)	1.8±1.3	1.6±1.2	0.8	2.2±1.5	1.9±1.6	0.9
Street vendors	114 (41%)	1.9±1.7	1.7±1.3	0.09	2.0±1.7	1.7±1.5	0.1	199 (26%)	1.7±1.3	1.8±1.3	0.3	2.2±1.6	2.1±1.5	0.3
Village shop	200 (73%)	1.8±1.5	1.7±1.2	0.3	1.8±1.5	1.8±1.7	0.9	668 (88%)	1.8±1.3	1.7±1.0	0.6	2.1±1.5	2.0±1.5	0.3
Wet market	259 (94%)	1.8±1.5	1.0±0.9	0.003	1.9±1.6	1.2±0.8	0.01	433 (57%)	1.8±1.3	1.7±1.3	0.1	2.2±1.5	2.0±1.5	0.2
Mini mart	81 (29%)	1.6±1.5	1.9±1.4	0.1	2.0±1.6	1.8±1.6	0.4	31 (4%)	1.6±1.5	1.8±1.3	0.4	2.4±1.6	2.1±1.5	0.4
Farmers market	8 (3%)	1.6±0.7	1.8±1.5	0.8	2.9±1.8	1.8±1.6	0.06	22 (3%)	2.4±1.2	1.8±1.3	0.013	2.6±1.7	2.1±1.5	0.2
Restaurant	44 (16%)	2.0±1.7	1.8±1.4	0.4	2.3±1.7	1.7±1.6	0.03	34 (5%)	2.3±1.1	1.8±1.3	0.009	2.7±1.8	2.1±1.5	0.053
Online	30 (11%)	1.8±1.7	1.8±1.4	0.8	2.1±1.5	1.8±1.6	0.4	13 (2%)	1.7±1.0	1.8±1.3	0.8	2.9±1.2	2.1±1.5	0.054

Table 3b

Urban versus rural caregiver GDR-limit and GDR-healthy scores based on where food is sourced

	Urban (n=276)							Rural (n=757)						
	n (yes)	Caregiver GDR-limit score			Caregiver GDR-healthy score			n (yes)	Caregiver GDR-limit score			Caregiver GDR-healthy score		
		Yes	No	p	Yes	No	p		Yes	No	p	Yes	No	p
Collect around house	129 (47%)	2.1±1.5	1.8±1.2	0.041	3.1±1.6	2.6±1.6	0.007	598 (79%)	1.7±1.1	1.6±1.3	0.2	3.2±1.6	3.0±1.6	0.3
Collect on roadside	43 (16%)	2.1±1.7	1.9±1.3	0.3	2.7±1.5	2.9±1.6	0.5	232 (31%)	1.7±1.2	1.7±1.1	0.9	3.1±1.6	3.2±1.6	0.6
Catch fish	51 (19%)	2.2±1.6	1.9±1.3	0.9	2.9±1.5	2.9±1.6	0.1	327 (43%)	1.7±1.2	1.7±1.2	0.3	3.4±1.6	2.9±1.5	<0.001
Own fields	51 (19%)	2.0±1.3	1.9±1.3	0.6	3.3±1.9	2.8±1.5	0.02	491 (65%)	1.7±1.2	1.8±1.2	0.2	3.2±1.6	3.1±1.6	0.4
Food garden	85 (31%)	2.0±1.4	1.9±1.3	0.6	3.1±1.7	2.8±1.6	0.1	587 (78%)	1.7±1.2	1.8±1.3	0.1	3.2±1.6	2.9±1.6	0.06
Raise animals	58 (21%)	2.3±1.4	1.8±1.3	0.011	3.2±1.7	2.8±1.6	0.09	627 (83%)	1.7±1.2	1.6±1.2	0.2	3.2±1.6	2.9±1.6	0.07
Own pond	15 (5%)	1.9±1.1	2.0±1.3	0.9	3.1±2.0	1.9±1.6	0.5	113 (15%)	1.7±1.3	1.7±1.2	0.7	3.5±1.6	3.1±1.6	0.018
Mobile vendors	217 (79%)	2.0±1.4	1.7±1.1	0.1	2.9±1.6	2.6±1.8	0.2	624 (82%)	1.7±1.2	1.6±1.1	0.4	3.2±1.6	3.0±1.7	0.4
Street vendors	114 (41%)	2.1±1.5	1.9±1.2	0.2	3.2±1.7	2.7±1.6	0.011	199 (26%)	1.7±1.3	1.7±1.2	0.6	3.2±1.6	3.1±1.6	0.3
Village shop	200 (73%)	2.1±1.4	1.7±1.1	0.025	2.9±1.5	2.7±1.8	0.2	668 (88%)	1.7±1.2	1.8±1.2	0.4	3.1±1.6	3.2±1.7	0.5
Wet market	259 (94%)	2.0±1.4	1.2±0.7	0.022	2.9±1.6	1.8±1.0	0.006	433 (57%)	1.8±1.2	1.6±1.2	0.07	3.2±1.6	3.0±1.7	0.06
Mini mart	81 (29%)	2.0±1.4	2.0±1.3	0.9	3.3±1.5	2.7±1.6	0.01	31 (4%)	2.0±1.5	1.7±1.2	0.2	3.3±1.5	3.1±1.6	0.6
Farmers market	8 (3%)	1.8±0.9	2.0±1.3	0.7	3.5±0.9	2.8±1.6	0.3	22 (3%)	1.9±1.3	1.7±1.2	0.5	3.6±1.8	3.1±1.6	0.2
Restaurant	44 (16%)	2.1±1.5	1.9±1.3	0.4	3.3±1.4	2.8±1.6	0.052	34 (5%)	2.4±1.2	1.7±1.2	<0.001	3.8±1.6	3.1±1.6	0.012
Online	30 (11%)	2.1±1.2	1.9±1.3	0.6	3.3±1.4	2.8±1.6	0.1	13 (2%)	1.7±0.9	1.7±1.2	0.8	3.9±1.3	3.1±1.6	0.07

References

Bose I, Deptford A, Baldi G et al. (2018) Consumption of empty-calorie snack foods raises cost of nutritious diet. *Sight and Life*, 32, 2, 29–39.

Consortium for Improving Complementary Foods in Southeast Asia (2023) Cambodia COMMIT Synthesis Report. unicef.org.

Herforth A, Wiesmann D, Martinez-Steele E et al. (2020) Introducing a suite of low-burden diet quality indicators that reflect healthy diet patterns at population level. *Current Developments in Nutrition*, 4, 12.

Kulikov A, Mehta A, Tarlton D et al. (2019) Prevention and control of noncommunicable diseases in Cambodia: The case for investment. WHO Regional Office for the Western Pacific.

Lipoeto N, Lin K & Angeles-Agdeppa I (2021) Food consumption patterns and nutrition transition in South-East Asia. *Public Health Nutrition*, 16, 9, 1637–1643.

National Institute of Statistics (2022) Cambodia demographic and health survey 2021-22: Final report. dhsprogram.com.

What we know:

Lebanon, a country with one of the highest proportional refugee populations globally, is currently facing a multifaceted financial and health crisis. Despite the release of the Lebanon National Nutrition Strategy and Action Plan (2021–2026) and efforts by the Lebanese Ministry of Public Health (MOPH) and partners, challenges with the implementation and evaluation of infant and young child feeding (IYCF) programmes remain.

What this adds:

Action Against Hunger (AAH) interviewees working in Lebanon outline environmental barriers to IYCF programming, suggestions to improve programming to support caregiver practices, and potential staff training tools that can be used to improve health and nutrition services. Further exploration of complementary feeding challenges is needed to fill the remaining knowledge gap, particularly in humanitarian and conflict settings, where the provision of safe, nutritious, and culturally appropriate complementary foods is key.

In Lebanon, children continue to bear the brunt of one of the world's worst economic crises. Among children aged under 2 years, 26% can be classified as severely food poor, with malnutrition posing a new threat to the health and development of infants and young children (UNICEF, 2023). Poor adherence to optimal IYCF practices is noted (Akik et al., 2017; Naja et al., 2023). Weak policy endorsements, poor implementation of baby-friendly hospital initiatives, and the strong influence of private industry that promotes the distribution and marketing of commercial milk formula, along with other cultural barriers, were all listed as obstacles to optimal IYCF practices in Lebanon and its neighbouring countries (Shaker-Berbari et al., 2021).

AAH has worked in Lebanon since 2006. Nutrition interventions, which have been incorporated into the overall response since 2012 (with increased attention from 2020 onwards), focus on promoting appropriate IYCF practices through knowledge sharing, one-on-one counselling, and group sessions. These were delivered by a multi-pronged staff intervention strategy at community level, with most interventions provided through home visits.

The aim of this study was to explore the challenges and opportunities faced by AAH community health workers and implementation team members in their promotion of appropriate IYCF practices among vulnerable Lebanese and Syrians in Lebanon. The study objectives were to examine the perceptions of programme workers regarding available tools, guidelines, and training, and to explore worker perceptions regarding existing opportunities and barriers to the promotion of IYCF in this context.

Study design

This qualitative study was facilitated through a collaborative effort between

the University of North Carolina at Chapel Hill's Gillings Humanitarian Health Initiative (UNC-HHI), researchers from the Department of Nutrition Sciences at North Carolina Central University, and AAH Lebanon. Recruitment took place via purposive sampling, where a list of all current AAH Lebanon nutrition staff, as well as any health/nutrition staff who finished their contract within the last 2–3 months, was shared with researchers. Then, 13 potential voluntary interviewees were identified by the AAH health and nutrition coordinator, resulting in 12 interviewees responding. The positions covered were IYCF specialists (n=6), community nutrition officers (n=3), and managerial/supervisory staff (n=3). All interviewees had prior community-level experience and were national workers. Their years of service at AAH ranged from 1–8 years.

Semi-structured remote interviews were conducted from December 2022 to January 2023. Interviews were based on a topic guide that included questions about staff knowledge and skills, tools used to implement teaching interventions, gaps in resources, and what staff felt were biggest barriers to implementation of optimal IYCF counselling and education. Each UNC-HHI-trained interviewer followed the same structure with the same questions from the pre-approved topic guide. Interviews were 35–60 minutes long. Consent to record audio, clarify study aims, and obtain secondary verbal consent occurred at the beginning of each interview.

The UNC-HHI team created a preliminary coding frame for the first stage of analysis. Each research assistant coded 6 interviews for continuity and then checked several of their partner's interviews to verify they used similar codes. Codes were grouped together under overarching themes and then organised into various sub-themes. The organisation of themes and sub-themes were refined



An early childhood development specialist from the Action Against Hunger team organised an informative session in Nabatieh, Lebanon, 2024

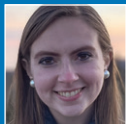
Promoting infant and young child feeding in Lebanon: Lessons learned from programming



Lamis Jomaa
Associate Professor at North Carolina Central University and Affiliate Associate Professor at the American University of Beirut, Lebanon



Kate Price
Intern at the Humanitarian Health Initiative, University of North Carolina Chapel Hill (UNC)



Clara Hare-Grogg
Intern at the Humanitarian Health Initiative, UNC



Astrid Klomp
Former Nutrition and Health Coordinator at Action Against Hunger Spain (AAH), Lebanon



Aunchalee Palmquist Associate Professor of the Practice, Duke Global Health Institute

We would like to acknowledge the efforts of all AAH members who took part in the interviews and facilitated data collection. Thanks to Domanique Richards, from the Department of Nutrition Sciences at North Carolina Central University, for her support with the annotations for this article.

© Elise Saab - Action Against Hunger

through group discussion and are presented below (Figure 1).

Findings

AAH staff noted that one-on-one counselling and group sessions were particularly helpful for IYCF promotion. Counselling sessions improved understanding and gave staff opportunities to tailor intervention strategies to specific concerns, economic situations, and feeding misconceptions (*theme 1*). AAH IYCF specialists also felt that they could better assess mother and baby dyads in-person. The COVID-19 pandemic affected these in-person activities, but since restrictions have been lifted in-person interventions have resumed. However, the experience of conducting remote support during the pandemic was useful preparation in case of extraneous factors that may affect access – including conflict, which remains an imminent challenge faced in Lebanon.

In-person visits with added virtual messaging were considered the ideal mode for optimal IYCF promotion. This mixed modality of services allowed staff to assess the feeding and health-seeking behaviour of caregivers closely, while making sure that those who couldn't attend sessions still had information communicated to them. The use of voice memos and photos through WhatsApp and other messaging services was also noted as advantageous by nutrition/health staff. Group sessions were also noted as positive, as staff saw an increased sense of community from shared experiences.

"...we see that the baby is drinking tea during breakfast. We advise them no, please don't take tea with food, especially for the babies. During follow up, we see that there is really a change. The baby is not drinking tea during breakfast, so there really is a change in thinking... you see that the parents are changing their lifestyles, their beliefs." – Interview 5

Challenges faced by community workers with IYCF counselling (*theme 2*) included phone accessibility issues affecting their ability to reach caregivers and schedule and/or conduct counselling services remotely, in addition to maternal workload and other competing demands that limit the ability to conduct counselling sessions. In addition, the lack of consistent and reliable internet services posed an issue in regard to people receiving voice memos. Many service users did not have reliable use of mobile phones due to financial instability, lack of stable mobile networks, or male partners in the house using the phone for work purposes.

"...we see that the baby is drinking tea during breakfast. We advise them no, please don't take tea with food, especially for the babies. During follow up, we see that there is really a change. The baby is not drinking tea during breakfast, so there really is a change in thinking...you see that the parents are changing their lifestyles, their beliefs."

– Interview 9

Interviewees also highlighted environmental and external barriers to IYCF programming (*theme 3*) that were related to the worsening economic circumstances in the country affecting food costs and the ability of service users to access food and other basic resources for their households. Cultural misperceptions and social practices that limited optimal breastfeeding practices from caregivers and/or affected their confidence in their ability to breastfeed their children were also noted as barriers. Tea remains one of the common beverages provided early, particularly among the Syrian refugee population in the country. Offering ultra-processed snacks and beverages to young children – i.e., sweetened juices and sodas – was another common practice highlighted by some interviewees. Reasons cited for early introduction of

complementary foods include cultural beliefs that breastmilk alone becomes insufficient after 3–4 months, the perception that the child is old enough, and the onset of a new pregnancy (Nasreddine et al., 2012).

According to interviewees, service users often receive contradictory messages about nutritional guidance from different international organisations (like AAH) and certain local primary health care centres, where commercial milk formulas are often promoted by health professionals. Despite the release of strategies and policies to promote optimal IYCF practices, violations of the 'WHO Code' continue to be reported in this context (Shaker-Berbari et al., 2018; Mattar et al., 2023). There is a need to create a stronger enabling policy environment for breastfeeding that is free from commercial influence. In support of this, AAH positions itself within relevant coordination structures, such as the humanitarian nutrition sector and the national IYCF committee, and reports any violation of the law when this is observed. The organisation provides training to national staff and medical team members at primary health care facilities on 'The Code' and the Lebanese 47/2008 Law supporting breastfeeding.

Suggestions to improve existing programming varied among service providers (*theme 4*). AAH staff suggested a longer follow-up period and increased frequency of follow-ups to ensure programme effectiveness. They also expressed a desire for better coordination with primary health care centres and social services to offer psychosocial support and provide specialised services where needed. Increased service mapping, along with expanding interventions to include pregnant individuals, were also common suggestions. In addition, interviewees/staff suggested providing incentives like food parcels to retain families in AAH's nutrition and IYCF programming.

With AAH implementing IYCF programming in certain areas of the country for the last 4 years, it is anecdotally noted that behavioural changes are slowly happening when programming is delivered within the same communities over a longer period. These promising results

Figure 1

Summary of themes and subthemes emergent from interviews with field workers

Theme 1. Perceived benefits from IYCF education on caregivers	<ul style="list-style-type: none"> • 1.1 Benefits of one-on-one counseling (education understanding, breastfeeding assistance) • 1.2 Benefits of awareness sessions (group session community, knowledge provision) • 1.3 Perceived benefits of virtual vs. in-person sessions
Theme 2. Challenges faced by community workers with IYCF counseling	<ul style="list-style-type: none"> • 2.1 Challenges to one-on-one counseling (phone accessibility, maternal workload) • 2.2 Challenges to AAH as an organisation (monetary) • 2.3 Challenges to awareness sessions (resources) • 2.4 Challenges to breastfeeding (cultural, environmental)
Theme 3. Environmental and external barriers to IYCF programming	<ul style="list-style-type: none"> • 3.1 Challenges in the physical and cultural context (contradictory messages from NGOs) • 3.2 Challenges in the economic context (cost of food, mobile network service, healthcare access) • 3.3 Challenges of AAH's funding (inability to provide cash stipends or additional family-based social services)
Theme 4. Suggestions to improve IYCF programming and caregivers' practices	<ul style="list-style-type: none"> • 4.1 Existing programmes (increase service mapping) • 4.2 Additional programmes (increased collaboration with other NGOs) • 4.3 Reaching populations (increased access to service users during pregnancy) • 4.4 Staff training suggestions (referrals to other services)
Theme 5. Training tools for health care and nutrition staff	<ul style="list-style-type: none"> • 5.1 Helpful documents and tools used by AAH staff to disperse education • 5.2 Training and previous education helpful to AAH staff • 5.3 Teaching strategies helpful to AAH staff • 5.4 Other support helpful to AAH staff



© Elie Saab - Action Against Hunger

A team member from Action Against Hunger measures mid-upper arm circumference of a young girl to determine nutrition status. Lebanon, 2024

have led AAH to advocate for programming to continue beyond the 1-year project timeframe.

“We usually do our sessions within two weeks. I prefer if we could have another visit after two or three months to see if it was really a behavioural change or if they just changed during the period that you are visiting them.” – Interview 8

Furthermore, AAH staff highlighted the importance of getting more training on the use of various educational visuals and promotion tools to assist with their services, along with the engagement of community members as a source of peer-to-peer education (theme 5). AAH Lebanon continues to look at how staff training can be improved, specifically around complementary feeding, since the current training focuses heavily on breastfeeding promotion. Although the availability of trainers has been limited thus far, AAH continues to provide on-the-job training and supervision to improve the skills of staff through developments described below.

What do these findings tell us?

This study utilised a diverse and well-trained team of researchers with national and international humanitarian experience. The standardisation of interviewing and probing methods, by trained interviewers, further increases our confidence in these findings. Nevertheless, sampling from a single international organisation does limit our ability to generalise these findings. Future research could also include interviews with service users (caregivers) to explore

“I wish that I could have more training on the details of complementary feeding. What can be given and what not? How much should be given to the child? If any foods could cause an allergic reaction, what are the signs, and how do we identify any risk to the child?” – Interview 3

their perceptions and experiences. Using community perspectives to build interventions is essential to implement meaningful changes.

Environmental and economic factors were commonly cited as the biggest barriers to effective implementation of promotional IYCF sessions and their translation to behavioural change in the feeding practices of caregivers in this context. Most of the challenges raised by interviewees were focused on breastfeeding promotion, with less emphasis on challenges related to complementary feeding practices (beyond the ongoing economic hardships and limited access to food that households face). More programmatic considerations and research are needed to address knowledge gaps and needs for complementary feeding within high-risk, low-resource settings – particularly in humanitarian and conflict settings.

Since this study, new tools and training have been put in place by the organisation. Specifically, they have clarified the different roles of IYCF specialists and community nutrition officers: IYCF specialists now focus more on one-on-one counselling, with a special focus on breastfeeding promotion, while community nutrition officers

now focus on providing supportive supervision for community mobilisers, who provide home group sessions. Anecdotal feedback suggests this change has improved staff confidence and enables AAH to better utilise resources to reach more children and their caregivers in Lebanon.

Community MUAC screening of both pregnant and breastfeeding women and children aged 6 months to five years was rolled out nationally in late 2022. AAH has integrated this into their programmes – thus referring women and children who are found to be malnourished to the nearest primary health care facility for follow-up.

