



Nutrition for  
Resilience



Micronutrient  
FORUM

**Micronutrient Forum  
6th Global Conference**

**CONFERENCE  
PROCEEDINGS**



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# MICRONUTRIENT FORUM

## Overview

The Micronutrient Forum is a global non-profit focused on nutrition, specifically micronutrient health. We are a group of experts bringing leaders together to help build and strengthen the evidence base on micronutrient deficiencies and interventions, build consensus, and ultimately contribute to the development of stronger policies, programs, and systems to protect the health of vulnerable communities everywhere.

The Micronutrient Forum (Forum) delivers unique value to the nutrition community by developing collaboration platforms to address pressing micronutrient issues where progress is insufficient and where collaboration can improve efficiency and accelerate progress.

Our programs, which have missions that range from preventing maternal undernutrition to strengthening the micronutrient data ecosystem and generating evidence on the relationship between climate change and nutrition, represent the power of collaboration and collective action to remove bottlenecks and transform micronutrient health for the better. Through this work, the Forum aims to create a world where all people have optimal micronutrient status for health and well-being.





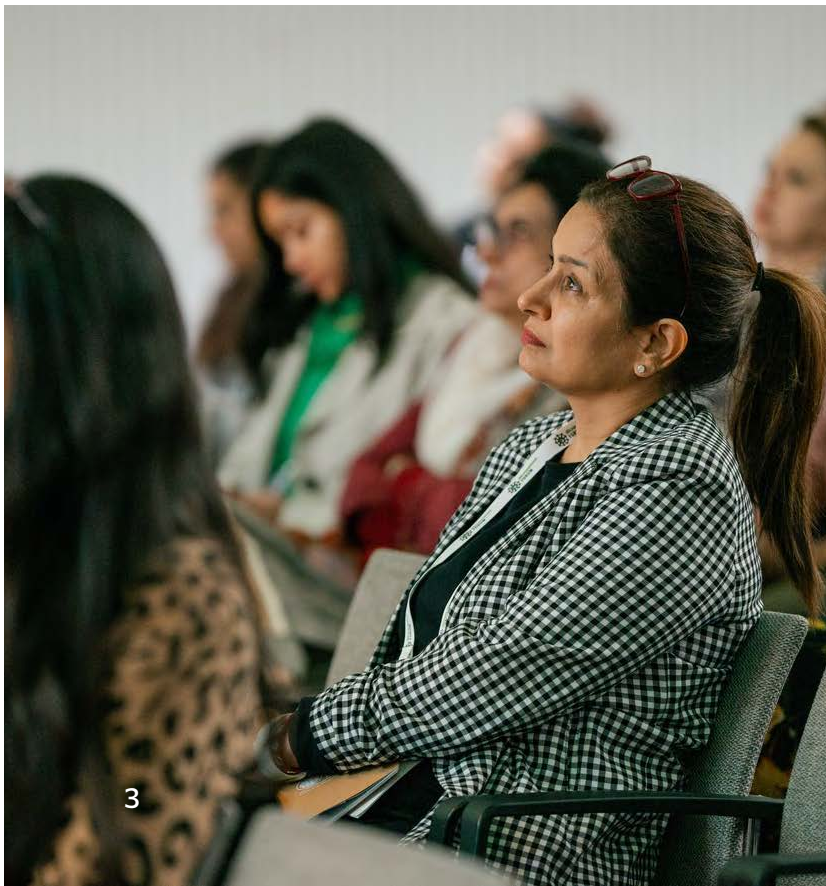
**The Micronutrient Forum is the central global platform for evidence, collaboration, and advocacy to improve micronutrient health.**

# GLOBAL CONFERENCE

The Global Conference is the flagship event of the Micronutrient Forum. It brings together thousands of stakeholders from diverse sectors and disciplines to accelerate progress toward micronutrient-related global health and development goals and shape the discourse around global nutrition.

The 6th Global Conference took place from October 16 to 20, 2023, coinciding with World Food Day. Over 2,200 delegates from more than 100 countries participated either online or in person at the World Forum in The Hague, Netherlands.

The conference aimed to explore and enhance understanding of the complex relationship between micronutrient health and human resilience and to accelerate action supporting vulnerable populations amid unprecedented global food and nutrition crises.



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# CONFERENCE ORGANIZATION

Many individuals, committees, and partners collaborated in conference planning to ensure a wide range of content and perspectives and to support the overall success of the event.

## Conference Committee

The Conference Committee provided leadership, oversight, and guidance across the entire event, from conceiving the timely and important theme to execution of the event.

- Klaus Kraemer, Conference Committee Chair
- Kenneth Brown, Program Advisory Council Chair
- Maria Elena Jefferds, Program Committee Chair
- Saskia Osendarp, Executive Director
- Rajul Pandya-Lorch, Board of Directors

## Program Committee

The Program Committee was responsible for developing the scientific program, ensuring that it was rigorous, unique, and thoughtfully designed and that it adequately represented the diversity of the field.

### PROGRAM COMMITTEE CHAIR

- Maria Elena Jefferds

### TRACK 1

- Sophie Moore, Track 1 Co-Chair
- Kyly Whitfield, Track 1 Co-Chair
- Kenneth H. Brown
- Jennifer Coates
- Kerry Jones
- Saurabh Mehta
- Alida Melse-Boonstra
- Martha Mwangome
- Victor O. Owino
- Sant-Rayn Pasricha

### TRACK 2

- Lindsay Allen, Track 2 Co-Chair
- Erick Boy, Track 2 Co-Chair
- Kamija Phiri
- Lisa Rogers
- Maria Elizabeth Tejero Barrera
- Shakuntala Thilsted
- Mary Uyoga
- Michael Zimmermann
- Stanley Zlotkin

### TRACK 3

- Mduduzi Mbuya, Track 3 Co-Chair
- Deanna Olney, Track 3 Co-Chair
- Mandana Arabi
- Sarah Bauler
- Anabelle Bonvecchio
- Inge Brouwer
- Nita Dalmiya
- Omar Dary
- Rebecca Heidkamp
- Dan Irvine
- Frances Knight
- Denish Moorthy
- Debbie Obadan-Benneth
- Lisa Shireen Saldanha

### TRACK 4

- Asma Lateef, Track 4 Co-Chair
- Rajul Pandya-Lorch, Track 4 Co-Chair
- Rina Agustina
- Shawn K. Baker
- Howarth Bouis
- Muhammad Irshad Danish
- Augustin Flory
- Greg S. Garrett
- Solange Heise
- Klaus Kraemer
- Anna Lartey
- Saskia Osendarp
- Larry Umunna
- Marti van Liere



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## Host Committee

The Host Committee helped plan and organize the in-person component of the conference in The Hague, Netherlands. They increased participation from local partners, mobilized financial sponsors, provided logistical support, offered on-site assistance, and facilitated collaboration with European and Dutch nutrition partners.

