

Maternal and Child Undernutrition Progress 2



Mobilising evidence, data, and resources to achieve global maternal and child undernutrition targets and the Sustainable Development Goals: an agenda for action

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As the world counts down to the 2025 World Health Assembly nutrition targets and the 2030 Sustainable Development Goals, millions of women, children, and adolescents worldwide remain undernourished (underweight, stunted, and deficient in micronutrients), despite evidence on effective interventions and increasing political commitment to, and financial investment in, nutrition. The COVID-19 pandemic has crippled health systems, exacerbated household food insecurity, and reversed economic growth, which together could set back improvements in undernutrition across low-income and middle-income countries. This paper highlights how the evidence base for nutrition, health, food systems, social protection, and water, sanitation, and hygiene interventions has evolved since the 2013 *Lancet* Series on maternal and child nutrition and identifies the priority actions needed to regain and accelerate progress within the next decade. Policies and interventions targeting the first 1000 days of life, including some newly identified since 2013, require renewed commitment, implementation research, and increased funding from both domestic and global actors. A new body of evidence from national and state-level success stories in stunting reduction reinforces the crucial importance of multisectoral actions to address the underlying determinants of undernutrition and identifies key features of enabling political environments. To support these actions, well-resourced nutrition data and information systems are essential. The paper concludes with a call to action for the 2021 Nutrition for Growth Summit to unite global and national nutrition stakeholders around common priorities to tackle a large, unfinished undernutrition agenda—now amplified by the COVID-19 crisis.

Introduction

Paper 1 of this two-part Series shows that, prior to the COVID-19 crisis, rates of maternal and child undernutrition in low-income and middle-income countries (LMICs) were declining, albeit slowly. Since 2010, 61 countries and four Indian states have joined the Scaling Up Nutrition (SUN) movement, and together with countries not in SUN, committed to new multi-sectoral strategies.¹ Nevertheless, as of 2019, only 106 of 194 countries were on track to reach at least one of nine World Health Assembly (WHA) nutrition targets.²

Long before the COVID-19 pandemic, the global nutrition community considered 2020 a pivotal year, marking 5 years until the WHA targets endline and a decade remaining to reach the Sustainable Development Goals (SDGs). At the 2013 Nutrition for Growth (N4G) Summit, donors and civil society actors made broad policy, programme delivery, impact and investment commitments, including mobilising \$4 billion for nutrition-specific and \$19 billion for nutrition-sensitive interventions by 2020. These commitments have been difficult to track; available evidence suggests mixed fulfillment.²

The themes of the follow-up N4G summit, which has been rescheduled from 2020 to 2021, are quite pertinent to the COVID-19 crisis: (1) nutrition within universal

health coverage (UHC); (2) climate-smart food systems for healthy diets and livelihoods; (3) nutrition in fragile states; (4) data-driven accountability; and (5) new investment and innovation in nutrition financing.³ In people infected with SARS-CoV-2, risks of complications and mortality are higher for those with malnutrition and diet-related non-communicable diseases than in individuals without these health problems.⁴ At the population level, unprecedented disruptions to global health, economic, and food systems have contributed to declining coverage of routine health services, sharp increases in household food insecurity, and anticipated setbacks to global nutrition targets.^{5,6} Furthermore, the pandemic has underscored gaps in timely information for decision making and, as economies falter, the need for new nutrition investment strategies.⁷

To support the global nutrition community, particularly those shaping N4G 2021 commitments, we first take stock of what we have learned since the 2013 *Lancet* Series on maternal and child nutrition about addressing undernutrition through health, food systems, social protection, and water, sanitation, and hygiene (WASH) interventions. For discussions specific to fragile states, we refer readers to recent publications from the BRANCH consortium.⁸ We then review the evolving nutrition data landscape and, finally, take stock of resource commitments needed to recoup and extend progress towards undernutrition goals.

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This is the second in a Series of two papers about progress in maternal and child undernutrition

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Key messages

- The evidence base for direct and indirect health, agriculture and food systems, social protection, and water, sanitation, and hygiene (WASH) interventions to reduce undernutrition has grown substantially since the 2013 *Lancet* Series on maternal and child nutrition. However, information about the costs and cost-effectiveness of interventions delivered across sectors has not kept pace and remains a barrier to effective planning by governments.
- The available evidence reaffirms key priorities for undernutrition, including an emphasis on the first 1000 days (early pregnancy up until the first 2 years of child life). Interventions and actions targeting this age window require renewed commitment, new insights from implementation research, and fast-tracked funding to increase coverage and improve quality of service delivery.
- Several direct nutrition interventions are ready for scaling up in health systems and others appear promising; these policies should be considered for inclusion in national plans. Greater specificity about what direct and indirect actions health, agriculture and food systems, education, WASH, social protection, and other sectors should prioritise, in different contexts, is needed.
- A new body of evidence from in-depth analyses of successful stunting reduction at the national or subnational level reaffirms the need for a range of sectoral actions, especially those that address the underlying determinants of undernutrition, and the need to foster enabling environments.
- Nutrition data and accountability have improved since 2013, but more action is needed to ensure that global goals and commitments can be tracked and, more importantly, that national and subnational actions across sectors are tailored to each specific context and reach the most vulnerable groups.
- A 2017 global Investment Framework for Nutrition estimated that, on average, an additional US\$7 billion per year is required to reach global maternal and child undernutrition targets—a cost that will increase given setbacks due to COVID-19. Donors increased spending on priority interventions between 2015 and 2017, but more funds are still needed. Data on domestic spending for nutrition show a decline for many countries during the same period.
- There is no time to lose. For both the pandemic response and the rapidly approaching global target deadlines, nutrition actors at global and national levels must respond to the call to action to bring together resources, leadership, and coordination, along with data and evidence, to address the large remaining burden of undernutrition worldwide.

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Updating the evidence on what works Nutrition in health systems

The 2013 *Lancet* Series on maternal and child nutrition prioritised ten interventions that, if scaled to 90% coverage in 34 high-burden countries, could potentially reduce child mortality by 15% and stunting by about 20%.⁹ Nine of the ten interventions are usually delivered through health systems. Recent systematic reviews and meta-analyses go beyond the 2013 focus on interventions during the first 1000 days of life.^{10,11} In particular, the evidence base has grown for multiple micronutrients during pregnancy and lipid-based nutrient supplements for children. WHO has updated or newly issued several nutrition-related recommendations and guidelines including guidelines for antenatal care (appendix pp 1–2). Evidence is also increasing for the interplay between infection, inflammation, and nutrition, emphasising the importance of coupling health and nutrition interventions.¹²

See Online for appendix

For nutrition in health systems, the pressing issue remains how to deliver at scale what we know works—a question that demands more investment in implementation research.^{13,14} Sparse data suggest only modest coverage gains during the past decade for both nutrition interventions and their associated health services^{15,16} (figure 1). The low coverage of maternal iron folic acid (IFA) and zinc for childhood diarrhoea in many LMICs are indicative of system-wide supply and demand issues that will impede scale-up of new interventions such as maternal multiple micronutrient supplementation. Furthermore, intervention coverage is not equitable; coverage in specific regions and population subgroups falls far below national estimates.¹⁶ Addressing system-wide challenges to equitable delivery is a priority of the universal health coverage movement. However universal health coverage progress monitoring frameworks and indices do not yet include maternal child nutrition services.¹⁷

In panel 1, we gather evidence on the implementation of nutrition interventions predominantly delivered by the health sector and in the table we summarise their readiness to scale from a global perspective. Readiness to scale was rated using six factors: (1) evidence of effectiveness across multiple geographical regions; (2) availability of WHO guideline or recommendation; (3) established or potentially effective delivery platforms that equitably reach target populations; (4) product specifications and global supply chain identified (as relevant); (5) delivery cost available to inform budgeting; and (6) indicators defined and data available to track progress.¹⁵ Our focus is on undernutrition, but so-called double duty actions such as breastfeeding promotion can address both undernutrition, and overweight and obesity.⁶⁸