Introducing joint IYCF and multi-purpose cash assistance has been strongly advocated for by AAH Lebanon as there is evidence that dietary outcomes improve when these two are combined (Global Nutrition Cluster, 2020). AAH has also changed its model for group sessions, as attendance was limited in the past. Now, community mobilisers are being trained and supervised to provide home group sessions within their local communities. Home sessions are considered a more organic form to implement group sessions, since transportation to and from a community location to health care sites remains a barrier in Lebanon. There is also now a greater understanding of the importance of male-led peer-support groups. In Nigeria, such programming encouraged all household members to utilise limited resources to ensure diverse diets (Atuman et al., 2023).

For more information, please contact Astrid Klomp at Astrid.Klomp1@alumni.lshstm.ac.uk

References

- Akik C, Ghattas H, Filteau S et al. (2017) Barriers to breastfeeding in Lebanon: A policy analysis. *Journal of Public Health Policy*, 38, 3, 314–326.
- Atuman S, Langat O, Lellamo A et al. (2023) Father-to-father support groups in northern Nigeria: An emergency response initiative. <https://www.enonline.net/fex/70/father-to-father-support-groups-in-northern-nigeria>
- Global Nutrition Cluster (2020) Evidence and guidance note on the use of cash and voucher assistance for nutrition outcomes in emergencies. nutritioncluster.net.
- Mattar L, Hassan H, Kalash N et al. (2023) Assessing the nutritional content and adequacy of food parcels among vulnerable Lebanese during a double crisis: COVID-19 pandemic and an economic meltdown. *Public Health Nutrition*, 26, 6, 1271–1283.
- Naja F, Hwalla N, Chokor F et al. (2023) Infant and young child feeding practices in Lebanon: A cross-sectional national study. *Public Health Nutrition*, 26, 1, 143–159.
- Nasreddine L, Zeidan M, Naja F et al. (2012) Complementary feeding in the MENA region: Practices and challenges. *Nutrition, Metabolism, and Cardiovascular Diseases*, 22, 10, 793–798.
- Shaker-Berbari L, Ghattas H, Symon A et al. (2018) Infant and young child feeding in emergencies: Organisational policies and activities during the refugee crisis in Lebanon. *Maternal & Child Nutrition*, 14, 3, e12576.
- Shaker-Berbari L, Qahoush Tyler V, Akik C et al. (2021) Predictors of complementary feeding practices among children aged 6–23 months in five countries in the Middle East and North Africa region. *Maternal & Child Nutrition*, 17, 4, e13223.
- UNICEF (2023) Child Food Poverty: A Nutrition Crisis in Early Childhood in Lebanon. [unicef.org](https://www.unicef.org)

Special focus: Wasting patterns in Somalia



Gwenaelle Luc (Food and Agriculture Organization (FAO)),
Modibo Keita (FAO), Baguinébié Bazongo (FAO),
Brahima Diarra (FAO),
Angelina Virchenko (FAO),

Claudia Okley (FAO),
Tiphaine Seyvet (FAO),
Yannick Ngongang Mbungang (FAO),
Daniel Molla (FAO),
Dunja Dujanovic (FAO),

Abukar Nur (FAO),
Anastasia Marshak (Feinstein International Center, Tufts University),
Afaf Rahim (Brussels School of Governance),
Abdal Monium Osman (FAO).

What we know:

Few studies analyse food insecurity or malnutrition at the community level, potentially missing key community drivers and more localised basic causes of these outcomes. Moreover, the complex relationship between wasting and food insecurity over seasons and livelihood zones remains poorly understood.

What this adds:

In this extended article, we examine the spatial clustering of child wasting before investigating the spatiotemporal relationship between child wasting and food insecurity in rural Somalia. We observed clustering of child wasting and household food insecurity at the community level within districts and livelihood zones – suggesting the influence of community-level drivers. We also observed two distinct seasonal peaks in child wasting, yet these peaks did not align with food insecurity trends, where a decrease in wasting prevalence during the lean season was seen. Conclusively, this study reveals the need for increased attention to collecting and analysing data in a way that captures context-specific spatial and temporal variations in food insecurity and wasting. Most importantly, our findings suggest that capturing the drivers of food insecurity and wasting is needed to support locally appropriate interventions and outcomes.

Part 1: An introduction to Somalia

In Somalia, despite long-term humanitarian, development, and peace interventions, food insecurity has typically remained above Integrated Food Security Phase Classification (IPC)¹ 'Crisis' levels (Phase 3+) over the last three decades. Based on the latest food security IPC analysis from January to March 2024, approximately 3.2 million people (17% of the population) are IPC Phase 3 (crisis) and around 800,000 people (4% of the population) are experiencing worse conditions – IPC Phase 4 (emergency). Between January and December 2024, a projected 1.7 million children aged 6–59 months face wasting, including 430,000 who are likely to be severely wasted. Overall, wasting prevalence has consistently exceeded the 15% emergency threshold for global acute malnutrition.

Although tools such as the IPC and other national food systems diagnostics are used to assess food insecurity and malnutrition in Somalia, evidence gaps remain in understanding the complexity of wasting drivers and food insecurity and how the two are linked. Despite ongoing collective efforts at prioritising local and context-specific knowledge, data is frequently aggregated across time and space. Such a gap can be addressed by collecting more granular spatial and temporal data.

This granularity is important, as current literature highlights a geographical clustering of food insecurity and malnutrition at lower administrative levels (Luc et al., 2023),

which has cost-efficiency implications for programmes. Moreover, current hunger analysis systems² and studies show that food insecurity and wasting vary according to livelihood systems and seasons (Chotard et al., 2010; Martin-Canavate et al., 2020). An analysis of variation in wasting prevalence in Somalia found more significant seasonal variation than annual variation on average (Kinyoki et al., 2017). Several studies in Somalia have also reported associations between systemic drivers of hunger, such as climatic conditions and conflict, and persistent levels of wasting.

¹ <https://www.ipcinfo.org/ipc-country-analysis/en/>

² <https://www.ipcinfo.org/ipc-country-analysis/en/>

Production systems in Somalia

Rural Somalia has three main livelihood zones: pastoral, agropastoral, and riverine/farming. Dominant livelihood systems vary from one community area to another. Local factors such as ethnicity, traditional knowledge, vulnerability to climate and manufactured shocks, and access to markets and natural resources all influence the predominant livelihood zone. While pastoralist livelihood zones seem to be more affected by food insecurity over the years, wasting prevalence is higher in riverine and agropastoral zones in central and southern Somalia (IPC, 2024).

Seasonality in rural Somalia

Somalia is generally arid and semi-arid, with bimodal rainfall influenced by the Inter-Tropical Convergence Zone (the north-south movement resulting in two rainy seasons and two dry seasons per year). 'Jilaal' is the most extended dry season (January to March), characterised by livestock migration and decreased milk production among pastoralist systems. *Jilaal* is followed by 'Gu', Somalia's heaviest and most reliable rainfall season (April to June). About 70% of annual crop and livestock production depends on the Gu rains, with the Gu harvest following (July and August). The Gu season is characterised by increased pasture and water availability for the livestock and increased availability of milk, fruits, and vegetables, including the peak period for production of ghee (a liquid butter made from milk).

Subsequently, there is the 'Hagaa' dry season (July to September), with light coastal *Hagaa* rains in July and August. The *Hagaa* season is followed by the 'Deyr' rainy season (October to December). *Deyr* rains are less widespread and less reliable than the *Gu* rains. They are usual-

ly patchy and localised. *Deyr* harvest is normally expected between December and January, providing the food needed to take households through the *Jilaal* season. *Deyr* harvest is usually not as substantial as the main *Gu* harvest.

Typically, household food stocks last about seven months per year, although production volume determines when their stocks are depleted and their lean season starts. The peak hunger season in cropping areas is toward the end of the *Gu* rains (late May/mid-June), when household stocks are depleted and agricultural activities cease. Below-average precipitation usually results in diminished production. However, rainfall distribution is equally, if not more, important. Heavy rains over a short period can lead to flash floods, causing crop devastation.

The pastoral production year starts with the onset of the *Gu* rainy season (April) when most livestock species give birth, and households have access to their milk and meat for consumption and sale. The *Gu* rainy season is when most pastoral households can access sellable animals and animal products, which can help repay accumulated debt to maximise non-staple food purchases and other essentials. Milk consumption and production are directly related to the seasonality of livestock conception. Goats tend to conceive during the onset of rains (April and October), while camels mainly conceive in the mid-rainy period (May and November) and cattle at the end of the seasonal rains (June and December). Similarly, kidding/calving rates are high in March and September for goats, May and December for camels, and August for cattle – with milk consumption increasing accordingly.

The two dry seasons, *Jilaal* (January–March) and *Hagaa* (July–September) break the



Woman giving water to her cow, Somalia, 2021

© FAO/Aete/Abdulkadir Zubeyr

two rainy seasons, resulting in pasture and water scarcity and leading to seasonal migrations in search of water and pasture. The seasonal lean period for the livestock corresponds to the end of the dry season when animal body conditions deteriorate and milk yield decreases.

Recent studies on seasonality in African drylands have found that food insecurity and wasting indicators might have a more complex relationship and do not move in tandem during all seasons and across all livelihood zones (Kinyoki et al., 2017). For example, research in Chad, Sudan, and South Sudan shows that wasting prevalence is highest at the end of the dry season and the start of the rainy season, with a much smaller secondary peak before the harvest when food insecurity is at its highest (FAO & Tufts University, 2019). This indicates the role of different drivers at different times of the year. The recent Adapted Nutrition in Africa's Drylands Framework from UNICEF highlights the crucial role of considering fundamental and more systemic drivers of wasting and food insecurity, focusing on seasonality, livelihood systems, conflict, and climate (Young, 2020).

Part 2: Methods

Primary data sources for this study include the Food Security and Nutrition Analysis Unit (FSNAU) cross-sectional household surveys conducted in rural areas of Somalia between 2014 and 2021. Anthropometric data from 85,837 children aged 6–59 months were surveyed across a total of 27,520 households. We supplemented the data from these surveys with cross-sectional nutrition surveys conducted by Action Against Hunger during the same period. FSNAU survey data were collected primarily around July and December, corresponding to the assumed timing of Somalia's *Gu* and *Deyr* seasons from 2014 to 2021.

First, the study population was divided into smaller geographical areas, such as villages. Clusters were then randomly selected from these villages, with the odds of any village being selected being proportional to the size of its population. Second, individuals were chosen randomly from within each village, with each person having an equal chance of being selected. We supplemented survey data with available secondary data on climate (e.g., normalised differential vegetation index (NDVI), conflict events reported by active conflict location from

the Armed Conflict Location and Event Data Project (ACLED) database, IPC food insecurity analysis, and stakeholder consultations.

The primary outcomes analysed in this study were child nutritional status (assessed using weight-for-height z-score (WHZ)), including child wasting (defined as WHZ threshold < 2 SD), and household food security (assessed using the Food Consumption Score (FCS)). Explanatory variables included various household- and community-level characteristics (number of camels, cows, sheep, and goats owned by households and the tropical livestock unit (TLU) calculation³), as well as spatial factors such as livelihood zone (defined by the Famine Early Warning Systems Network as proxies for production systems), and district and environmental factors (NDVI, rainfall, and ACLED conflict events).

We ran linear regression models for continuous and normally distributed variables (z-scores and FCS) and logistic regression models for binary outcomes (wasting or food insecurity). We analysed the community clustering of key outcome indicators using the intraclass correlation coefficient and average cluster size (Janjua

et al., 2006). The design effect allows us to understand inter- and intra-village variability and comparability across key outcomes. A design effect equal to 1.0 suggests homogeneity within communities living in the same district and livelihood zone. Conversely, a design effect of 2.0 signals a variance twice as large as expected, indicating significant differences within or between these communities and reflecting a greater degree of diversity in the outcomes measured. Clusters were villages sampled within district and livelihood zones, and their design effect levels were incorporated into the model to allow for structured and unstructured heterogeneity of wasting (spatial and temporal).

The main limitation of this study is that areas for data collection were not consistent across Somalia, with a likely bias toward areas most affected by conflict. Data was unavailable on all key indicators likely affiliated with outcomes, such as ethnicity and clan affiliation. Geospatial coordinates were unavailable, limiting the granularity of the analysis.

³ <https://www.frontiersin.org/articles/10.3389/fvets.2020.556788/full>

Part 3: Spatial variation in wasting and potential drivers

Wasting and food insecurity

Our results show an apparent community clustering of wasting and household food insecurity across all livelihood zones and seasons, using the design effect as a proxy to assess spatial heterogeneity between sampled communities. Results below (Table 1 & Figure 1) suggest the presence of pockets or hotspots of child wasting and household food insecurity at the community level within the same district and livelihood zones. This indicates the central role of community-level drivers and district and livelihood zone drivers. The design effect for food insecurity is substantially higher than for wasting, especially for the pastoral livelihood zone (design effect of 5.2), suggesting that food insecurity is even more driven by community-level specific drivers.

Livelihoods

While assessing income sources within districts located in riverine, agropastoralist, and pastoralist livelihood zones, we observed high heterogeneity in household and community production systems in the same district and livelihood zone. For example, in Belwendwe district (a riverine livelihood zone), 20.2% (95% CI, 16.8–23.9) of households rely on livestock as their primary source of income, with a design effect of 9.8. On the other hand, only

49.6% (95% CI, 45.3–53.9) of households living in Goldogob (a pastoralist livelihood zone) rely on livestock as their main production system, with a design effect of 8. The high design effect indicates that the reported main source of livelihood is clustered at the village level as opposed to the zone level, which is suggestive of more diversity within a zone but overall homogeneity within a village.

We looked at the spatial distribution of livestock using TLU to better understand the distribution of livelihoods and investments in livestock. We also performed a regression analysis on livestock ownership by household between 2014 and 2021 (Table 2). We observed that households in riverine and agropastoral zones had more livestock per household. In contrast, households in pastoralist areas showed decreased livestock ownership (mostly camels and small ruminants). We found that some agropastoral and riverine districts had higher numbers of TLU than districts in pastoralist areas. In 2021, the districts with the highest median of TLU by households were Balad Hawo and Dollow (riverine livelihood zones), followed by Baki, Berbera, and Boroma (agropastoral livelihood zones).

We also observed a more complex spectrum of pastoralist systems. The analysis of livestock

owned showed a high diversity of herd composition (defined by species owned and average numbers of each species) across communities living in the same livelihood zones. Moreover, the study of the design effect (as a proxy of heterogeneity within surveyed districts) indicated that livestock ownership was clustered in specific communities across all livelihood zones (TLU design effect > 1.5 across all livelihood zones). Thus, the diversity of livestock management needs to be considered beyond just livelihood zones.

Rainfall, vegetation, and conflict

The rainfall distribution pattern in Somalia is influenced by several factors, including geographical location, topography, proximity to water bodies, and prevailing wind patterns. As a result, rainfall patterns can vary significantly from one village to another, leading to disparities and vulnerabilities to very localised floods or drought. Such differences exacerbate Somalia's existing socio-economic and political dynamics as communities compete for scarce resources. It also affects population movements, as people may migrate to areas with favourable rainfall patterns or seek alternative livelihood options in response to droughts and water scarcity.

Table 1 Estimation of design effect of child wasting by districts

District	Year	Design effect of wasting: Deyr season	Number of clusters surveyed: Deyr season	Number of children measured: Deyr season	Design effect of wasting: Gu season	Number of clusters surveyed: Gu season	Number of children measured: Gu season	Livelihood zone
Beledweyne	2014	2.4	30	743	2.4	29	758	Agropastoral
Burco	2014	2.1	15	269	2.2	16	145	Pastoral
Beledweyne	2018	2.0	28	495	2.0	28	215	Agropastoral
Gebiley	2019	1.9	18	326	2.8	16	162	Pastoral
Ceerigaabo	2019	4.1	18	613	3.8	15	118	Pastoral
Luuq	2019	1.7	19	540	1.5	18	204	Riverine/ Farming
Burco	2019	2.4	16	495	2.8	15	155	Pastoral
Luuq	2020	2.2	21	621	2.6	20	218	Pastoral
Ceerigaabo	2020	2.7	19	619	3.4	17	255	Pastoral
Baidoa	2020	1.5	21	451	1.6	21	145	Riverine/ Farming
Burco	2020	1.3	18	429	1.6	15	155	Pastoral
Gebiley	2020	1.9	21	524	2.8	21	243	Agropastoral
Zaylac	2020	3.7	17	360	2.0	17	175	Pastoral
Ceerigaabo	2021	3.7	18	624	2.1	21	218	Pastoral
Dollow	2021	2.9	15	402	2.0	16	193	Agropastoral
Baidoa	2021	2.2	20	436	1.7	21	145	Riverine/ Farming
Luuq	2021	2.2	17	508	2.0	19	178	Agropastoral
Gebiley	2021	2.8	16	330	1.8	17	152	Pastoral
Hargeysa	2021	2.1	20	400	3.7	19	210	Agropastoral
Eyl	2021	1.9	18	419	1.8	15	128	Pastoral

Figure 1 Estimation of the design effect of child wasting and household food insecurity

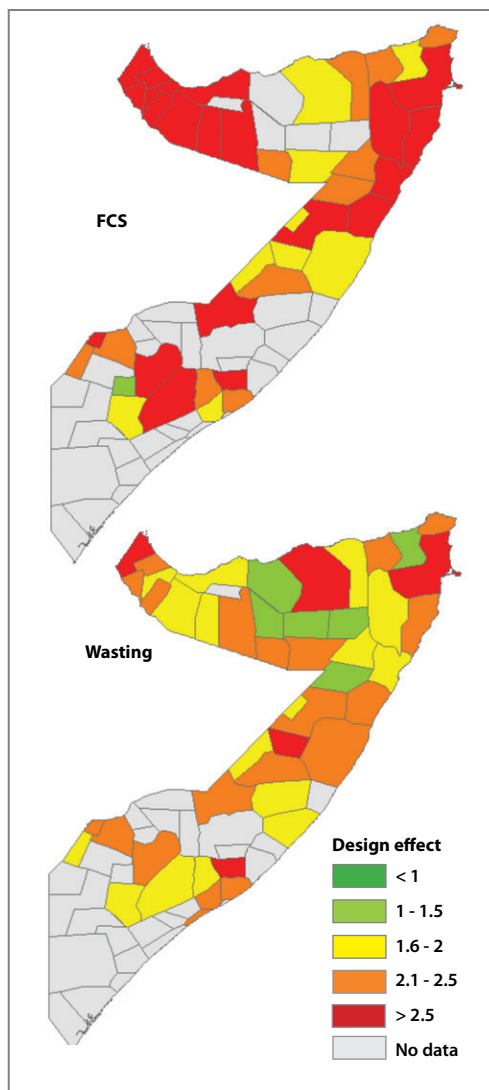
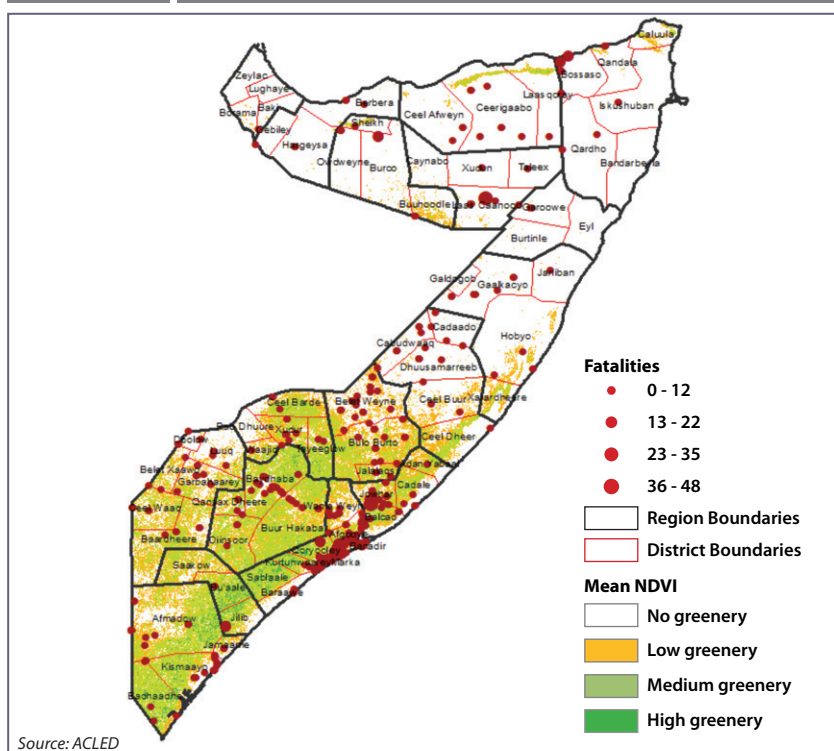


Table 2 Livestock ownership by households across livelihood zones and seasons – averages from 2014 to 2021

Household livestock ownership	Pastoral zones		Agropastoral zones		Riverine/Farming zones	
	Gu	Deyr	Gu	Deyr	Gu	Deyr
Average number of camels	1.2	1.1	4.3	1.8	0.1	5.7
Average number of cows	0.4	0.4	3.2	2.3	2.1	4.1
Average number of sheep and goats	19.0	17.9	24.3	18.7	3.8	26.8
Average TLU	3.4	3.1	8.9	5.3	2.5	11.3

Figure 2 Spatial distribution of conflicts and vegetation in Somalia (2017-2021)



The spatial distribution of conflict across rural Somalia overlaps with some areas experiencing emergency levels of food insecurity and wasting. Clannism and clan cleavages are major sources of conflict that divide Somalis and generate competition for access to and control of resources, affecting livelihood specialisation and escalating conflict. Conflict can also affect food insecurity and wasting through other pathways, such as the destruction of and limited access to health services and malnutrition treatment centres, displacement, distribution of humanitarian aid, disruption of food production, and migration of livestock for pasture and water.