- Inge Brouwer, Host Committee Chair
- Monique Beun
- Lucy Elburg
- Edith Feskens
- Rens Koele
- Alida Melse-Boonstra
- Andre Oelofse
- Elise Talsma
- Arine Valstar
- Hans Verhoef
- Anouk de Vries
- Laura Witlox



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# SPONSORS

The Forum is grateful for the support of the sponsors of the 6th Global Conference. Thanks to their generous contributions and efforts, the conference was possible. Special thanks to the student volunteers and to Wageningen University and Research for their time and financial support in publishing these conference proceedings.

## ● GOLD

Bill & Melinda Gates Foundation  
dsm-firmenich  
European Commission  
Global Affairs Canada  
Global Alliance for Improved Nutrition (GAIN)  
Helen Keller Intl  
Kirk Humanitarian  
Ministry of Foreign Affairs Netherlands  
Nutrition International  
TechnoServe | Millers4Nutrition  
United States Agency for International Development (USAID)  
Vitamin Angels  
World Vision International

## ● SILVER

Bopinc

## ● BRONZE

Access to Nutrition Initiative  
CGIAR - Nutrition, Health and Food Security  
Impact Area Platform  
Children's Investment Fund Foundation (CIFF)  
Nutraset Group  
SNV

## ● PARTNER

Wageningen University and Research (WUR)

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BioAnalyt GmbH  
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Food and Agriculture Organization of the United Nations (FAO)  
Food Fortification Initiative & Iodine Global Network  
Gioventù  
HarvestPlus  
Healthy Mothers Healthy Babies (HMHB)  
The Hospital for Sick Children (SickKids)  
Intake – Center for Dietary Assessment  
International Alliance of Dietary Food Supplement Associations (IADSA)  
International Food Policy Research Institute (IFPRI)  
Johns Hopkins University  
Lucky Iron Life  
Micronutrient Data Innovation Alliance (DInA)  
Ministry of Health of Ethiopia  
Mirpain  
Multidisciplinary Digital Publishing Institute (MDPI)  
Nutrition CEO Council  
PATH  
Philippine Society of Nutritionist-Dietitians (PSND), Inc.  
Quansys Biosciences  
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Sight and Life  
Standing Together for Nutrition (ST4N)  
Tufts University  
University of California, Davis  
Walter and Eliza Hall Institute (WEHI)  
World Health Organization (WHO)  
World Food Programme (WFP)