Delivery platforms that extend the reach of health systems

Community-based delivery channels are used to extend the reach, intensity, and effects of nutrition interventions, particularly nutrition education and counselling.⁹¹ Evidence from pooled analyses suggests that home visits between trained community health workers or peer counsellors and mothers improves infant and young child feeding practices. Combining home visits and mother peer groups is an even more effective approach.⁹² Community health workers can also deliver psychosocial interventions for perinatal depression, a common underlying cause of undernutrition that often goes unaddressed in low-resource settings.⁹³

Mass media and mobile technologies can be powerful tools for scaling nutrition messages by directly reaching target audiences and supporting front-line workers. Combined exposure to consistent messages through mass media, interpersonal counselling, and community engagement can improve feeding practices.^{94–96} Opposing messages, however, can also spread; numerous studies report promotion of unhealthy foods and breastmilk

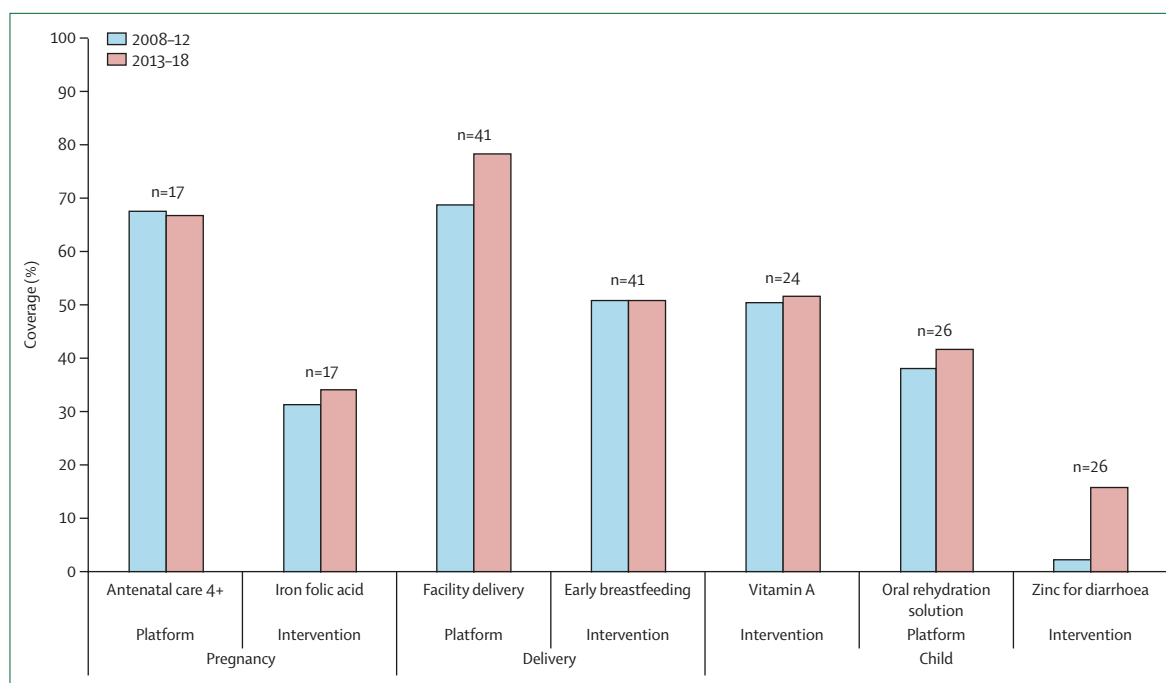


Figure 1: Pooled estimates of coverage for health services and associated nutrition interventions in low-income and middle-income countries with at least one DHS or MICS in 2008–12 and 2013–18

n is the number of countries with data contributing to the estimates. Estimates are not weighted by country population. DHS=Demographic and Health Survey. MICS=Multiple Indicator Cluster Survey. Antenatal care 4+=women received four or more antenatal care visits in most recent pregnancy in previous 3 years (DHS). Iron folic acid=consumed at least 90 iron folic acid tablets in most recent pregnancy in previous 3 years (DHS). Facility delivery=most recent birth in public or private facility in previous 2 years (MICS) or 5 years (DHS). Early breastfeeding=initiation of breastfeeding within 1 h of delivery. Vitamin A=children aged 6–59 months received vitamin A dose in the past 6 months. Oral rehydration solution or zinc tablets for diarrhoea=treatment given in past 2 weeks.

substitutes via television and social media, even where prohibited by law (eg, in Cambodia).^{96–98} Diverse mobile applications provide users with tailored nutrition advice or serve as job aids for front-line workers.^{99,100} Evaluations of mHealth applications confirm acceptance by front-line workers and association with increased target group contacts.¹⁰¹ Evaluations also identify challenges to scaling up technology that requires regular updates, refresher trainings, network maintenance, data quality control, and use of information.^{102,103} A community health worker mHealth application rigorously tested in two Indian states (Bihar and Madhya Pradesh) has recently been scaled up nationally and is being evaluated.^{103–105}

Almost 180 countries worldwide implement some form of national growth monitoring programme.¹⁰⁶ There is perceived value of the platform for community-level intervention delivery and data collection, but little evidence of impact on child nutrition outcomes.^{47,106,107} Critiques of growth monitoring programmes include absence of focus on counselling, poor quality implementation, and insufficient use of collected information for decision making.^{106,108} A recent expert consultation called for a rethink on how such programmes are designed and delivered.¹⁰⁶

Strategies to reach adolescents

Adolescents, especially girls aged 10–19 years, are a priority population for nutrition action. The WHO

recommends IFA supplementation for non-pregnant menstruating girls in contexts with high rates of anaemia.¹⁰⁹ Data on anaemia in girls aged 10–14 years and subnational estimates for all adolescents are scarce because many national surveys sample women aged 15–49 years. There is little but growing evidence for how to effectively reach adolescents via schools, youth groups, health systems, mobile technologies, and media.^{110–112} A forthcoming *Lancet* Series on adolescent nutrition aims to provide a focused action agenda.

New evidence for effective food system and agriculture policies to improve diet and nutrition and slow climate change

Achieving undernutrition goals requires renewed efforts to ensure affordable healthy diets for all people.¹¹³ Food system transformation that includes fostering healthy food environments is needed to ensure equitable access to healthy, affordable, and sustainable diets to enable elimination of all forms of malnutrition and to slow down the process of climate change.^{68,114–116} Rising urbanisation is associated with growing demand for beef and dairy products, as well as ultra-processed foods and beverages, escalating obesity, and increased agriculture-related greenhouse gas emissions.^{117–119} In LMICs, rapidly changing food environments drive

Panel 1: Recommended interventions for maternal child undernutrition delivered through health systems**Micronutrient interventions in non-pregnant adolescents and women of reproductive age**

Daily or weekly supplementation with iron folic acid (IFA) is recommended by WHO for all menstruating girls and women in contexts with a high prevalence of anaemia (appendix pp 1–3). According to the WHO Global Database on the Implementation of Nutrition Actions (GINA), national programmes for weekly IFA supplementation exist in five countries (Ethiopia, Kenya, Senegal, Tanzania, and India) and a multi-district pilot initiative in Indonesia is reaching adolescents through schools.¹⁸ Delivery to these populations requires strong community-based delivery platforms.¹⁹

Maternal nutrition during pregnancy

In 2016, WHO released new guidelines on antenatal care that recommend IFA supplements, calcium supplements for women at risk of low intake, balanced energy protein supplements for undernourished women, and nutritional counselling on healthy eating and physical activity.²⁰