Studies indicate that conflicts are typically in riverine and agropastoral livelihood zones (Majid et al., 2022). Our spatial analysis of conflict events using ACLED data and NDVI in the month of May from 2017 to 2021 indicates that conflicts are clustered in south and central Somalia, where surface water and vegetation (as a proxy for water, pasture, or land for cultivation access) are available at that time of the year. This further underscores the importance of considering natural resource management when designing emergency response interventions in a context of competition between production systems (Figure 2).



Woman feeding her cow. Somalia, 2023

Part 4: Temporal variation of wasting

It is commonly assumed that wasting prevalence follows the seasonal pattern of food insecurity, with worsening conditions at the end of the *Jilaal* dry season until harvesting in August and September. However, we identified two seasonal peaks of child wasting in Somalia in May/June (the beginning of the *Gu* rainy season) and November (mid-*Deyr* rainy season), with a decline in child wasting in between (during the lean season) (Figure 3). Furthermore, we observed minimal year-to-year variability in wasting prevalence from 2014 to 2021 in rural Somalia.

We observed a difference in the seasonal patterns of child wasting by livelihood zones. In pastoralist areas, the first peak of wasting in June (*Gu* season) does not match the lean season because the pastoral consumption year starts with the onset of the *Gu* rainy season (April) when most species give birth, and households have access to their own milk and meat and income for other essentials from saleable animals. The second observed peak in November – after the *Gu* harvesting (August–September) when food insecurity should be at its minimum – mainly affects farming and agropastoralist zones (Figure 4). However, children living in agropastoralist zones seem vulnerable to both peaks. The temporal distribution of child wasting by sex in Somalia indicates that boys are significantly more vulnerable to wasting than girls across all seasons and livelihood groups. However, boys seem to be more affected by seasonal variations of wasting, especially across riverine livelihood zones.

Different patterns of wasting and food security trends

When looking at the spatial distribution of food insecurity, districts with higher levels of child wasting did not match those affected by poor food security over seasons and years. Stakeholders (from interviews of food security cluster partners in Somalia, May 2022) also noted that the nutrition situation in Somalia has not always been responsive to changes in the food security indicators, suggesting other factors are at play (Figure 5).

Figure 3 Seasonal variation of child wasting in Somalia by months

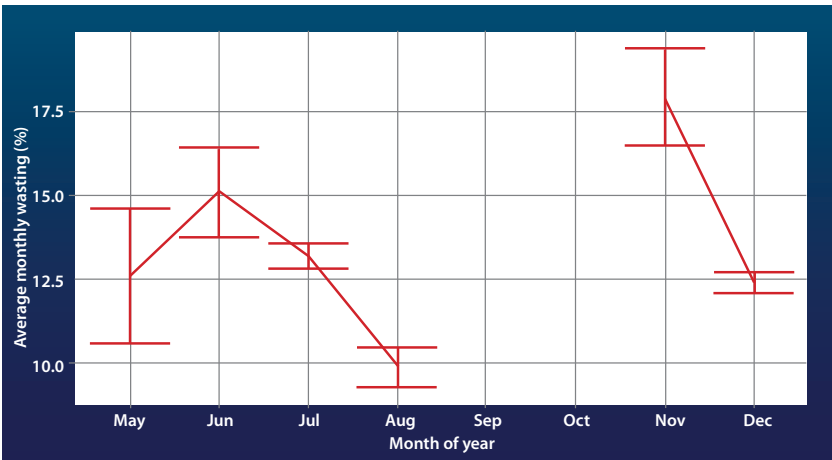


Figure 4 Child wasting prevalence per livelihood zone

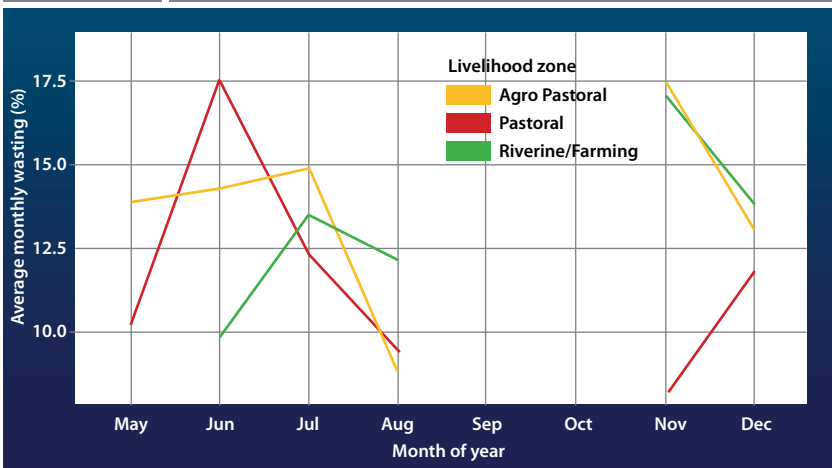
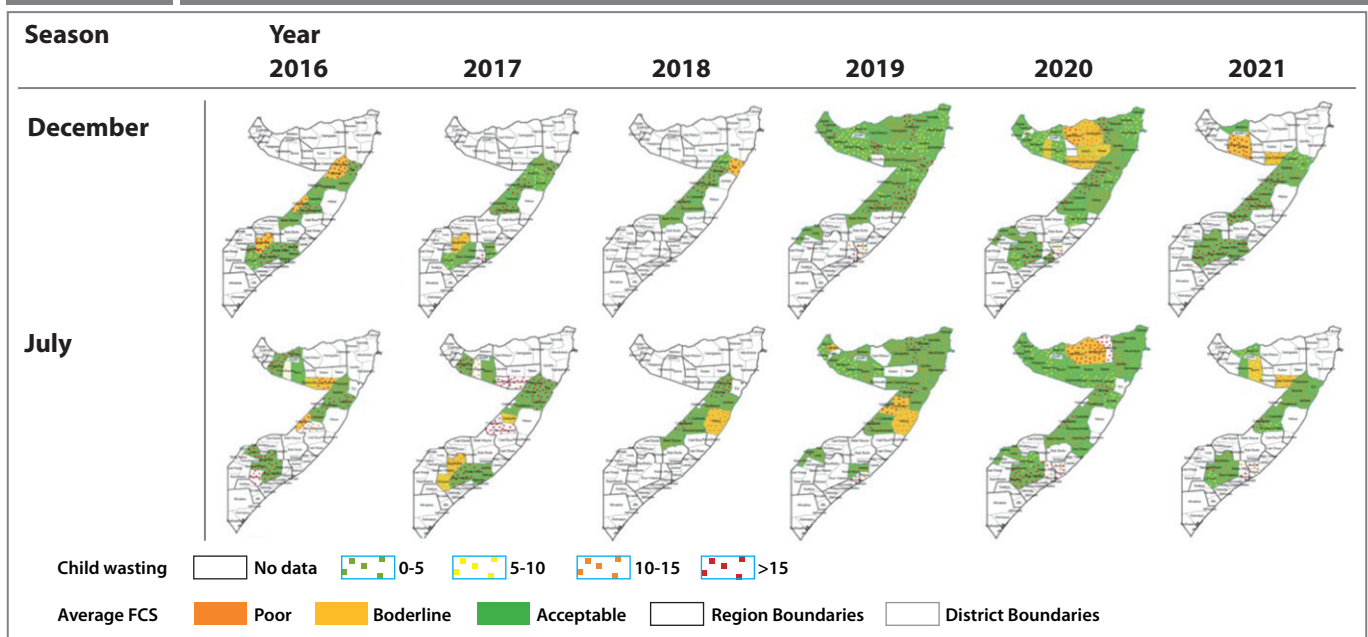


Figure 5 Space-time distribution of child wasting and food insecurity



Part 5: Discussion

Humanitarian, development, and peace actors require comprehensive information about who will likely experience wasting and food insecurity in Somalia and why. While general risk trends are well understood, adjusting the humanitarian responses and interventions requires a detailed and accurate understanding of how different populations are affected. Our work has shown a spatiotemporal disconnect between food insecurity and wasting both across and within livelihood zones in Somalia. This calls for more attention to collecting and analysing data in a way that captures context-specific spatial and temporal variations in food insecurity and wasting.

Using the design effect as an outcome instead of a correction in nutrition survey analyses enables us to more thoroughly investigate the degree to which community-level factors – rather than household- or individual-level ones – operate at the household or individual level. The design effect of the primary outcomes and basic drivers within communities shows that wasting, food insecurity, livelihood specialisation, conflict, vegetation, and rainfall are highly clustered at the community/village level. The apparent clustering of the outcome indicators likely implies that major drivers of food insecurity and wasting are prominent and distinctive at the community and livelihood zone levels.

Our analysis shows the heterogeneity of livelihood specialisation across the different livelihood zones and their high complexity compared to what is often assumed with the categorisation of homogeneous zones. Our results highlight the critical need to consider various scenarios to better analyse, forecast, and implement early action for resilient livelihoods and to prevent extreme food insecurity and wasting, including famine risk. In this sense, analysis of livelihood systems should move beyond blanket categorisations of livelihood zones and districts and instead focus on the broad and multifaceted combinations of livelihoods and income activities within each livelihood zone.

Our study found that seasonal wasting patterns differ from seasonal patterns of food insecurity. Different patterns between food security and wasting have also been observed in several Sahelian countries with unimodal rainfed systems (FAO & Tufts University, 2019). This underscores the crucial role of understanding seasonal drivers of child wasting beyond annual patterns of households' food insecurity.

Furthermore, our data show a complex relationship between wasting and food insecurity across individuals, households, communities, and livelihood zones, indicating different drivers for each. This study's results suggest that the assumption of food security being the primary causal factor of wasting may be incorrect. This may bias crisis modelling and affect projections, which in turn may affect response efforts.

Instead, this study has shown that efforts to prevent wasting must move beyond food-cen-

© FAO/Arete/basak.Amin



Camels in a rural region. Somalia, 2022

tered approaches to include multisectoral and integrated responses. Particular attention must be given to fundamental drivers such as environment and seasonality, institutions, and livelihood systems – as highlighted in the updated conceptual framework for child wasting in Somalia (Young, 2020) and the geographical clustering of food insecurity and malnutrition (Luc et al., 2023). However, implementing localised and integrated programmes remains challenging in a context of fragmented international co-operation. Despite evidence that livelihoods, conflict, access to natural resources, and wasting are linked, international aid tends to overlook these dynamics and operate in silos focusing on the immediate drivers. Humanitarian, development, and peacebuilding efforts should be coordinated in a nexus approach to the design and implementation of programmes, address multisectoral challenges, and propose solutions that integrate considerations across sectors (FAO,

Development Initiatives & Norwegian Refugee Council, 2021).

Furthermore, while experts play a major role in the decision-making process, the centralisation of analysis often leads to poor consideration of communities' knowledge, perspectives, and local dynamics over time, impairing analysis, forecasting, and programming. Ultimately, reducing the spatial extent of the nutrition and food security analysis to create local models focused on environmental indicators for specific groups can improve our ability to forecast and respond to hunger. A new approach focusing on understanding these crises as complex local systems would offer the possibility of understanding the interacting dynamics that lead to different community outcomes.

For more information, please contact Gwenaelle Luc at Gwenaelle.Luc@fao.org

References

- Chotard S, Mason JB, Oliphant NP, et al. (2010) Fluctuations in wasting in vulnerable child populations in the Greater Horn of Africa. *Food and Nutrition Bulletin*, 31, 3, S219–S233.
- FAO, Development Initiatives & Norwegian Refugee Council (2021) Development actors and the nexus: Lessons from crises in Bangladesh, Cameroon, and Somalia. fao.org.
- FAO & Tufts University (2019) Twin peaks: The seasonality of acute malnutrition, conflict and environmental factors – Chad, South Sudan and the Sudan. fao.org.
- IPC (2024) Somalia IPC acute malnutrition (IPC AMN) trends (2016 Gu–2023 Deyr). fsnau.org.
- Janjua NZ, Khan MI, & Clemens JD (2006) Estimates of intraclass correlation coefficient and design effect for surveys and cluster randomized trials on injection use in Pakistan and developing countries. *Tropical Medicine and International Health*, 11, 12, 1832–1840.
- Kinyoki D, Moloney G, Uthman O, et al. (2017) Conflict in Somalia: Impact on child undernutrition. *BMJ Global Health*, 2, e000262.
- Luc G, Keita M, Houssoubé F et al. (2023) Community clustering of food insecurity and malnutrition associated with systemic drivers in Chad. *Food and Nutrition Bulletin*, 44, Suppl 2, S69–S82.
- Majid N, Jelle M, Adan G et al. (2022) Another humanitarian (and political) crisis in Somalia in 2022. *Feinstein International Center*. fic.tufts.edu.
- Martin-Canavate R, Custodio E, Yusuf A, et al. (2020) Malnutrition and morbidity trends in Somalia between 2007 and 2016: Results from 291 cross-sectional surveys. *BMJ Open*, 10, 2, e033148.
- Young H (2020) Nutrition in Africa's drylands: A conceptual framework for addressing acute malnutrition. *Feinstein International Center*. fic.tufts.edu.

Food-based recommendations for improving complementary feeding in Zimbabwe



Loreen is a small holder farmer who grows crops and keeps chickens. She prepares a nutritious meal for her young children. Zimbabwe

©WFP/Samantha Reinders



Jen Burns
Former Senior Technical Advisor at Helen Keller International, United States Agency for International Development (USAID) Advancing Nutrition



Pamela Ncube-Murakwani
Nutrition Lead at International Medical Corps, Amalima Loko



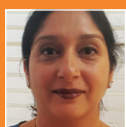
Chris Vogliano
Former Technical Advisor at Helen Keller International, USAID Advancing Nutrition



Lisa Sherburne
Former Director for Social and Behaviour Change at USAID Advancing Nutrition



Shaneka Thurman
Former Senior Advisor for Nutrition-Sensitive Social and Behaviour Change at USAID Advancing Nutrition



Kavita Sethuraman
Former Director of Nutrition in Humanitarian Contexts at National Cooperative Business Association CLUSA, USAID Advancing Nutrition

We would like to acknowledge the USAID Bureau for Humanitarian Assistance staff who supported this work, namely Mike Manske (Senior Nutrition Advisor), Themba Nduna (Nutrition Adviser, USAID Zimbabwe mission), and Andrea Warren (Nutrition Research Advisor). In addition, we would like to thank the field staff who carried out the participatory work in communities: Patricia Ndebele (Social Behaviour Change Lead), Tinashe Marange (Monitoring Evaluation and Learning Coordinator), Privilege Manenji (Nutrition Coordinator), Bekezela Ncube (Nutrition Coordinator), Talent Mpfu (Graduate Nutrition Intern).

What we know:

In Zimbabwe, approximately 11% of children aged 6–23 months receive a minimum acceptable diet and less than 68% of children receive the minimum meal frequency for their age. In Matabeleland North Province, only 5% of children aged 6–23 months receive a minimum acceptable diet, and using locally available, nutrient-rich foods remains a challenge for caregivers.

What this adds:

Using a participatory, community-based approach, we identified and tested a menu of food-based recommendations for young children, with caregivers, and supportive practices from various household members. The menu of primarily indigenous food options, recommended by age, permits caregivers to choose foods that are available, accessible, and culturally acceptable to improve complementary feeding practices at the household level. This goes beyond traditional programmatic messaging and cooking demonstrations.

The USAID-funded ‘Amalima Loko’ is a five-year (2020–2025) programme operating in five districts (Binga, Hwange, Lupane, Nkayi, and Tsholotsho) of Zimbabwe’s Matabeleland North Province. Amalima Loko aims to improve the nutritional status of and practices among women of reproductive age and children aged under five years. As part of a package of multi-sectoral efforts to improve nutrition outcomes, Amalima Loko envisioned developing local food-based recommendations and other supportive behaviours that utilise nutrient-rich, locally available indigenous foods. Between September 2022 and March 2023, USAID Advancing Nutrition provided the Amalima Loko programme with technical assistance to identify the recommendations that caregivers can use at the household level to improve complementary feeding.

Methodology

The Amalima Loko team used a seven-step approach (Figure 1), starting with a review of secondary data sources. As a second step, a ‘Key Foods List’ was developed based on several resources, including seasonal availability calendars, market surveys, and community focus group discussions, to identify foods which are locally available. Using the Key Foods List, meal preparation exercises were then carried out to observe the making of typical meals and to gather data for use in developing modifications to current feeding practices. A pile-sorting exercise was used to explore current practices and perceptions around food preparation and feeding practices.

¹ <https://www.advancingnutrition.org/resources/optimizing-diets-using-local-foods-guide>

Using an Excel-based analytical tool¹, specific types and amounts of foods were analysed to identify combinations with improved nutrient content. The types and quantities of food were then organised in a table by food group, to reflect a menu of foods that would meaningfully contribute to filling nutrient gaps (iron, vitamin A, and other nutrients, like zinc and calcium) for those aged 6–11 months and 12–23 months. This menu was used to offer suggestions to caregivers for foods and quantities that could be add-

Figure 1 Seven-step approach to develop food-based recommendations

- 1. Review Secondary Data**
 - a. Secondary data sources
 - b. Identification of sub-optimal dietary factors
- 2. Develop a Key Foods List**
 - a. Foods list
 - b. Seasonal food availability calendar
 - c. Market mapping exercise
 - d. Community focus group
- 3. Observe Common Meal Preparation**
 - a. Meal preparation exercise
 - b. Pile-sorting exercise
- 4. Analyse and Refine Food combinations**
 - a. Nutrient analysis
- 5. Test Recommendations**
 - a. Set the stage
 - b. Establish needed background
 - c. Try the behaviours
 - d. Assess the outcomes
 - e. Analyse and make recommendations
- 6. Apply Learning to the Programme**
- 7. Use the Training Guide for Programming**

ed to the child's own bowl of a typical meal or consumed as a snack (Table 1).

In addition to the menu of foods, USAID Advancing Nutrition developed guidance that could be offered to caregivers on the appropriate quantity of food per meal, frequency of meals, and variety of nutrient-rich foods for both meals and snacks, conforming to the needs by age group (Box 1). With this, a list of tasks that various

household members could carry out to support optimal young child feeding was also developed.

The menu of suggested foods and potential recommendations were then tested using the Trials of Improved Practices (TIPs) methodology, a formative research technique that tests and refines recommended practices over a series of household visits in a collaborative way to reach agreed solutions. In total, 32 households tried new or modified behaviours around dietary diversity, frequency of feeding, amount of food, and caregiver roles in young child feeding to determine which were the most feasible and acceptable. Constraints on participants' willingness to change behaviours were also investigated through the behavioural trials, as well as their motivations for trying and sustaining the new practices.

