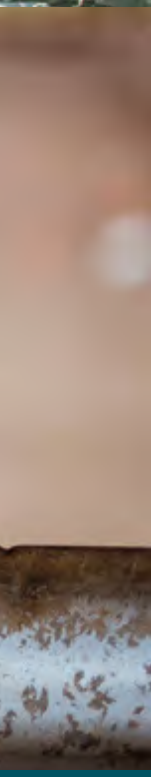
NESTLÉ
FOUNDATION
for the study of problems of nutrition in the world

REPORT 2025



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PRESIDENT'S MESSAGE

The year 2025 was marked by profound global challenges. Support for vulnerable populations declined sharply as major political powers increasingly prioritize military engagement over humanitarian and development assistance. Against this backdrop, child malnutrition remains a persistent and evolving crisis. Current estimates of stunting, wasting, overweight, and underweight signal that the world is not on track to meet the goal of halving child malnutrition by 2030. UNICEF reported that in 2025 approximately 150 million children were living with stunting, 42 million with wasting, and 35 million with overweight, often in combination with stunting. While wasting and underweight have continued to decline, the troubling rise in stunting highlights shifting patterns of malnutrition whose drivers urgently require deeper scientific understanding.

Regional disparities endure. Southern Asia and sub-Saharan Africa continue to show the highest prevalence of malnutrition, while Asia carries the largest absolute numbers, including the world's largest population of children living with overweight. The consequences are profound: stunting is linked not only to impaired growth, but also to cognitive deficits, gut dysbiosis, endocrine disruption, anaemia, and increased risk of chronic diseases later in life.

For decades, the Nestlé Foundation has worked to address these challenges by supporting locally grounded research on the mechanisms of malnutrition as well as the development of context-appropriate interventions. Our work spans diet patterns and food environments, child nutrition and school meals, anaemia and micronutrient

deficiencies, breastfeeding and maternal nutrition, the consumption of ultra-processed foods, and the development of climate-resilient and healthy diets. We have also invested in strengthening local scientific infrastructure, building leadership among local principal investigators, and designing funding mechanisms that leave lasting research capacity in the communities we serve.

As we look to the future, it is clear that malnutrition is no longer defined solely by scarcity. Inequality, fragile food systems, shifting diets, and climate pressures increasingly shape the nutritional landscape. These realities call for a new generation of research: bold in vision, interdisciplinary in approach, and rooted in local solutions. The Nestlé Foundation therefore calls for a renewed global commitment to protecting and expanding nutrition research, particularly in settings where resources are scarce but the potential for transformative impact is greatest. We remain dedicated to supporting rigorous and independent science, and to fostering partnerships that strengthen local capacity and leadership.

The Nestlé Foundation remains deeply committed to enabling progress in global child nutrition. By advancing locally led research, reinforcing research ecosystems, and ensuring the translation of evidence into effective action, we aim to help build a future in which every child can grow, learn, and thrive. **The path to 2030 is narrowing, but it is not closed.** With renewed ambition and shared determination, we can still transform the lives of millions of children and ensure that good nutrition becomes not a privilege, but a universal foundation for health and opportunity.

Petra S. Hüppi
President

DIRECTOR'S MESSAGE

As we look back on an inspiring and truly dynamic year for the Nestlé Foundation, I'm thrilled to share some of the key milestones that highlight both the continuity of our mission and the bold transformations propelling our global leadership in nutrition research.

A new home for the Foundation

In 2025, we moved from our long-standing office at Place de la Gare 4, 1001 Lausanne to our new domicile at Avenue de Rosemont 5, 1006 Lausanne. This relocation represents far more than a change of address; it symbolizes our commitment to growth and innovation as we continue to support impactful research worldwide.

Innovation in grant management

Continuous improvement lies at the heart of the Nestlé Foundation's mission to empower researchers and institutions. This year, we took a bold step forward with the launch of our new submission platform - developed in partnership with Spheriq - for Letters of Intent (LIs) and Grants. The platform is already live for LIs, with Grant submissions following soon.

Designed to bring clarity, transparency, and user-friendliness to the forefront, this refreshed system simplifies the application process and helps applicants submit the highest-quality proposals possible. It marks a significant stride toward making our grant-making more efficient, effective, and accessible for all.

This initiative also reflects our broader ambition to help shape the future of digital infrastructure in philanthropy, a topic explored in greater depth in Stefan Schöbi's contribution to this Annual Report.

Reimagining knowledge sharing

We also relaunched our enLINK web library, elevating it with enhanced features and improved accessibility. This revitalized resource remains central to our mission: fostering knowledge exchange and strengthening evidence-based nutrition interventions worldwide.

Engaging with global thought leaders

One of the highlights of the year was an inspiring meeting with Key Opinion Leaders (KOLs) during the International Union of Nutritional Sciences (IUNS) Congress in Paris. These discussions reaffirmed the importance of collaboration and innovation in addressing global nutrition challenges.

Refreshing our identity

To reflect our evolving vision, we have refreshed our visual identity with a new logo that vividly embodies our values and aspirations.

NESTLÉ FOUNDATION
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This new emblem brings together several symbolic elements:

- **protective hands cradling a baby**, representing care and the foundation's historical commitment to maternal and child nutrition;
- **hands holding a cup of warm, nourishing soup**, symbolizing comfort, sustenance, and the importance of food as a source of health;
- **and two people connecting and embracing**, emphasizing partnership, community, and the human relationships at the core of our work.

At the heart of the design is:

- **a circle symbolizing the Earth**, underscoring our global vision and reaffirming our deep focus on supporting research and implementation efforts in the **Global South**.

This renewed visual identity accompanies our long term commitment to remain forward thinking, inclusive, and impactful.

Celebrating 60 years of impact

This year, we celebrate a truly remarkable milestone: 60 years of advancing nutrition science. A special section of this report honours six decades of dedication, collaboration, and progress. This anniversary stands as a testament to the passion and commitment of our partners, grantees, and team members, all of whom have shaped the Nestlé Foundation's journey and continue to drive our mission forward.

Honouring exceptional service and welcoming new leadership

This year also marks an important moment of transition within our Foundation Council. We extend our heartfelt thanks to **Prof. Ann Prentice** and **Prof. Dominique Darmaun**, who conclude 13 years of exceptional service to the Foundation. Their vision, guidance, and unwavering dedication have been instrumental in shaping our strategy and amplifying our impact across the globe. We are deeply grateful for their remarkable contributions.

At the same time, we are truly delighted to welcome **Prof. Wilna Oldewage Theron** to the Foundation Council. She brings a wealth of expertise, a passion for advancing nutrition research, and a strong commitment to improving health outcomes worldwide. We look forward with great enthusiasm to the fresh perspectives and leadership she will bring in the years ahead.

> **Thank you for your continued trust, collaboration, and engagement. Together, we are shaping the future of nutrition science — and creating lasting impact where it matters most.**

Thomas Hauser
Director

FAREWELL

THANK YOU

PROF. ANN PRENTICE

For those of us who were fortunate to sit on the Council of the Nestlé Foundation with her, Professor Ann Prentice's presence was a masterclass in scientific leadership, mentorship, and a humanitarian focus. Ann is a globally recognized leader in nutritional science, specializing in many areas, but specifically in bone health, micronutrient metabolism, and maternal-infant nutrition. She was the Chair of the UK Scientific Advisory Committee on Nutrition between 2010 and 2020, and Chief Scientist for the UK National Diet and Nutrition Survey (NDNS). For her services to British and global public health nutrition, Ann was appointed Commander of the British Empire (CBE) in 2024.

Ann joined the Council of the Nestlé Foundation in 2014. Her expertise, which came from a wide range of experiences and exposure, from her service in The Gambia to her direction of the Elsie Widdowson Laboratory, was invaluable. Ann was always a strong supporter of young researchers in Africa and Asia, and very sensitive to their need for start-up funds, as well as handholding during their research. She could effortlessly slice through a wordy research proposal to reach its core and extract what was needed, to make a success for that fortunate candidate. Indeed, her commitment to independent, ethical, evidence-based research ensured that the Foundation's work remained driven by public health needs. For all this, we thank Ann for her warmth, mentorship, and the gravitas she brought to Council meetings with her deep experience in global nutrition.

PROF. DOMINIQUE DARMAUN

Dr Dominique Darmaun is a distinguished paediatric gastroenterologist and metabolic researcher at the University Hospital of Nantes, France, who has been a member of the Council of the Nestlé Foundation since 2013. He is an expert in paediatric metabolism, and his work with stable isotope tracer techniques, which are safe and relatively non-invasive, to study protein and amino acid kinetics in children, is well known globally. He has leveraged his work, ranging from clinical to public health, to bridge the gap between complex metabolic science and practical paediatric care, and he applied this to the communities that needed it most, thus providing critical clinical oversight to the decisions of the Council.

Dominique is the quiet, kind, yet forceful presence that all committees need when making decisions. He was generous in his evaluations of research proposals, yet all his evaluations had the scientific rigor that was required. He was gentle and this endeared him to all in the Council. He put his critiques in a way that allowed researchers to refine their proposals and always had a soft corner for those working in underserved areas, particularly with children. He also brought the invaluable clinical acumen that was required for judging the human nutrition research proposals, and his clinical insights were very helpful for all the Council members. Indeed, his distinguished background in paediatric gastroenterology and metabolic research was particularly useful for our nutrition focus and brought the necessary technical rigor to our scientific evaluations.

WELCOME TO

PROFESSOR
WILNA OLDEWAGE-THERON, PhD RD (SA)
TO OUR COUNCIL

As a Registered Dietitian and Professor, ARC/DALRRD/UFS Co-Chair for Agro-Processing for Climate-Smart Food Systems at the University of the Free State (South Africa), and Professor Emerita in Nutritional Sciences at Texas Tech University (USA), I bring 25 years of academic teaching and research experience across three universities.

A National Research Foundation (NRF) - rated researcher in South Africa, my work focuses on household food insecurity and malnutrition in resource-poor communities, evaluating interventions such as food fortification, supplementation, nutrition education, product development, and school feeding programs. Current efforts emphasize soy applications and the nutritional benefits of legumes through education, gardening, and skills training.

Over the course of my career, I have authored/co-authored six book chapters, 149 peer-reviewed articles, and two scientific letters, and presented more than 150 papers (including 30+ invited talks) at national and international conferences.

Joining the Nestlé Foundation Council provides an opportunity to help guide its mission of supporting research in human nutrition with public health relevance in low- and lower-middle-income countries (LMICs). This role enables me to translate a career-long commitment to food and nutrition security into impactful global action by reviewing and directing research initiatives that drive sustainable change. Beyond funding world-class scientific research, the focus is on institutional strengthening and capacity building of young researchers, ensuring that Nestlé Foundation grants deliver high-quality data and lasting impact in LMICs.

A total of

367

Letters of Intent (LIs) were assessed by the Scientific Committee in 2025.

2025

PORTFOLIO OF RESEARCH PROJECTS

50

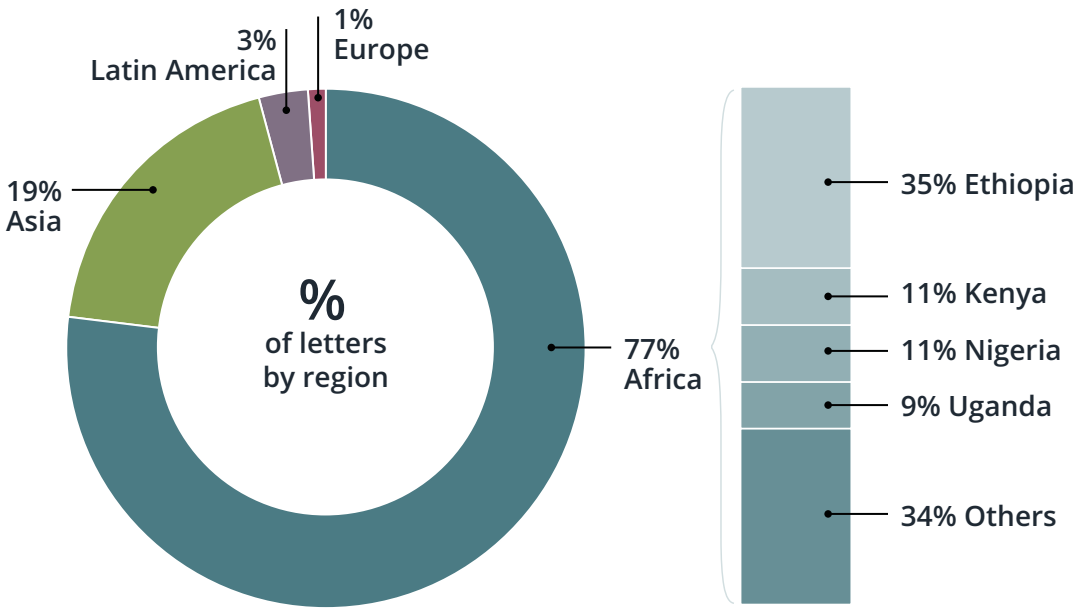
Full Grants were reviewed by the Foundation Council in 2025

and a total of

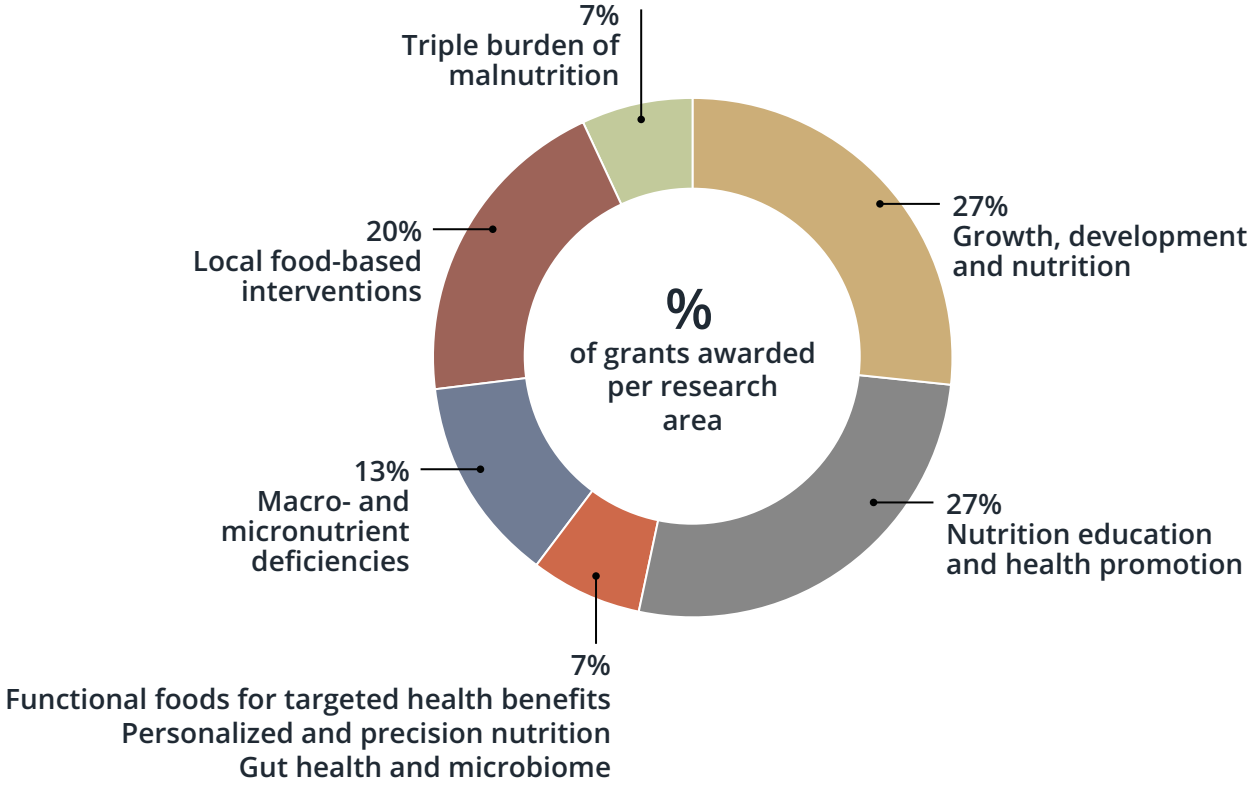
13

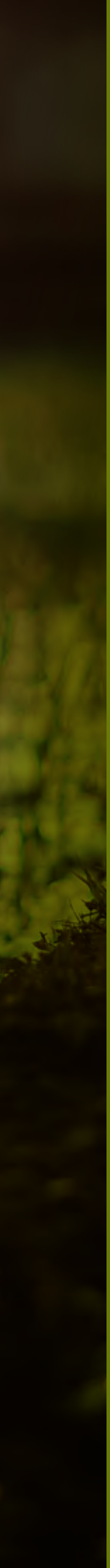
Grants were awarded.

PERCENTAGE OF LETTERS OF INTENT RECEIVED BY REGION IN 2025



PERCENTAGE OF GRANTS AWARDED PER RESEARCH AREA IN 2025





> What you do today is important, because you are trading a day of your life for it"
> Unknown

NEW RESEARCH PROJECTS

IN 2025 THE COUNCIL DECIDED TO FUND 13 RESEARCH PROJECTS.

NEW RESEARCH PROJECTS

Maternal micronutrients and infant immunity

Complementary feeding in urban Ethiopia

Nutrition interventions in Buruli ulcer

Iodized salt supply chain analysis

Iron intake and infant development

Trophic feeding outcomes in neonates

Pesticides and consumer health

Nutrition interventions and maternal anemia

Post-cesarean breastfeeding practices

Nutrition education and child nutrition

Breastfeeding optimization

School gardens nutrition

Micronutrients from fruit trees

MATERNAL MICRONUTRIENTS AND INFANT IMMUNITY

The impact of maternal micronutrient status during pregnancy on infants' immune response to early childhood infections

Hellen Nansumba, BBLT, MSc

Central Public Health Laboratories (CPHL), Uganda

$50,000

Many pregnant women in low- and middle-income countries do not get enough essential vitamins and minerals. In Uganda, about one in three pregnant women suffers from anaemia, and other nutrient shortages are also common but less well measured. These deficiencies matter because pregnancy is the period when a baby's immune system first develops. If the mother lacks key nutrients, the baby may start life with weaker protection against infections.

Children in these settings often respond less well to vaccines and face a higher risk of serious infectious diseases and death in early life. However, we still do not clearly understand how a mother's nutrition directly affects her child's immunity.

This study investigates whether the mother's nutritional status during pregnancy influences the baby's immune development. Researchers will analyse stored samples from mothers and their infants. They will compare 170 babies with weaker early immune systems to 170 babies with normal immune development. Using laboratory tests, they will measure markers of immune cell production in infants and levels of important nutrients and inflammation in mothers.

The goal is to determine whether improving maternal nutrition could strengthen babies' immune defences and help reduce childhood infections and mortality.