Maternal multiple micronutrient supplements were recommended over IFA in the 2013 *Lancet* Series on maternal and child nutrition, citing evidence for improved birth outcomes; additional trials and subgroup analyses have since strengthened that recommendation (appendix pp 1–3). The absence of a direct multiple micronutrient supplement recommendation in the 2016 antenatal care guidelines has been contested; a 2020 update to the guidelines recommends their use in research contexts.²⁰ Studies suggest that multiple micronutrient supplements are more cost-effective than IFA.²¹ As of 2019, the WHO GINA includes five countries with policies allowing for multiple micronutrient supplement delivery (Mongolia, Mozambique, Cambodia, Cameroon, and Madagascar).¹⁸ Several countries, including Myanmar, Bangladesh, Burkina Faso, Tanzania, Madagascar, Indonesia, Haiti, Dominican Republic, Nigeria, and Democratic Republic of the Congo are moving towards introducing multiple micronutrient supplements. Effective scale-up of multiple micronutrient supplements will require actions to ensure global supply, as well as addressing many of the same bottlenecks described below that have limited IFA scale-up and monitoring.^{16,22,23}

Maternal IFA is one of the few health system nutrition interventions for which we have population-based coverage estimates (figure 1). The recall-based methods for measuring consumption of IFA have limits; work is ongoing to validate and improve IFA coverage measurement.²³ Coverage of consumption of 90 or more tablets during pregnancy remains low but is slowly improving, particularly in middle-income countries.¹⁶ First priority should be given to closing the estimated 20 percentage point delivery gap between IFA and antenatal care coverage¹⁶ (figure 1). Numerous studies have identified bottlenecks related to supply chain, delayed and variable attendance at antenatal care, and lack of compliance by

pregnant women.^{24–26} Strategies for community-based delivery have been tested; research guided by a new implementation science initiative is ongoing.^{27,28}

Maternal calcium coverage data are scarce and suggest that it is not being scaled in many national programmes. The WHO-recommended dose of 1.5–2.0 g/day, divided over multiple pills daily, is more costly than IFA or multiple micronutrient supplements and poses additional adherence challenges.²⁹ Recent analyses suggest that a lower dose (<1.0 g/day) is efficacious for preventing pre-eclampsia, although data are scarce.³⁰ Non-inferiority trials of dose \leq 1.0 g/day are ongoing in Tanzania (NCT03350516) and Kenya.³¹ Additional implementation research around delivery and adherence could help to accelerate introduction and scale-up of the confirmed dose.

Nutrition counselling has been shown to improve diet, adherence to micronutrient supplements, and food security in pregnant women.^{32,33} Most countries do not have population-based coverage data for nutrition counselling during pregnancy but it is captured in the revised Demographic and Health Surveys (DHS)-8 core questionnaire. Nationally representative nutrition surveys carried out in Burkina Faso and Kenya in 2018 estimated that 56% and 67% of women who received antenatal care reported receiving information on maternal nutrition and diet.^{34,35}

Balanced energy protein supplements, defined as foods or food supplements that provide less than 25% of total energy as protein, were only recommended by WHO in 2016 despite showing evidence of improved birth outcomes in undernourished women for many years.^{36–38} The approach is not yet widely implemented and questions remain about how to cost-effectively deliver this intervention at scale. India's Integrated Child Development Services programme, which offers food supplements to all participating pregnant and lactating women, is a notable exception.³⁹

Small-quantity lipid-based nutrient supplements, which provide high-quality protein, micronutrients, and energy to both pregnant women and children aged 6–23 months, have accumulated a much stronger evidence base since 2013. At current dosage, daily supplementation with these supplements during pregnancy improves birth length and reduces newborn stunting compared with IFA, but provides no additional benefits over multiple micronutrient supplements.⁴⁰ Small-quantity lipid-based nutrient supplements are not recommended during pregnancy. Use for complementary feeding is discussed below.

Newborn interventions

Delayed umbilical cord clamping (not earlier than 1 min after birth) was included in 2014 WHO Guidelines to improve outcomes in healthy term infants where anaemia is prevalent (appendix pp 1–3) and is now included in the Essential Newborn Care package.⁴¹ The recommendation is based on

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evidence for improved nutritional status in early infancy (appendix pp 1–3). Furthermore, a recent systematic review in preterm infants suggests that delayed cord clamping reduces risk of newborn death before discharge from hospital, but optimal timing is uncertain.⁴² As is the case for several other interventions during childbirth, it is very difficult to accurately assess coverage of cord clamping through maternal recall and so data on scale-up are scarce.^{43,44}

Early skin-to-skin contact and support for breastfeeding initiation within 1 h of birth are included in new WHO recommendations for facilities providing maternal and newborn services (appendix pp 1–3). Few data exist about the coverage and scale-up of these interventions. As of 2015, only 45% of infants globally had timely initiation of breastfeeding.⁴⁵ Our analysis suggests little change in this behaviour in the past decade (figure 1). In 2018, WHO released updated implementation guidance for strengthening the Baby Friendly Hospital Initiative (BFHI). More than 150 countries implement the BFHI but only an estimated 10% of children are born in certified facilities.⁴⁶

Infant and young child feeding

Breastfeeding promotion is included in national strategies for many countries but implementation quality is variable.^{47–49} The *Lancet* 2016 Breastfeeding Series and accompanying evidence reviews documented the effects of optimal breastfeeding on maternal and child survival, health, and development, as well as the impact of breastfeeding promotion and support policies and interventions.^{50,51} This evidence was also considered in the background reviews for this Series.^{11,52} WHO guidance for effective breastfeeding promotion, released in 2018, recommends at least six counselling contacts across the first 2 years of life.⁵³ DHS capture coverage of breastfeeding counselling during early postnatal care and the updated DHS-8 includes coverage of breastfeeding counselling during pregnancy.⁵⁴

Promotion of age-appropriate complementary feeding is rooted in guidance first issued for breastfed and non-breastfed infants in 2003 and 2005, respectively.^{55,56} No WHO guidelines exist for complementary feeding counselling, but updated UNICEF programming guidance was released in 2020.⁵⁷ Findings from meta-analyses indicate that well designed education is effective in improving timing of introduction of solid foods, frequency of feeding, and diversity of young children's diets, as well as growth. Nutrition education has the greatest impacts in food-secure settings (appendix pp 1–3); however, recent findings suggest that in food-insecure contexts, improvements in dietary diversity and growth are possible with education-based approaches that promote specific nutrient-rich foods such as eggs.^{58–61} Data on coverage and quality of implementation of complementary feeding interventions are sparse but will be included in future DHS.⁶²

Small-quantity lipid-based nutrient supplementation, when used as a daily point-of-use fortificant for complementary foods, reduces wasting, underweight, stunting, anaemia, and all-cause mortality in children 6–23 months of age (appendix pp 1–3). Some studies suggest that this supplementation is associated with reduced morbidity and improved motor development, although evidence on these outcomes is scarce.^{63–66} An individual patient data meta-analysis of the impact of small-quantity lipid-based nutrient supplements on child growth has been completed.⁶⁷ At present, no global guidance exists around the use of these supplements. They are being implemented in select areas by the World Food Programme and in some United States Agency for International Development Food for Peace programmes. Concerns have been raised about potential for displacement of local complementary foods, influence on taste preferences, and excessive weight gain, although studies so far have not found evidence of these adverse outcomes.^{68–71} Given the evidence of benefit across multiple outcomes, developing global guidance for the use of small-quantity lipid-based nutrient supplements in children is a high priority, especially for contexts with inadequate nutrient intakes from locally available foods.