Findings

Overall, we found that this approach worked to identify and tailor food-based recommendations to the local contexts. Results from the TIPs indicated that many of the recommendations were both feasible and acceptable. The learning generated at each stage of the seven-step approach informed food-based recommendations related to dietary diversity, meal frequency, and food amounts, as well as influencing factors.

Initially, we found that children's meals often consisted of a staple (grains) and one, or sometimes two, additional foods – often plant based. Children aged 6–11 months typically received starchy and less diverse meals, whereas older children were offered more diverse food, sometimes including animal source foods. Across all age groups, children received two to three meals per day, depending on food availability and caregiver's availability. Age-specific knowledge regarding the amount of food to offer to a child was low, and caregivers typically did not measure food when cooking and serving children. Children usually received meals from their own bowl and plate.

Communities shared additional barriers to feeding local and indigenous foods, notably in regard to caregiver's time, food preparation and processing skills, and limited decision-making around purchasing food. Men primarily manage household income and make decisions around purchasing or selling livestock. Other household members are also involved in decisions around food purchasing, preparation, and the actual feeding of young children. For example, grandmothers, aunts, or older siblings will help with the actual feeding of young children when the mother is away or busy with chores. In addition, certain cultural beliefs – including around eggs causing epilepsy or affecting children's teeth, meat causing greediness, and peanut butter affecting the reproductive system – restrict what caregivers feed children. Religion also influences nutrition and health practices, as well as perceptions of indigenous foods. Communities noted perceptions of indigenous foods being valued because they are available for all people to consume, do not have to be purchased, and are considered "healthy"; however, some are viewed as "poor people's foods," a people expressed little desire to gather them. The Amalima Loko programme utilised these findings to develop community nutrition dialogues. These bring together influential community members, caregivers, and other family members to discuss specific issues, dispel myths and misconceptions, and foster a supportive, enabling environment for recommended practices to be adopted.

Successes

It was possible for caregivers to improve complementary feeding practices using locally available foods, provided they could access seasonally available foods, had the knowledge, skills, and time to prepare them, and had family and community support for putting the behaviours into practice.

During household trials, caregivers were willing and able to use a menu of options to add animal source foods, legumes, fruits, and vegetables to their child's meals, as well as offering snacks between meals. Caregivers were also willing to measure foods when cooking and to serve children appropriate amounts of food. Cultural beliefs around foods in different communities continued to influence those that caregivers are willing to try to offer children, making the menu of options critical. Offering the menu of food options permitted households to identify what works for them based on what is available and their own resources. Furthermore, when caregivers received the support of other household members to try a new food, households were more successful. One woman stated that other wives can work the grinding mill to produce readily available flours. Another stated the husband purchased peanut butter, which allowed her to add it to the porridge.

"The food-based recommendations are great. It's easy for mothers to learn through the practical cooking sessions. Each meal they give to the children is enriched with nutritious ingredients such as umviyo (an indigenous fruit)"

– Mother in Lupane district

Amalima Loko now implements the findings through a simple, clear, and easy-to-use recipe guide for over 36,000 caregivers. The guide offers the menu of options for household use and community cooking sessions with care groups and encourages caregivers to creatively use local foods to improve children's diets.

"Before I gained all this knowledge, I would just prepare porridge for my child without enriching it. Now I add two different ingredients from different food groups. My baby loves the porridge. She is healthy, happy and strong – and that makes me happy"

– Mother in Lupane district

The activity is supported by a series of lively community dialogues on child feeding and the engagement of 'male champions' who support childcare and feeding. Male champions learn and practice how to enrich young children's porridge with local foods such as milk and juice from an indigenous fruit, umkhemswane.

Challenges

Programme interventions were adapted to address challenges. To address cultural restrictions,

Table 1 Example menu of foods that could be added to a child's diet (aged 6–11 months)

Foods added to a meal	
Animal source foods (added to a meal)	
Mopane worm powder	- 15 grams
Goat's or cow's milk	- 50 grams (¼ cup)
Egg	- 1 egg
Kapenta	- 15 grams
Chicken	- 15 grams
Staple grains (added to a meal)	
Maize	- 50 grams
Millet	- 50 grams
Sorghum	- 50 grams
Sweet potato	- 50 grams
Fruits/vegetables (added to a meal)	
Monkey orange	- 10 grams
Tamarind	- 10 grams
Moringa powder	- 5 grams
Pumpkin leaves	- 10 grams
Watermelon (yellow)	- 10 grams
Baobab fruit	- 10 grams
Pumpkin	- 15 grams
Legumes/seeds (added to a meal)	
Cowpea	- 10 grams
Groundnuts	- 10 grams
Pumpkin seeds	- 5 gram
Snacks	
Cowpeas	15 grams
Groundnuts	
Pumpkin	
Sweet potatoes	
Amahewu	
Snot apples (xakuxaku)	
Donkey berries (Umbhunzu)	
Pawpaw	
Mangoes	
Watermelon	
Kale (umbhida)	
Gourds (amakhomane)	
Monkey orange (umkhemswane)	

Box 1 Example guidance on foods and supportive behaviours for a child aged 6–11 months

1. Prepare porridge or sadza, based on a staple available in your household.
2. For a child aged 6–11 months, ladle 2–3 teaspoons (and transition to about ½ cup) of porridge or sadza into the child's bowl, per meal.
3. Add 1–2 foods from animal source foods, fruits/vegetables, or legumes to the child's bowl of porridge or sadza at each meal.
4. During the day, offer foods from each of the four food groups.
5. Feed your child a meal three times a day.
6. Offer 1–2 snacks between meals.
7. Grandmother can help by preparing and feeding the child.
8. Husband can collect firewood for cooking and do household chores.

Creating a national nutrition information platform: Learnings from Bangladesh



© WFP/Sayed Asif Mahmud

especially in one district around feeding eggs to young children, the programme organised multiple community dialogues and an interactive forum theatre with influential family members – including grandmothers who uphold the norms. Some caregivers found that their children did not like the taste of mopane worm powder. To improve palatability for children, the programme adjusted recommendations to encourage mixing the powder with other ingredients. Seasonal availability continues to be another challenge. The programme promotes sun drying of vegetables and some indigenous fruits and pounding these into a powder that is then used to enrich the child's food. In addition, supporting farmers' groups to sun dry pumpkin seeds and nuts has helped to address year-round availability.

“Mothers are confident when it comes to preparing nutritious meals [now]... The babies are healthy and happy and the mothers cannot stop talking about the different kinds of recipes they are coming up with!”

– Priviledge Manenji, Amalima Loko Nutrition Coordinator

Lessons learned

Important lessons for improving young children's diets emerged from this experience. First, the Key Foods List demonstrates how even small amounts of indigenous foods can contribute significantly to meeting the nutrient requirements of children aged 6–11 and 12–23 months. This learning contributes to the growing evidence base on the role of indigenous foods in ensuring an affordable, accessible, and nutritionally adequate diet (Termote et al., 2014; Ruzengwe et al., 2022). It also highlights how ongoing natural resource management efforts, undertaken to conserve wild food resources by communities and supported through the programme, are essential for young child feeding as well as other nutrition and livelihood goals.

The seven-step approach can be used by any programme to translate a key foods list of indigenous foods into a menu of locally acceptable foods that communities and caregivers are willing and able to use to improve young children's diets through meals and snacks. The participatory approach with communities, caregivers, and their families was necessary to contextualise the programme's Key Foods List and develop the menu of options. Caregivers' real experiences helped identify practical and feasible solutions that mothers were keen to adopt. It is worth noting that, while the focus of this work was on food-based recommendations for children aged 6–23 months, programmes should also promote continued breastfeeding through to age two years and beyond. Breastmilk remains an essential source of energy and nutrients for this age group.

Finally, the move away from standard recipes to a menu of options from which caregivers could select based on seasonal availability, child's taste and preference, and other personal choices is a lesson learned from caregivers themselves.

Conclusion

Drawing on global best practice, and responding to the needs of many implementing partners of infant and young child feeding programmes, this experience offers a template for working to improve children's diets. Multi-sectoral nutrition programmes carrying out community-based work could apply the same approach to develop context-specific, locally acceptable, and feasible food-based recommendations to improve the diets of young children, and move away from providing food transfers.

For more information, please contact Jen Burns at jbarr5@yahoo.com

References

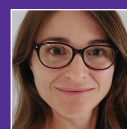
- Ruzengwe F, Nyarugwe S, Manditsera F et al. (2022) Contribution of edible insects to improved food and nutrition security: A review. *International Journal of Food Science & Technology*, 57, 10, 6257–6269.
- Termote C, Raneri J, Deptford A et al. (2014) Assessing the potential of wild foods to reduce the cost of a nutritionally adequate diet: An example from Eastern Baringo District, Kenya. *Food and Nutrition Bulletin*, 35, 4, 458–479.



Kimberly Rambaud
Lessons Learned Advisor at 'Capacity for Nutrition – National Information Platforms for Nutrition' Global Coordination, GIZ Belgium



Heather Ohly
Nutrition Researcher at N4D



Barbara Baille
Nutrition Advisor at 'Capacity for Nutrition – National Information Platforms for Nutrition' Global Coordination, GIZ Belgium

What we know:

Since 2015, the European Union has been supporting countries to create national multi-sectoral, country-led, and country-owned information platforms for nutrition known as National Information Platforms for Nutrition (NIPN). A rigorous and independent study on the performance and progress of the NIPN initiative was conducted in 2022.

What this adds:

The authors reflect on the specifics identified by the evaluation that led to the closure of the project in Bangladesh. While the project was seen as relevant, it lacked coherence and effectiveness and was not sustainable. The short duration and many challenges faced by NIPN Bangladesh did not prepare the ground for impact. Several interesting outcomes were observed, such as the increased demand for robust data, evidence, and analysis on nutrition to inform policy development. Overall, the study highlighted the complexity of multi-sectoral projects and the need for genuine stakeholder engagement throughout.

The NIPN initiative was launched by the European Union in 2015 to support partner countries who are part of the global Scaling Up Nutrition (SUN) movement. SUN countries have committed to delivering evidence-based programmes and interventions to improve human nutrition in their progress toward the 2030

Agenda for Sustainable Development Goal 2: to 'end hunger, achieve food security and improved nutrition and promote sustainable agriculture.'

The driving objective of NIPN is to create national multi-sectoral, country-led, and country-owned information platforms for nutrition. Each platform is intended to strengthen national

capacities in nutrition data analysis to ultimately bolster the inclusion of evidence-based nutrition recommendations to better inform decision makers in the areas of policy, programming, and investment for nutrition.

Starting in 2018, nine countries took part in the NIPN Phase 1 initiative: Bangladesh, Burkina Faso, Cote d'Ivoire (N'dri et al., 2022), Ethiopia, Guatemala, Kenya, Lao PDR, Niger, and Uganda. Between 2020 and 2022, eight countries transitioned to Phase 2 of the NIPN project, while NIPN Bangladesh closed in February 2022. The following year, in 2023, Zambia began implementing NIPN, bringing the number of countries back to nine at the time the current article was written.

A global coordination team, managed by Capacity for Nutrition (C4N¹), coordinates the nine NIPN projects at global level. In 2022, C4N-NIPN commissioned the group N4D² to conduct a rigorous and independent study on the performance and progress of the NIPN initiative³. The study included two country deep-dives, on Kenya and Niger, and a full audit of the closed Bangladesh programme. This article focuses on the learnings from NIPN Bangladesh. It aims to detail the lessons learned from the factors that led to the closure of the programme and to provide specific recommendations to support future design and implementation of successful national nutrition information systems.

Methodology

N4D used the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) criteria to assess the performance of the NIPN platform in Bangladesh in terms of relevance, coherence, effectiveness, impact, and sustainability. The study was driven by the research questions set out in Box 1. To answer each research question, the evaluators developed a set of judgement criteria/indicators that they explored either through analysis of secondary data (desk review of key strategic documents and data related to NIPN concepts and activities: theory of change, data landscape analysis and annual reports), or through the collection and analysis of primary data (interviews with NIPN stakehold-

Table 1 Summary of interviews

Category	Organisation	Number of participants	Modality
Implementing partner	International non-government organisation (INGO) (former NIPN staff)	5	In-person
Government partners	Bangladesh Institute of Development Studies; Bangladesh National Nutrition Council Food Planning and Monitoring Unit	3	In-person
Donor	European Union Delegation	3 (group interview)	Online
Other stakeholders	United Nations Children's Fund; World Food Programme; Global Alliance for Improved Nutrition	3	In-person (2) Online (1)
Total number of participants:		14	

ers and partners). In their approach, the evaluators assessed the relevance of NIPN design at country and global levels to meet both the needs of target stakeholders and the aims and objectives of the initiative.

In April 2023, the N4D nutrition researcher interviewed 14 stakeholders and partners in 12 interviews (Table 1). Interview findings were triangulated with the previously completed desk review.

Findings

Based on the desk review and in-depth interviews, the findings are presented in line with the five OECD-DAC criteria.

Relevance

There was unanimity among those interviewed that NIPN was a relevant initiative for Bangladesh. The nutrition data landscape is very fragmented, with a lack of coordination between sectors and within government. Additionally, data and information have historically flowed from programmes to donors individually and there has been no national information system to track progress. As such, respondents agreed that NIPN as a concept could add value to support the strengthening of data systems and using data to promote government-owned, multi-sectoral nutrition policies and programmes.

However, analysis showed that the method of implementation in Bangladesh was not appropriate for the national context nor responsive to the needs of the government and other key stakeholders. The donor-selected institutional arrangements for NIPN Bangladesh, with an INGO as the primary contract holder, was seen as less than optimal. Most respondents felt that the Government of Bangladesh should have had ownership of the initiative. Bangladesh is the only country in which NIPN was implemented by an INGO. The government partners and other national stakeholders were not invited to contribute to the decision-making process when contracts were awarded. This led to a feeling of lack of transparency and communication in the early stages of setting up NIPN Bangladesh.

Coherence

Multi-stakeholder projects are inherently complex, with many partners, stakeholders, and multi-sectoral committees. In Bangladesh, the evaluation showed that the inception period of

six months planned to set up a NIPN platform was too optimistic given the complexity of the institutional landscape. Key activities such as reaching consensus on the institutional structure and developing the multi-sectoral committees took much longer than expected. In the end, it took around 18 months for the project set-up to be completed. Participants consistently referred to the lack of progress during the first 12–18 months of the project, which they felt was due to poor management, poor communication, and delays with approvals. Progress was particularly slow because the main guarantor was an INGO, which was unable to efficiently engage government officials. Due to the multifaceted nature of NIPN, the project was a challenge to coordinate, resulting in significant delays from the start and throughout. Key strategic documents lacked comprehensive planning and were insufficiently detailed, resulting in incoherent engagement across stakeholders.

Changes in leadership also created challenges with internal coherence. During Phase 1 (2018–2022), covering the majority of the project duration, three different technical directors for NIPN Bangladesh were hired, with the position left vacant in between appointments. Respondents highlighted that these three leaders had vastly different interpersonal qualities, experience, and leadership skills, which required adjustment periods with each change. Interpersonal challenges between one of the NIPN technical directors and the INGO Country Director also resulted in barriers to trust and rapport building, and ultimately internal coherence.

Effectiveness

After the delays, NIPN Bangladesh became fully operational in the second half of 2019. The first policy advisory committee meeting took place in September 2019. This is the first step in the NIPN approach, whereby the NIPN partners

Box 1 Research questions for the evaluation of NIPN Bangladesh

Relevance

How relevant was the NIPN approach in driving optimal policy and programme approaches to address malnutrition?

Coherence

To what extent was NIPN coordinating and collaborating with relevant initiatives and actors to achieve results?

Effectiveness To what degree has NIPN achieved its intended results (direct outcomes)?

Impact To what extent have NIPN activities implemented contributed to impact (indirect outcomes)?

Sustainability To what extent have results been sustained to strengthen national capacities for evidence-based nutrition policy and programming?

¹ C4N is a joint multi-donor action between the European Commission and the German Federal Ministry for Economic Cooperation and Development (BMZ). C4N is part of the BMZ umbrella project, Knowledge for Nutrition Programme (K4N), implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

² <https://www.n4d.group>

³ The protocol report for the Contribution Study of the National Information Platform for Nutrition Initiative is available at: <https://www.n4d.group/national-information-platforms-for-nutrition/>

and stakeholders convene and discuss the most pressing nutrition issues and key governmental priorities in the country. This first meeting generated a series of policy questions for the data analysis unit to investigate. However, several respondents noted that the Bangladesh Institute of Development Studies, which was the government partner responsible for formulating and validating policy questions, was not suitable to host the policy component in the long term. As such, NIPN Bangladesh missed out on opportunities to provide valuable inputs to institutional stakeholders and to demonstrate its added value as a key player in the multi-stakeholder dialogue.

Despite challenges with the policy question formulation, NIPN Bangladesh made a concerted effort to generate evidence on national nutrition issues to support the country in strengthening national nutrition policies and interventions. It conducted 11 relevant studies; by the end of Phase 1, nine of these were in final or draft form.

Capacity-building activities were an important element for the effectiveness of NIPN Bangladesh. The platform demonstrated the ability to adjust to hybrid and remote formats during the ever-changing COVID-19 period, managing to train over 200 government stakeholders across 17 ministries. However, different members of staff were nominated to attend each course (presumably in an effort to ensure fairness), which limited the ability of individuals to complete the whole package of training. This ultimately resulted in fragmented coverage of skills development. Respondents also felt that institutional capacity strengthening had been insufficient. Overall, capacity development was viewed as impressive and well received, but inadequate to meet the needs of establishing a NIPN.

The hosting INGO and Bangladesh Bureau of Statistics had reached a formal agreement to establish a data repository. A server was purchased and data guidelines were developed, alongside procedures for managing and using data within the repository. Interviews revealed that no respondents knew about the status or whereabouts of the data repository. This is suggestive of a serious lack of accountability in regard to a crucial component of NIPN and a major gap in the effectiveness of the NIPN Bangladesh set-up.

Impact

Although the short duration and many challenges faced by NIPN Bangladesh were not conducive to achieving impact, respondents noted several interesting outcomes from the programme. For instance, NIPN increased demand for robust data, evidence, and analysis on nutrition to inform policy development. The studies conducted by NIPN Bangladesh were used by several stakeholders, including government and non-government partners such as the Food Planning and Monitoring Unit under the Ministry of Food and the Bangladesh National Nutrition Council.

Sustainability

NIPN Bangladesh attempted to develop a sustainability plan, but it was never finalised nor op-

erationalised. This suggests that sustainability was considered at a late stage. Opportunities for longer-term impacts were therefore likely missed.

In addition, there was no formal consultation to inform NIPN partners and stakeholders of the reasons behind the discontinuation of the platform, nor was there an opportunity for course correction once they were informed. Finally, a cost extension was granted to allow for proper programme closure. Despite it being planned for nine months, the extension period was reduced to two months, which meant the team was not able to devise an exit strategy to tie up loose ends or properly conclude the project.

Lessons learned

Multi-sector nutrition information projects can strengthen collaboration across sectors and add value by delivering evidence-based recommendations to nutrition policy-making processes. The audit of NIPN Bangladesh provided useful lessons learned for C4N-NIPN, the European Union Delegation, and other interested parties that may want to use the experiences to support future programme design. The following lessons, derived from the findings provided above, aim to provide readers with concrete elements to consider when setting up and implementing similar programmes.

Appropriate institutional arrangements

The institutional arrangements of a NIPN are critical to its success and should empower national actors rather than international organisations. A robust context analysis during the NIPN scoping exercises can inform the different options. The experience of the NIPN in Bangladesh highlights the importance of optimal institutional arrangements and how they support the implementation and achievement of objectives. Without appropriate institutional arrangements, the NIPN's ability to stimulate government interest and coordinate multi-sectoral and multi-stakeholder input is severely restricted. This statement is also supported by the experience of other NIPN countries, where the financial support was directly awarded to national institutions during Phase 1 of the project (such as Kenya and Burkina Faso). In these countries, NIPN directors are civil servants who are affiliated to national institutions, illustrating government leadership and ownership.