COMPLEMENTARY FEEDING IN URBAN ETHIOPIA

Prevalence and factors associated with unhealthy foods and consumption of sugar-sweetened beverages among children 6-23 months in urban areas of Central Ethiopia Region

Tegegn Tadesse
Tsegaye Demisse, PhD
Tafese Bosha, PhD

Hawassa University, Ethiopia

$13,389

In many low- and middle-income countries, especially in growing cities, children are increasingly exposed to unhealthy snacks and sugar-sweetened drinks at a very young age. Research shows that early consumption of these products can contribute to both immediate health concerns and long-term risks, including poor growth, overweight, and later chronic disease. In Ethiopia, however, very little is known about how often infants and toddlers consume such foods.

This project will study feeding practices among children aged 6–23 months in urban areas of Central Ethiopia. It aims to measure how common the consumption of unhealthy foods and sugary beverages is, identify the main factors that influence these behaviours, and examine breastfeeding and complementary feeding practices.

The study will include about 1,166 randomly selected children living with their mothers in six towns (Hosana, Butajira, Wolkite, Worabe, Halaba, and Durame) between May 2025 and April 2026. Trained interviewers will meet mothers in person using internationally recognized WHO/UNICEF questionnaires. They will also record children's growth measurements.

The findings will help understand why unhealthy feeding practices occur early in life and provide evidence to guide nutrition education and public health programs that support healthier diets for young children.

NUTRITION INTERVENTIONS IN BURULI ULCER

Impact of nutrition interventions in the management of Buruli ulcer

Dr Aloysius Kodjo Dzigbordi Loglo
Prof. Reginald Annan, MSc
Dr Yaw Ampem Amoako
Dr Alexander Kwarteng
Prof. Richard Phillips

Kwame Nkrumah University of Science and Technology (KNUST), Ghana

$74,800

Buruli ulcer (BU) is a skin disease that can cause long-term disability if it is not treated properly. Earlier studies have shown that giving patients food support can help them recover better. In Ghana, however, new findings show that many people with neglected tropical diseases have low levels of important vitamins and minerals. BU patients often eat very little animal protein and have low levels of zinc and vitamin C, which are nutrients needed for healing.

This project will test whether improving nutrition can help patients heal faster and better. To test this, 66 patients will be recruited from three health facilities. They will be divided into three groups: one group will receive nutrition counselling plus food supplements rich in protein and micronutrients, the second group will receive nutrition counselling only, and the third group will not receive any added nutrition support (counselling or supplements) to serve as the comparison group.

The study will measure growth, diet, and blood levels of key nutrients (iron, zinc, vitamin B12, and high-sensitivity C reactive protein) at three points in time: at the start, at week eight, and when the wound is healed. By doing this, the project aims to understand whether improving nutrition helps BU wounds heal better and increases important nutrients in the body.

IODIZED SALT SUPPLY CHAIN ANALYSIS

Chain analysis of iodized salt and determination of salt iodine concentration in the Bongo District of the Upper East Region

Jeremiah Issaka, PhD Student
Prof. Reginald Annan, MSc

Kwame Nkrumah University of Science and Technology (KNUST), Ghana

$18,958

Iodine deficiency is still a major public-health problem in many low- and middle-income countries. When people do not get enough iodine, the body cannot produce sufficient thyroid hormones, which are essential for growth and brain development. The consequences are especially serious for pregnant and breastfeeding women and for infants, as iodine deficiency can lead to learning difficulties and delayed development in children. Because these effects are preventable, improving iodine intake remains a priority.

Adding iodine to salt—known as universal salt iodization—is a simple and low-cost solution that has helped millions of people worldwide. However, in practice the program does not always work as intended. In some communities, particularly rural and marginalized areas, iodized salt may be unavailable, too expensive, or not used correctly in households. Even when it is consumed, the iodine content may not meet recommended levels.

This study examines whether iodized salt is available, accessible, affordable, and properly used, and measures how much iodine it contains in markets and homes. The results will help policymakers and public-health partners identify barriers and improve programs so that women and children receive adequate iodine and can grow and develop to their full potential.

IRON INTAKE AND INFANT DEVELOPMENT

Effect of iron-dense red teff-based porridge on anaemia and motor development of children aged 6–23 months in Ethiopia: A pilot study

Saba Desta, BSc in Midwifery, MSc
Lemma Getacher, MPH, PhD
Esuablew Tesfahun, MPH, PhD
Samuel Leulseged, MD
Mesfin Tadese, BSc
Demissew Shenkute, BSc, MSc
Abate Wondesen, BSc, MSc

Debre Berhan University, Ethiopia

$22,540

Iron-deficiency anaemia is a major health problem in Ethiopia, especially for children under two years of age. When young children do not get enough iron, they can grow more slowly and may struggle with movement, learning, and attention later in life. Traditional diets often contain too little iron, which helps explain the high rates of anaemia in this age group.

This project tests a simple, locally available solution: a semi-liquid porridge made from red teff, a widely grown Ethiopian cereal naturally rich in iron. Although red teff is inexpensive and accessible, there is little scientific evidence showing whether it can effectively improve children's health and development.

The study will take place in the Amhara Region of Ethiopia from July 2025 to June 2026 and will include 134 children aged 6-23 months. For six months, children in the intervention group will receive the iron-rich porridge at least three times per day, while a comparison group will continue their usual feeding practices.

Researchers will measure children's growth, haemoglobin levels (a marker of anaemia), and motor development skills. The results will show whether an affordable, culturally acceptable food can reduce anaemia and support early child development.

TROPHIC FEEDING OUTCOMES IN NEONATES

Outcomes of trophic feeding initiation and predictors among neonates on trophic feeding, Ethiopia

Yibelu Bazezew Bitewa
Addisu Andualem Ferede
Misganaw Fikrie Melesse
Lieltework Yismaw Wondimagegn
Dr Abiyie Zeleke Alem

Debre Markos University, Ethiopia

$49,745

Trophic feeding means giving very small amounts of milk to newborn babies—especially those born too early—within the first 24 hours of life. These tiny feeds help the baby's immature gut learn how to function. When started early, trophic feeding can improve weight gain, reduce serious intestinal infections, shorten recovery time, and support healthy brain development later in childhood.

In Ethiopia, many premature babies still die, with about 33 deaths per 1,000 live births. Although national guidelines to improve newborn survival exist, progress toward the Sustainable Development Goal on child survival remains slow. Earlier and better use of trophic feeding may help reduce this burden.

This study will follow 540 newborns admitted to the neonatal intensive care unit at Debre Markos Comprehensive Specialized Hospital over nine months. Each baby will be monitored from admission until they can take full feeding, for up to 28 days. Researchers will record survival, time to full feeding, hospital stay, weight gain, feeding problems, and intestinal complications. Information will be collected at admission, midway, and discharge.

The findings will guide improved newborn care practices, train health workers through workshops, and support larger programs to sustainably improve premature infant survival.

PESTICIDES AND CONSUMER HEALTH

Pesticides' impact on watermelon quality and consumer health

Akabassi Ghislain Comlan, PhD

University of Abomey Calavi, Benin

$20,000

Watermelon is a popular fruit with important nutritional benefits. It is low in calories and provides vitamins A and C, potassium, and natural antioxidants such as lycopene. These compounds help protect body cells and are associated with a lower risk of heart disease, obesity, diabetes, and some cancers. As awareness of these benefits grows, both production and consumption of watermelon are increasing.

To prevent crop losses caused by mites, insects, and fungi, farmers frequently apply synthetic pesticides. These products improve harvest yields but may leave chemical residues on the fruit that could reduce its nutritional quality and contribute to allergies, toxicity, and possible long-term health risks such as cancer. Because watermelon is typically eaten fresh and unprocessed, consumers may be directly exposed to these residues.

This project will evaluate how pesticide use affects watermelon quality and safety. It will compare texture and nutritional content of treated and untreated fruits, measure residue levels of synthetic pesticides, and investigate potential health effects in toxicity, allergenicity, and chronic health risks associated with consumption of watermelons containing synthetic pesticide residues. The project will also share its results with farmers, regulators, and consumers to promote safer eco-friendly agricultural practices and reduce pesticide use, supporting healthier diets and improved consumer protection.

NUTRITION INTERVENTIONS AND MATERNAL ANEMIA

Evaluation of the effect of nutrition interventions on maternal anaemia and birth outcomes among pregnant women in Ghana

Prof. Reginald Adjetey Annan, MSc
Monica Anane, PhD Student
Helina Gyamea, PhD Student
Dr Charles Apprey, BSc, PhD
Dr Herman Erick Luterodt, BSc, PhD

Kwame Nkrumah University of Science and Technology (KNUST), Ghana

$72,480

Anaemia during pregnancy threatens the health of both mother and child. In Ghana, around 51% of pregnant women are affected despite antenatal care, iron-folate supplements, and malaria prevention. Poverty, limited access to healthcare, and cultural practices often prevent women—especially adolescents—from eating adequately and seeking timely care. Previous research in the Ashanti Region showed that poor diet quality and iron deficiency are linked to low birth weight and premature delivery.

This project will follow rural Ghanaian women from early pregnancy and compare three approaches. One group will receive standard antenatal care. A second group will receive the same care together with community-based education and counselling, including home visits, to encourage clinic attendance and address cultural barriers. A third group will receive this support plus a daily beverage made from pearl millet fortified with baobab, a local food naturally rich in iron and vitamin C.

Researchers will monitor clinical attendance, anaemia status, and iron levels throughout pregnancy and record birth outcomes such as stillbirth, preterm delivery, and birth weight. The study aims to show that education and fortified pearl millet beverage supplementation can reduce anaemia and improve maternal and newborn health.

POST-CESAREAN BREASTFEEDING PRACTICES

Effect of an integrated support program on breastfeeding practices to reduce neonatal hypothermia and sepsis among post-caesarean mothers in Southern Ethiopia

Abinet Takele, MD
Tadesse Awoke, Biostatician, PhD
Kassahun Fikadu, Assistant Professor
Kidus Temesgen, MPH
Firdawek Getahun, Assistant Professor
Yonas Tattos, Senior Midwife

Arba Minch University, Ethiopia

$49,357

Every year, about 2.4 million newborns die worldwide, many from preventable causes such as low body temperature and infections. Ethiopia faces this challenge, especially after caesarean birth, when mothers often cannot start breastfeeding quickly. Early breastfeeding and skin-to-skin contact help keep babies warm, protect them from infection, and strengthen bonding. Cultural beliefs and lack of support, however, frequently delay these practices.

The proposed Integrated Support and Education Program (ISEP) will support 1,022 mothers who give birth by caesarean section in Southern Ethiopia. At key moments—from the first hour after birth to the baby's first month—mothers will receive simple guidance on breastfeeding and skin-to-skin contact proper attachment and positioning and self-hygiene practices for improving the timing and effectiveness of breastfeeding practices. Housekeeping staff will be trained to replace midwives to support breastfeeding education, ensuring continuous support for mothers. Education materials, community awareness sessions, mobile phone reminders, and a free call line will reinforce the advice.

The program aims to increase knowledge and daily practices for timely and effective breastfeeding. In addition, it aims to reduce newborn hypothermia and infection and strengthen mother-infant bonding. Results will be assessed during enrolment and again at four weeks after birth. The findings will inform scalable approaches for hospitals and communities across similar settings.

NUTRITION EDUCATION AND CHILD NUTRITION

Effects of nutrition education on the nutritional status of internally displaced school age children in Tigray region, Ethiopia: a quasi-experimental study

Kahsay Zenebe Gebreslasie, MSc, Assistant Professor
Professor Gebretsadik Berhe, PhD Student
Dr Melissa Saftner

Mekelle University, Ethiopia

$20,000

Years of conflict in the Tigray region of Ethiopia have disrupted food security and health, particularly among displaced children from the Tigray region. Despite this, little evidence exists on how best to improve the nutrition of school age children through practical education.

This project aims to examine whether teaching school age children and their caregivers in Mekelle City in the Tigray region about food can improve the nutritional status of the children. A total of 294 displaced children aged 7-15 will take part. Half will attend a structured nutrition education program, including simple workshops, discussions about balanced meals, and guidance on choosing locally available foods. The other half will continue their normal activities, allowing researchers to compare results.

Researchers will assess the children before and after the program. They will measure growth and weight, identify clinical signs of malnutrition, and evaluate nutrition knowledge and eating habits.

The study is expected to show that clear, practical nutrition education can improve children's growth, reduce signs of malnutrition, and strengthen families' understanding of healthy eating. The findings will help guide future interventions for displaced children in the Tigray region of Ethiopia.

BREASTFEEDING OPTIMIZATION

Optimizing breastfeeding practices through a baby-friendly community initiative (BFCI) in Ethiopia

Birhan Tsegaw Taye, MSc
Tebabere Moltot, MPH, MSc
Lemma Getacher, PhD, Assistant Professor
Muhabaw Shumye Mihret, PhD, Assistant Professor

Mekelle University, Ethiopia

$49,981

Breastfeeding is one of the simplest and most effective ways to protect infant health and survival. Yet worldwide, only 44% of babies are exclusively breastfed during their first six months of life. In Ethiopia, about 59% of babies are exclusively breastfed, yet many families lack adequate support, especially because more than half of all births occur at home, far from health facilities.

To address this gap, the Baby-Friendly Community Initiative (BFCI) provides practical guidance and support directly within communities, offering community driven education and support, and linking mothers with health services and trained health extension workers.

This project will test whether BFCI can improve breastfeeding practices in the rural North Shewa zone. The study will follow about 500 pregnant women, divided into two groups. One group will receive standard care, while the other will benefit from education, counselling, home visits, and follow up during pregnancy and the first six months after birth, delivered by trained health extension workers and community women leaders. Researchers will measure practices before birth and again at three and six months after delivery.

The project aims to increase exclusive breastfeeding, improve maternal and child health in Ethiopia, and contribute to global nutrition and health targets.

SCHOOL GARDENS NUTRITION

Effectiveness of school gardens on nutritional outcome in school feeding programs in Addis Ababa

Hailemichael Bizuneh, MSc, Assistant Professor

Saint Paul's Hospital Millennium Medical College, Ethiopia

$20,000

Many primary-school children in Addis Ababa do not get enough nutrients to grow well or learn effectively. About 779,000 pupils in 221 public schools depend on school feeding programmes. Yet current meals often lack variety and provide less than half of the recommended daily nutrients. One promising way to improve this is to grow food directly at school through school gardens. Some schools already have gardens, but we still do not know clearly whether they improve children's nutrition or how easy they are to implement.

This study will compare 20 schools: 10 with gardens linked to school meals and 10 without. A total of 840 children aged 6-12 will be followed over 18 months. Researchers will measure what children eat, their energy and micronutrient intake (such as iron, vitamin A and zinc), and their growth. Interviews with teachers, parents, and officials will help understand practical challenges and success factors. In five schools without gardens, a practical toolkit and training will be tested to support adoption.

The project expects school gardens to improve dietary diversity, calorie intake, and overall nutritional status. By working with education, health, and agriculture authorities and providing materials in Amharic, the initiative aims to create a sustainable model that schools can continue beyond the study.

MICRONUTRIENTS FROM FRUIT TREES

Uncovering the underutilized Indigenous Fruit Trees (IFTs) in arid areas to curb micronutrient deficiencies among pregnant women and children in Kenya

Dr Redemtor Awuor Ojwang
Maseno University, Kenya

$46,600

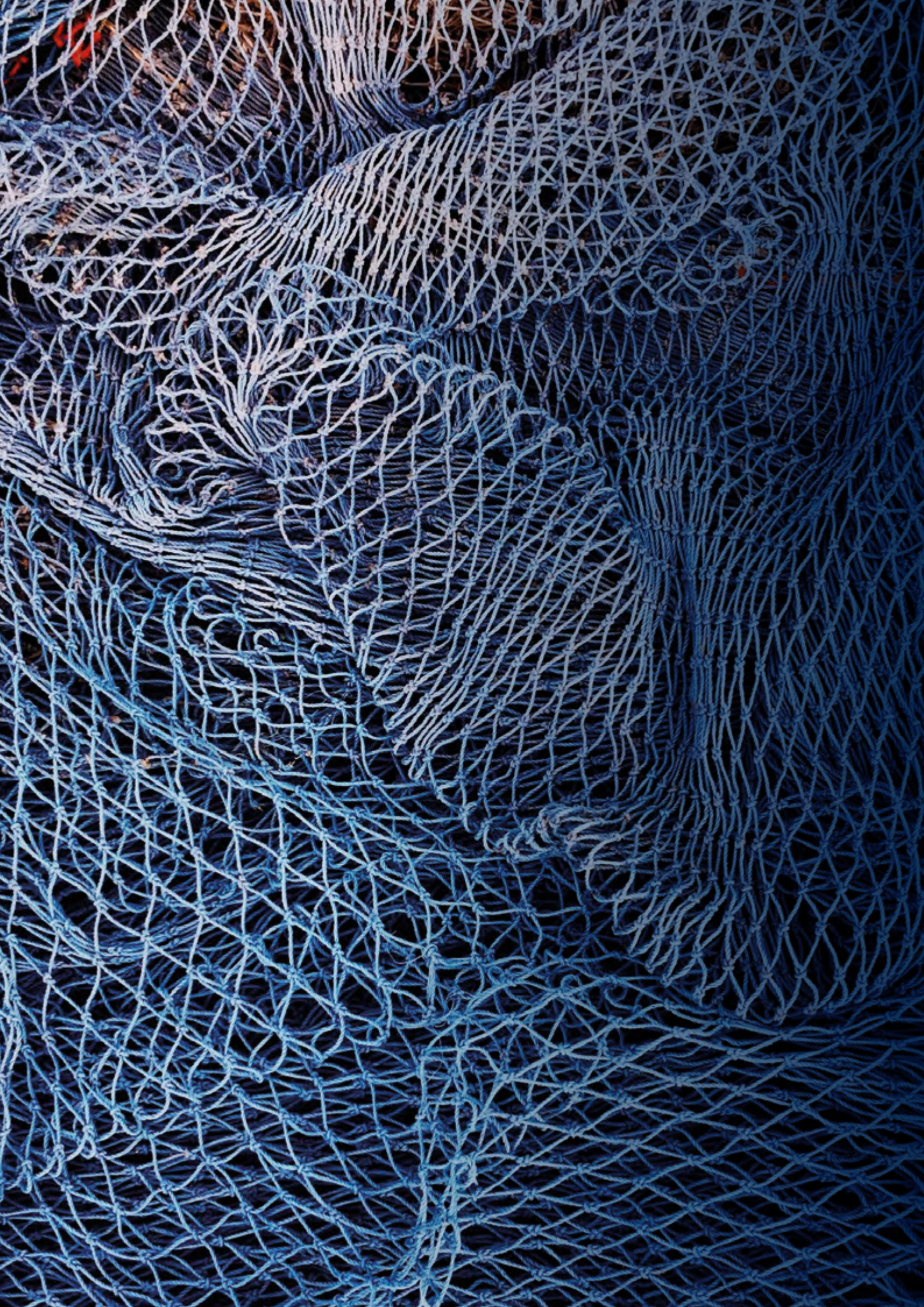
Nutrition insecurity is a major public-health concern in Africa, especially for pregnant women and young children. The World Health Organization estimates that about 222 million people in sub-Saharan Africa do not get enough food. A key problem is the lack of vitamins and minerals in daily diets. In East Africa, over one-third of pregnant women have insufficient micronutrient intake, which increases the risk of anaemia, infections and impaired child development. Fruit consumption is also very low—around 36 grams per person per day, far below the recommended 200 grams.