# >2,200

ATTENDEES

1409 In-person  
822 Virtual

# >€650K

IN SUBSIDIZED

LMIC & Student Attendees

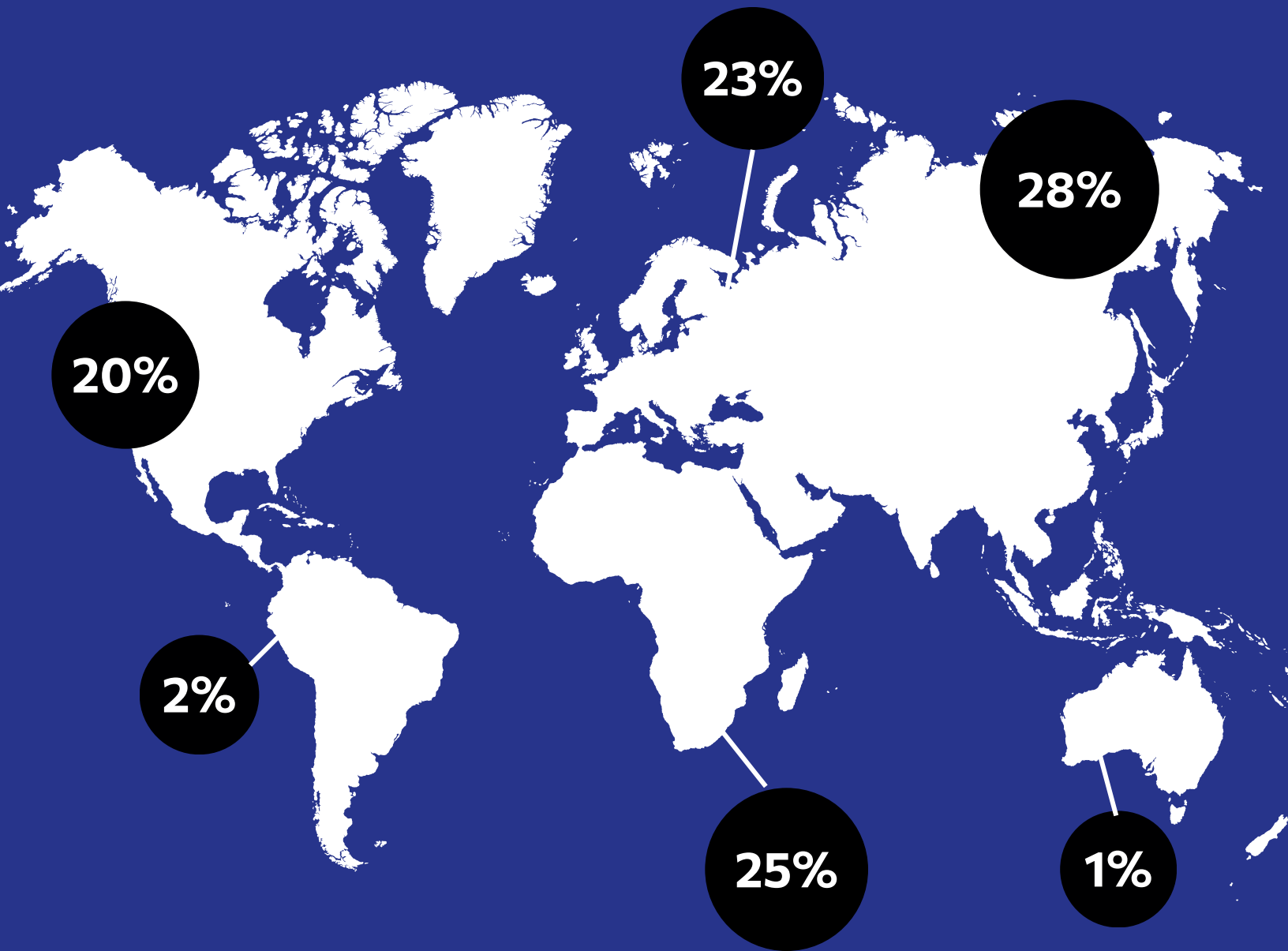
# 102

COUNTRIES  
REPRESENTED

# 422

SPEAKERS / PANELISTS

# ATTENDEES BY REGION





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# PROGRAM OVERVIEW

## Why a conference on “Nutrition for Resilience”?

The world is being confronted by multiple, complex, and cascading shocks, such as severe climate change events, an ongoing food price crisis, COVID-19 pandemic, and geopolitical conflicts that are impacting human nutrition in unprecedented ways. In the face of these crises, achieving the 2030 Agenda on Sustainable Development depends on strengthening the resilience of vulnerable communities and systems.

It is increasingly clear that at the foundation of human resilience lies micronutrient resilience—the ability of individuals, households, and communities to have stable and affordable access to all essential nutrients from diverse sources. Vitamins and minerals serve critical biological functions, making them vital for a healthy and productive life. Yet billions of people suffer from deficiencies of these micronutrients, including one in two children and two in three women worldwide. Micronutrient deficiencies raise the risk of adverse pregnancy outcomes, poor child growth, poor brain and cognitive development, and impaired immune response and resistance to infectious diseases. Furthermore, the consequences of undernutrition and micronutrient deficiencies are often lifelong, even multigenerational.

Because micronutrient deficiencies are staggeringly prevalent, their effects go beyond individuals and households: they lead to serious losses in human capital and high costs for health care and insurance, and in turn high economic costs and measurable losses in GDP.

There has been a marked failure to capitalize on the potential for micronutrient nutrition to play a role in improving resilience. Indeed, the nutrition community, compared with other disciplines, has been slow to engage with the international resilience agenda. To help address this shortcoming, the conference “Nutrition for Resilience (N4R)” brought together stakeholders from a wide range of sectors to take stock of what we know about the interdependence of nutrition and resilience and to identify knowledge gaps and areas of action.



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## Conference Objectives

The 6th Global Conference brought together experts, scientists, practitioners, and public officials from around the world and across disciplines to explore the interdependence of micronutrient nutrition and the resilience of individuals, communities, and systems, in the context of a world where global crises are the new normal. More specifically, the event aimed to:

- Better understand the role of micronutrients in improving resilience and consider potential approaches to exploiting this role so that individuals, households, and communities can achieve greater resilience in a world of shocks.
- Offer an opportunity to rethink and establish a compelling and evidence-based agenda on the interdependence of nutrition and resilience, with a gender-responsive focus.
- Propose a research agenda that can advance understanding of nutrition and resilience, support cost-effective micronutrient interventions, and accelerate progress toward global nutrition and broader development goals.





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# CONFERENCE TRACKS


The five days of conference programming were divided into four official tracks, with 39 concurrent sessions, seven plenaries, and an opening and closing ceremony, each focusing on a specific aspect of nutrition for resilience. These tracks incorporated a wide range of topics related to micronutrient nutrition, including micronutrient biology; advances in food and crop technology; the complex relationship between infection, immunity, and micronutrients; the effectiveness and safety of micronutrient interventions; and impact measurement and lessons learned from multisectoral nutrition programs. The conference also included sessions dedicated to addressing the broader policy and environmental considerations needed to ensure the health and well-being of individuals and communities worldwide.

The seven plenary sessions covered:

- One Health as an approach to crisis and resilience
- Connections between humanitarian and development efforts to strengthen micronutrient and nutrition resilience
- Current estimates of the global prevalence of micronutrient deficiencies and the need for more data
- Micronutrient deficiencies in the European context
- Leveraging social protection programs for micronutrient nutrition and climate resilience
- Supporting, scaling up, and sustaining micronutrient nutrition solutions
- Climate change and nutrition








## Track 1: Micronutrient Biology and Status Assessment


Track 1 explored fundamental aspects of micronutrient and nutrition biology and status assessment, the epidemiology and biology of micronutrient nutrition, and implications for program design. The track consisted of nine concurrent sessions, covering topics such as absorption, metabolism, and interactions of micronutrients; the impacts of genetics, infections, inflammation, gut health, and environmental factors on micronutrient status; innovations, new tools, and technologies for collecting data on micronutrient status and the global prevalence of micronutrient deficiencies; and the functional implications of both deficiency and excess.



A photograph of a man in a brown suit and pink shirt, speaking at a podium. He is gesturing with his right hand. The podium is decorated with flowers. The background is dark blue.

## Track 2: Efficacy and Safety of Micronutrient Interventions

Track 2 provided results of recent studies on the efficacy and safety of micronutrient interventions. Delegates had the opportunity to attend 10 concurrent sessions to explore topics such as the impact of interventions on nutritional status and functional outcomes, including women's nutrition and cognition; the dosages, duration, and frequency of micronutrient delivery; and adverse effects and risks of overexposure to micronutrients.



## Track 3: Program Implementation and Effectiveness

Track 3 sought to bridge the gap between evidence and implementation to help make micronutrient interventions more scalable. It featured nine concurrent sessions that addressed a wide array of topics, including dietary patterns, nutrient intakes, food safety, and resilience. These sessions explored advances in food fortification and biofortification; the use of modeling tools and dietary data for program design and implementation; and insights from implementation science, specifically as applied to multiple micronutrient supplementation (MMS). The sessions also included discussions on innovative program models; monitoring, surveillance, and evaluation for program improvement; and valuable lessons from country programs.