Adaptation to context

NIPNs need adequate contextual analyses that are regularly updated and inform decision-making. The design of the NIPN in Bangladesh was aligned to the general strategy of NIPN. However, there was insufficient attention to the specific contextual risks that may cause delays. The design of NIPN Bangladesh should have included a comprehensive risk register with corresponding mitigating actions, so the achievement of outcomes would not be threatened.

Clear coordination strategy

An initiative that depends on effective coordination mechanisms and dialogue between implementing entities should have a clear coordination strategy.

Recommendations for nutrition information systems

The lessons learned from NIPN Bangladesh provide valuable insights for other NIPNs as well as other nutrition information systems more broadly. Building on the findings previously mentioned, respondents identified certain critical elements necessary for a NIPN, or other national nutrition information system, to be successful.

Ensure government leadership

Government leadership is a prerequisite to national ownership that will enable stronger coordination across ministries and other key national entities, and a position closer to the policy-making process. Embedding NIPNs within national systems allows the project to be developed in line with government ways of working. This does not guarantee success, but it can bypass the implementation challenges experienced in Bangladesh.

Transparency on contracting

Transparent processes via an open consultation process must take place to identify, filter, and secure partnerships with the most relevant stakeholders.

Human centred

The influence of human relationships on the uptake of an initiative should never be underestimated. Promoting open and regular communication is key.

Embed communications

A communications strategy should be designed based on stakeholder mapping to ensure effective reach to target audiences. It should be approved in the early stages and updated regularly.

Standard operating procedures

Clear and efficient processes and mechanisms, such as decision-making processes, must be set into place to promote clarity and accountability.

Capacity development

It is necessary to invest time in targeting and tailoring capacity development activities to the right audiences, rather than casting a wider net to reach many. Key individuals should be targeted to receive comprehensive training in their technical areas. Training of trainers should be prioritised to facilitate skill transference and scaling of skills.

Conclusion

The learnings from the Bangladesh evaluation can help inform and strengthen current and future iterations of NIPN. C4N-NIPN promotes and encourages the frank exchange of challenges from both a global level with partners and donors as well as peer-to-peer formats. Above all, NIPN Bangladesh highlighted the complexity of multi-sectoral projects and the need for genuine stakeholder engagement throughout.

For more information, please contact Kimberly Rambaud at Kimberly.rambaud@giz.de

References

N'Dri F, Ake G, Mady R et al. (2022) Establishing an effective multi-sectoral nutrition information system in Ivory Coast. Field Exchange 68. <https://www.enonline.net/fex/68/nipncollaborationivorycoast>



© Alice Costa

What we know:

Nearly 800,000 people live in a situation of displacement in the province of Cabo Delgado in northern Mozambique, resulting from armed conflicts (since 2017) and the destruction caused by Cyclone Kenneth (in 2019) (IOM, 2022). The district of Mecufi, a southern district of Cabo Delgado, has poor access to basic services, elevated unemployment, and high levels of malnutrition (coinciding with a reduction in humanitarian food assistance programmes).

What this adds:

We designed a project aiming to increase access to and consumption of safe and nutritious foods by evaluating possible behaviour change interventions. Growing pumpkins and drying ripe mangoes (instead of drying unripe mangoes, which are low in vitamin A – the standard practice of many households) improved access to vitamin A rich food.

Mozambique: Behaviour change interventions increase production of vitamin A rich foods



Jurgita Slekiene

PostDoc at the Department of Consultation-Liaison Psychiatry and Psychosomatic Medicine, University Hospital Zurich, University of Zurich, Zurich, Switzerland; and Ranas Ltd, Zurich, Switzerland

Hans Mosler

CEO of RanasMosler, Switzerland



Alice Costa

Natural Resources Expert and Development Project Coordinator at Istituto Oikos, Mozambique



Arina de Fatima Momade

Nutritionist and Community Engagement Expert at Istituto Oikos, Mozambique



John Brogan

Water and Sanitation Advisor at Helvetas, Switzerland



Nicolas Morand

Programme Advisor at Helvetas, Madagascar and Mozambique

This project was funded by the Global Alliance for Improved Nutrition (GAIN) and implemented in 2020 and 2021 by partners working alongside the District Government of Mecufi. In total, 60 mothers of malnourished children and 100 smallholder farmers benefitted by improving their knowledge on sustainable food production and the appropriate consumption of self-produced fruit and vegetables.

Instituto Oikos is an Italian non-governmental organisation that has worked in Mozambique since 2012, developing projects in Cabo Delgado to support institutions and people to enhance their capacity to face the impact of climate change on natural resources and communities. Oikos collected data pre- and post-intervention and collaborated with RanasMosler to analyse the context, design the programme, and provide technical support.

Helvetas is an independent development organisation based in Switzerland, with affiliated organisations in Germany and the US. Helvetas works to alleviate poverty and advance human rights in almost 40 developing and transitional countries across Africa, Asia, Latin America, and Eastern Europe. Helvetas guided Oikos to use a behaviour change approach – Risks, Attitudes, Norms, Abilities, and Self-regulation (RANAS) – to design their nutrition programme, train field teams, and to lead implementation. RanasMosler was founded as a spin-off collaboration of the Swiss Federal Institute of Aquatic Science and Technology and has helped pioneer the RANAS approach. RanasMosler measured changes in behaviour, intention, and behavioural factors, with results that form the basis of this article.

Methods

Oikos conducted a 24-hour dietary recall survey in 60 households with children aged under five years. Results showed that low consumption of vitamin A rich foods was a major driver of poor diets. We identified two interventions that had the potential to tackle this: a) growing pumpkins; and b)

drying ripe mangos (Box 1). The drying of mango is traditionally limited to green mangoes, which have lower nutrient density compared to the ripe fruit, in Northern Mozambique.

We collected quantitative data regarding homestead food production of vitamin A rich foods, to develop behaviour change interventions. We applied the RANAS approach (Mosler, 2012; Mosler & Contzen, 2016), which offers an evidence-based method to identify and measure relevant psychosocial factors to change, then design and evaluate behaviour change interventions and strategies in the public health sector. The applicability of the RANAS approach has been demonstrated in previous research in more than 30 countries.¹

The baseline survey (N=200) was conducted in October 2020. A quantitative questionnaire based on the RANAS model was used to collect data on the two target behaviours – i.e., growing pumpkins and drying ripe mangos – and the psychosocial factors underlying those target behaviours, by performing face-to-face interviews in households. Baseline study results informed the behaviour change interventions, although these findings are beyond the scope of this article. The RANAS practical guide² was used to develop a behaviour change strategy.

Behaviour change interventions were implemented from November 2020 to February 2021. Funding limitations prevented this study from continuing for a longer period, but this timeframe was suitable to observe the growth of both mangoes (90–150 days) and pumpkins (85–120 days), which were central to this intervention. The Oikos team developed a four-step behaviour change strategy and trained groups of 15–20 women, involving 160 households in total (100 households in sustainable agriculture and 60 households in nutrition activities) (Box 1).

¹ <https://www.ranasmosler.com/publications>

² https://www.ranasmosler.com/_files/ugd/acbbe3_2540cf86e0e84a779156dd4a58aab14.pdf

Collecting follow-up data

Follow-up data was collected in February 2021, with face-to-face interviews conducted with the same baseline participants. The quantitative questionnaire, based on the RANAS model, was used to collect data on the target behaviours and the psychosocial factors underlying those target behaviours.

Evaluation analysis

The differences between baseline and follow-up data, for intention to grow pumpkin and to dry ripe mangos, as well as the contextual and behavioural factors underlying target behaviours, were analysed using T-tests for dependent samples, at a 5% significance level. Where five-point response scales were used, variables were considered as an 'interval scale' and differences in means were calculated. We acknowledge that there is some debate regarding the use of Likert scales as interval-scale continuous measurements (Sullivan & Artino, 2013). Although the use of an 11-point scale is sometimes recommended (Wu & Leung, 2017), we opted to use a five-point scale in this setting due to ease of comprehension (for respondents), accurate administration (by researchers), and the nature of the data being analysed.

Findings

The evaluation analysis revealed statistically significant changes in intention to grow pumpkins (Table 1) and to dry ripe mangos (Table 2). Although 200 households participated, only 119 could be used for the baseline to follow-up comparison. Of the 119 households, 73.6% (N=89) of the participants were female and 26.4% (N=32) were male.

Growing pumpkins

Growing pumpkins or other vegetables requires the availability of a home garden (or field) and around 24.1% of families cultivated in their homestead at baseline. The cultivation of a home garden increased significantly (to 47.9%) after the intervention. The cultivation of fields was already very high at baseline (99.1%) and reached 100% at follow-up.

There were significant differences between baseline and follow-up surveys regarding intention to grow pumpkins. The RANAS factors for growing pumpkins targeted with the behaviour change intervention showed significant differences between the baseline and follow-up surveys, with the exception of the ability factor 'confidence in performance', which did not significantly change (Table 1).

Drying ripe mangos

Drying mangoes was an already common practice in the study group at baseline (89.7%), but increased in popularity post-intervention (99.2%). More specifically, interest and intention to dry ripe mangos increased significantly at follow-up compared to baseline (Table 2). At baseline, 0% of respondents reported that they knew the advantages and disadvantages of drying ripe mango, which increased to 93.4% and 63.6%, respectively. The drying of other vegetables and fruits increased by 20% at follow-up, compared to baseline (36.2% to 56.2%) – a complementary outcome of the intervention. Knowledge about the differences between drying ripe and unripe mangos increased from 4.3% to 91.7%. All RANAS factors for drying ripe mango that were targeted with behaviour change interventions showed significant differences between the baseline and follow-up surveys (Table 2).

Discussion

We observed that the cultivation of home gardens for growing pumpkins increased significantly post-inter-

Box 1 The interventions

Growing pumpkins

Training included pumpkin growing techniques in homestead gardens and planning workload using an annual agronomic calendar. Each participant family received a flag to be put in their garden to recognise their efforts and to prompt goal setting. Next, we described the benefits in terms of both health and livelihoods that growing and consuming pumpkins may have. Each family received technical support on subjects such as water management, pest control, soil amelioration, seed production, and conservation. In the final step, radio spots (10-minute radio shows in which nutritional and sustainable agricultural messages were disseminated) and debates created a positive group identity and reinforced the importance of consuming vitamin A rich foods.

Drying ripe mangos

Two Oikos agronomists trained participants on the techniques to dry ripe mango instead of unripe mangos. In group discussions with study participants, an Oikos nutritionist then led the tasting of dried mango and shared recipes. Any barriers identified were discussed between agronomists and nutritionists to find solutions to support participants to plan and practice target behaviours.



Ripe mango slices, previously dipped in lemon juice, arranged in the trays of the solar dryer. Mozambique, 2020

© ALICE COSTA

Table 1 Changes in context, intention, and behavioural factors underlying growing pumpkins

	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (SD)
Intention to grow pumpkins			
Do you intend to grow pumpkin in the future? 1 (not at all) to 5 (very much)	3.97 (0.91)	4.50 (0.73)	0.51* (1.22)
RANAS behavioural factors underlying growing pumpkins			
Attitude factor: feelings, like Do you like to grow pumpkin near your home? 1 (not at all) to 5 (very much)	3.54 (1.12)	4.17 (1.14)	0.67* (1.59)
Attitude factor: costs and benefits, time consuming Do you think you save time for other activities if you grow pumpkins in a home garden? 1 (no time saving at all) to 5 (saving a lot of time)	3.60 (1.30)	4.16 (0.77)	0.57* (1.55)
Norm factor: personal obligation Is it important for you to grow your own pumpkins to have a healthy family? 1 (not at all important) to 5 (very important)	3.10 (1.27)	3.31 (1.30)	0.20 (1.60)
Ability factor: confidence in performance Are you sure you will be able to produce your own pumpkins in your home garden? 1 (not at all) to 5 (very much)	3.10 (1.27)	3.31 (1.30)	0.20 (1.60)
Self-regulation factor: action control Are you respecting the planning and caring for the healthy growth of the pumpkin plants? 1 (not at all) to 5 (very much)	3.44 (0.95)	3.79 (0.67)	0.35* (1.29)
Self-regulation factor: barrier planning Do you think you will have difficulties in growing pumpkins? 1 (no difficulties) to 5 (many difficulties)	4.43 (1.05)	2.46 (1.34)	0.46* (1.64)
Self-regulation factor: remembering Do you remember to sow pumpkins when planning your home garden or in other areas? 1 (never remember) to (always remember)	4.43 (1.05)	4.79 (0.53)	0.37* (1.06)
Self-regulation factor: commitment Do you feel committed to producing your own pumpkins? 1 (not at all committed) to 5 (very committed)	3.17 (0.95)	3.88 (0.95)	0.68* (1.31)

N=104-121 *p ≤ .05

Only factors that were targeted with behaviour change interventions were included in the analysis.

vention. However, only half the participants reported that they cultivated their home garden after the behaviour change intervention. The intention of participants to grow pumpkins, as well as almost all targeted behavioural factors, increased significantly post-intervention – but we discovered that participant confidence (to practice the behaviour) did not change with the intervention. This mirrors findings in the self-regulation factor, specifically ‘barrier planning’, which showed an increase in the perception of barriers to growing pumpkins post-intervention. Possible reasons for this are beyond the scope of the study and would require further examination. Given the short time scale of the study, the validity of findings related to enhancing the ‘remembering’ factor would benefit from confirmation through a longer observation period.

Our interventions resulted in significant, positive changes in regard to drying ripe mangos – specifically, interest in drying ripe mangos and all associated behavioural factors. However, over half of respondents still reported drying both raw and ripe mangos, with only a quarter practicing the desired behaviour of drying only ripe mangos after the intervention. Raw mango is an important ingredient for many traditional dishes and trade-offs in terms of shelf life, transportability, and market demand make drying unripe mangos a more practical choice for many people in Mozambique.

Participants increased their understanding of better dietary strategies (e.g., they could easily use home courtyards as gardens for growing pumpkins, or they discovered the advantages of drying ripe mangos to improve vitamin A intake). Through an in-depth analysis of the presence/absence of the behaviour in the target community, we were able to design a project that was adapted to the specific context and to focus on relevant interventions to strengthen the technical capacities needed to adopt a new behaviour, such as increasing the commitment to perform the behaviour, enabling the participants to plan and control their progress, and sharing feelings.

Our study reinforced the usefulness of the RANAS evidence-based behaviour change approach in developing a behaviour change intervention and to quantify any changes observed. To build upon the approach described above, it may be useful to develop a concise and ready-to-use questionnaire and analysis tool that can be easily integrated into project baseline questionnaires. This can also provide important methodological guidance, based on the RANAS approach, considering the psychological factors present in the target community.

The RANAS approach has several characteristics that distinguish it from other behaviour change approaches. First, it is grounded in psychological theory whereby the factors that are relevant for behaviour change are clearly defined by the psychological research evidence base. Second, RANAS defines which behaviour change techniques are suitable for each factor, providing a more tailored approach. Third, RANAS uses quantitative data and statistical analysis for defining which behavioural factors must be changed in a specific context. Fourth, RANAS is adapted

Table 2 Changes in the behaviour, intention, and behavioural factors underlying drying ripe mangos

	Baseline Mean (SD)	Follow-up Mean (SD)	Difference Mean (SD)
Intention to dry ripe mangos			
Do you intend to dry ripe mangos instead of ripe ones? 1 (not at all) to 5 (very much)	3.00 (1.05)	4.06 (0.90)	1.06* (1.35)
Interested in drying ripe mangos 1 (not interested) to 5 (very interested)	2.27 (1.25)	3.60 (0.68)	1.34 (1.55) *
If yes, what type of mangoes do you dry?			
Green mangos	88.5%	4.2%	84.3%
Mangos, mainly green	4.8%	6.7%	1.9%
Mangos green and ripe	6.7%	62.5%	56.1%
Mature mangos in particular	0%	2.5%	2.5%
Ripe mangos	0%	24.2%	24.2%
RANAS behavioural factors underlying drying ripe mangos			
Attitude factor: feelings, like dry			
Do you like to dry ripe mangoes? 1 (not at all) to 5 (very much)	1.70 (1.21)	4.73 (0.56)	3.04* (1.35)
Ability factor: confidence in performance			
Are you sure you will be able to dry the ripe mangoes from one year to the next? 1 (not at all) to 5 (very much)	2.17 (1.14)	4.30 (0.72)	2.15* (1.29)
Ability factor: confidence in performance			
Do you feel able to overcome these difficulties? 1 (not at all able) to 5 (very able)	2.23 (1.09)	3.38 (1.15)	1.43* (1.50)
Self-regulation factor: Action control			
Do you respect the mango processing work plan (esp. harvesting the fruit, drying, storing, etc.)? 1 (not at all) to 5 (very much)	1.95 (1.29)	3.64 (1.11)	1.66* (1.71)
Ability factor: action knowledge			
Do you know how to dry ripe mangoes? 1 (I don't know at all) to 5 (I know a lot)	1.25 (0.78)	4.04 (1.02)	2.78* (1.28)
Self-regulation factor: commitment			
Do you feel committed to processing ripe mangoes through drying? 1 (not at all committed) to 5 (very committed)	1.27 (0.68)	3.84 (0.92)	2.55* (1.05)
N=98-121 *p ≤ .05 Only factors that were targeted with behaviour change interventions were included in the analysis			

to (and has been proven for) low- and middle-income settings. Additionally, the RANAS approach can be applied to any behaviour, whereas other approaches may be restricted to only particular behaviours (e.g., handwashing, toilet building, etc.).

Social and behaviour change communication should only be applied when it is possible for people to behave in a desired way. To promote handwashing, it is only reasonable if water and soap are available. If infrastructure is provided, such approaches are cost-effective and can be easily scaled up using appropriate communication channels.

Conclusion

The RANAS behaviour change interventions were successful in increasing access to vitamin A rich foods, through growing pumpkins and drying ripe mangoes, and in changing RANAS factors targeted with the behaviour change intervention. The results of the project confirmed that, by using evidence-based behaviour change interventions adapted to the cultural context, important improvements in nutrition behaviours can be achieved. We recommend including evidence-based behaviour change approach-

es, such as the RANAS approach, in future Helvetas and Instituto Oikos interventions. We also hope that the design, methodology, and results from this complex, low-income setting can act as useful guidance for those looking to apply the same strategies in their own areas of work.

For more information, please contact John Brogan at John.Brogan@helvetas.org

References

- IOM (2022) Global data institute displacement tracking index – Mozambique (as at February 2022). dtm.iom.int.
- Mosler HJ (2012) A systematic approach to behaviour change interventions for the water and sanitation sector in developing countries: A conceptual model, a review, and a guideline. *International Journal of Environmental Health Research*, 22, 5, 431–449.
- Mosler HJ and Contzen N (2016) Systematic behaviour change in water, sanitation, and hygiene. A practical guide using the RANAS approach. Version 1.1. [ranas-mosler.com](https://www.ranas-mosler.com).
- Sullivan G & Artino A (2013) Analyzing and interpreting data from Likert-type scales. *Journal of Graduate Medical Education*, 5, 4, 541–542.
- Wu H & Leung S (2017) Can Likert scales be treated as interval scales? – A simulation study. *Journal of Social Service Research*, 43, 4, 527–532.



Niger: An integrated preventive and curative health package for nutritional status

This is a summary of the following paper: *Pedrero-Tomé R, Marrodán D, López-Ejeda N et al (2023) Impact of integrated preventive and curative health package on nutritional status of children under 2 years of age in the health area of Tama, Tahoua region Niger. Frontiers in Nutrition, 10. <https://doi.org/10.3389/fnut.2023.1259706>*

Médecins Sans Frontières (MSF) has been working in Niger since 2001, with increased efforts since 2005. Responding to alarming food insecurity, elevated fertility and infant mortality rates, and various medical challenges – including measles and meningitis epidemics, as well as wasting – has shifted MSF's focus from treatment to an integrated preventive and curative healthcare package. This is known as the PPCSI (an acronym for “Paquet Préventif et Curative de Soins Intégrés”). The package intends to prevent and treat malnutrition, malaria, and other common diseases, and includes support to vaccination and breastfeeding. The primary aim was decreased mortality in children aged under 5 years that, if proven effective, could be replicated in more areas of the country.