This project explores a practical, local solution: indigenous fruit trees. These trees naturally grow in dry and semi-arid regions and are often rich in essential nutrients. However, many are poorly known, rarely cultivated, and at risk of disappearing.

Researchers will map where these trees grow using drones, GPS field walks, and botanical expertise. They will also study soil and climate conditions to understand how the trees survive drought. Discussions with farmers, women's groups, and community elders will document traditional uses and economic value.

Finally, the most promising species will be analysed for nutritional content and resilience. The goal is to identify locally available fruits that can improve diets and health for mothers and children while supporting biodiversity and local livelihoods.

KENYA



> Half of your beauty comes from the way you speak and treat people”
>
> attributed to Imam Ali

OTHER ACTIVITIES

DEVELOPMENT OF COMPLEMENTARY FOODS

DR GUILLAUME ANTOINE BALOUCOUNE
DR FATOU KINÉ NDIAYE
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IMPACT OF THE CONSUMPTION OF FORTIFIED BISCUITS ON THE IRON STATUS OF SCHOOL-AGED CHILDREN IN RURAL SETTING IN KAOLACK, SÉNÉGAL

Anaemia is currently the most widespread nutritional deficiency globally, affecting approximately 25% of the world's population (Da Silva Ferreira et al., 2016). Primarily of iron-deficiency origin, it remains a major public health concern in low- and middle-income countries. In Senegal, 71% of children aged 6 to 59 months are anaemic (Diouf et al., 2015). According to the 2024 report of the *National Nutrition Development Unit* (CNDN, 2024), anaemia affects 29.1% of Senegalese adolescents overall, specifically 23.3% of children aged 10-14 years and 38% of adolescents aged 15-19 years. Among them, 20% have mild anaemia, 8.2% moderate anaemia, and 1.1% severe anaemia. Fiorentino et al. (2013) reported a prevalence of 14.4% among children aged 5-17 years living in Dakar. These findings highlight that anaemia continues to be a significant public health problem among Senegalese children and adolescents.

To address anaemia in Senegal, several strategies have been implemented, combining both general and targeted approaches. National programs have focused on promoting dietary diversification and the consumption of iron-rich foods while limiting the intake of iron-absorption inhibitors. Mass fortification programs have also been established, such as the enrichment of wheat flour with iron and folic acid (NS 03-052) (ASN, 2013) and the biofortification of millet and cowpea, two major staple foods in local diets. Targeted interventions have included iron supplementation for pregnant and lactating women and school-based supplementation programs for adolescents. Other school nutrition initiatives have been developed, including the vitamin and mineral fortification project in Dakar's suburbs known as "Lemateki", and the "Bon Départ" initiative, which provides weekly iron and folic acid supplements in selected high schools (CNDN, 2024). Additionally, the World Food Programme (WFP) and the Government of Senegal have launched a fortified rice program, including iron fortification, to improve school meals and strengthen nutrition. Despite these various interventions, anaemia remains a major national public health issue.

The consequences of anaemia in school-aged children are profoundly detrimental, significantly affecting their overall development. It particularly impairs cognitive abilities and motor development, manifesting as fatigue, low productivity, and reduced work capacity, which in turn lead to unsatisfactory academic performance. Moreover, anaemia can result in stunted physical growth as well as poor language coordination and motor skills development (WHO, 2017).

The causes of anaemia are multifactorial. Although iron deficiency is the most common cause of anaemia globally, its underlying factors vary considerably by geography, age group, and sex (WHO, 2017). Its multifactorial nature calls for a holistic approach to effective management. Therefore, the development of tailored and efficient intervention strategies requires an in-depth and systematic identification of etiological and predisposing factors. However, in Senegal, data on the determinants of anaemia among school-aged children remain limited, particularly in the Kaolack region.

In this context, the present study aims to contribute to improving the iron status of school-aged children in Senegal through an integrated approach designed to better understand the epidemiology of anaemia and propose locally adapted nutritional solutions.

The first phase assessed the prevalence and determinants of anaemia among 504 children aged 6-16 years living in rural areas of the Kaolack region. Demographic and socioeconomic data of households and children were collected using structured questionnaires. Dietary diversity was assessed using a 24-hour dietary recall, and anthropometric measurements (weight and height) were taken for all participants. Anaemia was evaluated based on haemoglobin levels measured using the Hemocue Hb 301 system. Logistic regression analyses were conducted to identify factors associated with anaemia, including both bivariate and multivariate analyses. Results showed that 19.72% of the children were anaemic, with a higher prevalence among those over 10 years old. This prevalence was higher than that reported by Fiorentino et al. (2013) in Dakar (14.4%) and by De Benoist et al. (2008) among African children aged 5-15 years (13.2%). It was

also higher than the 12% reported by EL Hioui et al. (2008) among rural schoolchildren in Kenitra, Morocco, and greater than the 18.6% and 11% reported among schoolchildren in Morocco and Côte d'Ivoire, respectively (Zimmermann et al., 2005). Conversely, it was lower than prevalences observed in other regions such as Filtu (23.66%), Arba Minch Zuria (37.3%), and Cape Verde (23.8%) (Gutema et al., 2014; Tariku et al., 2019).

The main factors associated with a reduced risk of anaemia were belonging to the highest wealth quintile (AOR = 0.08; CI: 0.01–0.72) and regular consumption of dark green leafy vegetables (AOR = 0.17; CI: 0.03–0.86; p = 0.032). Dark green leafy vegetables are well known for their high iron content. In the study area, moringa leaves are consumed in some households as a sauce mixed with couscous. Moringa leaves are particularly rich in iron, and their therapeutic properties are well established. Thus, the regular consumption of leafy vegetables, especially moringa leaves, could play an important preventive role against anaemia. In contrast, malaria significantly increased anaemia risk. Children suffering from malaria are six times more likely to develop anaemia than those without the disease (AOR = 6.10; CI: 1.07–34.73; p = 0.041). These findings are consistent with results reported in southern Senegal, where malaria parasitaemia was identified as one of the main causes of anaemia. It was significantly associated with anaemia in that region (AOR = 5.23; CI: 1.1–28.48) (Tine et al., 2012). These findings emphasize the need for integrated nutritional and health interventions targeting school-aged children.

The second phase focused on the development and optimization of an iron-enriched biscuit made from local raw materials, designed as an acceptable and iron-rich nutritional vehicle. Nine biscuit formulations were prepared using local ingredients (millet, maize, moringa, hibiscus, detarium, etc.) following a mixture design. Physicochemical and microbiological properties were assessed, and sensory analyses, hedonic and Just About Right (JAR) tests were conducted using a balanced incomplete block design (BIBD). All biscuits exhibited high iron content (3.8–5.8 mg/100 g), substantially exceeding that of commercial biscuits (0.4 mg/100 g). Hedonic test results indicated good overall acceptability, with mean scores ranging from 6.1 (fairly pleasant) to 7.7 (very pleasant). Based on overall liking and iron content, the optimized formulation contained 4 mg of iron per 100 g and achieved a mean hedonic score of 6.97 (pleasant).

The acceptability of the biscuits by children is a key factor in promoting regular consumption, an essential condition for the effectiveness and sustainability of a nutritional intervention. This research demonstrates the feasibility of producing foods that are both nutritionally rich and well accepted by consumers, using local resources. Such an approach contributes not only to the valorisation of endogenous agro-resources but also to the fight against malnutrition, a major public health challenge.

The third phase evaluated, through a randomized controlled trial, the effectiveness of the iron-enriched biscuit on iron status and anaemia among 496 schoolchildren in two schools in Keur Socé (Kaolack). After three months of daily consumption (100 g, five days per week), results showed a significant increase in serum ferritin (+8.82 ng/mL; p < 0.001) and a reduced risk of iron deficiency (OR = 0.59; CI: 0.36–0.96; p = 0.034) in the intervention group. Mean haemoglobin levels and anaemia prevalence also improved, although not significantly. Similarly, Rehman et al. (2025) noted that short interventions (<3 months) can be sufficient to correct haemoglobin levels among children and adolescents with iron-deficiency anaemia, without fully resolving the problem. Stratified analyses revealed significant increases in ferritin and haemoglobin among children who were not initially iron-deficient (p < 0.001; p = 0.005), with stronger effects in children aged 6-9 years. The observed effect on iron status could be attributed to the synergy between iron sources such as Moringa oleifera and absorption enhancers like vitamin C, provided by fruits rich in ascorbic acid (Adansonia digitata, Hibiscus sabdariffa, Detarium senegalensis). Several studies have confirmed the efficacy of such combinations. Cook et al. (1997) demonstrated that adding 50 mg of vitamin C to a meal increased non-heme iron absorption.

Adetola et al. (2021) showed that baobab fruit powder enhances iron bioavailability, with effects comparable to those achieved by adding ascorbic and citric acids as mineral absorption enhancers. These findings underscore the potential of iron-enriched biscuits as a promising, culturally appropriate, and well-accepted strategy for preventing iron deficiency in rural settings.

Overall, this work highlights the relevance of an interdisciplinary approach that combines nutritional sciences, food technology, and social sciences to develop sustainable and transferable nutritional solutions. It paves the way for a more systematic integration of locally fortified products into school and community feeding programs, in line with the objectives of food security and sustainable nutrition. Furthermore, this study provides both a scientific and applied contribution to the understanding and prevention of iron-deficiency anaemia among school-aged children in Senegal. It emphasizes the value of complementary foods made from local ingredients, such as fortified biscuits, as a sustainable, culturally acceptable, and context-appropriate nutritional strategy to improve iron status. These findings lay the groundwork for the broader incorporation of fortified products into national school feeding policies and programs, thereby contributing significantly to improving the health and well-being of children.

The establishment of mechanisms to support technology transfer to women's groups and small local processing units would be essential to ensure the sustainability of production. Institutionalizing these products within national nutrition security policies, supported by economic incentives such as subsidies and school feeding procurement programs, would help guarantee their accessibility and large-scale dissemination. Integrating community-based food fortification into national malnutrition prevention strategies would, in turn, strengthen nutritional resilience and promote an inclusive, sustainable, and locally rooted development model. Moreover, further studies should investigate the long-term effects of such interventions, particularly regarding cognitive performance, school attendance, and cost-effectiveness, to support their integration into national school feeding programs.

Keywords: Anaemia, Iron status, School-aged children, Biscuit, Sensory analysis, Mixture design, Senegal

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EVIDENCE FROM RURAL ZAMBIA

RETHINKING THE AGRICULTURE NUTRITION PATHWAY

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Introduction: The hungry farmer paradox

Despite significant increases in agricultural productivity across sub-Saharan Africa, mal-nutrition rates remain stubbornly high among farming communities. In Zambia, the smallholder farmers who produce 80% of the country's food paradoxically experience some of the worst nutrition outcomes, with 32% of children under five stunted nationally (Zambia Statistics Agency, 2024). This disconnect between agricultural productivity and nutrition - termed the "hungry farmer paradox" (Bacon et al., 2014) - challenges conventional assumptions about the relationship between farming, market participation, and household wellbeing. The prevailing narrative has long suggested that agricultural commercialization, which is the process of farmers selling their produce, should improve nutrition by increasing household incomes, which can then be used to purchase diverse and nutritious foods. However, mounting evidence suggests this relationship is far more complex. The World Bank has explicitly called the assumed positive relationship between commercialization and nutrition a "myth," concluding that "there is little evidence of a relationship between increased commercialization and improved nutritional status" (Christiaensen & Demery, 2018, p. 89). Our research in rural Zambia helps explain why.

Reframing the question: It's not just what you sell, but what you keep

Most studies examine whether farmers who sell crops have better nutrition outcomes than those who do not. Our research asked a fundamentally different question: Does it matter whether farmers are selling surplus nutrition (production beyond their household needs) versus selling nutrition that could have contributed to meeting their family's requirements?

To answer this, we developed a novel concept: Nutrient Deficiency from Own Production (NDOP), or the gap between what a household needs nutritionally and what they actually keep from their harvest for home consumption. NDOP can arise in two ways:

1. Underproduction NDOP: When farmers simply do not produce enough to meet their household's nutritional requirement.

2. Marketing-induced NDOP: When farmers produce enough but sell so much that what remains cannot meet household nutritional needs.

Using data from 528 households in Zambia's Mbala and Katete districts, collected during the lean season - when the effects of previous harvest decisions become most apparent - we examined how these different types of nutrition deficiency affect children's height-for-age z-scores (HAZ), a critical indicator of chronic malnutrition.

Key Findings: The Devil is in the Details

Our findings reveal why the agriculture-nutrition relationship is so complex: Using a control function approach to address endogeneity, we found that:

- A 10-percentage point increase in energy (calorie) NDOP reduced child HAZ by approximately 0.085 standard deviations.

- The negative effects were even stronger for specific nutrients: fat-specific and vitamin A-specific NDOP showed particularly strong associations with poor nutrition outcomes.

- Marketing-induced NDOP appeared to have effects as severe as or worse than underproduction NDOP.

Contrary to the assumption that farmers use income from crop sales to purchase nutritious food, we found that NDOP did not significantly correlate with the quantity or diversity of market-bought foods, and that most households with marketing-induced NDOP were not buying back nutrition from the market. When they did purchase food, it was primarily to replace calories (through staple foods like maize), not to improve dietary diversity.

In an extension analysis, we found that selling crops showed a positive association with child nutrition, but this positive effect disappeared for households without nutritional self-sufficiency from their own production. However, the benefit was nearly the same for households who only sold genuine surplus (production beyond their nutritional requirements).

Why This Matters: Social Determinants and the Limits of Market Solutions

Our findings illuminate important social determinants of nutrition that are often overlooked in agricultural development programs. The assumption that markets can seamlessly convert agricultural income into nutrition breaks down when markets are poorly integrated and households face high transaction costs (Alene et

al., 2008). Furthermore, marketing decisions are typically made by men, while women are primarily responsible for food allocation and child feeding. When production that could meet household nutrition needs is sold, this can disrupt women's ability to ensure food security, a finding consistent with research across sub-Saharan Africa showing that commercialization can undermine women's food provisioning role (Bonis-Profumo et al., 2022). Only 41% of households in our sample had ever received nutrition information. But even with knowledge, households cannot act on it without adequate production or the ability to access markets on favourable terms. Nutrition is shaped not just by individual behaviours but by the structural conditions in which households operate.

Implications for policy and practice

These results have three key implications for policy: (i) increasing agricultural productivity alone is insufficient. Programs must explicitly consider whether increased production meets household nutritional requirements before promoting market sales; (ii) the nutritional composition of what is produced, not just quantities, must be considered; (iii) reducing transaction costs through better roads, market access, and storage facilities allows farmers to sell their products strategically.

For organizations such as the Nestlé Foundation and other donors, social determinants of health are just as important as other factors like food, WASH, etc. There is still work to be done to understand better ways to make agriculture work for nutrition. While our study provides important insights, it also reveals how much we still do not know about the complex pathways linking agriculture, livelihoods, and nutrition. We need research that can answer important questions such as: how do households navigate trade-offs between selling for immediate cash needs versus retaining food for nutrition? How do intra-household dynamics and gendered decision-making shape these trade-offs? Under what conditions can markets effectively translate agricultural income into better nutrition? What combination of production increases, market improvements, nutrition education, and social protection most effectively improves nutrition?

Our research demonstrates that the pathway from agricultural production to child nutrition is neither simple nor automatic. Market participation can benefit nutrition, but only under specific conditions, primarily when households have first achieved nutritional self-sufficiency from their own production. The "commercialization improves nutrition" narrative overlooks critical social determinants: market access and functioning, gender dynamics, economic pressures, seasonal price volatility, and nutrition knowledge.

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STRENGTHENING AFRICA THROUGH NUTRITION

DR ROBERT FUNGO
President of the Federation of African Nutrition Societies (FANUS)

HOW THE FEDERATION OF AFRICAN NUTRITION SOCIETIES CONTRIBUTES TO SOCIAL AND ECONOMIC DEVELOPMENT IN AFRICA

The Federation of African Nutrition Societies (FANUS) is a voluntary, non-profit organization that unites national professional nutrition societies from African countries. Currently the federation membership stands at 21 fully registered National Nutrition Societies in Africa. Its core vision is to enhance the visibility, relevance, and functionality of nutrition societies continent-wide; strengthen their operations; and unite stakeholders to influence and promote nutrition security throughout Africa.

FANUS serves as a powerful continental platform for collective action on nutrition, with diverse African membership that brings expertise, academic rigor, and leadership to drive the platform forward. The members' combined efforts are instrumental in breaking cycles of poverty and ill-health, fostering resilient communities, and accelerating sustainable socio-economic development across Africa—aligning perfectly with the continent's aspirations for self-reliance and prosperity. This positions FANUS at the forefront of continental efforts to advance nutrition across Africa.

The Federation contributes significantly to social and economic development in Africa, and beyond, through the following key areas:

1. Combating malnutrition and improving public health (social development)

   At FANUS we coordinate efforts to address major nutrition challenges such as stunting, micronutrient deficiencies, the double burden of malnutrition (undernutrition + rising obesity/non-communicable diseases), and diet-related illnesses. For example, FANUS is a member of the Research Consortium on School Health and Nutrition hosted at the London School of Hygiene and Tropical Medicine, where we support research

efforts that enhance the use of appropriate food technologies to drive evidence-based sustainable solutions applicable to school feeding.

The work of FANUS' diverse membership across Africa includes research on food diversity, the role of locally available food in nutrition, and public health issues, thus directly supporting healthier populations. Healthier individuals lead to improved school performance, higher productivity, reduced healthcare burdens, and stronger communities—foundational pillars of social progress.

2. Strengthening nutrition governance and policy (social and institutional development)

   FANUS leads continental advocacy and FANUS conferences. For instance, the Federation of African Nutrition Societies (FANUS) conference is a major scientific gathering held approximately every four years to address nutrition, health, and food security in Africa. FANUS also engages in strategic collaborations that influence national nutrition policies, budgeting, and programs, for example through engagement with initiatives like Scaling up Nutrition (SUN). This fosters better governance, accountability, and multi-sectoral (government, academia, private sector, and civil society) approaches to nutrition—enabling countries to meet global goals like the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger).

3. Promoting food security, sustainable agriculture, and innovation (economic development)

   At FANUS we emphasize promoting locally adapted African solutions, such as utilizing indigenous foods, biofortified crops, and value addition in food processing to boost dietary quality while supporting smallholder farmers. FANUS members' academic and research contributions can help develop evidence-based interventions that enhance food-systems resilience. Stronger food systems reduce poverty in rural areas (where agriculture dominates employment), create jobs in food processing and agribusiness, lower import dependence on unhealthy foods, and increase economic productivity through a healthier workforce.