Other micronutrient interventions for children at risk

Despite there being no World Health Assembly or Sustainable Development Goal target for childhood anaemia, micronutrient deficiencies in children are a widespread problem in low-income and middle-income countries (LMICs).⁵²

High-dose vitamin A supplementation coverage has declined in recent years, especially in countries where deficiency is common and supplementation is most effective for reducing child mortality^{16,72} (appendix pp 1–3). Declines are most likely due to shifting delivery strategies from polio immunisation programmes to child health days and other strategies susceptible to delay and funding shortfalls. Some countries, such as Senegal, Ethiopia, and Tanzania, are integrating vitamin A supplementation into routine service delivery.⁷²

Micronutrient powders used for point-of-use fortification of complementary foods are effective for improving child anaemia, iron-deficiency anaemia, and iron deficiency. However, updated reviews show that they do not affect growth and have been associated with increased diarrhoea in some LMIC settings (appendix pp 1–3). As of 2017, UNICEF reports 54 countries delivering micronutrient powder interventions at various scales, reaching an estimated 16.6 million children, most of whom are assumed to be 6–23 months of age.⁷³ As in delivery of IFA during pregnancy, several implementation challenges with delivery and compliance to micronutrient powders have been identified as part of a multi-country implementation science initiative.⁷⁴

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Preventive zinc supplementation was included in the package of ten recommended interventions in the 2013 Series to call attention to its importance in child diets, and has been used in modelling of global stunting reduction strategies.^{10,75} Zinc deficiency is assumed to be high in LMICs.⁵² Studies consistently show that supplemental zinc reduces the incidence of all-cause child diarrhoea; evidence of its impact on linear growth is less consistent (appendix pp 1–3). Preventive zinc-only supplementation is not recommended by WHO, nor have there been efforts to introduce this intervention in LMICs. Alternatives include multiple micronutrient supplements with zinc (ie, small-quantity lipid-based nutrient supplements and micronutrient powders), promotion of zinc-fortified and bio-fortified foods (for which data are still scarce), and promotion of animal source foods.⁷⁶ Since 2004, WHO has recommended zinc, together with oral rehydration salts, for treatment of diarrhoea (appendix pp 1–3). However, coverage among children with diarrhoea remains low (figure 1), even after multiple calls to action by leading public health scientists.⁷⁷

Prevention and treatment of wasting

In March, 2020, the United Nations Global Action Plan on Wasting was released and puts new emphasis on prevention of wasting through scale-up of multisectoral interventions.⁷⁸

Community management of acute malnutrition and related approaches, which are primarily focused on screening for and treatment of severely wasted children, have been increasingly scaled up through routine LMIC health systems during the

past decade (appendix pp 1–3). Community management of acute malnutrition was initially implemented mostly in emergency contexts.^{78,79} Recent estimates of treatment coverage for severe acute malnutrition suggest that it is only around 30% in most locations due to barriers to uptake and utilisation.^{73,80–82} The 2020 action plan on wasting calls for further integration of treatment into routine services.⁷⁸

To strengthen routine screening, some programmes are training caregivers to regularly assess children's mid-upper arm circumference at home.^{83,84} Some, but not all, national community management programmes include treatment of moderate acute malnutrition; implementation challenges specific to this treatment include a lack of normative guidance, high costs, and fragmentation among global actors.^{85,86} Findings from randomised, controlled trials in Sierra Leone, South Sudan, and Kenya demonstrate that an integrated protocol that uses a single ready-to-use therapeutic food product at different dosing to treat both severe and moderate acute malnutrition is as effective for recovery and more feasible than usual community management of acute malnutrition standards of care.^{87–89} Programmes in west Africa have attempted to integrate wasting prevention and treatment approaches with mixed levels of success.^{80,81} Improving the coverage and quality of wasting treatment is especially important in the context of the COVID-19 pandemic, where experts predict that disruptions to health services and access to food will increase child deaths due to wasting by 18–23% over a 6-month period.⁹⁰

increased consumption of unhealthy, low-cost, ultra-processed foods and beverages, even in infants and young children. These children are at risk of excessive weight gain, inadequate micronutrient intake, and growth failure, or, if fortification is unregulated, of exceeding some micronutrient upper limits.^{120–124}

Several policy options targeting industry and consumers can help to re-shape food environments and address multiple forms of malnutrition; these approaches include restrictions on marketing and promotion of unhealthy foods to children and of breastmilk substitutes and follow-on formula incentives to caregivers; legislation or taxation; and clear product labelling.⁶⁸ Many of these policies have been implemented at scale, but, except for fiscal policies, evidence for their nutritional impacts remain scant.¹²⁴

Agriculture programmes

Agriculture programmes can shape food environments, improve access to affordable, healthy diets, and improve nutrition outcomes, especially where market access to nutritious foods is low.^{58,125} Support to local production of nutritious foods (ie, fruits, vegetables, dairy, and eggs) is recommended to mitigate economic effects

related to the COVID-19 pandemic on low-income households.¹²⁶

A recent review of nutrition-sensitive agricultural programmes shows positive effects on household production; maternal and child diet diversity; consumption of target foods; and micronutrient intake and status.¹²⁷ The effects were greatest in programmes that included nutrition behaviour change communications and women's empowerment activities.¹²⁷ Positive effects on child linear growth were achieved only in the few programmes that also included well designed WASH interventions or provided children with micronutrient supplements. Work is underway to standardise and capture data on the cost-effectiveness of agricultural interventions for improved nutrition.¹²⁸

Biofortification aims to increase the micronutrient content of staple crops through plant breeding, biotechnology, or both. In 2017, 33 million people in 14 countries across Africa, Asia, Latin America, and the Caribbean consumed biofortified crops.¹²⁹ Evidence is growing for biofortification's positive effects on micronutrient status and potential to compensate for the expected iron and zinc losses associated with rising atmospheric carbon dioxide levels.^{130–133} In 2008, the

Copenhagen Consensus estimated that \$17 in economic returns could be gained for every \$1 spent on biofortification over the next 30 years.¹³⁴ However, reaching smallholder farmers with necessary inputs requires long-term buy-in from public and private stakeholders, especially regulatory bodies.¹³⁵

Large-scale food fortification

Large-scale food fortification of staple foods and condiments is embedded within the food systems of many LMICs.¹³⁴ More than 140 countries have mandatory salt iodisation programmes, 90 mandate fortification of at least one cereal grain, and 50 mandate fortification of edible oil, margarine, or ghee.¹³⁶ Recent evidence from national programmes confirms benefits previously shown in efficacy trials.¹³⁷ Large-scale food fortification is highly cost-effective, yielding an estimated \$27 in

economic return per \$1 spent.¹³⁸ Analytical modelling of vitamin A-fortified foods suggests that large-scale food fortification can replace high-dose supplements in some settings.¹³⁹ Despite its potential, large-scale food fortification faces barriers including identifying commercial food vehicles that reach the most vulnerable people, and establishing and enforcing national fortification standards.¹³⁶

Nutrition in other sectors

Social protection programmes

Social protection programmes, including cash or food transfers and food subsidies or vouchers, address poverty and food insecurity—two key drivers of undernutrition.¹⁴⁰ Despite a proven impact on poverty, evidence for the effect of these programmes on nutrition outcomes is mixed.⁹² Evidence from cash and food