This study analysed the effect of the PPCSI, which included a small quantity of lipid-based nutrient supplement (SQ-LNS) as a food complement, on the nutritional status of children aged 6–24 months in Tahoua, Niger. The study included anthropometric follow-up data from 6,962 children aged under 2 years, who received complete vaccination, malaria chemoprevention, and nutritional supplementation for those aged over 6 months. The Composite Index of

Anthropometric Failure (CIAF) and growth indicators were assessed at the beginning and end of the programme for all children who completed a minimum of 3 visits, with an average programme duration of 14.5 ± 6.6 months. A comparative analysis was conducted with a sample from a neighbouring region's vertical vaccination programme, in which children did not receive any nutritional supplementation.

Results showed a shift in z-scores for height-for-age, weight-for-height, and weight-for-age toward values indicating malnutrition at the end of the intervention. In contrast, mid-upper arm circumference increased by an average of 0.5cm. The CIAF analysis revealed a 20% increase in anthropometric failure, primarily observed in categories including stunting. Compliance with the entire programme impacted anthropometric indicators differently. Wasting improved significantly while stunting and underweight worsened. The same pattern was seen according to length of stay in the programme. When comparing Tahoua with the neighbouring region's sample, the children in Tahoua had significantly less worsening in all 3 indicators: height-for-age (-0.70 vs. -2.44 $p < 0.001$), weight-for-height (-0.13 vs. -0.70 $p < 0.001$), and weight-for-age (-0.38 vs. -1.78 $p < 0.001$).

Distribution of super cereal plus as part of the treatment of moderate acute malnutrition in the region of Tahoua, Niger



Study limitations included measurement errors by inexperienced health staff, the absence of a formal control group and reliance on data from a different MSF study for impact assessment, warranting cautious interpretation of results. That said, the authors conclude that the integrated PPCSI programme ‘is slightly effective in curbing the accumulated burden of malnutrition in the early years of life in complex contexts’.

Use of mid-upper arm circumference measurement for children with disabilities Critical research gaps

This is a summary of the following paper: *Hayes J, Quiring M, Kerac M, et al. (2023) Mid-upper arm circumference (MUAC) measurement usage among children with disabilities: A systematic review. Nutrition and Health, 0, 0. <https://journals.sagepub.com/doi/10.1177/02601060231181607>*

Children with disabilities are routinely excluded from malnutrition guidelines, assessment tools, nutrition programming, and the general global conversation. This systematic review analysed current evidence regarding the use of mid-upper arm circumference (MUAC) among children (aged six months to 18 years) with disabilities. The review followed PRISMA guidelines, searching four databases between 1990 and 2021, with 32 papers included in the final analysis. Most of the included studies (91%) were observational. Key findings from across 26 countries indicate that MUAC is commonly and routinely used as part of nutritional as-

essment for children with disabilities, but that MUAC measurement methods, references, and cutoffs were inconsistent. Due to limitations in the available research, it was not possible to compare MUAC's ability to identify high-risk children with disabilities in comparison to other anthropometric measures or to children without disabilities.

The pooled study sample was weighted toward certain disability subtypes, although nine studies included multiple disability types. Cerebral palsy was observed in 44% of studies, as well as intellectual impairment (19%), visual impairment (9%), and autism spectrum dis-

order (9%), to name a few. This highlights the need for further research into specific, under-represented groups to expand the evidence base and better understand how varying disabilities may impact MUAC measurement accuracy. It is also important to note that the evidence for, and use of, MUAC has evolved during the selected time period – which makes it harder to compare between these studies.

However, due to its simplicity and ease of use, MUAC does present as a potentially valuable part of nutritional assessment for children with disabilities of all ages. What is clear from this research is that there is an urgent need to identify standardised methods and references to identify malnutrition and monitor the nutritional status of millions of children with disabilities as we work to create more inclusive systems.

“WHO guidelines are highly regarded and used to develop malnutrition protocols worldwide, but the lack of disability-specific recommendations leaves children with disabilities underserved.”

Nutritional intervention in Mozambique: Policies and progress?

This is a summary of the following paper¹: *Cinquenta A, Abdul-Karim S, Tenente Frio E et al. (2023) Progress in the fight against malnutrition in Mozambique: A review of policies, action plans, and nutritional interventions. Research Society and Development, 12, 12, e107121244053. <https://rsdjournal.org/index.php/rsd/article/view/44053/35343>*

Despite numerous interventions over the years, Mozambique is still grappling with persistent chronic malnutrition, with 37% of children aged under 5 years in the country being stunted. This exploratory study considered Demographic and Health Surveys (DHS), Family Budget Surveys (FBS), Standardized Monitoring and Assessment of Relief and Transition (SMART) Surveys, Integrated Classification of Food Security Phase (IPC), Economic and Social Plans (PES), and FAO Database (FAOSTAT) – as well as other more specific survey data pertinent to the country – to determine how malnutrition rates were affected by various policies that were implemented concurrently.

This is a crude analysis which can only provide a high-level summary of the situation in Mozambique. Heterogeneity (of different surveys) remains a key challenge, as it is not appropriate to compare exact figures from different surveys, using different methods, across multiple years. Nevertheless, when comparing the same surveys across different time points, it is clear that little impact has been achieved, for stunting and wasting, despite the implementation of several initiatives: PARPA (2001–

2005, 2006–2009), ESAN II (2008–2015), and PAMRDC (2010–2020). Both stunting and wasting prevalence have remained broadly stable between 2003 and 2023, with minor oscillations. Wasting prevalence did fall from 11% in 1997 to 4% in 2003 (DHS) – the only notable change during the study period.

As is seen in many countries, stunting rates vary dramatically by region (from 46.7% in Nampula and 45% in Cabo Delgado to 8.1% in Maputo province, in 2021), which in turn reflects an urban–rural disparity. Notably, illiteracy rates were higher in the northern, high-burden provinces (up to 61.1% in Cabo Delgado). Access to drinking water mirrored this trend, with 80% of families reporting access in the south, compared to less than 50% in the north and under 70% in the centre. More generally, the authors highlight the role of hidden debt, armed conflict, COVID-19, cyclones, and poor monitoring and reporting data, citing these as barriers to adequate nutrition. This led the authors to recommend the following policy steps:

Such policy focuses have achieved success in other countries and the authors are optimistic in their conclusion that ‘the country remains



Malnutrition monitoring in Cabo Delgado, Mozambique

© WFP/Alfredo Zuniga

on course to reverse the situation’. However, it remains to be seen how Mozambique can find a way to implement each of these suggestions when facing such a variety of development challenges. Reducing the urban–rural divide, focusing on higher-burden regions, may be an appropriate place to start.

“Ensure an equitable distribution of resources to all provinces and between rural and urban areas, control the situation of peace and stability throughout the national territory, invest in agricultural technology policies, increase the number of hospitals with a focus on rural areas, establish strengthening policies on climate change and, finally, to bet on a robust and realistic monitoring and evaluation system for the public policies created.”

¹ This paper was originally published in Portuguese and minor linguistic errors may be seen in the original translated text.

Relationship of maternal short stature with coexisting forms of malnutrition in Pakistan

This is a summary of the following paper: *Khaliq A, Nambiar S, Miller D et al (2024) Assessing the relationship of maternal short stature with coexisting forms of malnutrition among neonates, infants, and young children of Pakistan. Food Science & Nutrition.*

<https://doi.org/10.1002/fsn3.3945>

‘Co-existing forms of malnutrition’ (CFM) involves a combination of two or more malnutrition indicators in an individual and is associated with a fourfold higher risk of mortality in children. Additionally, a child’s nutritional status is significantly influenced by various maternal factors, with maternal height being a key predictor of offspring growth. This study explores the association between maternal short stature and CFM among mother–child dyads in Pakistan. Using Pakistan Demographic Health Survey data from 2012–2013 and 2017–2018, a panel cross-sectional analysis was conducted on 6,194 mother–child dyads aged 15–49 years and 0–59 months, respectively.

Maternal overweight and obesity increased by over 10% between the two survey periods, while prevalence of CFM among mothers remained below 5%. In children, CFM prevalence decreased from 30.7% to 20.7% across the sur-

vey periods. Coexisting underweight and stunting were consistently the most prevalent type of CFM. The presence of CFM in the mother–child dyad was 1.1% in 2012–13 and decreased to 0.5% in 2017–18.

Two maternal height categories were defined: Short stature (<145cm) and normal stature (≥145cm). The study reveals a significant association between short maternal stature and various forms of child undernutrition, including coexisting undernutrition. It found at least twofold higher odds of stunting, underweight, and various coexisting forms of undernutrition in children of short-statured mothers compared to those of normal stature ($p < 0.041$). However, no association was observed with wasting, overweight/obesity, and coexisting stunting and overweight/obesity.

The 2017–2018 survey reported a higher prevalence of coexisting underweight with wasting compared to the 2012–2013 survey.

Maternal employment and caesarean section significantly reduced the odds of coexisting underweight with wasting, while an increase in family size raised the odds of coexisting underweight with both wasting and stunting (by 1.07). Between the 2 survey years, the odds of stunting with overweight/obesity significantly decreased to 0.28 in 2017–2018.

Despite national coverage and representative sample sizes in each demographic health survey, this study has limitations impacting internal validity. The cross-sectional design hinders establishing causation between maternal and child malnutrition. Missing data on variables like birthweight, birth size, and maternal health interventions further hinder a comprehensive assessment. Nutritional status relied solely on anthropometry, lacking biochemical tests, physical examinations, and dietary investigations. Anthropometric data had measurement errors and exclusions, impacting the study’s representativeness. Acknowledging these limitations is crucial when interpreting these findings.

The study does however affirm the heightened vulnerability of children born to short stature mothers to various forms of undernutrition. Further exploration of the relationship between maternal health, infant feeding, and child undernutrition, including coexisting forms of undernutrition, is needed to identify effective strategies for interrupting the intergenerational transmission of malnutrition and CFM in children.

The Lancet Countdown on health and climate change: The 2023 report

This is a summary of the following report: *Romanello M, di Napoli C, Green C et al (2023) The 2023 report of the Lancet Countdown on health and climate change: The imperative for a health-centred response in a world facing irreversible harms. The Lancet, 402, 2346–2394* [https://doi.org/10.1016/S0140-6736\(23\)01859-7](https://doi.org/10.1016/S0140-6736(23)01859-7)

The Lancet Countdown's 2023 report, the 8th iteration of the international research collaboration, provides a comprehensive assessment of the evolving impacts of climate change on health and the health opportunities emerging from climate action. Even in the face of the urgent warnings of the previous year, progress in addressing the interconnected challenges of the climate change, energy, cost-of-living, and health crises appears limited.

The report highlights the escalating health toll of climate change, with 2023 witnessing the highest global temperatures in over 100,000 years. Vulnerable populations, such as the elderly and infants, face a doubling of heatwave days compared to 1986–2005. Heat-related deaths among those aged over 65 years have surged by 85% since 1990–2000. Climate change is also disrupting natural and human systems, expanding the global land area affected by ex-

treme drought and increasing the risk of infectious diseases.

Economic losses from extreme weather events have risen by 23%, amounting to \$264 billion in 2022 alone. Heat exposure led to potential income losses of \$863 billion, disproportionately affecting low- and medium-ranked Human Development Index countries. These multiple and simultaneous risks amplify global health inequities.

The report emphasises the failure to address these challenges, particularly the persisting reliance on fossil fuels, with subsidies totaling \$305 billion hindering their phase-out. The Lancet Countdown warns that, without rapid action, the use of fossil fuels will lead to an increasingly inequitable future, jeopardising lives globally.

However, despite the challenges, the report identifies opportunities for a healthy future through the transition to a zero-carbon

world. Persistent structural inequities in access to, and the use of, clean energy need to be addressed – particularly in countries with high levels of energy poverty.

The report calls for several interventions, including promoting renewable energy, enabling safe active travel, and advocating for equitable access to healthy, low-carbon diets (which would prevent many of the 12.2 million deaths currently attributed to suboptimal diets globally). The health sector is urged to lead by example, transitioning to sustainable, net-zero emission health systems. Encouraging signs of progress, such as a decline in deaths from fossil-fuel-derived air pollution and growth in the renewable energy sector, offer hope for the potential benefits of health-centered action.

As the world accelerates toward 3°C of heating, the Lancet Countdown underscores the imperative of prioritising health in international climate change negotiations. The report calls for a people-centered transformation, putting health at the heart of climate action. Achieving this vision requires confronting the economic interests of fossil fuel industries, delivering science-driven progress, and ensuring accountability. The report concludes with a call for the leadership, integrity, and commitment of the health community, corporations, policymakers, and financial institutions to realise the promise of health-centered climate action and secure a thriving future for all.

Ethiopia: Are ultra-processed foods a barrier to appropriate complementary feeding?

This is a summary of the following paper: *Tadesse E, Abdirahman I, Letta S et al. (2024) Barriers to appropriate complementary feeding and the use of ultra-processed foods: A formative qualitative study from rural Oromia, Ethiopia. Maternal & Child Nutrition, 20, e13576* <https://doi.org/10.1111/mcn.13576>

Evidence shows that, even in rural settings with low dietary diversity, Ethiopian children are increasingly consuming ultra-processed foods (UPF). Introducing complementary foods too early and providing inappropriate foods (such as UPF) threatens infant growth and development.

This formative qualitative study explored complementary feeding practices, particularly provision of UPF to young children, in rural Oromia, Ethiopia. Sixteen focus group discussions were conducted using semi-structured questionnaires with mothers (N=45), fathers (N=21), and grandmothers (N=23) of children 6–23 months of age in beneficiary households of the Productive Safety Net Programme (PSNP). Four key informant interviews were also conducted with health workers. Inductive analysis was applied to transcripts complemented by field notes using MAXQDA software.

UPF were commonly fed to young children, often before the recommended age of initiating complementary foods at six months. In many cases, these foods were part of a liquid diet in which UPF, like juice, biscuits, and lipid-based

nutrient supplements (LNS), were diluted with or dissolved in water and fed through a bottle. Caregivers perceived UPF as affordably priced and packaged, easily prepared, and nutritious. In comparison, the milk, legumes, and cereals traditionally used as complementary foods were subject to price inflation that limited their accessibility. Health workers believed that therapeutic foods and those distributed by the government and non-governmental organisations as part of food assistance programmes, like LNS and 'Fafa', were perceived as nutritionally balanced and prevented malnutrition in children.

“They are interested only with foods like Fafa and plumpynut foods... They think the food we are telling them to prepare and feed their children is not balanced diet food and think only as Fafa and plumpynut is balanced diet food.”

– quote from a Health Worker in Milkayee kebele, Ethiopia

Provision of UPF contributed to an overall pattern of inadequate complementary feeding

practices that included both early and late initiation of complementary foods – at anything between 2 and 12 months of age. Early introductions were primarily driven by a perception of breastmilk inadequacy and requirements for mothers to engage in activities taking them away from their infants at early ages, such as income generation and domestic work. In contrast, late introduction of complementary foods was linked to an overreliance on breastmilk, as well as children's dislike or rejection of the first food(s) introduced.

“I spent [much time] outside petty trading. So, grandmother started [feeding the baby] at three months of age with milk and sugar.”

– quote from a mother in Hula Jeneta kebele, Ethiopia

Notable study limitations included the selection of only extremely poor households who are PSNP beneficiaries and the focus on a single region of Ethiopia relatively proximate to Somalia, where importing of UPF (particularly LNS) across the international border may have influenced the local availability of complementary foods.

Following this research, the authors called for properly designed nutrition education for caregivers, including fathers and grandmothers, to promote optimal complementary feeding practices and minimise the use of UPF. In parallel, intersectoral interventions should be considered to mitigate the impacts of price inflation on livelihoods and food security.

Preventing child wasting in Africa's drylands through a food systems lens

This is a summary of the following paper: *Fracassi P, Daget M, Seo S et al. (2023) Preventing Child Wasting in Africa's Dryland: An Exploratory Review of the Enabling Environment in 8 Sub-Saharan Countries Using a Food Systems Lens. Food and Nutrition Bulletin, 44, 2, S32–S44. <https://doi.org/10.1177/03795721231188767>*

In 2021, two events – the United Nations (UN) Food Systems Summit and the Tokyo Nutrition for Growth Summit – represented a decisive time for the alignment of food systems and nutrition. In a context of persistent child wasting, notably across the Sahel and Horn of Africa, the costed country operational roadmaps, developed in 22 countries as part of the joint UN Global Action Plan (GAP) on Child Wasting, recognised the importance of preventing child wasting using a multisectoral approach.

In this review, authors used a food systems lens to assess how current governance mechanisms, policies, and programming priorities in eight sub-Saharan countries were responsive to the food security and nutritional needs of the most vulnerable people. The eight countries – Burkina Faso, Ethiopia, Kenya, Niger, Nigeria, Mali, South Sudan, and Sudan – were selected because of their commitment to address child wasting using a systemic approach as part of the GAP.

Authors assessed the governance mechanisms through a review of joint annual assessments con-

ducted by the Scaling Up Nutrition movement; the policy frameworks through an analysis of recommendations included in operational roadmaps and findings from the review of national multisectoral nutrition plans; and programming priorities through the analysis of the typologies of costed interventions in the food and social protection systems.

Governance mechanisms: Most fragile and conflict-affected countries had platforms in place that were convened around emergency responses but lacked well-equipped mechanisms to build the humanitarian–development nexus and effectively coordinate preventive actions using a food systems lens. Overall, there was limited evidence that the most vulnerable communities were prioritised through assessments of their context-specific needs and responsive actions to address shortcomings of the food systems as well as environmental, livelihoods, and/or political/conflict drivers.

Policy frameworks: Most recent plans showed a shift in systems thinking by plac-

ing sustainable food systems at the core for supporting healthy diets and better nutrition. There was a high level of emphasis on nutritionally vulnerable individuals (young children, adolescents, and women during pregnancy and lactation). Few policy recommendations mentioned other categories of vulnerable individuals such as the poor, internally displaced people, refugees, and people with disabilities.

Programming priorities: In addition to wasting, countries considered factors such as food insecurity, poverty, and vulnerability as criteria for geographic prioritisation. Costed interventions included in the operational roadmaps were aligned with recommendations to orient food systems toward healthier diets. All countries prioritised and costed interventions on nutritious food value chains and social transfers (cash and in-kind). Most countries prioritised food safety, food fortification and biofortification, school food and nutrition, and social protection.

The review revealed common strengths in terms of existing multistakeholder governance mechanisms, opportunities for engaging key actors in the food systems, and existence of policy frameworks. It also revealed that context-specific risks and vulnerabilities linked to livelihoods, environment, and seasonality, as well as political/conflict drivers, could be better incorporated into how policies are enacted and programmes implemented.

Seasonality in the African drylands: 15 years of evidence

This is a summary of the following paper: *Venkat A, Marshak A, Young H et al. (2023) Seasonality of acute malnutrition in African drylands: Evidence from 15 years of SMART surveys. Food and Nutrition Bulletin, 44, 2, S94–S108. <https://journals.sagepub.com/doi/full/10.1177/03795721231178344>*

Seasonal peaks in wasting prevalence and incidence are important considerations for nutrition programming, including humanitarian food aid interventions. However, implementers often categorise (and approximate) such data into simplified binary categories such as preharvest/postharvest or dry/wet seasons, which presents limitations. This study uses 15 years of Standardised Monitoring and Assessment of Relief and Transition (SMART) survey data (2000–2015), from 412,370 observations across 19 African dryland countries, to model peaks of wasting prevalence more accurately in continuous time across the year.

A thorough data cleaning approach was taken to increase data accuracy and study validity, including removing internally displaced person or refugee camp settings (which may have artificially inflated measures), ensuring overlaps of geographic areas between surveys, and excluding likely erroneous anthropometric measures. This thorough data cleaning, as well as the detailed breakdown of the methods provided, increase our confidence in the study findings. A detailed breakdown of the methods used is beyond the scope of this summary but

can be found in the original paper.