4. Capacity building and knowledge sharing

   Through FANUS conferences, webinars, and leadership training, the federation is building the next generation of African nutrition professionals. This empowers national societies to implement impactful programs locally, creating a multiplier effect on development. At FANUS we created a platform which enhances collaboration among nutrition and food science and technology professionals, helping them to identify local nutrition and health problems which can be addressed through the application of appropriate practical and technical knowledge to develop safe, affordable, sustainable, and climate-friendly solutions to the challenges of school feeding programmes in Africa

In summary, FANUS serves as a powerful continental platform for collective action on nutrition, with its multi-faceted membership and academic rigor. Our combined efforts are instrumental in breaking cycles of poverty and ill-health, fostering resilient communities, and accelerating sustainable socio-economic development across Africa.

> Children are not a distraction from more important work. They are the most important work”
>
> C.S. Lewis

VISION

DIGITAL PHILANTHROPY AS INFRASTRUCTURE

STEFAN SCHÖBI, PhD, EMBA
CEO Spheriq

Foundations make a decisive contribution worldwide—across an impressive range of issues, approaches, and contexts. Alongside the *what* of funding, meaning the thematic focus and the intended impact, increasing attention is being paid to the *how*: the processes of selection, decision-making, and exchange between funding institutions and projects. The instruments of digital philanthropy play a central role in this shift.

Philanthropy as the third sector—or, as I prefer to call it, the third force. Alongside the state or public sector, which delivers democratically legitimized services shaped by majorities and political negotiation. And alongside the economy or private sector, which is driven by market logic, creates value, fosters innovation, and keeps our societies functioning. Philanthropy is that third force which can achieve a great deal with comparatively limited resources—provided it fulfils its role well and is impact oriented.[1]

Today, this role necessarily includes being digital. More than that: *being digital in the right way*. Increasingly, the actual impact achieved by this third force depends on how confidently it practices digital philanthropy. Not in the sense of adopting new tools for their own sake, but in the deliberate design of funding processes that enable impact, foster learning, and use resources wisely.

THE "WHAT" OF FUNDING

At the heart of any funding activity lies the what. Before processes, instruments, or digital systems come into play, the fundamental question must be answered: which initiatives are to be supported, and which are not. Thematic priorities, geographic focus, and substantive objectives form the core of any funding strategy and ultimately define what a foundation stands for.

The *what* of funding is therefore specified through a set of criteria: thematic priorities, geographic scope, and mandatory or optional requirements relating, for example, to target groups, project formats, or duration. Added to this are exclusion criteria, such as the deliberate decision not to fund events or anniversary publications. Taken together, these elements form a funding program.

Many foundations operate several funding programs in parallel, each with its own thematic focus and specific criteria. This makes sense from a professional perspective and allows for differentiated funding strategies. At the same time, it creates considerable complexity for applicants, who must reorient themselves for each program, particularly in the absence of shared standards.

Transparency as a prerequisite

All of these substantive decisions are essential. Yet they remain ineffective if they are not communicated in a way that is clear, consistent and accessible. Between the *what* of funding and the *how* of its implementation lies a crucial prerequisite: transparency.

In philanthropy, transparency is not an end in itself, nor merely a matter of formal communication. It is a functional condition for funding to be effective. Only when funding programs, criteria, and expectations are understandable can projects plan realistically, set priorities, and deploy their resources in a targeted way.

Especially in complex funding landscapes, transparency determines whether applicants find orientation or invest time and energy in unsuitable applications. Vaguely formulated criteria, implicit expectations, or opaque decision-making processes do not only cause frustration; they tie up resources that are urgently needed for substantive work.

Digital systems fundamentally change this dynamic. They make it possible not only to establish transparency selectively, but to scale it. Clear funding logics, consistent criteria, and comprehensible processes can be represented digitally in a way that ensures lasting accessibility—independent of location, time, or personal contact. Transparency thus shifts from an individual practice to a structural characteristic of funding.

When processes have an impact

At this point it becomes clear that funding processes are far more than an administrative framework. They have an impact in their own right. Well-designed funding processes structure expectations, sharpen questions, and influence how projects are conceived, formulated, and implemented. They are therefore not only selective, but shaping. In other words: The cumulative effort

required for selection, steering, control, and evaluation is not neutral. It shapes how much of philanthropy's potential energy is translated into impact, and how much is absorbed by process.[2]

Digital funding processes force clarity. They require decisions about what truly matters: What objectives does a project pursue? What assumptions underpin it? Which resources are necessary, and which are realistically available? This structuring helps applicants articulate their projects more precisely and set clear priorities. At the same time, funding organizations gain a clearer picture of which approaches are viable and where expectations may be unrealistic.

In this way, capacity building does not arise primarily through additional programs or accompanying measures, but through the practice of funding itself. Better applications, more focused reporting, and consistent feedback are concrete expressions of this effect. Processes that promote clarity lead to better work, regardless of whether a project ultimately receives funding.

Simplification as a driver of impact

Digital tools entered the field with the promise of simplifying funding processes. This promise has not always been fulfilled. All too often, digital systems have generated additional complexity by merely replicating or even multiplying existing processes instead of questioning them. The decisive lever therefore lies not in digitalization as such, but in the deliberate reduction to what is essential.

Complex application and reporting requirements often serve funders more than they serve impact.[3] In contrast, lean processes increase not only efficiency, but above all the quality of engagement with the *what* of funding. Where requirements are clear and consistent, the focus shifts from formal compliance to substantive quality. In this sense, digital philanthropy is a question of design, not of tools. And simplification is not a technical detail, but a driver of impact.

Foundations do not need to be original in this regard. On the contrary, it is precisely where processes are lean, predictable, and reusable that space is created for better projects. Simplification does not mean relinquishing control but making a conscious choice for focus. It reduces waste, preserves scarce resources, and thus contributes directly to impact.

Artificial intelligence and human judgement

Artificial intelligence marks a decisive technological step for digital philanthropy. Advances in semantic understanding, text interpretation, and pattern recognition make it possible to work with complexity in new ways. Information can be connected across formats and contexts, interoperability can be achieved through meaning rather than rigid standards, and large volumes of unstructured knowledge become accessible. Used well, AI has the potential to equip people in the third sector with powerful new instruments.

Precisely here, however, lies a central challenge. Not everything that is technically possible is meaningful. In philanthropy, impact is never created by systems alone, but always by people. Decisions, trust, judgement, and responsibility cannot be automated. What matters, therefore, is whether AI-based tools help us to better understand the people behind projects, their intentions, constraints, and assumptions—or whether this human dimension is lost behind a polished technological surface. More than any other technology, artificial intelligence demands intentional design choices to ensure alignment with human values, responsibility, and purpose.[4]

Depending on how AI is designed, it can sharpen differentiation or flatten it. It can support careful reading and reflection or replace them with synthetic summaries that appear precise while concealing uncertainty. It can make complexity more legible or hide it behind convenience. Artificial intelligence thus confronts digital philanthropy with a fundamental design choice: do we use technology to deepen understanding, or to optimize away what is difficult to grasp?

This makes AI a defining test case for digital philanthropy. Its development cannot be left solely to technology companies whose primary logic is rooted in the second sector, shaped by market incentives and commercial optimization rather than by public purpose. If philanthropic organizations adopt AI without actively shaping its use, they risk importing solutions that create new problems rather than solving existing ones.

Digital philanthropy therefore requires intentional leadership in the age of AI. The task is not to deploy the most advanced technology, but to develop applications that are aligned with purpose, reinforce human judgement, and strengthen the capacity to act. Where this succeeds, artificial intelligence becomes not a substitute for human

engagement, but a means of making it more immediate, more comprehensible, and ultimately more effective.

Foundations as co-shapers of infrastructure

Funding foundations therefore have an impact not only through the projects they support, but also through the systems they establish. Every funding practice generates implicit standards; digital systems amplify this effect and make it visible.

As a result, foundations increasingly assume the role of co-shapers of infrastructure within the third sector: an infrastructure intentionally designed for philanthropy, rather than shaped primarily by markets or states.[5] Digital funding platforms, transparent processes, and consistent logics become orientation systems whose impact extends beyond individual organizations. They shape expectations, working practices, and ultimately the quality of what is funded.

For philanthropy as a third force, this entails a clear responsibility. Its impact cannot be measured solely by the volume of funds deployed or by individual success stories. It is equally reflected in the way processes, standards, and digital structures are designed to enable collaboration and foster quality.

The question, therefore, is not whether philanthropy will become digital. What matters is how digital systems are designed: whether they facilitate good work, create clarity, and promote learning—or whether they increase complexity and hinder impact. Where digital philanthropy is conceived as infrastructure, it realizes its full potential.

About the author

Stefan Schöbi has been CEO of the Swiss philanthropy platform Spheriq (formerly StiftungSchweiz) since 2022. Before that, he set up and managed the Migros Pioneer Fund, which was founded in 2012, and was most recently responsible for the entire national social commitment of the Migros Group. From 2008 to 2012 he was Head of Marketing at the Zurich University of the Arts. Schöbi studied literature, history and theatre studies in Zurich, Berlin, and Vienna and did his PhD on early modern Zurich's economic history. He holds an EMBA in Marketing from Zurich University of Applied Sciences and certificates from INSEAD and Stanford University.

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INSIGHTS AND PERSPECTIVES FROM AN AFRICAN SCIENTIST

WHAT DOES IT TAKE TO "GROW" THE NEXT GENERATION OF LEADERS IN NUTRITION IN AFRICA?

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Introduction

Growing the next generation of nutrition leaders in Africa requires reflections from a historical perspective. Nutritional science has evolved over time, in tandem with advancements in science, chemistry, medicine, and public health. Socrates (400 BC) declared that "food is medicine", thereby emphasising the centrality of food and nutrition in the sustenance of life and ensuring good health and wellbeing, whilst also preventing disease.

Our understanding of modern nutritional science stems from the work of researchers between the late eighteenth to the twentieth century. In my view, every student and aspiring leader of nutrition in the twenty-first century ought to study this history to understand how we got here, and to appreciate the inter-generational capacity building required to grow the next generation of leaders for the rest of the twenty-first century and beyond.

In the late eighteenth century, Lavoisier ("the father of nutrition") laid the groundwork for future discoveries in nutrition, through his early work testing relationships between food and metabolism and measuring human respiration. Dimitry Mendeleev's publication of a "Table of the Chemical Elements" in 1869, showing an ascending order of the atomic masses of the elements, was a revolution in physico-chemical science (Christo Balareu, 2019) which led to the elucidation of the structures and properties of various elements and compounds of nutritional importance. From the foundational metabolic studies in the late eighteenth century, nutritional science has evolved into a modern, structured field encompassing national public health and policy-focused outputs addressing the multiple burdens of nutrition-related chronic diseases and health and wellbeing-focused precision nutrition simultaneously. Unsurprisingly, training in nutrition has merged the chemical and biomedical sciences with social and behavioural sciences, and more recently leadership and advocacy have become important attributes.

Historically, students and mentees of the great scientists and pioneers have often built upon what they had been taught and their insights led to new discoveries, insights, and the innovations of nutritional science. For example, when the Dutch scientist Gerardus Johannes Mulder first described a substance in animal tissue as "protein" in the nineteenth century, it was Justus von Liebig who further advanced Mulder's work, demonstrating the importance of proteins in the diet. Francois Magendie and Jean-Baptiste Bousingault at the Collège de France and Sorbonne also focused their work on protein and agricultural science, unravelling our understanding of the types, nature, properties, roles, and factors which influence them. Now we know that in addition to their importance for growth and maintenance, proteins also function as enzymes, hormones, ionic channels, and immune markers, thus making them essential for homeostasis.

To answer the specific question about how we "grow" the next generation of nutrition leaders in Africa, the following key areas are important considerations:

- Building institutional capacity as a basis for nutrition capacity building
- A personal interest and hunger for knowledge and innovation
- Institutional strengthening and establishment of programmes with a future focus
- Deliberate and strategic mentoring systems to identify, train, and guide the next generation of scientists, practitioners, and leaders
- Collegiality and fraternity through national, regional, and global affiliations and exposure
- Deliberately targeted funding support for innovations in research, practice, and advocacy
- Future directions for nutrition and the new Nutrition Professional for Africa

1. Building institutional capacity as a basis for nutrition capacity building

No doubt human capital and expertise are essential for advancements in nutrition. However, we cannot build capacity for nutrition without developing the systemic capacities of institutions to provide the enabling environment for scientific thinking, discovery, and innovation. In reflecting upon this, I have been fascinated by historical developments in a number of well-established institutions across the world, such as Cornell University, Massachusetts Institute of Technology, the Rowett Institute in Scotland, the Dunn Nutrition Unit at the University of Cambridge, the Nutrition Unit at the London School of Hygiene and Tropical Medicine, and the Pasteur Institute in France.

Nutrition Training at Cornell University started with Home Economics in the 1910s, through the

formalisation of research in the 1940s, and the consolidation of these disciplines into a premier academic unit in 1974. Today, nutrition training is embedded in the Division of Nutritional Sciences (DNS), which celebrated its fiftieth anniversary in 2024.

Martha Van Rensselaer and Flora Rose founded Home Economics at Cornell in 1911 and built a solid foundation of training. Over the following decades, their students and mentees sustained their work. Research expansion and the high interest in nutritional science in the 1930s and 40s led to the first Cornell Nutrition Conference (CNC), held in 1938 for feed manufacturers and researchers, and a foundation for the establishment of the American Society of Nutrition (ASN) and the Society of Experimental Biology (EB). Cornell University was the first institution in the United States to establish a School of Nutrition to meet national needs, and served as a centre for graduate training and research. A federally funded community outreach programme, the Expanded Food and Nutrition Education Program (EFNEP) for low-income families, was started in 1969. This later became a cornerstone for practical training and community outreach. The Division of Nutrition Sciences (DNS) was established in 1974, a merger of the graduate school of nutrition and the department of human nutrition and food, which consolidated teaching, research, and extension activities into a single unit. Cornell's *NutritionWorks* was established in 2000 to expand training to professional development, with a new focus on precision nutrition. Over the years, notable figures have emerged from generation to generation of training at Cornell, including Leonard Amby Maynard (1915) who established extensive nutritional science and biochemistry programmes at Cornell. Maynard studied chemistry with Atwater (the founding father of nutrition in the US) at Wesleyan University and undertook research on the biochemistry of lactation and the influence of diet on milk production and composition in animals.

Today, the DNS at Cornell University is one of the largest academic units in the United States devoted to nutrition, focusing on training the next generation of leaders. They offer training to students and scholars from many countries, thus forming a critical mass of emerging nutritional scientists, experts, and leaders who continue to influence training, policy, practice, and advocacy across countries and continents.

2. Personal interest and hunger for knowledge and innovation

Growing up as a child in Ghana in the 1960s and 70s, Protein-Energy Malnutrition (PEM) or Kwashiorkor, a condition first described in the Gold Coast (Ghana) in the early twentieth century by Dr Cecily Williams, a Scottish paediatrician, was a common cause of mortality in children under five years of age. Now described as "oedematous malnutrition", it is characterised by a miserable, lethargic child with bilateral pitting oedema, hepatomegaly, skin and hair changes (the key symptom), and a puffy face. Much later, one learned of other aspects of the pathology, including molecular and immunological deficits increasing risk of infections and mortality. Longer-term risks of non-communicable disease in survivors has also been established. We also observed the so-called Marasmus, or growth failure in very skinny infants and young children with loose skin and muscle-wasting.

As a medical student, my earliest exposure to nutrition was on the maternal and child nutrition course in our third year. This subject was new and unfamiliar to medical students and doctors alike. My interest in the subject grew because I could relate to it from my childhood experience. In my clinical years, I observed how malnourished children struggled to survive. The clinical team relied heavily on the hospital dietician, who was often relied upon to prescribe a diet for the patients. I soon realised that the doctors knew very little about management of severe acute malnutrition (SAM), and were mostly treating accompanying conditions such as infections. Furthermore, laboratory tests often revealed deficiency of minerals and electrolytes like potassium. I read an article on fatty liver in malnutrition authored by Hendrickse at the Liverpool School of Hygiene and Tropical Medicine. At that time in the early 1980s, understanding of nutritional science was expanding and the nutrition-immunology-infection links were becoming clearer. Hendrikse in his paper had described "noxae" (harmful, injurious, and toxic agents that damage living organisms and tissues) or the so-called acute-phase reactants which were found to be part of the pathology of SAM. This early exposure stirred my interest in and passion for the study of nutritional medicine, which at the time in Africa was not a recognised field of specialisation.

As a House Officer, a friend who knew about my interest in nutrition shared a flyer inviting young African scholars to apply for Nestlé Foundation scholarships for postgraduate training in nutrition and child health. At the time of my application, I

had accepted and enrolled in the Master of Medical Science (Nutrition) programme at the University of Sheffield on a half-scholarship obtained from a UK Charitable Educational Trust. The condition for the Nestlé Foundation award was that it would be received in your home country. Whilst at Sheffield, I wrote to the Foundation to explain my situation. The Board considered my request favourably and approved my award, thus making me a Nestlé Foundation Scholar.

3. Institutional strengthening and establishment of programmes with a future focus

Strong institutional structures including human capital, research laboratories, a strong academic faculty, and high-quality academic programmes are necessary. The Nobel Laureate Sir Hans Krebs elucidated the tricarboxylic acid cycle (TAC) – the foundational structure of the metabolic pathways for carbohydrate, protein, and fat metabolism and within it, the roles of various minerals, vitamins, enzymes, and co-enzymes – while at Sheffield. During my time there, the Human Nutrition Unit was led by Nick Read, a world-renowned gastroenterologist. There was a strong research foundation including B-vitamin research led by Hilary Powers, and energy balance work led by my own mentor, Maureen Duggan, who had done most of her work in paediatric nutrition research in East Africa (Kenya, Tanzania) and at Ahmadu Bello University in Zaria, Nigeria. Margot Barker led work on social, behavioural, and community nutrition which was gaining global interest. Steve French, a young scholar supported by Dave Rumsey, was fast building a reputation in the new field of sports nutrition. The training programme had frequent specialist workshops led by renowned invited experts in the field of nutrition, including Michael Golding, whose work in international nutrition had included landmark work in the West Indies, Asia, and Africa, culminating in the development of the WHO Ten Steps in the Management of Severe Acute Malnutrition. These scientists were also leaders and strong advocates who inspired young scholars into research, leadership, and advocacy. Institutions in Africa should invest in building such formidable human capital with clear research pathways and focus.