A man with glasses and a blue blazer is speaking into a microphone on a stage. He is gesturing with his right hand. The background is dark and out of focus, showing other people seated in the audience.

## Track 4: Designing Enabling Environments for Micronutrients

Track 4 broadened the scope of the program to include discussions on global, regional, and national policy considerations; financing; partnerships; climate change; communications; and advocacy. Topics covered in this track's 11 concurrent sessions included the impact pathways for climate change and nutrition resilience; the interdependence of micronutrient nutrition and community resilience; micronutrient security as a human right; strategies for shaping markets for micronutrients and nutrition; the investment case for nutrition; multisectoral engagement for nutrition and resilience; the cost-effectiveness of interventions at scale; responsible policies and business models; and effective leadership, communication, capacity development, and advocacy.



# PROGRAM IN NUMBERS



Track 1:  
Micronutrient  
Biology & Status  
Assessment



Track 2:  
Efficacy & Safety  
of Micronutrient  
Interventions



Track 3: Program  
Implementation &  
Effectiveness



Track 4: Designing  
Enabling  
Environments for  
Micronutrients







**148 hours**  
of recorded  
content

**9**  
Plenaries

**39**  
Concurrent

**46**  
Sponsored

**17**  
Learning Centers

**39**  
Meet the Experts

**677**  
Posters



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# CROSS-CUTTING THEMES

## Scaling up proven micronutrient interventions

Although recent decades have brought progress in implementing and scaling up evidence-based micronutrient interventions, micronutrient deficiencies remain widespread. It is clear we need to improve the quality and coverage of implementation to deliver proven micronutrient interventions to many more people and accelerate scale-up to hard-to-reach populations. Our scale-up efforts must focus on micronutrient interventions shown to be efficacious and effective. We need to pursue intentional and planned collaboration, including with professionals working outside nutrition. And we need to drive impact by getting more money for nutrition and more nutrition for our money. For maximum impact, more and better-quality data are needed to inform where limited resources should be invested.

## New and emerging evidence

Promotion of exclusive breastfeeding for children up to six months of age and continued breastfeeding through two years of age and beyond is one of the most efficacious and effective nutrition interventions. We have little information, however, on the nutrient composition of breast milk, though it is likely that the concentrations of nutrients are highly variable and context-specific. The MILQ study aims to fill this knowledge gap and establish reference values.

The wide-ranging success of large-scale food fortification shows how a systems approach—drawing on health, food, and social protection systems—is working to successfully address micronutrient deficiencies. Public health data are being used to analyze the problem, with unparalleled access to fortification data on the Global Fortification Data Exchange (GFDx), and global and national health agencies, such as the Food Safety and Standards Authority of India have improved quality and reach by adopting standards and resolutions for mandatory or voluntary food fortification. Incentives and technical support have increased food industry participation in fortification. And social protection systems are distributing fortified foods to vulnerable groups who lack access to markets.

The successful scaling up of universal salt iodization helped reduce the number of countries with insufficient iodine status from 113 to 21 over three decades. Unfortunately, this progress has led to complacency, and in some countries iodine deficiency is on the rise again.

The widespread adoption of biofortified crops following 20 years of biofortification investments by HarvestPlus has been stimulated by robust evidence for improved nutritional status and functional outcomes, as well as economic incentives, such as higher yields for zinc-biofortified beans. Over 100 million people in farming families now eat biofortified foods, and many millions more have access to biofortified foods through markets.



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Now, longstanding experience with vitamin A or iron-folic acid supplementation (IFAS) has provided valuable lessons on how to strengthen health services, build capacity, and ensure the commodity supply chain for relatively new interventions such as MMS for pregnant women and small-quantity lipid-based supplements (sq-LNS) for young children.

## Next Steps

The road map to scaling up promising interventions includes the same key steps that have led to effective national scale-up of existing interventions.

- Build a consensus around robust evidence on the scope of the problem and appropriate solutions, using data-informed policy and program decision-making.

- Advocate with one voice for policy change and investments, including highlighting the economic benefits of micronutrient interventions as part of a multisectoral nutrition approach.
- Ensure a sustainable supply chain of micronutrient commodities by creating a global and national enabling policy, strategy, and regulatory environment, including adoption of global product standards, subsidies or tax exemptions, investments in regional production capacity, and advance procurement commitments by governments and donors.
- Design context-specific programmatic approaches, taking a consumer-centered approach to improve the acceptability, affordability, awareness, and availability of interventions. Adjust implementation as needed to optimize adherence, coverage, and impact.
- Strengthen public delivery platforms across systems, such as the food, health, education, and social protection systems. Include nutrition in universal health care.
- Engage, incentivize, and regulate private sector involvement to produce affordable nutritious foods. Collaborate to bring in new skills and innovations that can help address malnutrition, and provide practical implementation guidance.



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## Powering women's and adolescent girls' nutrition

At every stage of life, women and girls have nutritional needs that they are often unable to meet owing to long-standing gender inequalities across social, political, and economic domains. As a result, 1.2 billion women of reproductive age globally are estimated to suffer from deficiencies in one or more micronutrients, with serious consequences for their health and productivity, as well as for the well-being of their families. In the current context of crisis upon crisis, empowering women and investing in their nutrition will have a multiplier effect on the resilience of women, their families, and their communities.

### New and emerging evidence

Recent research sheds light on the causes and consequences of micronutrient malnutrition for women and adolescent girls. Socioeconomic factors, cultural practices, and gender inequalities have been shown to be key determinants of the nutritional status of women and girls. We have also learned more about the role of women's and girls' nutrition in promoting maternal health and in supporting cognitive development and preventing noncommunicable diseases (NCDs) in their children.