	Readiness criteria*						Comments
	Evidence	Global guidance	Delivery platform	Product and supply system	Cost to deliver known	Data for monitoring	
Micronutrient supplementation for non-pregnant adolescents and women aged 15–49 years							
Iron folic acid supplements	✓	✓	±	✓	±	±	Guidance exists, but delivery platform needs to be identified for adolescents in particular
Maternal interventions during pregnancy for women aged 15–49 years							
Counselling on maternal diet during pregnancy	✓	✓	✓	NA	±	±	Assumed to be included in most national antenatal care guidelines, but evidence-based messages, coverage, and quality not known. Indicators will be in DHS-8. Feasible for HMIS
Maternal multiple micronutrient supplements containing iron and folic acid	✓	±	✓	±	±	±	Global guidelines need to be updated beyond research contexts; global supply constraints currently being addressed
Iron folic acid supplements	✓	✓	✓	✓	✓	✓	Assumed to be included in most national antenatal care guidelines but iron folic acid supplementation coverage lags delivery platform coverage. Coverage measured in DHS
Calcium supplementation in populations at risk of low intake	✓	✓	✓	±	×	×	Studies on dosing underway, and once established can move ahead with cost; coverage not included in global surveys
Balanced energy protein supplements (<25% energy as protein) for undernourished women	✓	✓	✓	±	±	±	More specific product formulations currently being improved on, information on cost to deliver for budgeting not available; food assistance during pregnancy will be in DHS-8; feasible for HMIS
Interventions for newborns							
Delayed cord clamping	✓	✓	±	NA	±	×	Ready to be included in national guidelines, but need to address births outside of health facilities. Coverage unknown due to measurement challenges
BFHI 10 steps to support for immediate initiation of breastfeeding including skin-to-skin contact	✓	✓	±	NA	✓	±	New guidelines issued and many countries are implementing but coverage or quality might be low; need to address births outside of health facilities; feasible for HMIS
Kangaroo mother care for low birthweight babies	✓	✓	±	NA	±	±	Guidance exists but scale-up has been slow
Infant and young child feeding							
Protect, promote, and support optimal breastfeeding	✓	✓	✓	NA	✓	✓	Assumed to be included in most national guidelines but coverage and quality not known; to be measured in DHS-8; feasible for HMIS
Complementary feeding education for children aged 6–23 months	✓	±	±	NA	✓	✓	Assumed to be included in most national guidelines but coverage and quality not known; community-based delivery platforms recommended; to be measured in DHS-8; feasible for HMIS
Complementary food supplements for children aged 6–23 months	✓	±	±	±	±	×	Few large-scale programmes exist at present, and need to develop models that can be scaled; feasible for HMIS
Small-quantity lipid-based nutrient supplements for children aged 6–23 months	✓	×	±	±	×	×	Requires WHO guidelines to move ahead with scale-up

(Table continues on next page)

	Readiness criteria*						Comments
	Evidence	Global guidance	Delivery platform	Product and supply system	Cost to deliver known	Data for monitoring	
(Continued from previous page)							
Micronutrient supplementation in children							
High-dose vitamin A supplementation for children aged 6–59 months	✓	✓	✓	✓	✓	✓	Scaled up, but falling coverage assumed to be due in part to shifting delivery platforms
Zinc-containing supplements or fortified foods for children aged 6–59 months	✓	±	±	±	×	×	Need to establish specifications for inclusion in small-quantity lipid-based nutrient supplements, micronutrient powders, fortified foods, or all of these; delivery platform for children aged 6–23 months could be via complementary feeding programmes but not clear for those aged 24–59 months
Iron supplementation for children aged 6–59 months	✓	✓	±	✓	±	±	Scale of implementation unknown
Micronutrient powders for children aged 6–23 months, 24–59 months, or both	✓	✓	±	✓	✓	✓	Delivery platform for children aged 6–23 months could be via complementary feeding programmes but not clear for those aged 24–59 months; updated indicators in DHS-8; feasible for HMIS
Zinc for management of diarrhoea in children aged 6–59 months	✓	✓	✓	✓	✓	✓	Assumed to be included in most national guidelines. Included in DHS; persistently low coverage
Management of wasting							
Screening for wasting	✓	✓	✓	✓	✓	±	Assumed to be included in most national guidelines but coverage and quality not known; to be measured in DHS-8; feasible for HMIS
Treatment of severe wasting	✓	✓	✓	✓	✓	±	Assumed to be included in most national guidelines but coverage and quality not known; feasible for HMIS
Supplementary feeding for moderate wasting	±	±	±	±	±	±	No global consensus on guidelines and overall priority of intervention
<p>BFHI=Baby Friendly Hospital Initiative. DHS=Demographic and Health Survey. HMIS=Health Management Information System. NA=not applicable. Tick symbols indicate that criteria are mostly or fully met; ± indicates that criteria are partially met; and crosses show that criteria are not met. *Criteria for readiness was defined as follows: evidence=existence of a published systematic review and meta-analysis with studies covering multiple geographies; global guidance=recommendations or guideline from WHO; delivery platform=existence of published systematic review and meta-analysis from multiple geographies demonstrating health systems' ability to deliver intervention (criteria fully met), availability of implementation research documenting delivery feasibility in multiple geographies (criteria partially met); product and supply system=on WHO's essential medicines list or UNICEF supply division list; cost to deliver known=evidence from multiple geographies on marginal cost to deliver the intervention; data for monitoring=globally tested or agreed on coverage indicator exists (criteria partially met) and data collected regularly in standard surveys or administrative data systems (criteria fully met).</p>							
Table: Summary of readiness to scale up the prioritised health systems interventions							

transfer programmes in Mexico, Bangladesh, and Pakistan suggest that the following design features of such schemes help to achieve impacts on undernutrition: (1) transfer size meaningfully increases household income; (2) targeting during the first 1000 days of life; (3) inclusion of women's empowerment actions; (4) the programme is combined with behaviour change interventions; and (5) provision of maternal or child micronutrient supplements.^{141–145} Food and cash transfers are critically important for mitigation of COVID-19 related economic shocks on households, but established systems might not have enough capacity to meet the dramatic increases in demand.

Transformative WASH interventions

Recent trials of low-cost household WASH interventions showed that these have no meaningful effects on child growth and mixed results in improving diarrhoea, despite high methodological quality, internal validity, and, especially in Zimbabwe, high intervention fidelity and compliance.^{146–148} In response, experts have called for highly contextualised transformative WASH programmes that reflect population-specific disease burden and pathways for environmental pathogen exposure.^{149,150} More

advanced WASH infrastructure, including piped safe water into households and human waste treatment facilities, might be needed in many settings.¹⁵⁰ In country case studies described in the following section, the WASH sector contributed significantly to stunting reduction in settings with unsafe water and poor sanitation coverage.

How does it come together? Learning from contexts with stunting declines

Since 2013, two research initiatives, Stories of Change (SoC) and Exemplars in Global Health (EGH), have carried out rigorous case studies in 11 countries and four Indian states where stunting in children has notably declined. The aim was to understand what factors or drivers contributed to stunting declines; what policy levers led to changes in dominant drivers; and which programmes across sectors were important for improving the nutrition situation. Appendix p 4 provides more methodological details of these studies.

What determinants contributed to stunting declines?

Consistent with other analyses, the case studies find that health care, household wealth, and parental

education are important predictors of stunting declines in most countries.^{151–155} Across the 19 analyses (figure 2; appendix p 5), 11 had health care as one of the top two drivers of stunting declines, 11 had wealth, and seven parental education. The roles of other determinants vary across case studies, emphasising the importance of context. For example, in Ethiopia, agricultural investments improved household food security, whereas in Tanzania and Zambia insecticide-treated bednet expansion was a significant contributor to stunting reduction. Reductions in open defecation were particularly important in south Asia. Overall, the quantitative analyses affirm that actions within and outside of the health sector are required for rapid reductions in stunting.¹⁵⁶

What enabled the policies and programmes that led to stunting reduction?

In some countries, including Peru, stunting reduction was driven by strategies explicitly focused on improving child growth.¹⁵⁷ In other countries, pursuit of sector-specific targets (eg, WASH interventions and education) indirectly led to stunting improvements. In many cases, the policy focus was on nutrition more broadly, health equity, poverty reduction, or other social development goals.