4. Deliberate and strategic mentoring systems to identify, train, and guide the next generation of scientists, practitioners, and leaders

Historically, many students of the early pioneers eventually succeeded and built upon their work. Nevin Scrimshaw directed the World Hunger Program (later re-named the Food and Nutrition Program for Human and Social Development) at the United Nations University (UNU) in Tokyo, Japan for two decades from 1975, during which time he created programmes which trained and mentored over 500 food and nutrition scientists from developing countries. Notable African scholars under his tutelage were Tola Atinmo and Isaac Olaoluwa Akinyele from Ibadan (Nigeria); Ruth Oniang'o (Kenya), who founded the African Journal of Food, Agriculture, Nutrition & Development, AJFAND); Orraca-Tetteh and Sefa-Dedeh (Ghana); and Cheikh Ndiaye (Senegal). The latter became Director of the Nutrition Division of the FAO. Noel Solomons worked with Nevin Scrimshaw in Guatemala and other Latin American countries, where they made significant advances in nutrition. Similarly, Ricardo Uoay, who later led the Nevin Scrimshaw International Nutrition Foundation (NS-INF) and was President of the International Union of Nutritional Sciences (IUNS), worked closely with Scrimshaw and his colleagues at the Massachusetts Institute of Technology. Nevin Scrimshaw was the recipient of the 1991 World Food Prize, in recognition of his immense contribution to global nutrition. In South Africa, the likes of Este Vorster mentored many students who became leaders in nutrition.

My own mentors include Maureen Duggan, who taught me about nutrition research and rigor in scientific writing. Nick Read was a constant source of encouragement and guidance. As a young African physician scientist, I soon found myself building a reputation as a leader and advocate for nutrition in the UK, and more importantly, in international nutrition. Jill Davies, at London South Bank University, introduced me to Professor Emeritus John T. Dickerson of Cambridge and later Surrey University in 1994. They introduced me to the Royal Society of Medicine and the Nutrition Society. John Dickerson believed I could play an important role as a future leader in international nutrition. Under their tutelage, we built a thriving nutrition department and introduced sports nutrition into the training of our students, among whom was Liam Kilduff, now an eminent professor in sports and exercise science at the University of Wales. Alan Jackson and Steven Wootton worked closely with David Barker, the originator of the Developmental

Origins of Health and Disease (DOHaD) at the University of Southampton. They also played a key role in my professional development, as well as other African scholars. Jackie Langman-Bowes (former Registrar of the Nutrition Society) and Fred Wentworth-Bowyer (Chief Executive of the Nutrition Society) guided my path into nutrition professional leadership, culminating in my role as Chairperson for International Nutrition Affairs at the UK Society (2007-2015). Mark Hollingsworth, the current Chief Executive of the Nutrition Society, has played a key role in supporting our training of young African scholars, strengthening the African Nutrition Society (ANS), and the Federation of African Nutrition Societies (FANUS).

5. Collegiality and fraternity through national, regional, and global affiliations and exposure

In building capacity for nutrition, and to grow the next generation of leaders, professional identity is necessary in the form of learned societies, national associations, regional federations, and international unions. The first Cornell Nutrition Conference (CNC) in 1938 brought together scientists and researchers. They explored existing knowledge, research gaps, and new opportunities for further work including collaborative research. Such scientific meetings provide a forum for students and young scientists to interact with their peers and subject experts. The CNC laid the foundations for establishment of the Society of Experimental Biology (EB) and the American Society of Nutrition (ASN). Today, the annual EB meeting in the United States is a global event attracting thousands of scientists, researchers, and students. Elsewhere in Europe, Latin America and Asia, similar scientific societies were established to bring together nutritionists, agricultural scientists, home economists, dieticians, etc. In the United Kingdom in 1941, Sir John Boyd Orr and his colleagues founded the Nutrition Society to "advance the science of nutrition." Boyd Orr was a visionary in food security and nutrition and a Nobel Peace Prize laureate around the time of World War II. His work linking agriculture, nutrition, poverty, and public health culminated in his appointment as the founding Director-General of the UN's Food and Agriculture Organisation (FAO) at its establishment in 1945. Boyd Orr showed a link between poverty, poor diets, and ill health, and advocated for affordable healthy foods on a global scale. He promoted nutrition research which directly influence government policy on food security and public health.

In 1948, the International Union of Nutritional Sciences (IUNS) was founded in London by researchers initially from thirteen countries, hosted by the British Nutrition Society, and chaired by Professor EJ Bigwood (Belgium). The IUNS, which now boasts over eighty-five Adhering Bodies and many Affiliate members, celebrated its seventy-ninth anniversary in 2025. IUNS Members include national nutrition associations and regional federations in North and South America, Asia, Oceania, and Africa (FANUS).

The African Nutrition Society (ANS) was founded by a group of scientists from over eighteen countries and Africans in the Diaspora at a meeting in Cairo in 2008. The ANS emerged from the African Nutrition Epidemiology Conferences (ANEC), first organised in 2001 at the Vaal University of Technology (VUT), South Africa, hosted by the VUT. It was conceived of by a team of African and European scientists at the University of Westminster, UK, of which Wilna Oldewage-Theron and I were an integral part. Its articles of association were ratified in 2010 in Nairobi (Kenya) as a professional learned society with individual membership from across Africa. The goals are to provide a forum for scientific dialogue, research dissemination, mentoring and training of young scientists, and to serve as a voice for nutrition on the continent and globally. The ANEC (preceding the ANS) was a catalyst for the establishment and growth of FANUS, providing the platform for its launch at the second ANEC meeting in Accra, Ghana in August 2006, with Tola Atinmo of Nigeria as its first president. FANUS held its first meeting in Ouarzazate, Morocco, in October 2007. Its goals include promoting the establishment and strengthening of national nutrition associations for greater impact nationally, regionally, and globally.

In the early 1990s, academics from Wageningen University in The

Netherlands proposed the idea to create a leadership programme for PhD students in the nutritional sciences in Europe. This led to the formation of the European Nutrition Leadership Programme (ENLP) in Luxembourg in 1994. Now renamed the European Nutrition Leadership Platform, it runs a series of seminars and workshops designed to help recently graduated food, nutrition, and dietetics professionals build their skills and start to build relationships with fellow professionals across Europe. Since the foundation of the ENLP, other Nutrition Leadership Platforms (NLPs) have been established in Africa (ANLP), Southeast Asia, and Latin America. Their main objective is to "empower nutrition professionals to achieve their goals and to inspire individuals to lead others to attaining their goals" (ENLP, 2021). The African Nutrition Leadership Programme (ANLP) was initiated by Johann Jehling in 2002, at the Northwest University (NWU), South Africa, as a ten-day intensive training course designed to develop leadership, team building, and communication skills for mid-career professionals in nutrition. To date the ANLP has trained over 500 professionals across thirty African countries.

More recently, in 2015, the Agriculture, Nutrition and Health (ANH) Academy was established as a global network to connect researchers, practitioners, and policymakers working at the intersection of agriculture, food systems, nutrition and health, the main focus of which is to build capacity in low- and middle-income countries (LIMCs), especially Africa and Asia. Annual ANH Academy Weeks feature learning labs and a research conference across various countries in Africa and Asia. Its Technical Working Groups develop and validate tools, surveys, and metrics, e.g. the Food Environment Technical Working Group (FETWG). From a project-based initiative, the community has expanded into a global network of over 12,000 members in 160 countries, fostering research to tackle climate change, nutrition, and environmental challenges.

6. Deliberately targeted funding support for innovations in research, practice, and advocacy

Training and capacity building must be deliberate, targeted, and strategic to ensure continuity, growth, and impact. Current knowledge and understanding of nutrition issues, our ability to innovate and find solutions to real-life challenges, planned actions to mitigate or prevent illness and promote public health require strategic investments in institutions, people, and research to grow a critical mass of the next generation of nutrition leaders. Navigating the intricacies of nutrition within complex food systems amidst globalization of trade and pressures on the climate and the entire food value chain require high-quality training. These endeavours require a multi-sectoral, multidisciplinary approach, working across the public and private sectors, and with civil society organisations as vocal watchdogs and advocates of healthy diets for healthier lives (HD4HL). The social and behavioural sciences are particularly important in our pursuit of nutrition research, policy, and practice, particularly as non-communicable diseases linked to human behaviour and diets have taken centre stage in the spectra of the burden of disease in developing countries, and particularly in Africa.

7. Future directions for nutrition and the new nutrition professional for Africa

Generating strong evidence for national nutrition policies and global actions requires research training to build capacity, including basic laboratory research. Mixed-methods research blending behavioural, lifestyle, and social components and linkages between agriculture, nutrition, and health in the context of complex food systems across countries and regions of Africa is needed. Institutional partnerships for training and research within and across countries has become imperative.

Lartey and Amuna (2023) have recently lamented the poor level of funding for cutting-edge research especially at postgraduate and postdoctoral levels in Africa. The huge gaps in research funding stem from limited government investments in nutrition training and research across our countries, lack of dedicated national research training budgets in many countries, and limited industrial training fellowships and partnerships. The latter should be seen as a missed opportunity for academic institutions to contribute to new innovations for industry in the field of food security, nutrition, food product development, and healthy diets across the life cycle. In the age of immunological nutrition, metabolomics, and precision / personalised nutrition, Africa risks being left behind in new scientific and technological innovations needed to improve nutrition, wellbeing, and public health.

Ample examples of the impact of public investment in outputs and innovations which can lead from the classroom through the laboratory and the field to market exist. A recent visit by the author to the University of Mohamed VI Polytechnique (UM6P) in Ben Guerian, Morocco where public

investments in infrastructure and an enabling environment, coupled with investments from industry, have created a highly productive, output-driven, solutions-based ecosystem for translational research, should serve as a classic example of what is possible in Africa with the right investments. The National Research Foundation in South Africa has also demonstrated a track record for research funding that has driven high-impact outputs from researchers. It is also noteworthy that charitable foundations and organisations including the Wellcome Trust, Rockefeller Foundation, Mastercard Foundation, and the Nestlé Foundation have over the last century supported ground-breaking scientific research including in nutrition.

Conclusions

My own journey as a nutritional scientist and that of many contemporaries demonstrate that sponsorship and scholarship are useful investments that grow the nutrition leaders of the future. Over the last six decades, the Nestlé Foundation has funded hundreds of research training, pilot, small, large, and re-entry grants which have enabled quality research across Africa and other parts of the world. As the Foundation celebrates its sixtieth anniversary, it would be useful to put together a compendium of grants and their outputs, as evidence of the impact the Foundation continues to make in nutrition research, training, and the growth of new leaders in nutrition. To borrow from the African visionary Dr Kwame Nkrumah, these grants are "investments". Finally, I recommend curiosity, interest, and investments from industry to support training and research using challenge-based approaches aimed at finding specific solutions to real-life problems in food security, nutrition, agri-business, climate change, and human health. This approach will transform the fortunes of our human capital, the institutions and industries in Africa.

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FROM EVIDENCE TO ACTION:

CONTINUOUSLY LEARNING DIGITAL TOOLS FOR FOOD SECURITY AND NUTRITION

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Ensuring food security and adequate nutrition remains one of the most complex global challenges of our time. Despite decades of research and intervention, undernutrition, micronutrient deficiencies, and food insecurity continue to affect millions of women and children, particularly in low-resource settings. The persistence of these challenges reminds us that scientific advances alone are not enough. What ultimately determines impact is how evidence is translated into action.

Across research in global health, a consistent lesson emerges: empowering local communities through information and capacity matters. Whether the focus is improving maternal micronutrient intake, increasing dietary diversity, or supporting more resilient food production systems, success depends on people's ability to make informed decisions.

At the Laboratory for Intelligent Global Health and Humanitarian Response Technologies (LiGHT), our work sits at the intersection of health, technology, and implementation in resource-constrained settings.[1] We focus on how digital tools can strengthen local capacity and empower decision-makers with the right information. In the context of food security and nutrition, this means supporting the people who are on the front lines: community health workers, nutrition counsellors, midwives, agricultural extension agents, and caregivers themselves.

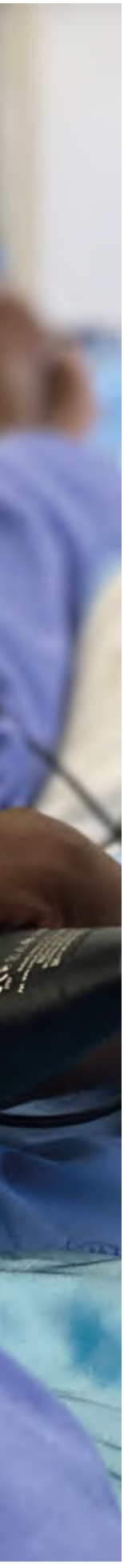
Nutrition science has generated an extraordinary body of evidence on what improves health outcomes. We know, for example, the importance of the first 1,000 days of life, the role of micronutrients in cognitive and physical development, and the links between food insecurity and long-term health and educational outcomes. Yet translating this knowledge into consistent, context-appropriate action remains a major bottleneck.

Frontline workers are often expected to navigate complex guidelines while facing time constraints, limited training opportunities, and highly variable local conditions. Decision-support tools can help bridge this gap by organizing evidence into practical, usable guidance. When designed with end-users, such tools can enhance confidence, consistency, and quality of care, particularly in nutrition counselling for pregnant women and young children. At LiGHT, this approach underpins initiatives such as **MAM*AI:** an open, resource-adapted chatbot that supports health workers in the assessment and management of maternal and child health in Zanzibar, including cases of child malnutrition, a significant public health issue.[2] By translating clinical and nutritional guidelines into structured, context-aware decision pathways, tools like **MAM*AI** aim to enhance confidence, consistency, and quality of care, particularly in nutrition counselling for pregnant women and young children.

Crucially, technology is not the intervention. It is the enabler. Its value lies in reinforcing human judgment, not in automating it away. This principle mirrors what we see across successful nutrition and food security programs: sustainable impact is achieved when interventions strengthen, rather than bypass, local systems.

Long before nutrition is assessed in clinics, food security is determined by agricultural practices, market access, and household choices. Household decision-making plays a central role in determining what foods are consumed, by whom, and when. Cultural practices, economic pressures, and knowledge gaps all influence these choices. Supporting food security therefore requires approaches that link agricultural production to nutrition outcomes through education, counselling, and community engagement.

Digital tools can help make these connections more visible and actionable. For example, decision aids can support extension workers and health workers in aligning agricultural advice with



nutritional needs. By integrating data on local food availability, seasonality, and nutritional requirements, such tools can help ensure that agricultural gains translate into meaningful health improvements.

The key here is 'local data'. At LiGHT we focus on evaluating, validating, and implementing such tools that are in local languages and represent local realities and knowledge.[3] Not even three percent of the studies in the largest Pubmed medical database represent Africa. This is a recipe for biased and inequitable distribution of accuracy.

As digital approaches become more common in food and nutrition systems, there is a shared responsibility to ensure they serve the populations most at risk of being left behind. This means prioritizing accessibility, cultural relevance, and long-term maintainability over technological novelty.

What gives me optimism is the growing convergence between science, community-based practice, and human-centred innovation. By focusing on capacity and supporting people to make better decisions with the data available, we can move closer to food and nutrition systems that are not only more effective, but also more equitable and resilient.

The path forward lies not in choosing between science and practice, or between technology and human expertise, but in thoughtfully integrating them. When evidence, local knowledge, and supportive tools come together, meaningful and lasting progress becomes possible.

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STABLE ISOTOPIC TRACERS IN NUTRITION RESEARCH

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Introduction

Atoms of an element which are chemically identical but 'heavier', due to additional neutrons in their nucleus, are called stable isotopes. Unlike the radio isotopes, stable isotopes do not emit radiation and are relatively safe when used in trace concentrations. Stable isotope labelled molecules are generally present in nature at relatively fixed ratios or percentages (abundance) in different compounds, also called a 'background' abundance. By introducing small (tracer) quantities of these stable isotopes labelled molecules into the body, their abundance can be increased over their background; this increase in abundance over the background is called 'enrichment'. Tracing the dynamic nature of the enrichment of any selected molecule in biological systems make it possible to determine the kinetics of appearance, disappearance, and metabolic fate of their unlabelled (also called tracee) counterparts. Since their mass is different from the unlabelled tracee molecule, they can be quantified using mass spectrometric techniques.

One important area of human nutrition is the precise measurement of the daily requirement of various nutrients to sustain growth in growing animals and maintain health in animals at all ages, and to measure function in terms of, for example, body composition during growth, or lactational performance. The daily nutrient requirement is not easy to measure, not only due to the wide variability in dietary intakes, physical activity, and metabolism, but also due to the complexities in capturing whole-body responses to measure their utilization and loss from the body. The latter is used to calculate the requirement or daily replacement, subject to their bioavailability from different diet matrixes, which allows for adjusting the requirement based on the nature of the diet. One can also evaluate the effect of different nutritional interventions through changes in isotopic kinetics and distribution (within nutrient stores) in the body. Isotopes such as deuterium (^{2}H), carbon-13 (^{13}C), oxygen-18 (^{18}O), and nitrogen-15 (^{15}N) are used for these techniques, which are generally minimally invasive but accurate. Some applications of stable isotopic tracers in nutrition are outlined below.

Energy expenditure and requirement

The daily energy requirement is based on energy expended on essential functions at rest (basal metabolic rate), for physical activity, and for digestion and absorption of nutrients (thermic effect of food) in a day. Energy expenditure is conventionally assessed by measuring the rate of oxygen consumption and carbon dioxide (CO_2) production at rest, using direct or indirect calorimetry. However, based on individual behaviours, the energy expenditure varies throughout the day and the measurement of respiratory exchanges in free-living conditions are cumbersome. Doubly labelled water (DLW) technique, which uses ^{2}H and ^{18}O labelled water, is the reference method for total energy expenditure (TEE) estimation. In this method, DLW administered equilibrates the body water pool within three to six hours. The elimination of these isotopes from body water (saliva, urine, or plasma) are then measured over one to three weeks using an Isotope Ratio Mass Spectrometer (IRMS) **(Figure 1)**. While ^{2}H is lost only as water, ^{18}O is lost as water and CO_2. The difference between the elimination rates of ^{18}O and ^{2}H provides a measure of excess oxygen excreted, which is equivalent to the CO_2 produced. This in turn can be used to calculate TEE. In weight-stable healthy individuals, TEE is equivalent to the daily energy requirement. Energy cost of growth, tissue accretion, and milk production can be added to TEE to estimate energy requirements during growth, pregnancy, and lactation.[1] A recent analysis of TEE measured by DLW across age groups (from eight days to 95 years) has shown four distinct life stages, where energy expenditure increased rapidly in neonates and at one year equalled ~50% above adult values. The expenditure then decreased gradually from one to ~20 years, remained stable from 20 to 60 years, and declined in older adults.[2]

Indispensable amino acid requirement

Indispensable amino acid (IAA) requirements in humans are determined by measuring oxidation of ^{13}C-IAA tracers. Methods used for measurement of IAA requirements are based on the principle that amino acid (AA) intakes exceeding the protein synthetic requirement are oxidized and that the daily requirement of an IAA is equivalent to its dietary intake needed to replace its daily excretion through all routes, of which the primary route is oxidation.