There was a greater proportion of observations from Sudan (19.6%), South Sudan (17.8%), Nigeria (13.6%), and Chad (13.2%) compared to other countries, which should be considered when interpreting these findings. The authors also caution that the limitations of SMART survey methodology restrict this analysis to interpreting the variability of wasting patterns rather than the magnitude of wasting in these settings.

The findings indicate that there are 2 distinct peaks of wasting during the calendar year in the African drylands. Contrary to common opinion, the results suggest that a primary wasting peak is observed between April and May (in line with peak temperature) rather than the preharvest season in August to September. A secondary peak (September to October) then occurs in line with primary rainfall, Normalised Difference Vegetation Index (NDVI) (vegetation coverage), and a secondary temperature peak. However, less than

15% of SMART surveys were implemented in April to May – highlighting a significant data gap. The relative absence of data may reflect the bias that comes with aggregating data into broad seasons, which in turn can impact survey design and/or timing.

“Greater focus on the secondary wasting peak in September to October has led to a ‘blind spot’ for the primary peak of wasting in April to May, which should be the period of greatest concern”.

It should be noted that these findings are specific to the drylands in question. Indeed, the authors flag that wasting peaks are geographically specific and are impacted by a complex blend of human and environmental interactions – which in turn are becoming more variable with changing climates. Yet, more broadly, these results showcase the importance of analysing seasonality using the time of year as a continuous variable, rather than divided into discrete seasons, to capture the true annual variability of wasting. Qualitative data can also be used to increase data quality by illuminating how changing weather patterns affect food production systems, which in turn drive wasting.

¹ <https://gisgeography.com/ndvi-normalized-difference-vegetation-index/>

Unravelling community clustering in Chad

This is a summary of the following report: *Luc G, Keita M, Houssoubé F et al (2023) Community Clustering of Food Insecurity and Malnutrition Associated with Systemic Drivers in Chad. Food and Nutrition Bulletin, 44, 2, S69–S82. <https://journals.sagepub.com/doi/10.1177/03795721231189970>*

This study focuses on agropastoral communities in Chad's Sahelian belt experiencing prolonged hunger, high food insecurity, and wasting.

The researchers conducted this mixed method study to understand the spatial distribution of child wasting and household food insecurity and systemic drivers (including conflict, livelihoods, vegetation, and cultural norms), as well as to better understand the relationship between child wasting and household food insecurity, with the goal of improving linkages in programming and targeting. A cross-sectional randomised cluster survey was conducted in August and September 2021 in Kanem and Bahr-el-Ghazal regions across 86 villages, reaching 7,002 households and 6,136 children to collect data on child anthropometry, household food security, and livelihoods. These primary data were then triangulated with secondary geospatial data on the local vegetation index and conflicts, as well as with qualitative interviews with local actors. Analysis was conducted using comparison tests and linear and logistic crude and adjusted models, as well as looking at the design effect as a measure of clustering of outcomes at the community level.

Results at regional level showed that malnutrition was worse in Bahr-el-Ghazal, while food insecurity was worse in Kanem. The authors also found weak associations between food security and malnutrition indicators in both regions. Geospatial analysis showed the distribution of both child wasting and food insecurity were highly clustered, and that communities with a high prevalence of child wasting were not the same as those with the highest levels of food insecurity. Except for conflict and natural resources, which were associated with both outcomes, the origins of malnutrition and food security had generally different pathways. The drivers of food insecurity were linked with poverty and shocks (surface cultivated, sources of income, multidimensional poverty, conflict, and rainfall). The drivers of malnutrition were linked with greater livestock ownership at the community level and proximity to seasonal rivers, with no relationship to food insecurity. This could potentially indicate greater household use of non-potable water (given community preference and use of seasonal rivers) as well as increased sharing between animals and humans.

The authors note that, despite the clear clustering of the outcomes at the community level, few studies – particularly few quantitative studies – analyse food insecurity or malnutrition at the community level. Both study design and data collection tend to be focused on individual and household characteristics, potentially missing key community drivers but also more basic causes of these outcomes. The report argues that participatory processes that involve communities all along the project cycle are critical to making sure activities are context sensitive. Funding mechanisms should support sustainable and sequenced investments to respond to protracted crises. The authors conclude that community-level and systemic drivers require greater consideration from the start in research design and data collection. There is a need for better integrated humanitarian, development, and peace-building interventions to address the persistent high prevalence of food insecurity and child wasting.

“I go to sleep on an empty stomach”: Older people in humanitarian nutrition

This is a summary of the following report: *“I go to sleep on an empty stomach” (2024) HelpAge International. <https://www.helpage.org/resource/i-sleep-on-an-empty-stomach/>*

Older people are often overlooked in humanitarian responses, where the focus remains predominantly on infants, children, and maternal health. Due to factors such as disease susceptibility and changes in metabolism, older people are particularly vulnerable to malnutrition. This report consolidates a comprehensive review of 42 documents. Additional insight was then provided through interviews with 28 humanitarian actors and 10 older people from Ethiopia.

“Food remains the biggest challenge. It’s a constant reminder of how vulnerable we are in the face of circumstances beyond our control.”

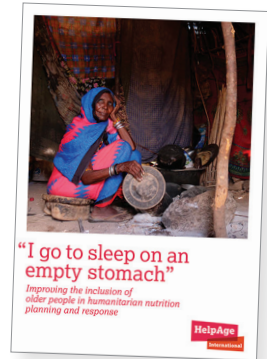
– Jirmo Toke, 81, Ethiopia

Although guidance on older people's inclusion exists, it is rarely applied. A lack of consensus on diagnostic criteria for malnutrition in older age remains a barrier. Despite heterogeneity, current evidence suggests that 23% of older people experience malnutrition globally – with this figure heavily influenced by independent living status and care practices. There is a paucity of evidence on malnutrition, in terms of both prevalence and risk, for this group in humanitarian settings.

“We share not only the pain of hunger but also the worry about where the next meal will come from.”

– Elema Boru, 75, Ethiopia

Older people have a variety of different needs, and treating them as a single group fails to account for the intersection of age, disability, ethnicity, sexual orientation, gender identity, economic activity, and health status. The evidence suggests that older women have poorer outcomes than men in disaster and conflict settings, with data from Ukraine highlighting that older women face greater barriers to accessing assistance than men. Lack of meaningful consultation with older people regarding their diverse needs during times of



humanitarian crisis planning and response is particularly problematic. A compounding difficulty is the limited understanding of the diverse nutritional needs over the life course, particularly in later life, among humanitarian and nutrition partners.

Another barrier to including older people in humanitarian nutrition is a lack of funding. This is true of the nutrition sector in general, but organisations report particular challenges when obtaining funding for this age group in emergency settings. This may be partially attributed to negative perceptions surrounding older people in humanitarian crises, where they are often labelled as dependent or economically inactive. Reframing these perceptions remains critical. In crises, older people can provide support and wisdom to their communities. Many are actively involved in disaster response and recovery, family care, and income generation – with many having experienced previous crises themselves.

“Life at this age is too difficult. No one helps me and my wife. I’m a pastoralist and I reared animals for a living. Those animals were my source of income, but due to the drought I lost all of my livestock.”

– Male, 98, Qabana’a Kebele

The full findings of the report are beyond the scope of this summary. We encourage readers to explore the 10 key recommendations found in the executive summary, with more detailed recommendations for nutrition cluster coordinators and members, national governments, and donors found in the body of the report. These point to the practical next steps to ensure the inclusion of older people in humanitarian nutrition responses.

Learning from the implementation of the Child Nutrition Program

This is a summary of the following paper: DeLacey E, Tann C, Smythe T et al (2022) *Learning from the Implementation of the Child Nutrition Program: A Mixed Methods Evaluation of Process*. *Children*, 9, 12, 1965. <https://doi.org/10.3390/children9121965>

Holt International launched the Child Nutrition Program (CNP) in 2012 to combat malnutrition risks in its global programmes. The programme operates in community-based settings, foster care systems, and health care and institutional based care facilities. It targets vulnerable children including orphans and abandoned children, many of whom have significant disabilities. The CNP aims to enhance nutrition and feeding practices for vulnerable children via training, resources, and support to caregivers and facilities, using a 'training of trainers' approach. This study retrospectively analyses CNP implementation in Mongolia and the Philippines, aiming to identify key learnings through a mixed methods evaluation.

The CNP spans 8 countries, with 68 sites serving over 7,500 children in total. Mongolia and the Philippines were selected for analysis due to a combination of logistics and data availability. The study utilised primary and secondary data. Participants were selected for

key informant interviews (KIIs) via purposive sampling (one per site and per country programme). Secondary data was collected during routine programme audits between 2016 and 2020 and included Knowledge Attitude and Practice Surveys (KAPS) and nutrition and feeding pre-/post-training tests completed by staff from all levels at CNP sites.

Analysis of nutrition and feeding tests in both Mongolia and the Philippines indicated statistically significant ($p < 0.0001$) improvement following training. While KAPS showed changes in desired practices after training, there were no statistically significant differences ($p = 0.67$) in post-training outcomes. Thematic analysis of KIIs highlighted the essential components for programme implementation and effectiveness, including strong leadership, buy-in, secure funding, reliable supply chains, training, and adequate staffing. Overall, findings supported the importance of ongoing support, frequent participatory training, and reinforcement for caregivers to achieve sustained behaviour change and desired outcomes.

This study contributes to the limited evidence on nutrition and feeding programme implementation. The study utilised a convenience sampling approach and remote interview format, both of which are efficient methods but may introduce bias. The principal investigator's involvement, though providing insight, could influence the findings. Analysis limitations include independent test samples and smaller sample sizes, both impacting the interpretation of the results. The routine nature and unknown validity of KAPS and pre-/post-training tests warrant further examination. The study did not involve other important stakeholders, such as children, caregivers, community members, families, or government partners in KIIs, presenting another key limitation.

Nevertheless, the CNP's implementation in Mongolia and the Philippines offers insight for comparable interventions in other settings, emphasising the importance of addressing barriers and fostering strong partnerships. Key factors for success include local government engagement, secure funding, adequate staffing, continuous training, robust support systems, and efficient supply chains. As malnutrition remains a significant challenge, the authors suggest programmes like the CNP should be prioritised. Using scaling frameworks in future research on CNP can increase understanding on how similar programmes can be scaled up globally to reach more vulnerable children.

Ghana: Sustained growth effects of early lipid-based nutrient supplements

This is a summary of the following paper: Bentil H, Adu-Afarwuah S, Prado E et al. (2023) *Sustained effects of small-quantity lipid-based nutrient supplements provided during the first 1000 days on child growth at 9–11 y in a randomized controlled trial in Ghana*. *The American Journal of Clinical Nutrition*, 119, 2, 425–432. <https://doi.org/10.1016/j.ajcnut.2023.10.033>

Nutritional supplementation during the first 1,000 days has proven effective in preventing child undernutrition. In 2009–2014, a trial in Ghana enrolled 1,320 pregnant women ≤ 20 weeks of gestation and randomly assigned them to three groups. The first group received Iron-folic acid (IFA) during pregnancy and a placebo at six months postpartum. The second, multiple micronutrient supplements (MMS) during pregnancy and six months postpartum. The third, small-quantity lipid-based nutrient supplements (SQ-LNS) during pregnancy and six months postpartum, with SQ-LNS for their children (aged from 6–18 months).

In this article, surviving children were followed up and re-enrolled from the original trial, at ages 9–11 years. This study analysed findings in two groups: SQ-LNS vs a control group (comprised of the original IFA and MMS groups). Height-for-age z-score (HAZ), systolic blood pressure (SBP), and diastolic blood pressure (DBP) were primarily assessed. Secondary outcomes included body mass index-

for-age z-score, mid-upper arm circumference (MUAC), triceps skinfold, waist-to-height ratio, blood pressure, and overweight, obesity, and stunting prevalence.

At follow-up, measurements were obtained from 966 children (331 SQ-LNS, 635 control). Baseline characteristics, except household asset score (higher in controls, $p = 0.02$), were similar. Mean HAZ did not differ significantly ($p = 0.06$) between SQ-LNS (-0.04 , $SD = 0.96$) and control groups (-0.16 , $SD = 0.99$). No group differences were found in other outcomes. Both groups approximated the WHO median for HAZ, with a 2% prevalence of stunted children. Overweight and obesity prevalence in the SQ-LNS group was 10.9% and 3.9%, respectively, with few having high blood pressure (0% systolic, 1% diastolic). There were near identical results in the controls.

However, the authors found an interaction of the intervention with child sex (p -interaction = 0.075) and maternal pre-pregnancy body mass index (BMI) (p -interaction =

0.007). In girls, the SQ-LNS group had a higher HAZ than controls (0.08 vs. -0.16 ; $P = 0.01$). There was no difference in boys. Among mothers with pre-pregnancy $BMI < 25$ kg/m², the SQ-LNS group had a higher HAZ (-0.04 vs. -0.29 ; $P = 0.004$). For $BMI \geq 25$ kg/m², no significant differences were observed.

The study's strengths were a randomised design and large sample size. Limitations arise from children lost to follow-up, whose mothers differed in parity – which may affect our interpretation. The study population (from a specific region in Ghana) also prevents us from extrapolating these findings. Nonetheless, the semi-urban areas observed encompass characteristics of both rural and urban settings – enhancing relevance to both contexts. Overall, the findings reveal that providing SQ-LNS during the 1,000-day window promotes long-term linear growth in girls and those with non-overweight/obese mothers. Further investigation is warranted to understand the differential response between girls and boys to SQ-LNS in terms of growth.

Comments from the editors

These are intriguing results showing increased linear growth in girls and children born to mothers with a lower pre-pregnancy BMI. This paper features an excellent original trial design and a rare opportunity to follow up longer-term linear growth (ages 9–11 years) for the children involved. At this stage, the mechanisms are unclear and warrant further investigation. Over time, as the evidence builds, we look forward to learning the public health significance of the effect sizes and their programming implications.

Donor aid: Does it target newborns and stillbirths proportionately?

This is a summary of the following paper: *Kumar M, Bath D, Binyaruka P et al. (2023) Donor aid mentioning newborns and stillbirths, 2002–19: An analysis of levels, trends, and equity. The Lancet Global Health, 11, 11, E1785–E1793. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(23\)00378-9/fulltext?dm_i=7MI4,15WX,D8T82,49OX,1#%20](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(23)00378-9/fulltext?dm_i=7MI4,15WX,D8T82,49OX,1#%20)*

Maternal and child mortality rates are reducing globally, yet neonatal mortality (deaths 0–28 days after birth) remains stagnant – making this a global aid priority. Maternal undernutrition is a key driver of neonatal mortality (Hunter et al., 2023). This paper used the Organisation for Economic Cooperation and Development (OECD)’s Creditor Reporting System database (2002–2019). The database showed how much money was flowing to recipients, defined here as ‘newborn or stillbirth-focused’ (20,673 records) or ‘including both newborns or stillbirths and other population groups’ (1,284 records). Key search terms were based on those used in a previous analysis for aid funding (Pitt et al., 2017), in seven languages.

“Stillbirths remain almost absent in reported aid and were not mentioned in any funding for the years 2002–2009. Over the 2010–19 period, only 46 records (USD 44.4 million) specifically mentioned stillbirths.”

Overall, 69% of aid mentioning stillbirths was stillbirth focused (USD 30.5 million), with the remainder (USD 13.9 million) mentioning stillbirths along with other population groups. The value of global aid mentioning stillbirths steadily increased from 2002 (USD 49 million) to 2017 (USD 1.8 billion), before fluctuating. From 2009 to 2019, aid mentioning stillbirths consistently represented 8–11% of aid for reproductive, maternal, newborn, and child health.

Overall, five donors disbursed 80% of aid mentioning newborns (USD 12.2 billion of 15.2 billion). Between 2002 and 2019, donors directed 40% of this aid (USD 6.1 billion of 15.2 billion) to reproductive health. The remaining USD 9.1 billion was directed to basic health care – of which basic nutrition comprised USD 1.1 billion (just 7% of 15.2 million).

The US and Canada contributed 50% of funding alone in the period 2011–2019. The Bill & Melinda Gates Foundation was the only private donor in the top 10 donors. There were six African and four Asian countries in the top 10 recipients list, which received 42% of total funding.

“In Angola, USD 18 was received per death, the lowest of all countries. In contrast to USD 1,183 per death in Haiti and USD 1,389 per death in Timor-Leste.”

There was substantial variation in aid between countries of similar health and economic needs – aid received was not always consistent with the burden of newborn and stillborn mortality.

“Nine of the least developed countries received less than \$100 per newborn death and stillbirth per year.”

We note that aid disbursements are self-reported variables by donors and that this dataset does not capture all donors. Notably, China and Brazil are absent from this listing, which limits our interpretation. As there were many records requiring review and/or elimination by a researcher (3,773,701 initially identified), the incidence of human error is also a consideration in regard to this study. Nevertheless, these findings show that aid mentioning newborns (10% of reproductive, maternal, newborn, and child health overall) is not proportionate to their mortality contribution: neonatal mortality represents 50% of mortality in children aged under five years.

References

- Hunter P, Awoyemi T, Ayede A et al. (2023) Biological and pathological mechanisms leading to the birth of a small vulnerable newborn. *The Lancet*, 401, 10389, 1720–1732.
- Pitt C, Grollman C, Martinez-Alvarez M et al. (2017) Countdown to 2015: An analysis of donor funding for prenatal and neonatal health, 2003–2013. *BMJ Global Health*, 2, 2.

Resources: Ages and stages reference package

This is a summary of the following resource: *Supporting integrated infant and young child nutrition and early childhood development programming: Ages and stages reference package and resource collection (2024).*

<https://www.advancingnutrition.org/resources/ages-and-stages-collection>



Increasingly, evidence shows that integrating nutrition and caregiving interventions improves childhood development outcomes more than standalone practices. To support programme managers to implement more holistic care, USAID Advancing Nutrition’s ‘Ages and Stages Reference Package’ was created to support the health of children aged 0–2 years.

There are four age-specific modules that users can explore, aligning to each age/stage group: ages 0–6 months, 6–9 months, 9–12 months, and 12–24 months. The modules provide information on how children grow and develop, their feeding and care needs at each stage, and challenges to optimal care. At the time of publication, there are 56 resources available within the 0–6 months age group, including technical reports, guidelines, and education materials. There are 54 resources available in each of the 6–9 months, 9–12 months, and 12–24 months groups.

Resources can also be searched through cross-cutting themes (breastfeeding, complementary feeding, monitoring and evaluation, nurturing care, social and behaviour change, and support to caregivers), improving accessibility. In addition to the online resources, the full package is available in a downloadable format to support users in areas of low connectivity. The package is also available in both English and French¹.

We know that children grow best in an environment with nurturing care, which includes safe and secure surroundings, responsive caregiving, adequate maternal and child health care and nutrition, and opportunities for stimulation and early learning.

Global research shows that integrated approaches that provide more holistic care, such as combining nutrition and responsive care and early learning interventions, result in better outcomes for children.

¹ <https://www.advancingnutrition.org/fr/resources/ages-and-stages-collection>

Nutritional care for children with feeding difficulties and disabilities

This is a summary of the following paper: Klein A, Uyehara M, Cunningham A et al. (2023) *Nutritional care for children with feeding difficulties and disabilities: A scoping review*. PLOS global public health, 3, 3, e0001130. <https://doi.org/10.1371/journal.pgph.0001130>

Malnutrition can cause disability in the short and long term, while disability can also lead to malnutrition. Children with disabilities are three times more likely to be underweight and twice as likely to be stunted or wasted than non-disabled children. Feeding difficulties are over twice as frequent in children with disabilities, compared to children without disabilities, and 80% of the one billion people with a disability live in low- and middle-income countries. These numbers demonstrate the importance of providing adequate nutritional care and support for children with feeding difficulties and disabilities. However, there are no global reviews of systems, initiatives, and programmes for improving nutritional care for these children. To address this gap, the authors conducted a non-systematic scoping review of programmes and evidence focused on supporting the nutritional care of children with feeding difficulties, related to disability or not.