Evidence-based interventions—ranging from community-based initiatives providing nutritional education and supplements to pregnant women, to national campaigns promoting healthy eating habits—have had positive impacts. Examples include comprehensive approaches to reducing wasting

and anemia among adolescent girls in Nepal and integration of water, sanitation, and hygiene (WASH) into school curricula. A human-centered design approach, combined with social behavior change, was shown to improve adherence to IFAS among women and adolescent girls. New research also points to the effectiveness of specific micronutrient interventions for women and girls: providing pregnant women with MMS improves birth outcomes over IFAS, and early postpartum thiamine supplementation has positive effects on infants' cognitive development and language skills. The [MMS Cost-Benefit tool](#), developed by Nutrition International, offers guidance to governments on the decision to transition from IFAS to MMS.

The success of these interventions depends, in part, on bringing together governments, NGOs, and the private sector to create an enabling policy environment for sustainable change. The newly adopted [World Health Assembly \(WHA\) resolution on large-scale flour fortification](#) with folic acid and other micronutrients for the prevention of neural tube defects and micronutrient deficiencies is a good example how cross-sectoral advocacy can help create an enabling environment.





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## Next Steps

- Fill knowledge gaps to inform interventions. Focus research on understanding the specific nutritional needs of diverse demographic groups, including women and girls; analyzing the impact of cultural practices; and unraveling the long-term effects of undernutrition on women's health.
- Advocate for comprehensive nutrition policies, and tailor nutrition policies to the unique needs of women and girls, considering cultural, economic, and social factors.
- Scale up successful nutrition programs targeted to women and girls. Interventions that have been shown to improve the nutrition of women and girls, such as nutrition education and MMS, should be adapted to local contexts, be accessible, and engage and empower communities.
- Strengthen monitoring and evaluation. Robust gender-disaggregated data collection and analysis enable evidence-based decision-making and allow practitioners to refine programs and policies to maximize their effectiveness for women and girls.
- Raise awareness of women's and girls' nutrition by launching advocacy campaigns and mobilizing support from governments, civil society, and the private sector.



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To strengthen our nutrition resilience, we must transform our food systems, invest in agro-ecological and local practices, scale up cost-effective nutrition interventions, engage civil society and young people, prioritize women and girls in all decision-making processes, and honor our commitments to nutrition...prioritizing these principles can ignite change and create a future where nutritious food is a right, not a privilege."

*-Alexandra Newlands, Head of Scaling Up Nutrition Civil Society Network*





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## Improving and expanding micronutrient data

Timely, context-specific, and high-quality data are critical to make informed decisions that appropriately target interventions.

Unfortunately, few countries have recent data on the micronutrient intake or status of their population that would reveal the extent of micronutrient deficiencies and suggest how to design effective interventions to combat them. As a result, interventions often do not have the desired impact and may fail to reach the most vulnerable populations. The lack of data also hinders efforts at the global level to assess the extent of micronutrient deficiencies and make it difficult to advocate for their inclusion in global and local agendas.

### New and emerging evidence

Several recent advances that will better support micronutrient data have emerged. First, we have a better understanding of improved reference values and cutoffs for micronutrient deficiencies. This is especially important for clarifying what is defined as “healthy.” For example, physiologically based serum ferritin thresholds are informing the need for higher standards of iron deficiency among non-pregnant women. The World Health Organization (WHO) will publish updated guidelines for measuring anemia status, focusing on young children, pregnant women, and those living at elevation. For some neglected micronutrients—such as thiamine, riboflavin, and vitamin D—little is known about the global prevalence of deficiencies, but researchers are uncovering increasing evidence of their importance for a range of health indicators.

Second, there have been important advances in the development and collection of biomarkers of micronutrient status. The use of stable isotopes, bioavailability algorithms, and biological systems models are improving assessment for iron, calcium, vitamin A, and other nutrients. New analytical tools are emerging, such as the WHO Micronutrient Survey Analyzer, the [Nutrition Data Portal](#), and the [Nutrition Landscape Information System](#). [Micronutrient Action Policy Support \(MAPS\)](#) has developed an open-data methodology for reproducible micronutrient biomarker data analysis. Artificial intelligence is increasingly being used with survey and other data to inform nutrition programming and prediction of biomarker-based nutritional status.

Finally, national-level capacity is improving. Recent surveys in Ethiopia and Burkina Faso show rich, differential results across rural and urban settings for many micronutrient deficiencies. The US Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC) have collaborated to strengthen the laboratory capacity of the Tanzania Food and Nutrition Centre (TFNC). Nine Asian countries are translating knowledge on biomarkers to develop consensus on laboratory development and survey implementation. Case studies recently published by the Micronutrient Data Innovation Alliance (DInA) from [Ethiopia](#), [Guatemala](#), and [Nepal](#) highlight importance of political commitment, investments in capacity building and surveillance systems, and alignment of micronutrient information with government priorities.

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## Next steps

The extensive research presented at the conference underscores several critical next steps in the field of nutrition and micronutrient research.

- Establish and publish reference values for micronutrient concentrations in breast milk, and refine infant and maternal requirement values, particularly in complementary feeding.
- Develop harmonized methods for biomarker analysis.
- Generate more data-driven solutions, increase the availability of reliable information, address data scarcity challenges, and use untargeted metabolomics for novel biomarker identification.
- Link nutrition data with data from other sectors, such as climate change data.





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## Protecting nutrition in the face of climate change

Although ample attention has been given to the ways that climate change is threatening food systems and food security, less attention has gone to the effects of climate change on human nutrition. With accelerating climate change disruptions, the micronutrient value of many nutritious foods will be reduced, and crop yields and food production will be limited. At the same time, climate change-induced rises in the prevalence of vector- and water-borne diseases may increase human micronutrient needs, while extreme heat events are increasing the risk of adverse pregnancy outcomes and malnutrition.

Increasing people's nutrient resilience in the face of climate change raises several issues. Current food systems do not provide stable and affordable access to all nutrients, and diverse, healthy diets are unaffordable for an estimated 3 billion people globally. Animal-source foods—fish, meat, eggs, and dairy products—can be an important part of nutritious diets, but animal agriculture is also a significant source of greenhouse gas emissions.

### New and emerging evidence

Climate change and malnutrition are two of the greatest challenges to sustainable development. Furthermore, climate change is a threat multiplier, escalating social, political, and economic tensions, mainly in low- and middle-income countries.