Graded intakes of the test IAA are administered to healthy individuals on separate study days after an adaptation period (two to seven days) and the requirement is determined from the pattern of oxidation of an indicator IAA (such as

^{13}C-phenylalanine). When the intake of the test IAA is limiting, i.e. it is below its requirement, protein synthesis is not efficient, resulting in increase in oxidation of all the other AA including the indicator. Once the requirement of test IAA is approached, this oxidation declines and is lowest at the requirement, and then it reaches a steady state. The test IAA intake level at which the oxidation is lowest is the requirement of that IAA. This technique is called the indicator AA oxidation technique (IAAO). The method can be of short duration (eight hours) where the hourly meals are administered for seven hours and the $^{13}CO_2$ enrichment in breath over the last two hours is used to determine the indicator IAA oxidation. Since this can only represent the fed state and AA oxidation follows a diurnal pattern, a longer 24-hour IAAO and/or 24-hour indicator AA balance (24h IAAB) technique is recommended. The principle here is same as the short duration IAAO technique but is conducted over 24 hours, consisting of 12 hours fed and 12 hours fasted periods, and has a prior adaptation period of five to seven days.[3] The data from the 24h IAAO and/or 24h IAAB technique has been critical in establishing IAA requirements by the FAO/WHO/UNU expert committee for protein and amino acid requirements in human nutrition.

Dietary protein quality

The quality of a protein depends on its ability to the satisfy daily IAA requirements. Protein quality assessment is based on both the IAA content and the digestibility (digestion + absorption) of a protein source. The IAA digestibility of a protein is measured using the oro-ileal balance method, which is based on the difference between amount of protein/IAA ingested and that excreted at the end of ileum (digestion and absorption in the colon is minimal). Collection of undigested and unabsorbed protein/IAA at the ileum is invasive and requires naso-ileal intubation. Ileal effluents thus collected contain a mixture of undigested protein/IAA of dietary and endogenous origin, which leads to underestimation of digestibility. Therefore, a correction for endogenous protein contribution needs to be applied to arrive at an accurate true ileal IAA digestibility value. The use of stable isotopically labelled dietary protein (^{2}H/^{13}C/^{15}N, **Figure 2**) helps circumvent the above limitation, but the method is still invasive.

Another method, called the dual isotope tracer technique, uses two differently stable isotopically labelled protein sources, one a ^{2}H labelled test protein (**Figure 2**), and another a ^{13}C labelled reference protein of known digestibility. In this technique, both the protein sources are ingested simultaneously in a plateau feeding protocol to minimize blood sampling. The ratio of plasma IAA enrichment from the test protein with respect to its enrichment in the ingested meal (^{2}H-IAA plasma:^{2}H-IAA meal) is compared to a similar ratio from the reference protein (^{13}C-IAA plasma: ^{13}C-IAA meal) to calculate IAA digestibility of the test protein. The ^{2}H and ^{13}C-IAA enrichments are measured using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) and Gas Chromatography-Pyrolysis-Isotope Ratio Mass Spectrometry (GC-P-IRMS) (Figure 1). Due to its minimal invasiveness, this method can be applied in all age groups. Dual isotope tracer technique has been used to measure true IAA digestibility of a variety of protein sources in different age groups including children of 9-12 months, 18-24 months, and 6-11 years, and in adults.[4]

Micronutrients: vitamin A and vitamin B12

Micronutrient deficiencies can occur due to dietary intakes that are of poor quality and are energy dense with low micronutrient concentration. These can also occur due to low bioavailability from inhibitory diet matrixes. To assess micronutrient status in populations, one can estimate whole body reserves of the specific micronutrient, as clinical signs of deficiency manifest late, when the body stores are low. Stable isotopic techniques have proved to be vital in measuring total body stores of micronutrients in a non-invasive manner, as these measurements otherwise require invasive access to organs under consideration, and are therefore impossible to use for screening or evaluating individuals.

The vitamin A body store, for instance, is an important measure of adequacy, and is assessed using the retinol dilution technique, in which either ^{2}H- or ^{13}C-retinyl acetate is administered to individuals. After tracer administration, a period of ten days is allowed for whole body equilibration. The enrichment of labelled tracer in plasma is used to estimate whole body and liver stores. This technique can be used in efficacy studies of provitamin A carotenoids supplementation from different sources on improving vitamin A status in humans.[5]

Another example relates to vitamin B12. The bioavailability of this vitamin from the diet was earlier measured using a radioactive vitamin B12 tracer, particularly in patients with pernicious

FIGURE 1

A. FTIR *B. IRMS* *C. GC-P-IRMS* *D. LC-MS/MS*

Figure 1: Analytical platforms used for measurement of stable isotopic tracer enrichments. [A] Fourier Transformed InfraRed (FTIR) Spectrometry used to measure ^{2}H enrichments in saliva for estimation of total body water. [B] Isotope Ratio Mass Spectrometer (IRMS) used for measuring ^{2}H and 18O enrichments in saliva/urine for estimation of total energy expenditure, as well as $^{13}CO_2$ enrichment in breath for substrate oxidation studies. [C, D] Gas Chromatography Pyrolysis Isotope Ratio Mass Spectrometry (GC-P-IRMS) and Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS) used for measurement of $^{2}H/^{13}C/^{15}N/^{18}O$ enrichments of biomolecules such as amino acids.

FIGURE 2

A. Rain Out Shelter Chickpea *B. $^{2}H_2O$ Watering*

Figure 2: Stable isotopic labelling of protein in plant foods involves the administration of labelled precursors for amino acid synthesis, such as $^{2}H_2O$, $^{13}CO_2$ or $^{15}NH_4$ salts, during plant growth. Images A and B illustrate ^{2}H intrinsic labelling of chickpea. Chickpea plants were grown in pots, under a rain-out-shelter (to prevent contamination with rainwater) with a gravimetric watering regime. After anthesis, $^{2}H_2O$ was administered in a single bolus, during the regular watering, with follow-up doses for four days. This allowed the seeds to be filled with labelled protein, which could be harvested at maturity, dried, and stored for protein digestibility studies.

anaemia. This is called the Schilling test, and it uses radioactive cobalt (^{57}Co or ^{58}Co) as the tracer in cyanocobalamin. This test is not used now, for reasons of radioactivity exposure, and in consequence, it became difficult to measure the requirement of vitamin B12, which was particularly important in poorer, mainly vegetarian, populations. Recently, a stable isotopic tracer that incorporated 13C in cyanocobalamin was synthesised to assess vitamin B12 absorption and excretion kinetics. These measurements were particularly useful to understand why a predominantly vegetarian Indian population, with low dietary vitamin B12 intakes, had an unexpectedly lower prevalence of vitamin B12 deficiency. This was explained by additional colonic absorption with a lower-than-expected daily excretion, which indicated a lower B12 requirement in this particular population, but which also highlighted the need of population-specific requirement assessments, particularly with accurate stable isotopic techniques.[6]

Assessment of Functional Endpoints

Body composition

An appropriate body composition is a very important part of child growth, particularly during catch-up growth, where it is important that the

weight gained is not predominantly fat. Body composition needs to be measured in convenient and non-invasive ways in children, and stable isotopic methods offer such a method, called the deuterium dilution technique. Here, a known quantity of $^{2}H_{2}O$ is administered to individuals and allowed to equilibrate to a transient plateau in the body water pool; this happens in three to five hours. The enrichment of ^{2}H can be measured in body water samples (like saliva or urine) using Fourier Transformed InfraRed (FTIR) spectrometry or IRMS (**Figure 1**), which allows the determination of total body water (TBW). In this technique, the body is divided into two compartments called the fat mass (FM) and the fat-free mass (FFM). TBW is logically assumed to be present only in the FFM, at a fixed proportion of ~73% in adult humans. The difference between the measured FFM and the body weight provides the FM. This is a field-friendly technique and can be used in evaluating longitudinal changes in FM and FFM in children, body composition in malnutrition, and the effectiveness of nutritional interventions in changing body composition.[7]

Breast milk intake

The measurement of breast milk (BM) intake is particularly important to evaluate nutritional intake of 0–6-month-old infants, and to measure the effectiveness of counselling for exclusive breastfeeding. The dose-to-mother technique, where $^{2}H_{2}O$ is administered to breastfeeding mothers to measure the flux of water between mother and baby, is used in quantification of infant BM intake. It can also be used, in this kinetic model, to measure the non-milk oral intake, or complementary food. This technique involves administration of known quantity of $^{2}H_{2}O$ to the mother, which then gets distributed into her TBW and is transferred to the baby through the BM. The infant receives ^{2}H into its body only through mother's BM intake, allowing for a kinetic model to be made that can measure this transfer, which can be converted to milk transfer with some assumptions of the water content of BM. The ^{2}H enrichment in saliva samples of both mother and the infant are measured using FTIR, where the disappearance of ^{2}H (as a reducing enrichment in the TBW) from the mother and its appearance in the infant TBW is followed for 14 days. This technique can be used to assess exclusive breast feeding, quantify nutrient intake from BM, evaluate nutrient flux from mother to baby, and explore associations of infant growth with BM intakes and mother's body composition with BM intake.[8]

Protein turnover

The measurement of protein or amino acid turnover can provide insights on the impact of differing protein intakes, meal timing and dietary protein sources on protein synthesis and breakdown rates. ^{2}H and ^{13}C-labelled AA such as phenylalanine, can be used as tracers for measuring protein turnover, but this method generally involves continuous intravenous infusions and allows measurement only over a short time period. In contrast, $^{2}H_{2}O$ can be administered over a longer duration to evaluate protein synthesis in free living humans.[9] When used to measure muscle protein synthesis (for example), this could help in evaluation of nutrient/protein intake recommendations for maintenance of the muscle mass, particularly in older adults with sarcopenia. In this instance, orally administered $^{2}H_{2}O$ serves as a precursor for AA synthesis, which in turn is incorporated into protein to measure its synthesis rate, as a fraction of its pool size.[9] This protein fractional synthesis rate is calculated from the ^{2}H enrichment of the precursor pool, which is TBW in this instance, and of a protein bound amino acid (alanine, for example, owing to its rapid synthesis in the liver and availability across tissues for protein synthesis) and its incremental enrichment over time in the specific protein. ^{2}H-alanine enrichment is measured using Gas Chromatography Mass Spectrometry (GCMS), GC-P-IRMS or LC-MS/MS (**Figure 1**). The disappearance of ^{2}H from alanine after stoppage of $^{2}H_{2}O$ dosing can also be used to measure protein breakdown.[10]

Summary

Stable isotopic techniques have provided windows into the body, to make precise in vivo measurements of nutrient metabolism. Due to their relative safety, these techniques can be applied across age groups and in vulnerable populations. The insights from these techniques have defined daily nutrient requirements and have informed nutrition supplementation policies. Techniques such as deuterium dilution and dose-to-mother method are field friendly and help in monitoring obesity prevalence, child feeding practices, and impact of nutritional policies. The integration of stable isotopes with systems biology approaches can help in understanding diet-metabolism-environment interactions which can inform targeted interventions. However, it is also important to note that there could be several technical limitations including, but not limited to, the requirement of sophisticated mass spectrometric platforms which limit their scalability.

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EDIBLE INSECTS:

KENYA'S PATHWAY TO RESILIENT NUTRITION AND CLIMATE-SMART FOOD SYSTEMS

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Global pressures and the search for sustainable nutrition

Global food systems are facing escalating pressures from climate change, population growth, biodiversity loss, and rising food prices.[1] This has made the search for nutrition solutions that are both sustainable and culturally grounded increasingly urgent.

Conventional livestock systems alone cannot meet future protein demand without worsening environmental degradation. In this context, edible insects are gaining recognition as a viable component of resilient, climate-smart food systems. Edible insects are a nutrient-rich protein source that requires fewer resources and produces far lower greenhouse-gas emissions than conventional livestock. Farming of insects requires less water and land, positioning it as a climate-smart protein aligned with the SDGs and maternal-child nutrition targets. A rapidly growing global market signals mainstream acceptance, underscoring the opportunity to integrate insects into resilient diets.[2] However, acceptance of insects as food remains uneven across regions, influenced by cultural norms, perceptions, and socio-economic realities. Cultural familiarity in Africa, Asia, and Latin America provides strong entry points for innovation: in these regions, insects are consumed seasonally or in traditional ceremonies and valued as natural sources of protein, vitamins, and minerals. In contrast, Western markets require product design that normalizes consumption:[3] western consumers remain hesitant to adopt insect-based foods due to psychological barriers such as food neophobia, disgust, and limited exposure even with regulatory approval. Acceptance increases when insects are incorporated into familiar foods, such as baked goods or snacks, rather than consumed whole. Examples include cricket protein bars in Europe and insect-enriched noodles in Asia, showing that familiar formats improve consumer acceptance.

These insights highlight the need for product innovation, consumer education, and culturally responsive food design. In addition, marketing campaigns, sensory testing, and awareness initiatives are essential for shifting perceptions and building consumer confidence in insect-based foods. Beyond consumer acceptance, global adoption will also depend on harmonized safety standards and investment in processing technologies. Equally important are international trade frameworks that can legitimize insect products across borders.

Kenya as a model for nutrition innovation

Kenya provides a strong case of indigenous food knowledge shaping future-oriented nutrition strategies. In many rural communities, edible insects are an integral part of local diets, valued for their taste, nutrition, and medicinal benefits. Termites, lake flies, and crickets have long supported household nutrition, especially in western Kenya. These insects are harvested seasonally and preserved through traditional methods like sun-drying or roasting, allowing households year-round access.

Modernization and fast-growing urban centres are gradually undermining traditional food practices, diminishing both their nutritional and cultural value. In urban settings, residents are influenced by Western diets and often dismiss insect consumption despite its nutritional value. This rural-urban contrast shows that nutritionally valuable foods are being displaced by changing lifestyles, despite their well-known benefits. Urban youth, influenced by Westernized diets and perceptions linking insects to poverty, are less willing to consume these nutritious foods. Our earlier research in Kenya, supported by the Nestlé Foundation, reveals the untapped potential of indigenous foods complementing modern nutrition. Many young people are willing to consume insect-based foods and engage in related livelihoods when supported by markets, training, and social acceptance. The findings reveal the risks of knowledge loss and the opportunities for revival through nutrition education, enterprise, and policy support. Nearly 80% of youth show interest in insect diets, and over 75% are open to farming or processing, highlighting entrepreneurship and livelihood opportunities.[4] This evidence underscores the importance of integrating insect consumption into school curricula, nutrition campaigns, and youth enterprise programs. Modernization without deliberate interventions threatens to erode indigenous knowledge and undermine cultural heritage and nutritional resilience.

Informal to structured insect food systems

Although Kenya hosts a rich diversity of edible insect species, their value chains remain largely informal. Barriers include seasonal availability, harvesting difficulties, inadequate processing infrastructure, and the lack of structured markets. Experiences from neighbouring countries show that these constraints can be overcome through organized production systems, safety standards, and market

development. Uganda has commercialized cricket farming through processing facilities and market linkages, demonstrating that insect enterprises can be scaled up.[5] Pilot initiatives in Kenya indicate that youth are willing to engage in insect farming when provided with training, market access, and clear quality standards. Insect-based enterprises create income opportunities, especially where land and capital are scarce, while also strengthening local food and nutrition security. Structured value chains enhance safety, hygiene, and consistency, supporting wider adoption in urban markets and schools. Developing structured insect value chains in Kenya can stabilize supply, generate rural jobs, cut post-harvest losses, and strengthen food security. Formalizing production could enable Kenya to become a regional hub for insect innovation, exporting knowledge, products, and technologies.

Transforming research into practice and leadership for resilient food systems

Kenyan universities and research institutions are increasingly shifting insect research into practical solutions. Academic-led initiatives have shown that insects can be incorporated into familiar food products, helping reduce stigma while boosting nutritional value. Cricket biscuits and insect flours show practical applications across age groups and diets. Regional research programmes highlight the potential of insect farming to support livelihoods, including those of youth and women, and to enhance climate resilience. These institutional efforts highlight the role of research and education in generating evidence, shaping markets, informing policy, and fostering community innovation. Institutions are building training, incubators, and demo farms to equip communities with skills for scaling insect-based food systems. This demonstrates the role research institutions play as bridges between scientific knowledge, community practice, and national policy.

Policy pathways for sustainable nutrition

Global and Kenyan experiences highlight key lessons where cultural familiarity increases acceptance and product presentation shapes consumer perceptions. Youth engagement provides strong entry points for innovation, but education systems and urban food preferences or habits can either reinforce or undermine traditional food knowledge.

Globally, insect farming requires fewer inputs compared to livestock and emits less methane, making it a climate-smart protein aligned with the SDGs. Realizing this potential requires integrating edible insects into schools, education, and policy to

normalize consumption and strengthen maternal and child nutrition. School programs, community outreach, and nutrition-focused policies foster supportive environments for youth and households to adopt insect-based foods. Promoting indigenous knowledge, fostering innovation, and integrating evidence into policy and practice can shift edible insects into mainstream food systems. Kenya's experience shows that culturally grounded innovation strengthens resilient diets, offering lessons for Africa and beyond in achieving sustainable nutrition security. Kenya blends traditional knowledge with modern food systems, modelling edible insect adoption that strengthens nutrition, entrepreneurship, sustainability, and cultural heritage.

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PROFILE OF A NUTRITION INSTITUTE

INFRAL

THE NEPAL NUTRITION INTERVENTION PROJECT, SARLAHI (NNIPS):

ADVANCING EVIDENCE-BASED HEALTH SOLUTIONS IN NEPAL

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The Nepal Nutrition Intervention Project, Sarlahi (NNIPS) is one of South Asia's unique and long-standing public health research sites, operated by Nepali researchers and investigators in collaboration with the faculty of the Department of International Health at the Johns Hopkins Bloomberg School of Public Health (Maryland, USA), and funded by US federal agencies and foundations. Established in August 1988, NNIPS has made groundbreaking contributions to maternal, newborn, and child health and nutrition research in Nepal, informing health policies and recommendations to improve the lives of the most vulnerable in rural, underserved communities locally and globally.

NNIPS has, since its inception, been a collaboration between researchers at the Bloomberg School and the Nepal Netra Jyoti Sangh, a local non-governmental organization focused on blindness prevention. The partnership arose from a shared commitment to tackle vitamin A deficiency and child mortality and blindness in Nepal. Building on pioneering research by Dean Alfred Sommer and Professor Keith P. West Jr. in Indonesia, NNIPS was envisioned as a community-based research enterprise to improve the lives of the rural poor. The southwestern district of Sarlahi, in the Terai (Southern plains), was selected for its representative health indicators, development indices, diet, and nutritional status common to rural South Asia.

Mission

NNIPS' core mission is to generate high-quality scientific evidence for interventions to improve the health and nutrition of women and children through:

- Conduct of rigorous community-based studies
- Capacity building at all levels of the research enterprise
- Translating evidence of impact into national and regional policies
- Promoting cost-effective, scalable interventions

Major research areas

Over the past four decades, NNIPS has implemented intervention and observational studies addressing nutrition, infections, neonatal and maternal health and survival, cognitive development, and noncommunicable diseases. Its hallmark has been the use of cluster-randomized controlled trials (RCTs), often enrolling tens of thousands of participants. Some of its most influential research activities included:

1. **Vitamin A supplementation of preschool-aged children**
   The inaugural trial, NNIPS-1, demonstrated that periodic high-dose vitamin A supplementation could reduce child mortality by ~30%, evidence that prompted the country's first national

vitamin A supplementation program, which continues today, and ultimately informed the WHO/UNICEF recommendation of semi-annual vitamin A supplementation as a transformative child survival strategy across low-middle-income countries.