In total, 127 documents, peer-reviewed or not, published between 2003 to 2022 and iden-

tified through keyword searches and snowballing, were reviewed. Interviews were conducted with 42 key informant experts in nutrition and disability. Detailed document review and interview notes were organised into two structured matrices based on challenges and opportunities. The universal progressive model of care framework for services, outlined in the Nurturing Care Framework (WHO et al., 2018), was then used to analyse the findings. In addition, authors also specifically considered the enabling environment in communities and families for accessing and benefiting from services.

The review found insufficient policies, programmes, and evidence to support children with feeding difficulties and disabilities and their families. While some resources and promising approaches exist, they are not standardised or universally used, staff are not trained to use them, and there is insufficient funding to implement them.

Additionally, their families face challenges providing the care they need, including coping

with high care demands, accessing support, obtaining appropriate foods, and managing stigma. This review also revealed challenges related to knowledge, attitudes, and practices of health workers toward children with disabilities, in general, and to addressing feeding difficulties more specifically.

Addressing these needs requires systems strengthening and quality improvement at all levels of service and – more holistically – including children with disabilities in nutrition services, programmes, and policies to help them thrive. Specific interventions needed include capacity strengthening and addressing misperceptions and biases among health workers and revising relevant nutrition and health guidelines and care protocols to include appropriate guidance and support for children with feeding difficulties.

“The combination of challenges in identifying feeding difficulties, a lack of understanding of the link between disabilities and feeding, and weak or non-existent referral pathways or specialised services puts these children at risk of malnutrition.”

References

WHO, UNICEF, World Bank (2018) Nurturing care for early childhood development a framework for helping children survive and thrive to transform health and human potential. Geneva: World Health Organization.

Treating growth faltering in infants under six months: Critical research gaps

This is a summary of the following paper: Tomori C, O'Connor DL, Ververs M et al (2024) *Critical research gaps in treating growth faltering in infants under 6 months: A systematic review and meta-analysis*. PLOS Global Public Health, 4, 1, e0001860. <https://doi.org/10.1371/journal.pgph.0001860>

Growth faltering, or a slower gain in weight, length, or head circumference than expected for a child's age and sex, increases the risk of mortality and morbidity. For many children, growth faltering is present at birth or develops within the first 6 months of life. Evidence is lacking on effective growth interventions for infants aged under 6 months (u6m).

This systematic review and meta-analysis was commissioned by the World Health Organization (WHO) to identify and evaluate interventions that included provision of supplemental milks to address growth faltering among infants u6m. The review was conducted according to the US National Academies of Sciences, Engineering, and Medicine guidelines. Of 7,390 deduplicated articles identified, 227 full texts were assessed for eligibility. Two randomised controlled trials were included, of which only 1 was published in a peer-reviewed journal.

The first study was a three-armed randomised controlled trial conducted in Bangladesh (2012–2015) in the context of infant reha-

bilitation from severe wasting. A total of 153 infants u6m admitted with diarrheal illness and weight-for-length z-score (WLZ) <-3 and/or bipedal oedema were provided with F-100, diluted F-100 (DF-100), or standard infant formula after stabilisation. While breastfeeding mothers were encouraged to continue, only about half of infants were breastfed upon trial entry and only a small proportion of their feeds were from breastmilk. Infants were offered water in between feeds, which runs counter to the WHO guidelines. Infants were discharged when they gained 15% of their weight or had oedema-free WLZ ≥-2.

The second study compared DF-100 and standard infant formula provided to infants u6m in the Democratic Republic of Congo (DRC) (2007–2008). Infants were included in the study if they were free of oedema and their mother reported breastfeeding failure or their child's lack of weight gain at home. All infants were either being breastfed or their mothers were receiving re-lactation support. Supplementation was halved when infants were gaining 20 g/day and stopped when infants maintained a weight gain of 10g/day for

3 consecutive days. Infants were discharged when they maintained weight gain for 3–5 days.

The Bangladesh study showed significantly higher rates of weight gain in infants receiving F-100 (mean difference 4.6 g/kg/day; p=0.004) and DF-100 (mean difference 3.1 g/kg/day; p=0.015) than those receiving infant formula. In the DRC trial, no difference in weight gain was observed for infants receiving F-100 compared to infant formula within a broader context of lactation support. The meta-analysis also showed no difference in weight gain between infants receiving DF-100 and infant formula.

The main limitation of this review was the dearth of high-quality evidence on interventions for nutritional management of infants u6m with growth faltering. The 2 included studies differed in their inclusion criteria and methods, had few shared outcomes, small sample sizes, and high attrition rates, thus limiting comparability between studies and the generalisability of study findings. Both interventions focused on providing supplemental milk, with no or limited support for breastfeeding or re-lactation – a misalignment with WHO guidance for exclusive breastfeeding to six months.

The authors recommend a paradigm shift to reorient research around supporting and restoring breastfeeding, rather than on supplementation. They propose a new framework to guide future research to inform development of an evidence-based decision tree to ascertain if, when, and for how long a malnourished child should receive supplemental milk and, if so, what form this should take.

The case for a Global South-centred model in global health

This is a summary of the following paper: *Rasheed MA (2023) The case for a Global South centred model in global health. BMJ, 383, 2256. <https://pubmed.ncbi.nlm.nih.gov/37844937/>*

There has been substantial emphasis on the need to decolonise global health in recent years, with an aim to confront and dismantle historic and systemic power imbalances and achieve more equitable and inclusive solutions. In this article, Muneera Rash-eed, a researcher in early childhood development from Pakistan, discusses why current approaches to decolonisation may be counterproductive. She makes the case for a new model that centres the Global South as primary actor and leader.

To date, efforts spearheaded by those in the Global North to decolonise global health have focused on granting access to decision makers and ensuring equity in research authorship and funding within existing systems. While their intentions are well meaning, these approaches position the health community in the Global South as collaborators, rather than as independent actors with the right to shape their own systems. Instead, centring the Global South in the primary role would ensure that their voices and

perspectives shape actions better suited to their own contexts.

Muneera recognises that achieving a Global South-centred model in global health will require a shift in mindset and a commitment to partnerships that align with a vision for change. This change should be value based and strive for more equitable health outcomes, rather than perpetuating a charity-based model that positions the Global South as a site for data collection in exchange for funding. Muneera calls for colleagues in the Global North to recognise the work being done in Pakistan, and beyond, as critical to decolonisation and to learn from it. She also calls on her colleagues in the Global South to take back their power, to learn from each other, and to realise this model for change.

School-age children and adolescent nutrition status in South Asia: A scoping review

This is a summary of the following paper: *Choedon T, Brennan E, Joe W et al (2023) Nutritional status of school-age children 5–19 years in South Asia: A scoping review. Maternal & Child Nutrition, e13607. <https://doi.org/10.1111/mcn.13607>*

Limited data on malnutrition in South Asian school-age children hampers effective nutrition policies, programmes, and research. A scoping review of 295 studies (January 2016 to November 2022) synthesises evidence on undernutrition, overweight/obesity, and micronutrient deficiencies. Of these, 54% were from India, 12% from Pakistan, 12% from Bangladesh, 11% from Nepal, and 7% from Sri Lanka.

The evidence highlights a triple burden of malnutrition among South Asian children and adolescents with widespread but varied rates. This underscores the need for targeted policies in the region. Identified interventions like education, fortification, supplementation, and school feeding programmes show potential, but more research is needed for effective strategies that address the rising burden of overnutrition. Greater standardisation of anthropometric indicators and more regular monitoring is needed, with further research required to inform the scalability and sustainability of small-scale interventions.

The study's strengths include a comprehensive literature search. Limitations include the absence of qualitative analysis and potential data gaps (especially in Bhutan, the Maldives, and Afghanistan). A lack of micronutrient deficiency data, irregular national nutrition surveys, and insufficient large-scale intervention studies was present.

Stunting

Prevalence varied from 3.7% (Sri Lanka) to 71.7% (Pakistan) across 64 studies. Factors influencing stunting included household wealth, social affiliations, maternal education, adolescent nutrition

awareness, paternal occupation, rural residence, safe drinking water access, and physical inactivity. Overall, 4 stunting interventions were identified, with 3 Indian studies showing mixed impacts and a Nepali school garden programme showing no impact on stunting but positively influencing nutrition knowledge and practices.

Wasting

Prevalence ranged from 3.0% to 48.0% across Bangladesh, India, Pakistan, and Sri Lanka across 9 studies. Sex differences in wasting prevalence were noted, with a higher prevalence among girls in 6 studies.

Underweight and thinness

Across all studies, the prevalence of thinness ranged from 1.9% (Pakistan) to 88.8% (India), while the prevalence of underweight ranged from 9.5% (Bangladesh) to 84.4% (India). However, studies used different cut-offs and indicators, making comparing contexts difficult. Family size, household income, parents' education, socioeconomic factors, low dietary diversity, water sanitation and hygiene practices, physical inactivity, and a history of illness were reported as predictors of thinness. Interventions in India and Nepal, including a school meals programme and multi-component interventions, showed mixed impacts on thinness.

Overweight and obesity

Among South Asian girls aged 15–19, overweight prevalence ranged from 2.9% (Nepal) to 21.0% (Pakistan), with obesity from 0.4% (Nepal) to 5.2% (Sri Lanka). Rural areas generally show lower rates and girls were more likely to have a higher body mass index. Socioeconomic

factors, dietary habits, and physical activity influence prevalence. School-based interventions in India had varied impacts.

Micronutrient deficiencies

Prevalence varies for anaemia (31.3%–60.0%), iron deficiency (7.1%–30.0%), iodine deficiency (6.3%–31.8%) and vitamin D deficiency (8.4%–93.0%). Overall, 18 interventions targeted micronutrient deficiencies, with positive impacts reported in some studies.

Dietary patterns and quality

Low dietary diversity, cereal-based diets, and inadequate fruit and vegetable consumption are prevalent. Socioeconomic status influences diet quality. Fast food and soft drink consumption was common, and adolescent hunger was reported in 4 studies. An intervention in Nepal showed positive changes in dietary habits.



Adolescents eating lunch at their school. Nepal



WHO guideline for complementary feeding of infants and young children 6–23 months of age

This is a summary of the following report: WHO (2023) WHO Guideline for complementary feeding of infants and young children 6–23 months of age.

<https://www.who.int/publications/i/item/9789240081864>

The World Health Organization (WHO) has recently released a comprehensive guideline for the complementary feeding of infants and young children aged 6–23 months. Acknowledging the importance of appropriate complementary feeding in the early stages of life, this guideline provides 7 evidence-based recommendations to optimise the nutrition and health of this critical age group, whether they are breastfed or not.

First, the guideline stresses the importance of initiating complementary feeding for infants aged 6 months while continuing breastfeeding for up to 2 years or beyond. To achieve this, all breastfeeding women will require an enabling and supportive environment.

“Exclusive breastfeeding for the first 6 months remains a crucial recommendation.”

Second, it recommends that, for infants aged 6–11 months who are fed milks other than breastmilk, either milk formula or animal milk is appropriate. For young children aged 12–23 months, animal milk should be used and follow-up formulas are not recommended.

Third, the appropriate age for introduction of complementary foods is six months, while continuing to breastfeed, and mothers who are concerned about the adequacy of breast milk alone could benefit from lactation support.

Fourth, daily consumption of animal-source foods – meat, fish, or eggs – is recommended. Moreover, when animal-source foods were excluded from infant and young child diets for children aged six to eight months, nutrient needs in terms of iron, zinc, and vitamin B12 could not be met. Additionally, fruits and vegetables should be included in the daily diet. Frequent consumption of pulses, nuts, and seeds is also encouraged, especially where meat, fish, eggs, and vegetables are limited. The guideline underscores the importance of nutrient-dense foods over less nutritious starchy staple foods. Diversification of the diet is a key aspect of feeding to meet the nutritional needs of the growing child.

Fifth, infants and young children should avoid unhealthy foods and beverages high in sugar, salt, trans fats, and non-sugar sweeteners, including sugar-sweetened beverages. Fruit juices should also be limited. Broad policy actions – including in regard to agriculture, front-of-package

labelling, and marketing practices – are essential, and caregivers require counselling on the harms of unhealthy foods and beverages.

Sixth, in contexts where diverse, nutrient-rich complementary foods are not accessible, nutrient supplements and fortified food products can address gaps in children’s nutrition. Multiple micronutrient powders, fortification of commercial cereals, and small-quantity lipid-based nutrient supplements are options, with guidance emphasising their supplementary nature – i.e., these products are not substitutes for a diverse, minimally processed diet. The guideline holds back from recommending fortified milk.

Seventh, the role of responsive feeding, through recognising and responding to the child’s hunger and feeding cues, is critical. This approach fosters a positive feeding environment, encouraging healthy eating habits, preventing overfeeding or underfeeding, and supporting cognitive, emotional, and social development.

To support the implementation of this guideline, WHO emphasises the need for education and awareness programmes targeting caregivers, healthcare professionals, and communities. Nevertheless, more studies with consistent research protocols across diverse regions and populations are needed. Most topics examined lacked robust, randomized controlled trials.

This guideline contributes to the global effort to improve child nutrition and support healthy growth and development. The guideline’s practical recommendations and adaptability to various contexts make it a valuable tool for healthcare providers, policymakers, and caregivers worldwide.

Climate action and nutrition: Pathways to impact

This is a summary of the following paper: FAO (2023) Climate action and nutrition – Pathways to impact. <https://doi.org/10.4060/cc8415en>

Malnutrition and climate change are both pressing global issues, needing comprehensive interventions to address their multifaceted impacts on health, economies, and the environment. Malnutrition and climate change are interconnected due to the interdependence of climate, ecosystems, biodiversity, and human societies. Populations most vulnerable to malnutrition are also those most at risk from the negative effects of climate change. Addressing both through integrated action offers a singular solution to significant sustainable development obstacles.

“The impact of malnutrition in all its forms on the global economy is an estimated USD 3.5 trillion each year, and climate change is predicted to cost USD 178 trillion by 2070”

This paper focuses on the 4 core systems supporting the interconnection of climate and nutrition: agrifood, water, social protection, and health. Integrated action within these systems can positively impact various national priorities simulta-

neously, including climate change, nutrition, and sustainable development. For each system, the report describes the system’s importance in regard to good nutrition and summarises the evidence of the system’s interaction with climate change. The report then proposes integrated actions and highlights corresponding potential nutrition-relevant and climate-relevant outcomes alongside their key enablers. Text is supported by useful tables and diagrams illustrating the interlinkages.

Proposed integrated actions within agrifood systems include diversifying production, sustainable soil management, reducing food waste and loss, enabling local markets, practicing sustainable procurement, aligning policies for biodiversity–climate–water–nutrition benefits, and implementing dietary guidelines considering sustainability, with a focus on reducing gender inequalities.

For water systems, proposed integrated actions include holistic governance, stakeholder engagement, technology integration, reduced water consumption, updated water, sanitation, and hygiene policies addressing climate change, and gender-responsive water, sanitation, and hygiene.

Social protection systems need inclusive climate adaptation, which supports livelihoods, disaster strategies integrating food needs, and gender-transformative approaches.

Integrated actions within health systems include increased data availability and use, nutrition integration, reduced environmental impact, One Health approaches, gender mainstreaming in health systems’ climate response, and strengthened early warning systems.

For all systems, gaps remain in our understanding of key influencers and enablers within pathways of integrated action to impact. The report calls for the development of a comprehensive and strategic research agenda to address this. It also highlights the underlying need for peace and stability, given that conflict, civil unrest, and displacement increase vulnerability to malnutrition and exacerbate the negative impacts of climate change.

In conclusion, the report underscores the urgency of integrated action to address climate change and malnutrition. Through detailed response options and pathways, it advocates for more collaborative efforts, increased evidence, and a focus on sustainable development. Integrated policies and action are positioned as the key to achieving progress across diverse global priorities, stressing the interconnectedness of climate and nutrition in the pursuit of a healthier, more resilient world. The Initiative on Climate Action and Nutrition (I-CAN) launched in 2022 at COP27 is highlighted as a crucial global multisectoral multistakeholder collaboration to drive forward transformative action.

ENN CEO: Nigel Tricks

ENN Directors: Marie McGrath, Tanya Khara

Operations Team Support:

Emily Cracknell, Hannah Fletcher, Holly Ruffhead, Laura Delfino, Nicola Johnstone

Design: Orna O'Reilly

Big Cheese Design.com

Website: Oxford Web Applications

Contributors for this issue:

Abigail Conrad
Abdal Monium Osman
Abukar Nur
Afaf Rahim
Alessandro Iellamo
Alice Costa
Alyssa Klein
Amelia Giancarlo
Anastasia Marshak
Angelina Virchenko
Arina de Fatima Momade
Astrid Klomp
Aunchalee Palmquist
Baguinébié Bazongo
Barbara Baille
Bindi Borg
Brahima Diarra
Catharine Fleming
Chris Vogliano
Clara Hare-Grogg
Claudia Okley
Cristina Alvarez
Daniel Molla
Dunja Dujanovic
Emily Keats
Gwenaelle Luc
Hans Mosler
Heather Ohly
Hillary Fry
Jen Burns
John Brogan
Julie Smith
Jurgita Slekiene
Kate Price
Kavita Sethuraman
Kimberly Rambaud
Lamis Jomaa
Leah Richardson
Lisa Sherburne
Modibo Keita
Natasha Lelijveld
Nicolas Morand
Pamela Ncube-Murakwani
Roger Mathisen
Sanne Singh
Shaneka Thurman
Silvia Alayon
Thomas Stubbs
Tiphaine Seyvet
Tuan Nguyen
Yannick Ngongang Mbanung

Cover

A herder community in rural Somalia. Somalia, 2023. ©FAO.

About ENN

Emergency Nutrition Network (ENN) is a UK registered charity that strives to enhance the effectiveness of nutrition policy and programming by improving knowledge, stimulating learning and building evidence. We are passionate about being field-driven and are globally recognised as thought leaders and conveners in nutrition.

ENN is based in the UK but works globally and is made up of a team of technical experts in nutrition with decades of collective experience in the field. We work alongside governments, the United Nations, non-governmental organisations or charities, and research institutions worldwide to look critically at existing practices, raise awareness of issues and drive change so that those working to tackle malnutrition can do the best possible job. We do this by:

1. Capturing what works and what is needed to reduce malnutrition – working with people implementing programmes to help them examine their experiences and document their achievements and challenges.
2. Coordinating technical bodies to increase the global understanding of malnutrition – particularly focusing on the most nutritionally vulnerable including infants and children, adolescent girls and mothers who are pregnant or are feeding their infants.
3. Supporting global efforts to reduce malnutrition – bringing our knowledge and technical expertise to strengthen the activities of organisations working to reduce malnutrition at the global level.

Field Exchange Team



Anne Bush
Editor



Nicki Connell
Editor



Philip James
Editor



Gwénola Desplats
Guest Editor



Thomas Stubbs
Content Coordinator



Natalie Sessions
Sub-Editor



Stephanie Wrottesley
Sub-Editor



Amir Samnani
Sub-Editor



Orna O'Reilly
Design and Production

Supported by:



The views expressed in Field Exchange are those of our authors as individuals and our Editorial Team. They do not necessarily represent the views of these stated donors or organisations featured in the issue, unless otherwise stated.

The Emergency Nutrition Network (ENN) is a registered charity in the UK (charity registration no: 1115156) and a company limited by guarantee and not having a share capital in the UK (company registration no: 4889844). Registered address: 2nd Floor, Marlborough House, 69 High Street, Kidlington, Oxfordshire, OX5 2DN, UK. ENN Directors/ Trustees: Graham MacKay, Marie McGrath, Jane Cocking, Harish Jani, Megan Howe, Patrick Webb, Carol Morgan, and Sophie Healy-Thow.



@theennonline



@theennonline



ENN Online



ENN (Emergency Nutrition Network)



ENN

2nd Floor, Marlborough House, 69 High Street,
Kidlington, Oxfordshire, OX5 2DN, UK

Tel: +44 (0)1 865 372340
Email: office@enonline.net

www.enonline.net