Several shared themes in policy, strategy, and programmatic investments were present across case studies. Health and nutrition initiatives addressed immediate determinants of maternal and newborn care, maternal nutrition, and infant feeding practices. Investments in reproductive health and reduced fertility

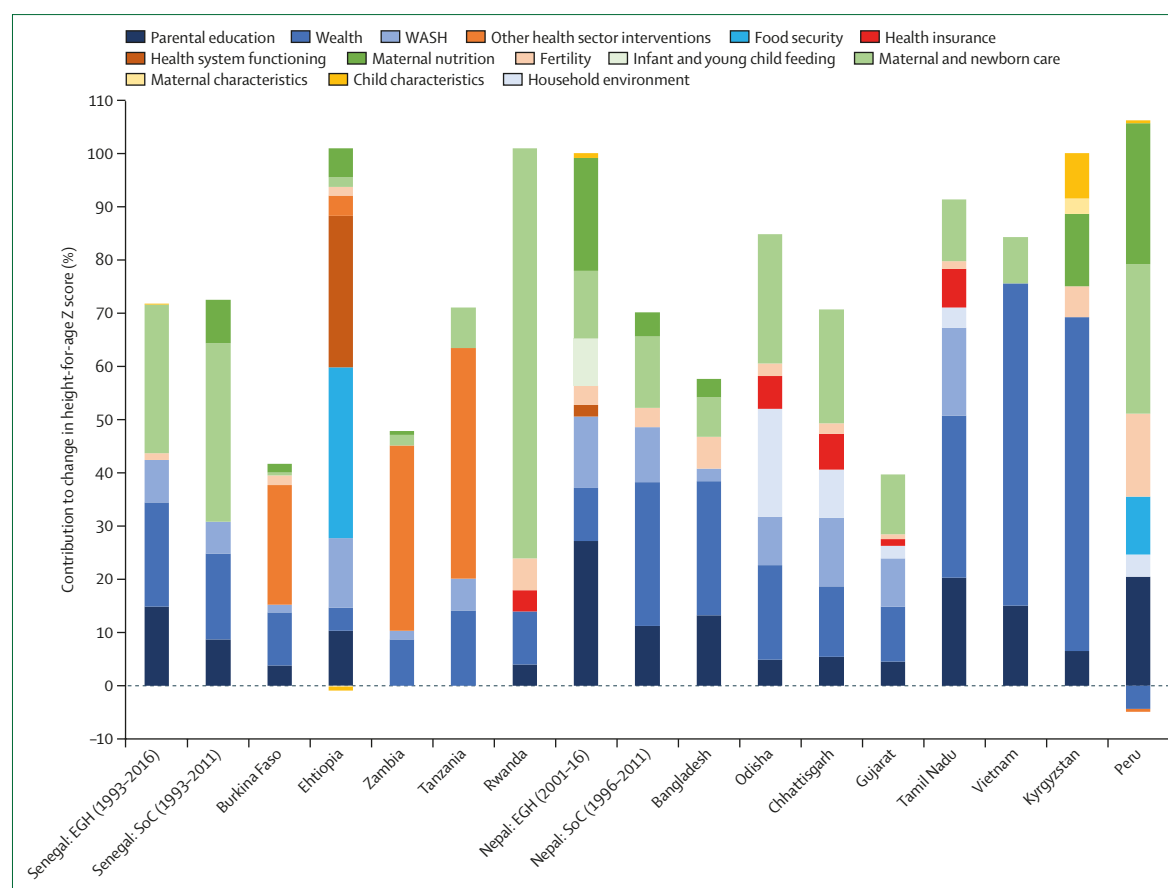


Figure 2: Estimated contributions of factors to change in height-for-age Z score across EGH and SoC country case studies

EGH=Exemplars in Global Health. SoC=Stories of Change. WASH=water, sanitation, and hygiene (ie, reductions in open defecation, and improved sanitation or water source). Parental education=maternal or paternal education. Wealth=asset or wealth index, and poverty reduction. Household environment=crowding, availability of electricity. Food security=consumable crop yield, altitude (mountainous population migration). Health system functioning=number of health facilities or workers, and health insurance coverage. Other health sector interventions=vaccination coverage, diarrhoea incidence, and antiretroviral knowledge among mothers. Fertility=parity or fertility, interpregnancy interval, early or late age pregnancy, and age at marriage. Infant and young child feeding=breastfeeding duration, and use of complementary feeding. Maternal and newborn care=antenatal care visits, health facility delivery, and presence or absence of a skilled attendant at birth. Maternal nutrition=maternal height and maternal body-mass index. Maternal characteristics=age on day of survey. Child characteristics=age, sex, region, birth order, and low birthweight. The term health care has been proxied by different variables in the case studies which, taken together, encompass access to, use of, and quality of health care. See appendix pp 1–3 for more details. However, the limitations of these analyses must be recognised, especially those posed by Demographic and Health Surveys, which do not, for example, routinely capture food security or dietary data and do not permit attribution of changes in determinants to specific policies or programmes. The relative contributions of various drivers should therefore be seen as illustrative and associational, not deterministic.

were also important. Sectoral strategies addressing underlying determinants of child growth through economic improvements, agriculture, parental education, and WASH interventions were also emphasised.

Pivotal enabling factors and processes in cases with more explicit stunting or undernutrition-focused strategies include: high-level political and donor commitment to reduce undernutrition; strong leadership advocating for mainstreaming nutrition across several sectors; investments in granular data for monitoring and decision making; and attention to cross-sectoral and vertical (national to community) coherence in planning and action, including in front-line workers.

A recent analysis of the political commitment of SUN countries to nutrition supports case study findings. Evidence of operational commitment reflected as actual, real-world action and embedded commitment to indirect sectoral actions were associated with national reductions in stunting and maternal anaemia.¹⁵⁸

Implications for action

Reframing multisectoral discourse around direct and indirect actions

An overarching lesson from the case studies and other evaluations of integrated programmes is that all sectors have the potential to implement policy actions that will directly or indirectly impact nutrition outcomes. In many case study countries, indirect actions targeting underlying and social determinants of malnutrition (ie, poverty, fertility, agriculture, WASH, and parental education), accounted for about half of the explained stunting reductions (figure 2).

Currently, insufficient clarity among policy makers and planners on what specifically makes sectoral work nutrition-sensitive impedes progress. A new framing that replaces nutrition-specific versus nutrition-sensitive concept and identifies sectoral actions as direct (nutrition outcomes as the primary benefit) or indirect (nutrition outcomes as a secondary benefit) could help to address this issue.^{11,156}

Cross-sectoral programme integration and coordination

Better nutrition outcomes are consistently seen in programmes that deliver cross-sectoral interventions or combine multiple delivery platforms. Implementation of such integrated programmes requires tight sector alignment, coordination, and regular performance monitoring.¹²⁷ To facilitate government-led and financed scale-up, it is important to consider how these approaches fit within more decentralised systems. Rather than fully integrated programmes, a pragmatic strategy might be co-location of sectoral programmes to reach the same communities and households.¹²⁷

Advancing the data and accountability agenda

In 2014, the Global Nutrition Report called for a nutrition data revolution over concern that many countries do not

have the necessary data to make problems visible, identify vulnerable populations, prioritise actions, track progress, and guide implementation.^{159,160} Since then, a range of efforts have been launched to strengthen nutrition data and accountability at global and country levels.

Examples of multi-country nutrition accountability initiatives focused on tracking progress to global targets include the Global Nutrition Report (the N4G accountability mechanism) and the WHO Global Nutrition Monitoring Framework.^{2,161} The SUN Monitoring Evaluation Accountability and Learning system tracks member state progress to SUN key results. A proliferation of other accountability efforts focused on specific geographical regions, sectors, nutrients, outcomes, and stakeholder groups commonly make use of scorecards, indices, or other metrics to highlight progress or call out poor performance.¹⁶²⁻¹⁷² A crucial unanswered question is how effective these accountability tools are at influencing investment and action.¹⁶³

The data value chain is a useful framework for assessing global and country nutrition data landscapes; it contextualises broader calls to strengthen SDG monitoring systems and improve data use culture.^{173,174} Beginning with a clear definition and prioritisation of what to measure, the value chain passes through links reflecting data collection, curation, analysis and translation, and dissemination to inform action.^{175,176} We briefly review advances and ongoing needs in the following paragraphs.