2. **Maternal and child micronutrient Supplementation**
   The NNIPS-2 trial explored the impact of vitamin A and beta-carotene supplementation during pregnancy, revealing a 44% reduction in maternal mortality and identifying a simple history of maternal night blindness as a risk indicator of both maternal vitamin A deficiency and mortality. The NNIPS-3 trial found that antenatal and postnatal iron-folic acid and multiple micronutrient supplementation reduced risk of low-birth weight. In the NNIPS-4 trial, zinc supplementation improved child survival beyond infancy, strengthening the imperative to prevent childhood zinc deficiency.

3. **Newborn care and survival interventions**
   NNIPS conducted groundbreaking work on essential community-based newborn care, including thermal care, delayed bathing, skin-to-skin contact, and cord care. Importantly, chlorhexidine applied to the cord lowered neonatal mortality and risk of infection, prompting its incorporation into Nepal's national cord care program and WHO recommending this procedure globally. Adjunct studies done in these trials revealed the importance of timely initiation of breastfeeding (< 1 hour), currently a WHO recommendation.

4. **Longitudinal cohort follow-ups**
   NNIPS trials have offered opportunities to assess the impact of early life interventions on longer-term health by revisiting tens of thousands of school-aged children, adolescents and young adults in 2006-2008 who had participated in earlier trials. Vitamin A-recipient preschoolers with ear infections were 40% less likely to have hearing loss as young adults; offspring of vitamin A-supplemented mothers had larger lungs and improved immunity; children born to micronutrient-supplemented mothers exhibited less cardiometabolic risk; and children exposed to prenatal iron-folic acid supplementation had

improved neurodevelopment outcomes.

5. **Maternal nutrition trial**
   A large NNIPS Maternal Infant Nutrition Trial (MINT) has recently been completed as part of a multi-country initiative to assess the effects of fortified balanced energy protein (BEP) supplementation, during pregnancy and lactation, on the risk of small-for-gestational-age birth and linear growth in early infancy. Findings are expected to inform WHO recommendations on the use of maternal BEP supplementation to improve birth and infant outcomes.

Achievements

NNIPS achievements can be measured across several dimensions:

- **Global health policy influence:** NNIPS' vitamin A and chlorhexidine studies have informed national, regional and WHO and UNICEF policy recommendations, saving millions of lives worldwide.
- **Evidence-based programming:** Findings have shaped Nepal's maternal and child health strategies, shaping guidelines for adopting proven interventions.
- **Public health leadership training:** NNIPS has helped strengthen national and international public-health research capacities. For example, to date the project has trained over fifty doctoral and masters' degree students and post-doctoral fellows. More than three dozen national and international students have had field placements or data analysis opportunities from NNIPS studies, building research, analytical, and public health skills.
- **Publications and recognition:** NNIPS researchers have published extensively in high-impact journals such as **The Lancet**, **American Journal of Clinical Nutrition**, **JAMA**, and **BMJ**, positioning Nepal as a recognized hub for global health research.
- **Community empowerment:** NNIPS has employed and trained several hundred female staff over the years, empowering women,

strengthening resources, building community trust, and improving health literacy.

Vision for the Future

NNIPS remains committed to advancing equity in health and nutrition for all Nepalis through science, evidence and partnership by:

- Conducting trials to identify low-cost nutrition and health solutions for mothers and children
- Applying digital technologies in research to accelerate knowledge generation that can improve health
- Addressing frontiers of climate-related food insecurity, adolescent malnutrition, early origins of health and quality of life in ageing, and the prevention of noncommunicable diseases
- Strengthening local research capacity through collaborations with Nepali universities, government agencies, and international institutions
- Building public-health research leadership through training of students and fellows from Nepal and around the world

Conclusion

The Nepal Nutrition Intervention Project, Sarlahi, stands as a testament to what is possible when science, collaboration, compassion and vision converge. Its enduring commitment to improving lives—in Nepal, across South Asia, and globally—ensures that its legacy will continue to inspire generations of researchers, policymakers, and practitioners dedicated to health equity and human development.

The Nepal Nutrition Intervention Project, Sarlahi (NNIPS) is not funded by or affiliated with the Nestlé Foundation.

NEPAL

AREA

Total[1]	147,181 km^2
Agricultural land (2023)[2]	26.0%
Arable land (2023)[2]	2.6%

POPULATION

Total (2025)[3]	29,600,000
Urban population (2025)[1]	67.0%
Population under age 15 (2025)[3]	28.0%
Median age (2025)[1]	25.3
Rate of urbanization (2024)[2]	0.2%

POPULATION GROWTH RATE

Total (2024)[2]	-0.1
Total fertility rate (2025)[3]	1.9

GDP

Per capita, PPP (2024)[2]	USD 5,736

LIFE EXPECTANCY

Total (2021)[4]	70
Male (2021)[4]	68
Female (2021)[4]	71.8

MORTALITY

Neonatal mortality rate (per 1000 live births) (2023)[4]	16.6
Infant mortality rate (per 1000 live births) (2023)[4]	23.3
Under-five mortality rate (per 1000 live births) (2023)[4]	26.51
Maternal mortality ratio (per 100,000 live births) (2023)[4]	142

MICRONUTRIENT DEFICIENCIES

Household consuming iodized salt (2017)[5]	94.0%
Vitamin A supplementation (children 6-59 months) (2023)[5]	82.0%
Prevalence of anemia among women of reproductive age (2023)[4]	35.2%

OTHER PARAMETERS

Population below poverty line (2022)[2]	20.2%
Women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods (2022)[4]	55.1%
Current health expenditure (% of GDP) (2023)[4]	6.2%
Physician density (per 10,000 population) (2023)[4]	10.11
Immunization, measles (children ages 12-23 months) (2024)[4]	97.0%
Adult literacy rate (2019)[2]	69.0%
Proportion of population using at least basic drinking water services	
National (2022)[4]	91.0%
Urban (2022)[4]	90.0%
Rural (2022)[4]	92.0%
Prevalence of HIV among adults aged 15 to 49 (2024)[4]	0.1%
Obesity among adults, BMI >= 30, prevalence (2022)[4]	7.0%
Population using the Internet (2023)[2]	56.0%

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ONGOING PROJECTS

INFANT AND CHILD NUTRITION	TITLE	PRINCIPAL INVESTIGATOR
1	2021 / Evidence-based nutrition intervention development to improve dietary habits of adolescents attending school in Vientiane Province, Lao PDR	Kounnavong Thdatheb / Nagasaki University, School of Tropical Medicine and Global Health, Nagasaki, Japan
2	2021 / Feeding patterns and growth during the first year of life in a cohort of preterm infants with Extra-uterine Growth Restriction (EUGR) at hospital discharge followed in two Kangaroo Mother Care (KMC) Programs in Bogotá, Colombia	Nathalie Charpak / Kangaroo Foundation, Bogotá, Colombia
3	2021 / Study of effectiveness of a complementary food based on the mixture of locally produced food in the malnutrition prevention of children from 6 to 23 months old	Emmanuel Ngoy Bulaya / University of Lubumbashi, Faculty of Medicine, Higher Institute of Medical Techniques of Lubumbashi, Lubumbashi, DR Congo
4	2022 / Growth and development outcomes in severe acute malnutrition (SAM) children discharged from nutrition rehabilitation centers (NRC): A community-based follow-up study	Kumar Rohitash / King George's Medical University, Department of Community Medicine and Public Health, Lucknow, Uttar Pradesh, India
5	2022 / Effect of double-duty interventions on the double burden of malnutrition among children under five years in Debre Berhan City, Central Ethiopia: A cluster randomized controlled trial	Lemma Getacher / Debre Berhan University (DBU), Asrat Woldeyes Health Science Campus, Debre Berhan, Ethiopia
6	2022 / Formulation of nutrient-rich recipes for complementary feeding of infants and young children in Douala, Cameroon	Marie Modestine Kana Sop / University of Douala, Department of Biochemistry, Faculty of Science, Douala, Cameroon
7	2022 / Impact of a bean-based soup flour containing vegetables and sweet potato on children in Rwanda	Marie-Rose Kambabazi / University of Rwanda, Department of Food Science and Technology, Musanze, Rwanda
8	2023 / Efficacy of developed pigeon-pea-based porridge on the nutritional status of children aged 12-24 months in rural areas of Tanzania	Zahra Majili / Sokoine University of Agriculture, Department of Human Nutrition and Consumer Sciences, Morogoro, Tanzania
9	2023 / Intra-household decision-making status, barriers and association with child nutritional status	Kassahun Fikadu Tessema / Arba Minch University, Arba Minch, Southwest Ethiopia, Ethiopia

10	2024 / Determination of an enteric bacteriome profile as a possible biomarker for growth and Environmental Enteric Dysfunction (EED) in children below two years of age in the Southern Highlands of Tanzania	Grantina Modern / Nelson Mandela African Institution of Science and Technology (NM-AIST), Arusha, Tanzania
11	2024 / A potential antidote to antimicrobial resistance carriage in infancy?	Chinenye Akpulu, Katy Thomson, Kirsty Sands / INEOS Oxford Institute for Antimicrobial Research, Department of Biology, University of Oxford, Oxford, United Kingdom
12	2024 / Nutrient adequacy of complementary foods in children aged 6-23 months in Southern Ethiopia	Kidus Temesgen Worsa / Arba Minch University, Arba Minch, Southwest Ethiopia, Ethiopia

NUTRITION EDUCATION	TITLE	PRINCIPAL INVESTIGATOR
13	2022 / Developing a nutrition educational program for burn survivors in Ghana: A pilot study	Jonathan Bayuo / Presbyterian University College, Agogo, Asante-Akyem, Ghana
14	2022 / Implementing a nutrition training package for rural women farmers in Tanzania	Mbwana Hadijah Ally / Sokoine University of Agriculture (SUA), Department of Human Nutrition and Consumer Sciences, Morogoro, Tanzania
15	2022 / Improving knowledge of prevention of non-communicable diseases among children in Morogoro, Tanzania	Safiness-Simon Msollo / Sokoine University of Agriculture, Department of Food Technology, Nutrition and Consumer Science, Morogoro, Tanzania
16	2023 / Empowering preschool teachers to integrate nutrition education in their routine teaching to advance child health	Margaret Kabahenda / Makerere University, Food Science and Technology, Kampala, Uganda
17	2023 / Nutrition education intervention targeted at some risk factors of NCDs among school-aged children in Greater Accra	Jane Appiaduah Odei / University of Ghana, Department of Nutrition and Food Science, Legon, Accra, Ghana
18	2023 / Effectiveness of culturally customized maternal nutrition education for health professionals in improving birth outcomes in Ethiopia: Parallel cluster randomized controlled trial	Yeshalem Mulugeta Demilew / Bahir Dar University, Department of Nutrition and Dietetics, School of Public Health, College of Medicine and Health Sciences, Bahir Dar, Ethiopia
19	2024 / Peer-led nutrition intervention to improve the dietary behaviour of adolescents in Ethiopia	Daniale Ekubagewargies, Faruk Ahmed, Patricia Lee, Lisa Vincze / Griffith University, Australia; University of Gondar, Ethiopia

NUTRITION EDUCATION	TITLE	PRINCIPAL INVESTIGATOR
20	2024 / Exploring the influence of nutrition club activities on adolescent nutrition knowledge and dietary behaviour in Abia state, Nigeria: A school-based initiative	Patricia Ogechi Ukegbu / Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria
21	2024 / Maternal health, literacy and pregnancy outcomes: The role of specialized nutrition education	Ruthfirst E. A. Ayande, Elena T. Carbone, Gloria E. Otoo / Yale School of Medicine, New Haven, Connecticut, USA; University of Massachusetts Amherst, Amherst, Massachusetts, USA; University of Ghana, Accra, Ghana

MIRCONUTRIENTS	TITLE	PRINCIPAL INVESTIGATOR
22	2021 / Vitamin A bioefficacy of high provitamin A carotenoid maize in Mexican schoolchildren	Verónica López Teros / Universidad de Sonora, Departamento de Ciencias Químico-Biológicas, Hermosillo, Sonora, México
23	2022 / Empowering Weekly Iron-Folic Acid (WIFA) supplementation program for adolescent schoolgirls in high-stunting areas	Ali Khomsan / IPB University, Department of Community Nutrition, Bogor, Indonesia
24	2022 / Improvement of iron and zinc bioavailability in complementary food of children 6-23 months in South Kivu (DR Congo)	Marie Amelie Nabuholo / Université Cheikh Anta Diop, Laboratoire de Recherche en Nutrition et Alimentation Humaine (LARNAH), Département de Biologie Animale, Faculté des Sciences et Techniques, Dakar, Sénégal
25	2022 / Impact of the consumption of spirulina on the vitamin-A status of mother-newborn couples: Chadian approach to the traditional food "Dihé"	Imar Djibrine Soudy / National Higher Institute of Sciences and Techniques of Abéché (INSTA-Chad), Biotechnopole Laboratory of INSTA/IRED, Ndjamena, Chad
26	2023 / Efficacy of zinc-biofortified rice for preventing zinc deficiency in Bangladesh: A randomized control trial	Faruk Ahmed / Griffith University, Gold Coast Campus, School of Medicine and Dentistry, Public Health, Southport, QLD, Australia
27	2024 / Empowering weekly iron-folic acid (WIFA) supplementation program for adolescent schoolgirls in high stunting areas (year 2)	Ali Khomsan / IPB University, Bogor, Indonesia
28	2024 / Chain analysis of iodized salt and determination of salt iodine concentration in the Bongo District of the Upper East Region	Jeremiah Issaka, Reginald Annan / Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ashanti Region, Ghana

MATERNAL NUTRITION	TITLE	PRINCIPAL INVESTIGATOR
29	2022 / Effects of maternal preconception nutrition on offspring body composition and cognition in adolescence	Nguyen Phuong Hong / Thai Nguyen University of Pharmacy and Medicine, Luong Ngoc Quyen Road, Thai Nguyen, Vietnam
30	2024 / Maternal under-nutrition and effect of amaranth grain bread on anaemia in the Northern Zone of the Sidama region, Ethiopia	Amanuel Yoseph Samago / Hawassa University, School of Public Health, Awasa, Ethiopia
31	2024 / Maternal poor dietary practice and its determinants among pregnant women in rural communities of Central Ethiopia	Addila Alemu Earsido / Wachemo University, Hosenna, Ethiopia

BREASTFEEDING	TITLE	PRINCIPAL INVESTIGATOR
32	2022 / Effect of breastfeeding education and support provided to male partners on optimal breastfeeding practice in Ethiopia: A cluster-randomized controlled trial	Abageda Mulatu / Wachemo University, Department of Midwifery, Hosenna, Ethiopia
33	2023 / Breastfeeding decision-making and practices among working mothers and the role of external influences in urban Nigeria	Victoria Adebiyi / University of South Carolina, Arnold School of Public Health, Columbia, South Carolina, USA
34	2023 / Effects of breastfeeding education interventions during pregnancy on breastfeeding practices in rural South Ethiopia	Belayneh Hamdela Jena / Wachemo University, Department of Epidemiology, Department of Public Health, Department of Medicine, College of Medicine and Health Sciences, Hossana, Ethiopia
35	2024 / Improving post-caesarean breastfeeding via lactation midwives in Southern Ethiopia: A randomised controlled trial	Mekdes Kondale Gurara / Arba Minch University, Arba Minch, Southwest Ethiopia, Ethiopia

FOOD SYSTEM	TITLE	PRINCIPAL INVESTIGATOR
36	2021 / Towards a decision support system to control mycotoxin contamination in raw milk production in Kolokani and Kita regions, Mali – MILKSAFE	Abderahim Ahmadou / Institut Polytechnique Rural de Formation et de Recherche Appliqué (IPR/IFRA), IPR Annexe de Bamako, Dar-Salam, Bamako, Mali
37	2021 / Exploring the potential of agro-ecology to restore community diet diversity and food security in a vulnerable rural area of Colombia	Miguel Altieri / Universidad Nacional de Colombia, Sede Palmira, Medellín, Colombia
38	2023 / Valorization of genetic resources of Cocoyam in Benin	Aboudou Hack Arouna / National University of Agriculture, Laboratory of Plant, Horticultural and Forest Sciences (LaSVHF), Ketou, Benin
39	2023 / From conventional agricultural system to agrobiodiversity: Influence on food and nutrition security	Cassamo Mahomed Ismail / Instituto de Investigação Agrária de Moçambique-IIAM, Centro Zonal Noroeste, Bairro Lulimile, Lichinga, Moçambique

OTHER RESEARCH AREAS	TITLE	PRINCIPAL INVESTIGATOR
40	2021 / Impact of nutritional biomarkers in the pathogenesis of Buruli ulcer disease	Aloysius Kodjo Dzigbordi Loglo / Kwame Nkrumah University of Science and Technology (KNUST), Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana
41	2022 / Safety aspects of edible grasshoppers consumed in Benin: Case study of Malanville	Sika Jeanne Gwladys Gnanvi / University of Abomey-Calavi (UAC), Faculty of Agronomic Sciences (FSA), Abomey-Calavi, Benin; Laboratory of Valorization and Quality Management of Bio-Ingredients (LABIO), Cotonou, Benin
42	2024 / Interplay of nutrition and infections: The impact of maternal nutritional status and sexually transmitted infections on pregnancy outcomes in Southern Ethiopia	Meskerem Jisso Ebido / Hawassa University, Awasa, Ethiopia

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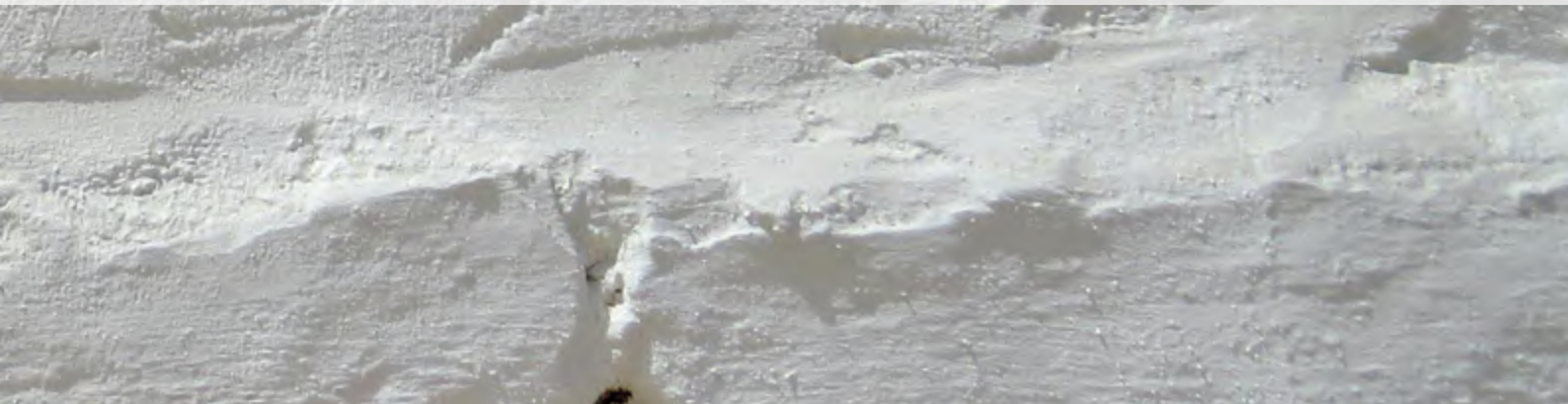

EMPOWERING GLOBAL NUTRITION RESEARCH

ENLINK LIBRARY

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OVERVIEW

The enLINK Library is a cornerstone of the Nestlé Foundation's commitment to advancing global nutrition research. This digital platform provides free, full-text access to leading nutrition journals, selected eBooks, and the renowned CAB Abstracts Database through the Ovid platform from Wolters Kluwer Health—enabling deeper exploration of topics critical to health and sustainability.