In addition, evidence shows that women are more likely than men to be disproportionately affected by both climate change and malnutrition because of societal gender roles and systematic gender inequities in access to resources or services.

There are multiple entry points for potential positive impact on nutrition and climate outcomes across four systems: agrifood systems, water systems, social protection systems, and health systems.

Food systems produce about 30% of greenhouse gas emissions, underlining the need to change the way we produce, consume, and finance food. Although climate finance totals about \$660 billion a year, only \$28 billion of that amount goes to agriculture and food. In addition, 90% goes to climate change mitigation, and only 10% goes to climate change adaptation, with little of that adaptation financing going to the countries experiencing repeated shocks. We need to be able to find better solutions for the most-affected people.

A new key initiative is the Vision for Adapted Crops and Soils (VACS), by the U.S. Department of State, the Food and Agriculture Organization of the United Nations (FAO), and the African Union. VACS aims to boost agricultural productivity of traditional and indigenous, nutrient-rich crops by developing diverse, climate-resilience crop varieties and building healthy soils.

As evidence emerges, several critical research gaps persist. More research is needed on climate change in relation to the entire food system, including the middle (logistics, processing, and wholesaling) stages, as well as on the contribution of climate change to nutrition-related health outcomes, especially in vulnerable populations. Research in these areas should identify inflection points or levers for intervention, incorporate complex dynamics and feedback loops, characterize trade-offs, and be applied in context-specific, localized ways for decision-making.

## Next steps

- Strengthen the links between the climate change and nutrition communities, particularly at key global moments, such as the UN Climate Change Conference.
- Prioritize interdisciplinary research gaps that address the two-way links between climate change and nutrition.
- Develop interdisciplinary research teams to produce policy-relevant evidence for resilience and mitigation and identify linkages between beneficial climate change and nutrition outcomes.





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In the intricate tapestry of the global crisis, the intersection of malnutrition and climate change present a very urgent and complex challenge. An integrated approach where nutrition is considered alongside climate in policy, budgetary, and financing decisions offers a pathway towards healthier, more resilient populations and economies. I count on all of us coming together to address nutrition and climate in an integrated way.

*-Afshan Khan, UN Assistant Secretary-General, Coordinator of the Scaling Up Nutrition Movement*



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## Strengthening system resilience in a time of polycrisis

The recent polycrisis—the combination of the COVID-19 pandemic, conflicts, and a global food crisis—has demonstrated how easily systems delivering nutrition services and interventions can be disrupted, with devastating impacts on access to healthy and nutritious diets and on the nutritional status of the most vulnerable and marginalized populations. Moreover, current food systems fail to provide safe foods and healthy diets, and they drain planetary resources in an unsustainable way.

### New and emerging evidence

The pandemic demonstrated the importance of strengthening systems resilience and safeguarding the delivery of nutrition services. Success factors include community involvement in screening for and delivering interventions, swift decision-making by government authorities, sharing of management information systems across systems, and the use of innovative technologies to target and reach beneficiaries.

Multisectoral collaboration can be used to help improve people's dietary intake and nutrition. Strategies include combining diversification of agricultural production with women's empowerment, using human-centered design and social marketing to encourage healthier eating practices and food choices, and leveraging social assistance programs to improve intermediary nutrition outcomes such as dietary diversity.

The use of precision fermentation and alternative protein sources, climate-resilient crop varieties and hybrids, regenerative agriculture, and agroecological practices have the potential to sustainably increase productivity while reducing food waste and postharvest losses.

Other new or promising approaches have emerged. Foodomics, which measures all components in foods through analytical and computer technologies to complement food databases, can help define healthy foods and healthy diets, make recommendations on the different stages of the food system, and explain how different food practices influence food quality. The One Health approach recognizes that the health (and nutrition) of humans, domestic and wild animals, plants, and the wider environment are closely linked and interdependent. The food systems infrastructure index measures countries' capacity to move products from the field to the consumer. This infrastructure includes agricultural, processing, market, storage, and waste infrastructure. Finally, regional initiatives have strong potential to strengthen systems resilience, as demonstrated by the Learning Network on Nutrition Surveillance (LeNNS), which facilitates learning and strengthens capacity in nutrition surveillance in eight countries in Africa.



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## Next steps

- Transform the systems that deliver nutrition-related services (food, health, WASH, education, and social protection), and strengthen their resilience so they can adapt to the changing environment. Ensure that systems can absorb shocks, adapt with incremental adjustments, and transform to achieve lasting structural changes that enhance nutrition resilience.
- Pursue cross-system and cross-sectoral collaboration by generating political will, building trust, creating consensus, and engaging in transparent communication.
- Involve women in building more resilient systems. Provide the resources that women need to build their own collective power to improve food systems, using innovative finance such as nutrition or gender equality bonds.
- Engage young people as co-creators and implementers of projects and programs.
- Invest in nutrition-resilient systems and programs across humanitarian and development programs to protect and maximize nutrition gains in the near and long term.



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## Nutrition resilience financing

Donor funding for nutrition is declining just as financing needs are soaring owing to unprecedented food and nutrition crises. Nutrition financing for humanitarian assistance is urgently needed to save lives, while longer-term development resources are essential to strengthen national systems that nourish vulnerable communities. Safeguarding the future of a generation of children born into an era of crises demands new ways to bridge humanitarian-development budgets and actions. This includes funding to strengthen the resilience of systems that can ensure the delivery of critical nutrition interventions and services before, during, and after crises.

### New and emerging evidence

The financial cost of responding to repeating crises is depleting resources and hampering the ability of governments to mobilize new resources. Funding shortfalls limit the amount of emergency assistance provided. Nutrient-dense products are typically more expensive for humanitarian agencies to provide, leading to difficult choices between providing optimal nutrition and maximizing coverage of the population in need.

Development and humanitarian assistance and funding flows should be complementary, operating as part of a continuum of support to systems, communities, and individuals. There is an urgent need for adequate development assistance so that humanitarian assistance can be reserved for response to shocks.