Prioritisation

Working across sectors makes data prioritisation challenging. Core nutrition indicators have been identified for health systems but other sectors have different information priorities that might not include nutrition-relevant data.^{15,176} Indicator frameworks designed for global monitoring must be further contextualised to include actionable indicators for a given national strategy.¹⁷⁷ Mirroring the successful efforts around HIV data, the nutrition community would do well to define core indicators relevant to national contexts; maintain a global standard online indicator registry to promote standardisation and comparability whenever feasible; reduce parallel reporting to global entities; and, most importantly, ensure country-led efforts on tracking, reporting and data use.¹⁷⁷⁻¹⁷⁹

Paper 1 in this Series highlighted data gaps for nutritional status, especially for micronutrients. Other common nutrition data gaps in LMICs include reach, coverage, quality, and cost of health sector nutrition interventions; reach, coverage, quality, and cost of nutrition interventions in other sectors, especially social protection, agriculture, and education; diet quality; household food insecurity; and budget and expenditure tracking. More disaggregated data are generally needed to support subnational efforts and help address inequities.

Collection

Effective monitoring of multisector nutrition strategies requires both well timed surveys and more continuous disaggregated administrative data.¹⁸⁰ Many LMICs rely on infrequent national multi-topic surveys including the Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys to inform nutrition actions. These are useful for tracking trends in outcomes and some determinants, but provide insufficient data on intervention coverage and quality at a national and subnational level.¹⁵ The COVID-19 pandemic has put pressure on administrative data systems and increased demand for remote data innovations, including mobile phone surveys.^{181,182}

To improve data availability, several African countries have used national Standardized Monitoring and Assessment of Relief and Transitions surveys to track key nutrition indicators between multi-topic surveys.¹⁸³ India increased the sample of its national family health survey from 100 000 to 500 000 to generate district-level data.¹⁸⁴ The DHS round 8 questionnaire (DHS-8), to be used by more than 50 countries starting in 2020, includes new questions on nutrition intervention coverage and diets in infants and young children and women of reproductive age.³⁴ New indicators, technologies, and guidance for collection of dietary data are now available.^{185–187}

Since 2013, several countries have added new nutrition indicators to health management information systems.^{188,189} UNICEF is leading global efforts to recommend standard health management information system indicators and District Health Information Software-2 templates for infant and young child feeding, growth monitoring, and acute malnutrition interventions.¹⁹⁰

Curation

There are few examples of truly multisectoral information systems, and much remains to be learnt about this approach. Challenges to compiling data across sectors include system interoperability and sectoral resistance to data sharing.¹⁹¹ Approaches being tried include parallel reporting of select indicators and designating subnational cross-sectoral nutrition data focal points.¹⁹²

Analysis and translation

Several multi-country initiatives focus on capacity building and mentorship for data analysis using scalable approaches.^{169,193} There are several new or improved analytical tools to support nutrition planning in the health sector and for developing strategies around diet and fortification (appendix pp 8–9). However, tools are still needed to support decision needs in other sectors.

Finally, more and better data requires additional resources. Data and information systems are not specifically addressed in the costed plans for most SUN countries.¹⁷ As part of multisectoral nutrition strategies, countries require well developed and fully

resourced plans for strengthening nutrition data value chains.¹⁷⁴

Advancing the financing agenda for nutrition in all sectors

How much will it cost to reach undernutrition targets?

In 2017, the first ever global Investment Framework for Nutrition (IFN) estimated the cost and developed financing scenarios around four of the WHA nutrition targets: stunting, anaemia in women of reproductive age, exclusive breastfeeding, and scale-up of severe acute malnutrition (SAM) treatment towards the wasting target.⁷⁵ The full package costing scenario included several interventions in addition to the ten modelled in the 2013 *Lancet* Series (appendix pp 1–3) plus intermittent preventive treatment for malaria during pregnancy for anaemia. The IFN estimated an additional average investment of \$7 billion per year over 10 years needed to achieve these targets. Almost two-thirds (65%) of estimated costs were for health sector interventions, 31% for food supplements to vulnerable children, and 4% for staple food fortification. A reduced package of interventions, not sufficient to reach targets, was estimated to cost an additional average investment of \$2.3 billion per year over 10 years (appendix pp 1–3).

Consistent with the findings of the EGH and SoC, the IFN model assumed that changes in underlying determinants, including food availability and diversity, women's education, women's empowerment, health, and WASH interventions, would account for more than 50% of stunting reduction. However, the IFN did not include cost of actions to change these underlying determinants because of insufficient evidence. The severe economic and health systems shocks from COVID-19 demand that we reassess our progress against undernutrition targets and revisit prioritised actions; updated costing analyses and financing recommendations are now being done by global agencies.^{4,7}

We are missing critical information about the specific actions different sectors can take to improve nutrition. First, as mentioned previously, we do not have enough information about the cost and cost-effectiveness of actions to address the underlying and social determinants of malnutrition. Second, sector stakeholders need to know how proposed actions will affect sector-specific outcomes, including agricultural and labour productivity, poverty reduction, or educational achievement. This information could be used to attract financing from sectors outside health, and sometimes co-finance between sectors.¹⁹⁴ Additionally, at a global level, data on the costs and benefits of multisectoral nutrition interventions could be used to develop analytical tools to support planning (appendix pp 8–9).

Is the world on track towards financing benchmarks?

However incomplete, the global IFN is the only available roadmap on financing needs and scenarios to enable us

Panel 2: Call to action to address the unfinished undernutrition agenda

In the lead up to the Nutrition for Growth (N4G) Summit in 2021, we call for:

- 1 Acceleration of financial commitments by governments, donors, and others to deliver on the unfinished maternal and child undernutrition agenda that has been hampered by the COVID-19 pandemic. There is simply no time to lose.
 - 1.1 Financing commitments by all parties should prioritise addressing bottlenecks to the expansion of coverage, quality, and delivery of proven interventions outlined in this Series. Mechanisms for tracking progress and holding stakeholders accountable for delivering on their specific, measurable, achievable, relevant, and time-bound financial commitments are a necessity.
 - 1.2 Governments need to substantially accelerate domestic investments in nutrition, which could include ensuring that nutrition goals are reflected in actions by health, food, and social protection systems to mitigate the impacts of the COVID-19 pandemic. Development partners need to continue ramping up financial support to countries in the near term.
 - 1.3 National costed strategic plans for nutrition data across sectors are needed. These plans should address each link of the data value chain, including data on priority indicators at a subnational level. Plans should improve capacity, adopt tools for analysis and evidence translation, and foster a culture of data use among decision makers at all levels.
- 2 National and subnational governments must rapidly scale up, with quality, the interventions with evidence of impact in the first 1000 days of life that derive from a context-specific, strategic priority-setting process (see point 3 below). At present, coverage is too variable and too inequitable to deliver impacts without concerted action.
 - 2.1 Governments must take action to address low coverage and quality of nutrition services within health systems. Closing the gap between health services and nutrition coverage is a priority.
 - 2.2 Nutrition-focused actors must work collaboratively across sectors to strengthen common delivery platforms including those at the community level. Implementation research should be used to identify and address context-specific operational, utilisation, and compliance barriers to universal coverage of high-quality nutrition programmes and interventions.
 - 2.3 Several food and health sector strategies exist to reduce micronutrient deficiencies in children and women of reproductive age, including staple food fortification, and these need to be scaled up.
 - 2.4 Immediate scaling and routine coverage measurement for multiple micronutrient supplements during pregnancy, as well as intensified efforts to develop the implementation-related evidence required to scale up calcium and balanced energy protein supplements in settings with low dietary intakes of these nutrients and a high prevalence of maternal undernutrition are also a priority.
- 2.5 Immediate scaling and routine coverage measurement for newborn interventions, including those that support delayed cord clamping, kangaroo mother care for low birthweight infants, and the ten steps to successful breastfeeding are an urgent priority.
- 2.6 Coordinated strategies supported by contextualised implementation research are needed to ensure that other interventions, such as micronutrient powders, small-quantity lipid-based nutrient supplementation, and counselling-based strategies to improve diet quality and enhance micronutrient intakes in children aged 6–23 months, are used in complementary and cost-effective ways within both national and subnational programmes.
- 2.7 Global guidelines for provision of small-quantity lipid-based nutrient supplementation to children aged 6–23 months should be developed, based on compelling evidence of their impact on growth, anaemia, and all-cause mortality.
- 2.8 New approaches for streamlining acute malnutrition treatment under a unified protocol are promising in terms of feasibility of implementation and outcomes, but we need more data on cost of scale-up to address the substantial burden of moderate malnutrition before changing recommendations and guidelines.
- 3 National and subnational efforts must address context-specific gaps in immediate and underlying social determinants to accelerate progress in maternal and child undernutrition. Successful countries and subnational entities have consistently done this.
 - 3.1 In view of the growing evidence for policies and programmes that can address both immediate and underlying or social determinants of undernutrition, we must provide clearer and more specific recommendations for the direct and indirect actions that health, agriculture and food systems; education; water, sanitation, and hygiene interventions; social protection; and other sectors can take given their context and goals.
 - 3.2 Countries must set their own strategic priorities regarding the mix of direct and indirect actions that they use within and across sectors, target populations, subnational areas, and delivery platforms, taking into account the specific nature of their nutrition problems, and gaps in achieving adequate income, education, food security, healthy diets for their population, and delivery infrastructure systems.