At the same time, efforts to build resilience are viewed as development rather than humanitarian activities. This has resulted in missed opportunities for aligning resilience efforts and emergency responses and for allocating emergency funding to livelihood activities.

In 2017 the World Bank created an investment framework for nutrition and estimated a need of \$70 billion over 10 years—a small amount when considered in a global context. On top of this, Standing Together for Nutrition (ST4N) estimated that \$44 billion would be needed to address the nutrition challenges stemming from the COVID-19 pandemic. Now the Bank is updating the framework to add new interventions, including packages of health, social protection, and agricultural interventions that can be scaled up. It will also include information on gender and climate change as well as assess the costs of inaction in terms of various outcomes, including years lost of schooling and economic productivity losses.

Some innovations in financing are already underway. The VACS initiative and the International Fund for Agricultural Development (IFAD) have developed a crowdsourcing platform to invest in long-term sustainable investments in climate smart and nutrition-sensitive agriculture. [The Child Nutrition Fund](#), led by UNICEF, is bringing together governments, donors, and partners to mobilize historic levels of funding to prevent, detect, treat, and ultimately end child wasting.



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## Next steps

- Advocate for packages of interventions that deliver broad nutrition solutions, with their overall cost clearly identified.
- Commit to delivering more nutrition for existing funding; this entails actions like adopting better financial management and implementing financial reviews to help set priorities.
- Pursue innovative financing sources as domestic funding and official development assistance (ODA) become more constrained. Such sources could include nutrition-linked bonds, repurposing of harmful agricultural subsidies, and tax and fiscal policies designed to reduce demand for sugar-sweetened beverages and ultra-processed foods.
- Encourage responsible private sector investment in healthy foods, including by large-scale food producers.
- Donors must recognize the need for flexible financing as shocks and crises arise and change.
- In crisis responses, sequence and layer humanitarian responses with development activities, working together across departments. Layer resilience solutions based on levels of risk and financing pathways.



“

I want to make a strong plug for innovative financing. Innovative financing for nutrition has not been mobilized. As mentioned in the sixth recommendation, [of the Way Forward Statement] the traditional modes of finance have failed us, we collectively need to look at new opportunities for raising new monies for nutrition, but also delivering more nutrition for the money.

*-Meera Shekar (Global Lead Nutrition, World Bank)*





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## Pushing the boundaries: Highlights of new research and innovative solutions

A number of promising new research approaches and interventions for understanding and addressing malnutrition in all its forms were showcased at the conference, including the following:

- Recent research shows that certain micronutrient deficiencies are strongly associated with NCDs. For example, recent studies have shown that zinc deficiency is strongly linked to the genesis and progression of type 2 diabetes and cardiovascular disease. However, more work is needed to determine whether micronutrient interventions can be used as double-duty interventions in communities experiencing the double burden of deficiency and metabolic diseases.
- To advance progress toward food on demand, researchers are exploring the use of 3D printing to craft personalized, nutritious food. This technology holds promise as a cost-effective, sustainable, and waste-reducing approach that could help meet the needs of, for example, people who require particular diets or people in space.
- Microbiome researchers are looking at how tools like prebiotics, probiotics, and fecal microbiota transplants can tackle micronutrient deficiencies by enhancing bioavailability.
- Going beyond conventional food biofortification, agricultural researchers are studying how to make staple crops more nutrient dense by using micronutrient fertilizer to improve soil quality. Efforts to increase folic acid content in staple crops through agronomic, breeding, and metabolic engineering are also yielding promising results.
- Genomic research sheds light on the complex interplay between nutrient deficiencies and DNA integrity. Preserving DNA integrity demands careful dietary choices, underscoring the need for dietary reference values to prevent DNA damage.
- Multiomic approaches, encompassing proteomics and metabolomics, can play a crucial role in identifying populations at risk for micronutrient deficiencies. Personalized micronutrient therapy, which considers individual needs and micronutrient-protein associations, is paramount for maintaining optimal health.

These and many other emerging technologies and strategies presented at the 6th Global Conference underscore the significance of innovation, research, and unconventional partnerships in the global effort to combat malnutrition.

# THE WAY FORWARD

At the closing ceremony themed, “A Road to Resilience,” the Forum issued a Way Forward Statement. This statement is based on a comprehensive synthesis of the evidence presented in the conference program and reflects consultations with more than 50 scientific, program, and policy experts.

The full statement outlines six evidence-based recommendations for immediate action:

1. Scale up proven and cost-effective micronutrient interventions across food, health, and social protection systems.
2. Drive more equitable and well-nourished futures for women and girls.
3. Accelerate generation of data and evidence for impactful decisions and action.
4. Join forces with the climate sector to leverage and amplify shared agendas and solutions.

5. Invest in nutrition resilient systems and programs across humanitarian and development programs to protect and maximize nutrition gains in the near- and long-term.
6. Accelerate the mobilization of financing for food and nutrition security.

This evidence-based policy tool aims to support the efforts of advocates and civil society stakeholders as they urge funders, policy makers, and leaders to increase investments in nutrition interventions during significant global events such as COP28 and the upcoming Nutrition for Growth Summit. Importantly, the statement has already received endorsements or support from the governments of Ethiopia, France, and Pakistan as well as from leaders of multilateral organizations, including the COP28 Presidency, the Scaling Up Nutrition (SUN) Movement, and the SUN Civil Society Network.





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The opportunities that we can use as an outcome of this conference at a national, regional, and global levels are many...The road to resilience is challenging, but I am hopeful it is doable if we work together.