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(Panel 2 continued from previous page)

- 4 An enabling political and regulatory environment for effective and cost-effective nutrition-relevant action needs to be cultivated and sustained.
 - 4.1 This enabling environment includes high-level political and donor commitment; leadership in mainstreaming nutrition and ensuring cross-sectoral and vertical policy and programme coherence; and investment in subnational data and capacity to monitor progress.
 - 4.2 Poor policy coherence across sectors can backfire on the efforts of food systems to address undernutrition, such as diversifying production and including biofortified and fortified foods. Actions are, therefore, imperative to restrict inappropriate marketing and promotion of unhealthy foods and beverages, as well as breastmilk substitutes.
- 5 National and subnational entities must monitor and learn so they can calibrate actions consistently and continuously to ensure women or children are not left behind, especially those in the most vulnerable households and communities.
 - 5.1 Accountability initiatives at global and national levels should ensure that they have a clear theory of change guiding their engagement strategies and use of scorecards, dashboards, indexes, profiles, and other data visualisation tools to promote specific actions. Global initiatives should work together to ensure metrics are harmonised and to avoid potential confusion.
 - 5.2 Development partners and donors need to accelerate global efforts to develop and disseminate guidance on nutrition data and information systems to countries, including core indicators and recommended methods for household and administrative data collection and analysis, as well as develop analytical tools to support planning across all sectors.
 - 5.3 In addition to continuing to evaluate what works to improve nutrition across sectoral platforms and to affect the underlying determinants of undernutrition, we need to understand the marginal costs of delivering services that improve nutrition and the marginal benefits expected by doing so, some of which can go beyond nutrition. Funders and countries will need to support this research agenda, while researchers align on standardised methods and protocols.
 - 5.4 Continue to develop the evidence base for effective actions among adolescents and in fragile states and conflict settings, including investing in more rigorous evaluations where programmes are being implemented.

to reach the WHA targets and, pending some adjustment for the COVID-19 crisis, will probably remain a key framework for the N4G 2021 commitment-setting process. Under the IFN's Global Solidarity financing scenario projected to fill the 10-year \$70 billion resource gap, donors significantly increase spending in the first 6 years and then progressively reduce their support to ensure transition to domestic financing (appendix p 11).

Data on domestic nutrition investments across sectors are scarce, although improving. Few countries have increased domestic health sector spending on nutrition between 2015 and 2017; spending actually declined in many countries during that period.¹⁹⁵ Donors have increased spending on the IFN's so-called ready-to-scale interventions (\$1.1 billion in 2015 to \$1.4 billion in 2017; 11% annualised increase accounting for a dip in 2016), but as of 2017 there was still a \$0.1 billion shortfall in expected donor aid, and a rapid assessment of 2018 disbursements suggests that the increase seen from 2015 to 2017 has not been sustained.¹⁹⁶ Looking forward, equity considerations and implications of broader aid transitions must be considered alongside COVID-19-related shifts in investments. Countries with high undernutrition burdens that are growing economically could become ineligible for donor support before they establish sustainable domestic financing, putting the most vulnerable population groups at greatest risk.^{197,198}

Since 2013, new financing mechanisms including the Global Financing Facility and the Power of Nutrition have

attracted more nutrition funding from both traditional and non-traditional sources.^{199,200} Philanthropies and international non-governmental organisations have also increased nutrition investments, although disbursements are difficult to track if they do not report to the Organisation for Economic Co-operation and Development Common Reporting Standard.²⁰⁰

There is little information about nutrition-related expenditures outside the health sector and by source. Forthcoming changes to the Organisation for Economic Co-operation and Development Common Reporting Standard should allow better identification of donor nutrition spending across all sectors. The Global Nutrition Report conveys national budget allocations for nutrition across sectors. Some countries are developing systems to track actual national and subnational on-and-off-budget nutrition spending. Routine, reliable data on nutrition spending by sector and geographical region could improve planning and budgeting, alignment of external funding with government priorities, and overall financial accountability and transparency.²⁰¹

Conclusion

Halfway through the UN Decade of Action on Nutrition, and with just 10 years remaining to make progress towards the SDGs, the COVID-19 crisis has underscored the imperative of addressing the unfinished undernutrition agenda.

Our growing evidence base affirms that multi-sector strategies that reach populations during the first 1000 days of life are effective in reducing undernutrition and, with adequate resourcing, can be implemented at scale. Progress in scaling interventions has been too slow, as evidenced in the health system by low coverage and the failure to introduce several proven interventions. There is no one-size-fits-all strategy for addressing undernutrition. Rather, depending on each nation's gaps and priorities, countries must decide which direct and indirect actions to scale within and across sectors and how to address specific implementation and utilisation challenges. In all cases, countries need strong nutrition information and accountability systems, coupled with implementation research and programme evaluation. Effective cross-sectoral approaches require the presence of other enabling factors and processes including proactive political leadership, and adequate budgets and financing.

The COVID-19 pandemic poses a serious challenge to achieving many of the SDGs, including the nutrition targets. Just when the nutrition community was looking to accelerate investment, global economies have contracted and timelines for recovery remain uncertain. However, there is cause for some optimism because many countries have prioritised food and nutrition security in their COVID-19 mitigation strategies.²⁷ Panel 2 describes concrete actions to address undernutrition that should inform commitments at the 2021 N4G Summit. With greater awareness and understanding of the fundamental role that food and nutrition systems play in health, livelihoods, and the environment, we need all actors to play a role in this response.

Contributors

RAH, EP, and ZAB conceptualised the paper in consultation with SG, PM, AF, MRD. RAH drafted the health sector coverage, and data accountability sections with substantial input from EP. ZAB, ECK, and JKD drafted the sections on health and food systems evidence reviews, adolescent health, and fragile states, with substantial input from RAH and EP. ZAB and PM drafted the sections on mass media and technology platforms, and social protection. ECK and JKD compiled the two evidence review tables (health and fortification) with input from ZAB, RAH, and EP. SG led the synthesis of and drafted the stunting case study findings, with substantial input from ZAB, ECK, and PM. The supporting figure and appendix table 2 (appendix pp 5–7) were prepared by ECK and SG with input from PM and ZAB. MRD, AF, and JWC drafted the financing section with substantial input from EP. MTR contributed substantial revisions to the food systems review. SV and JKA drafted text for the panel on analysis tools. All contributors reviewed successive drafts and provided input. RAH finalised the paper with support from EP.

Declaration of interests

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submitted work. RAH, EP, SG, ECK, PM, JKD, MTR, SV, and JKA declare no competing interests.

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