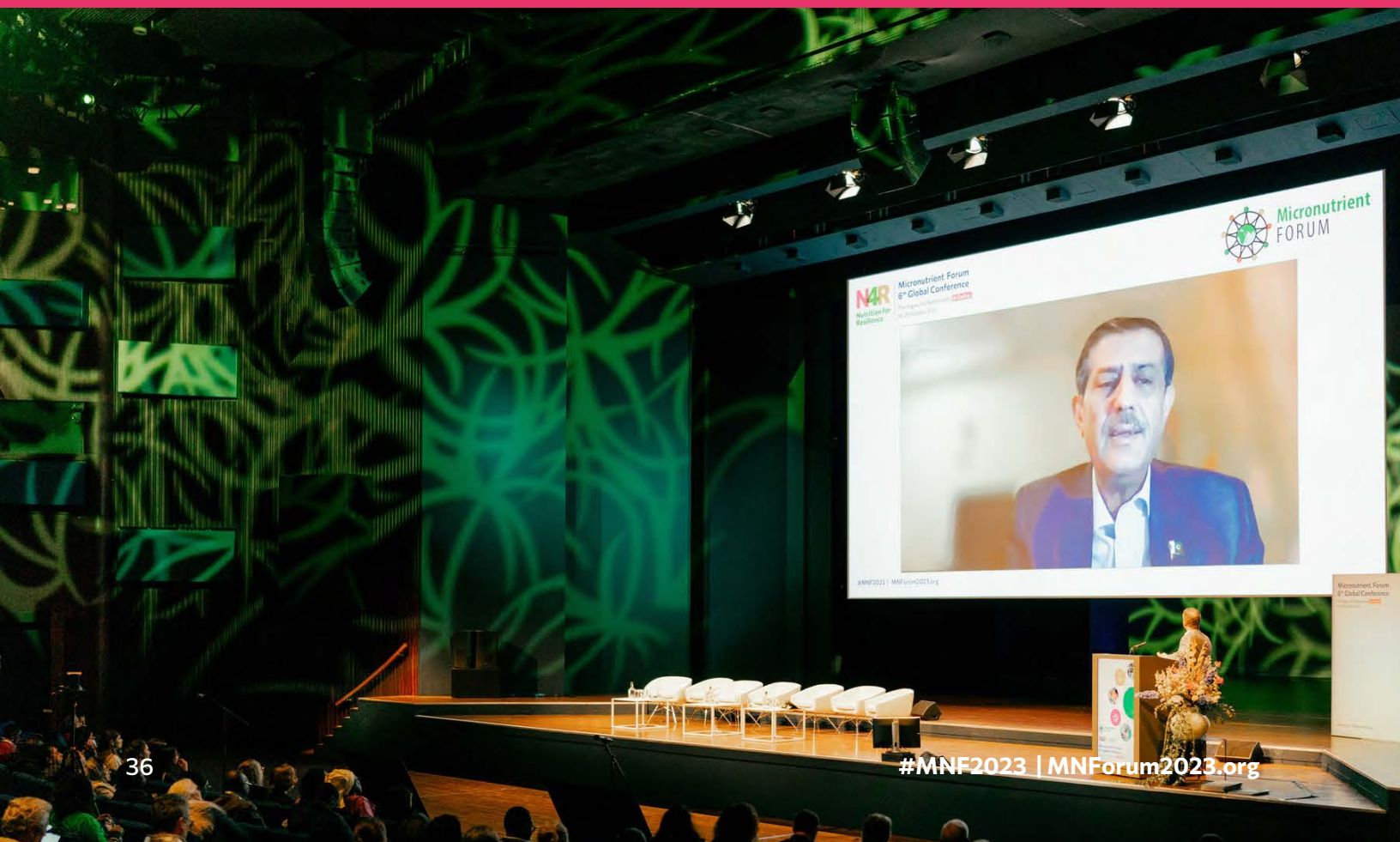
- H.E. Lia Tadesse, Minister of Health, Government of Ethiopia



“

We shall take the recommendations made with full zeal and enthusiasm by engaging all the stakeholders, especially the government institutions, to take steps to align these with SDGs targets. Furthermore, The Government of Pakistan has currently marked these initiatives as top of the agenda in negotiations with development partners and UN agencies.

- Baseer Khan Achakzai, Director General, Ministry of National Health Services, Regulations and Coordination, Pakistan





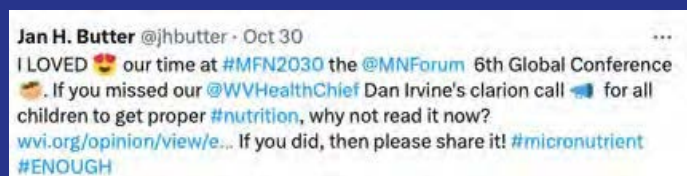
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“The recommendations from the Way Forward Statement will continue to contribute to our collective thinking on the best way to tackle malnutrition. We must promote better integration of gender in development policies and programs related to nutrition. And it is a commitment of our feminist foreign policy that France has adopted since 2018.”

*- Christophe Guilhou, Director of Sustainable Development of Ministry of Europe and Foreign Affairs, France*



# #MNF2023 REFLECTIONS





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The two plenary sessions [on day five] were quite revealing in terms of identifying the ideas that work. The closing remarks resonated with me and I am moved to take more action to reduce malnutrition and improve the health of children, adolescents and women in Nigeria.

*-MNF2023 Survey Respondent*



# CONFERENCE RESOURCES

All registered delegates can enjoy continued access to the conference content on the virtual platform until April 2024. This includes 148 hours of recorded content, including all concurrent, sponsored, and plenary sessions, the Meet the Speaker interviews, and two learning centers.

To access the virtual platform, login using your registration email and ID:

<https://mnforum2023.org/virtual-login/>

## EXPLORE ALL THE CONFERENCE RESOURCES:

- [The Way Forward Statement](#): A road to resilience to protect and accelerate nutrition progress in an era of crises
- N4R WHITE PAPER SERIES
  - White paper #1: [Micronutrient Resilience and Climate Change](#)
  - White paper #2: [Women's Equality and Nutrition](#)
  - White paper #3: [Micronutrient Resilience, the Immune System, and the Gut Microbiome](#)
  - White paper #4: [Strengthening Micronutrient Resilience](#)
- BRIEFS
  - [ST4N brief](#) highlighting key lessons from the forthcoming Global Resilience Report
  - [HMHB advocacy brief](#) on how prenatal vitamins are one of the best bets for global development
  - [DInA policy brief](#) on how micronutrient data can drive effective policy change
- [A short film](#), produced by Cloudera and the Micronutrient Forum, on the importance of micronutrient data in the fight against hidden hunger
- Video [recording of N4R teaser webinar](#), cohosted by the Forum and the SUN Movement
- Conference [highlight reel](#)





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