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- **LWW eBooks** – Comprehensive textbooks and reference materials to support coursework and deepen understanding
- **CABI eBooks and CAB Abstracts Database** – Covering nutrition, food security, sustainable development, and public health—ideal for life sciences and related fields
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50+

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registered users since launch

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- 25 LWW eBooks on nutrition, neonatology, clinical practice & research
- Over 100 CABI eBooks in human and food science
- CAB Abstracts database

User Statistics:

- Over 500 registered users since launching
- Registrations from more than 50 countries
- Top countries: Ethiopia, Ghana, Zimbabwe, Nigeria


60TH
ANNIVERSARY

OUR 60TH ANNIVERSARY

FOREWORD:

SIX DECADES OF COMMITMENT TO NUTRITION AND HEALTH:

Investing in knowledge and training of the next generation.

Established in **1966 to commemorate Nestlé's centenary,** the Nestlé Foundation was born out of a visionary idea: that advancing scientific knowledge in human nutrition could transform health and well-being worldwide. At that time, malnutrition was recognized as one of the most pressing global health challenges, particularly in low- and middle-income countries. Nutrition science was emerging as a critical pillar of public health, and the Foundation sought to play a pioneering role - supporting rigorous research, fostering collaboration, and ensuring that evidence could be translated into practical solutions for communities most in need.

From its earliest days, the Foundation focused on maternal and child nutrition, understanding that the first thousand days of life are decisive for long-term health. Over the decades, its scope expanded to address micronutrient deficiencies, sustainable

food systems, and the complex interplay between diet and disease. C**entral to this mission was - and remains - the commitment to building scientific capacity in the Global South**, empowering local researchers and institutions to lead studies that respond to regional needs and realities. By funding innovative projects and strengthening expertise in resource-limited settings, the Foundation became a trusted partner for researchers and institutions worldwide.

This chapter commemorates **six decades of history**, told through the voices of those who experienced and shaped the Foundation's journey. These time witnesses offer unique perspectives on its evolution and its role in advancing nutrition research. Their testimonies are organized into four chapters, each capturing a defining moment in the Foundation's evolution:

1. **Early years**
   The early years and Research in the Ivory Coast
   The pioneering spirit, bold ideas, and early scientific endeavors that shaped the Foundation's identity - highlighted by its groundbreaking fieldwork in the Ivory Coast, which set new standards for nutrition research in low income settings.

2. **The Foundation laboratory**
   Research in the Nestlé Foundation laboratories in Côte d'Ivoire
   A detailed look at the scientific work conducted in Nestlé's laboratories following the Foundation's own field research, demonstrating how initial insights inspired deeper inquiry, methodological innovation, and long-term scientific advancement.

3. **Presidents, Council Members and former Grantees experiences**
   Perspectives from two presidents, two former Council Members and two former grantees
   Personal reflections from leaders and beneficiaries whose careers and research trajectories were shaped by the Foundation. Their stories reveal how the Foundation's support has empowered scientific excellence, expanded opportunities, and fostered enduring global impact. One of the Presidents further reflects on the notion of the value of the child and the evolution of child health research - one of the Foundation's core funding pillars since its inception - highlighting how shifting understandings of childhood have shaped modern scientific priorities and reinforced the enduring relevance of our mission.

4. **The future**
   A glimpse ahead
   Forward-looking insights from the current President and the Chairperson of the Scientific Committee, offering their vision of the challenges and opportunities that lie ahead in a rapidly changing global health landscape.

Over these six decades, the Nestlé Foundation has supported **hundreds of research projects** across diverse regions, contributed to shaping global nutrition policies, and strengthened scientific capacity in low- and middle-income countries. These achievements reflect an enduring commitment to science as a driver of health and development.

These narratives are more than recollections; they are testimonies of commitment, curiosity, and collaboration. They remind us that progress is not only measured in discoveries but in the people and ideas that make them possible.

As you explore these stories, we invite you to reflect on the past, celebrate the present, and envision the future of nutrition research - a future that the Nestlé Foundation remains dedicated to shaping.

EARLY YEARS

Louis Haller
Pierre Dasen (psych)

THE FOUNDATION LABORATORY

Franz Gasser
Felix Herzog

PRESIDENTS, COUNCIL MEMBERS AND FORMER GRANTEES EXPERIENCES

Eric Jéquier
Anna Lartey
Jeyakumar Henry
Susanne Suter
Ann Prentice & Dominque Darmaun

THE FUTURE

Petra S. Hüppi & Virgilio Carnielli

1966 - 1977

EARLY YEARS

60 YEARS
OF COMMITMENT TO NUTRITIONAL RESEARCH

DR LOUIS HALLER, MD, DTPH (London)
Former Lecturer, University of Abidjan

The Nestlé Foundation is celebrating its 60th anniversary, a milestone that belongs not only to the institution itself, but also to the many scientists who, over the decades, have received its support for research in nutrition across medical, agronomical, and socio-economic fields. This anniversary is, in many ways, *ours as well*: we have shared in the Foundation's remarkable journey from its very beginnings.

The Foundation owes its origins to Professor Alexander von Muralt, a highly respected physiologist at the University of Bern known for his pioneering spirit and as a founder of several scientific institutions, most notably the Swiss National Science Foundation. Professor von Muralt was entrusted with creating the Nestlé Foundation. His vision and innovative thinking led him to propose the establishment of a research laboratory in Adiopodoumé, a village located 17 kilometres from Abidjan, the economic capital of Côte d'Ivoire.

At that time, the region already hosted several research institutions: a Dutch Research Centre, the French Overseas Office for Scientific and Technical Research, and nearby, a Pasteur Institute. Around fifty scientists and their families lived and worked in the area, all dedicated to biological and social sciences. The site, overlooking a lagoon surrounded by a pineapple plantation and tropical forest, resembled a miniature tropical version of University Campus.

Two Swiss colleagues, J.P. Gabbud and G.P. Ravelli, were responsible for setting up the laboratory. Their first project focused on introducing the *winged bean*, a protein-rich leguminous plant from Papua New Guinea, into Côte d'Ivoire. This crop, abundant in proteins, minerals, and vitamins (A, B, and C), was seen as a potential solution to protein-energy malnutrition (PEM) among infants. In many African regions, weaning is abrupt, and the traditional shift from breast milk to starch-based foods such as maize, cassava, or yam fails to meet a child's nutritional needs—leading to PEM, infections, and developmental delays.

Two Ivorian agronomists, Ba Samba Sylla and George Nzi, were appointed to establish small experimental plantations near local villages. As the laboratory became operational, new research projects emerged, notably those assessing the impact of PEM on the haematological and immunological systems.

Dr Kurt Schopfer studied white blood cells (granulocytes and lymphocytes) and discovered that phagocytosis was impaired in malnourished children. Dr Michael Reinhard investigated the causes of anaemia in newborns, examining links between maternal health—particularly malnutrition and malaria—and neonatal outcomes. Their numerous studies on these topics, along with my own research about the impaired complement system in PEM contributed to a deeper understanding of child malnutrition.

Our samples came from the paediatric department at Treichville University Hospital in Abidjan. Each morning, we crossed the city's busy streets at dawn to collect samples and return them promptly to our laboratory, where our skilled technicians—Christel Mayer, Solange Gros, and Raffaella DiMatteo—awaited for analysis. Looking back, it is hard to believe that such sophisticated immunological work was achieved in such modest facilities.

Our spouses, Nicole Reinhardt and Isabelle Haller, inspired by our research, conducted parallel studies on the health and nutrition of pregnant women, examining how socio-economic factors influenced maternal nutrition. Their theses were later presented at the Universities of Lausanne and Paris. We must also acknowledge Ruth Raemy, whose study on the birefringence of hair in severely malnourished children was presented as a thesis at Lausanne University.

While our main research focus was on the peri-urban populations of Abidjan, where PEM was most prevalent, we soon realized the need to investigate rural areas. The village of Kpouebo, located 200 kilometres north of Abidjan amidst dense forest, became the site of our field studies. Given the distance, we built a temporary research camp with sleeping quarters, an outdoor kitchen, storage facilities, and essential laboratory equipment powered by a generator. We would stay for one to two weeks at a time, gradually becoming part of the community.

Our first rural study examined breast milk composition. Local women believed that their milk became thinner and less nutritious toward the end of lactation (which typically lasted about 23 months). Under the supervision of Dr Edgar Lauber, milk samples were collected and analysed for protein and lipid content using high performance liquid chromatography. The results of these tedious examinations were clear: the

nutritional quality of breast milk remained stable throughout lactation, sometimes at the expense of the mother's own reserves. Another of his studies was related to the food consumed by those nursing mothers; each portion of food was weighed, checked for its nutrients, and analysed for its ingredients: proteins, lipids and carbohydrates. If the milk's quality remained stable, its quantity in contrast decreased in malnourished nursing women between the 4th to the 6th month.

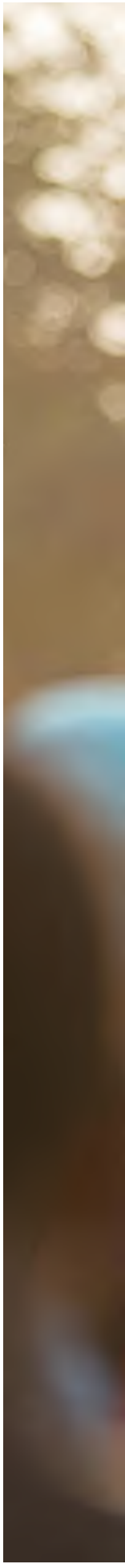
Later, we turned our attention to parasitic infections among schoolchildren in the region. More than 400 children from four villages were examined for parasites such as Ascaris, *Necator americanus, Schistosoma*, and *Onchocerca*. The villages were difficult to access via narrow paths winding through dense forest. We found that parasitic load significantly affected growth, haematological parameters, and vitamin levels (A, B, C, niacin, folates). Two unexpected findings emerged:

- A vitamin C deficiency (scurvy) in 10% of the children, despite adequate dietary intake, which normalized after antiparasitic treatment, suggesting that *Ascaris* infection impaired vitamin absorption
- A vitamin A deficiency in children with *Onchocerciasis*, with vitamin A concentrations eight times higher in onchocercomas than in surrounding tissues, a finding linking vitamin A depletion to river blindness

Scientific research often brings both frustration and satisfaction, and Africa offered us an endless field of exploration. While our work focused mainly on the biological effects of PEM, we also sought to provide direct benefits to the local population. We introduced winged bean and rainfed rice cultivation, and in Bouaké, a large city in central Côte d'Ivoire, we built a small, thatched cabin within the regional hospital where a nutritionist, Kouakou Akissi Hortense, advised pregnant women and young mothers on healthy diets.

Within a few years, our team had covered a wide spectrum of topics. Some of the findings could became essential for a rapidly growing urban centre like Abidjan, whose population has expanded from 600,000 in 1975 to nearly six million today. Nutrition remains a critical challenge that must continue to be addressed.

As we celebrate this 60th anniversary, we pay tribute to Professor Alexander von Muralt, whose vision founded the Nestlé Foundation and whose support never failed us. Between 1969 and 1983, our team published over 100 scientific papers, leaving a legacy that continues to inspire future research in global nutrition.
For us, those years in Africa were more than a scientific endeavour—they were a life-changing experience, marked by discovery, collaboration, and lasting friendships. The Nestlé Foundation's support remains a cornerstone of international nutritional research, and its impact continues to resonate across generations.



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PIAGET AND THE BAOULÉ

PIERRE DASEN
Professor Emeritus of Anthropology of Education, University of Geneva

In 1971, Professor Alexander von Muralt (head of the Council of the Nestlé Foundation) contacted Professor Bärbel Inhelder at the University of Geneva, asking her whether she might set up a research team to examine the impact of moderate malnutrition on child development. Prof. Inhelder was Jean Piaget's closest collaborator, and Piaget a world-famous scientist in developmental psychology. By an extraordinary piece of luck, I had just come back from Australia, where I had done my PhD research on the development of Aboriginal children. This was the very outset of cross-cultural psychology, which posits that theories developed in the West need to be tested in other cultures. This is how I was sent to join the Nestlé Foundation research team in Adiopodoumé, near Abidjan, to carry out a pilot study.

The preliminary question was whether the developmental scales called "baby tests" could be used appropriately in Africa. A number of studies had shown that African babies showed a more rapid development of motor skills than Western norms. We were particularly interested in a scale developed on the basis of Piaget's theory of sensori-motor intelligence. The scale had normative data from a large French sample of babies six to 24 months, but had not been applied elsewhere.

The pilot study (Dasen, 1973) showed that Baoulé babies were following exactly the same sequence of stages in sensori-motor intelligence as French babies. They seemed to be in advance of French norms on some subscales, particularly up to about 18 months. While the scale proved to be appropriate, great care has to be taken to establish a testing situation where the babies feel at ease, otherwise they cling to their mothers and testing becomes impossible.

On the basis of this preliminary work, a larger research project was financed by the Swiss National Science Foundation (SNSF) and the Nestlé Foundation, which allowed us to do a longitudinal study, following up a sample of 66 babies, testing them five times, at intervals of three months. Drs Margot Lavallée and Jean Retschitzki were part of the team (Dr Lavallée later becoming a professor at University Laval in Quebec, the latter professor at the University of Fribourg). We were allowed to take our families; the Nestlé Foundation had established housing at the Swiss Centre for Scientific Research (https://www.csrs.ch/fr) but we carried out our fieldwork in the village of Kpouebo. The location had been chosen by President Houphuet-Boigny himself, in his home area.

Anthropometric measures to assess nutritional status were taken by the medical team under the direction of Dr Michaël Reinhardt, also on a longitudinal basis, and biochemical measures once. This allowed for two subsamples matched on age, one suffering from moderate malnutrition and the other not; of course the psychologists were blind to this nutritional data. In the psychological part, we used not only the Piagetian scale, but also an observational study where the babies sat next to a series of objects and their interactions with these were videotaped. The purpose was to see how the children organise their play and in particular if they use the objects in a symbolic and normative way (for example using the comb to brush the doll's hair). In a rural area without electricity supply, this was quite a challenge, the cameras having to run on car batteries. The study also included observations of spontaneous behaviour in a natural home setting.

The study was fully reported in the book Naissance de l'intelligence chez l'enfant baoulé de Côte d'Ivoire (1978) (see also Dasen, Lavallée, Retschitzki & Reinhardt, 1977). The results showed that subclinical malnutrition does have a significant effect on child development, but only insofar as the malnourished group had results matching the French norms, while the others showed a

significant advance over these norms. The effect seems to increase with age, and is stronger on some parts of the scale, particularly when active exploration is involved. Similarly it is reflected in the semiotic function when playing with objects.
The literature of that time described an impoverished environment for African babies notably because parents do not provide toys. Our observations of spontaneous behaviour showed that, on the contrary, the natural environment was rich in objects because the children had access to most everything in the courtyard, notably all kitchen utensils, even dangerous items such as knives or machetes, that they quickly learn to use appropriately.

Unfortunately, the tools to study child development in the age range from two to five years were underdeveloped at the time, which is why we decided to concentrate our study on infancy. We did however test some school-aged children on tasks derived from Piaget's theory of concrete operational reasoning. We found that the substages followed a universal sequence, but that there were important differences in the rate of development according to content (for example, a quicker development in quantifications compared to spatial concepts). We also found that training could reduce any differences substantially, leading to the conclusion that concrete operational development was also universal, at least in competence if not performance.

In 1980 another study financed by the SNSF allowed us to continue the research in Kpouebo with 47 children aged eight to nine years (twenty of whom had been part of our earlier study as babies). We again had a medical doctor as part of the team, Dr Etienne Colomb, who took anthropometric measures. We again found some statistically significant correlations between nutritional status and cognitive tasks (Dasen & Collomb, 1982).

As research assistants we had a group of six MA level students in psychology from the University of Abidjan, all of whom spoke Baoulé, which allowed us to conduct interviews with parents. We asked them how one can tell that a child is intelligent. The Baoulé have the concept of n'glouèlê, which we might call social intelligence. It takes into account being helpful to the community.

Jean Retschitzki participated in 1980 with his own study on the development of reasoning in the board game called Awélé, which most children in Kpouebo learn from an early age (Retschitzki, 1990). In this game, experts use anticipation strategies that are similar to chess. During our 1980 fieldwork in Kpouebo, we witnessed the ceremony in which the director of the Nestlé Foundation (Beat Schürch) signed over the research compound to the Ministry of Health, no doubt symbolically the end of the Foundation's adventure in Côte d'Ivoire.

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1977 - 2009

THE FOUNDATION LABORATORY

PANTAINS MATTER

FRANZ GRASSER, PhD

Inside the world of plantains: Field notes from West Africa

When I completed my food engineering degree and a NADEL postgraduate program at ETH Zurich in the early 1980s, I knew that traditional development cooperation wasn't where I belonged. But I was determined to work in the Global South in a way that felt meaningful and grounded. So when Prof. Marc Bachmann invited me to pursue doctoral research in West Africa, focused on local foods and the realities of small scale processing, I didn't hesitate.

Building a research base from the ground up

My assignment took me to the Centre Suisse de Recherches Scientifiques (CSRS) in Abidjan, Côte d'Ivoire. The task sounded simple: reactivate a former Nestlé Foundation laboratory. The reality was anything but.

Before any research could begin, I needed to find out which instruments could actually survive tropical humidity and inconsistent electricity. I spent weeks learning to service equipment myself, organizing years' worth of spare parts, and coordinating the shipment of a complete laboratory system to Abidjan.

It was an unconventional introduction to field science, but it taught me resilience and resourcefulness faster than any textbook ever could.

Why focus on plantains?

Our mandate was clear: contribute to local food security by studying indigenous foods. While Europeans mostly think of sweet bananas, these make up only about 10% of global banana production. The rest are plantains: a starchy, indispensable staple across West Africa, eaten boiled, fried, mashed, or dried.

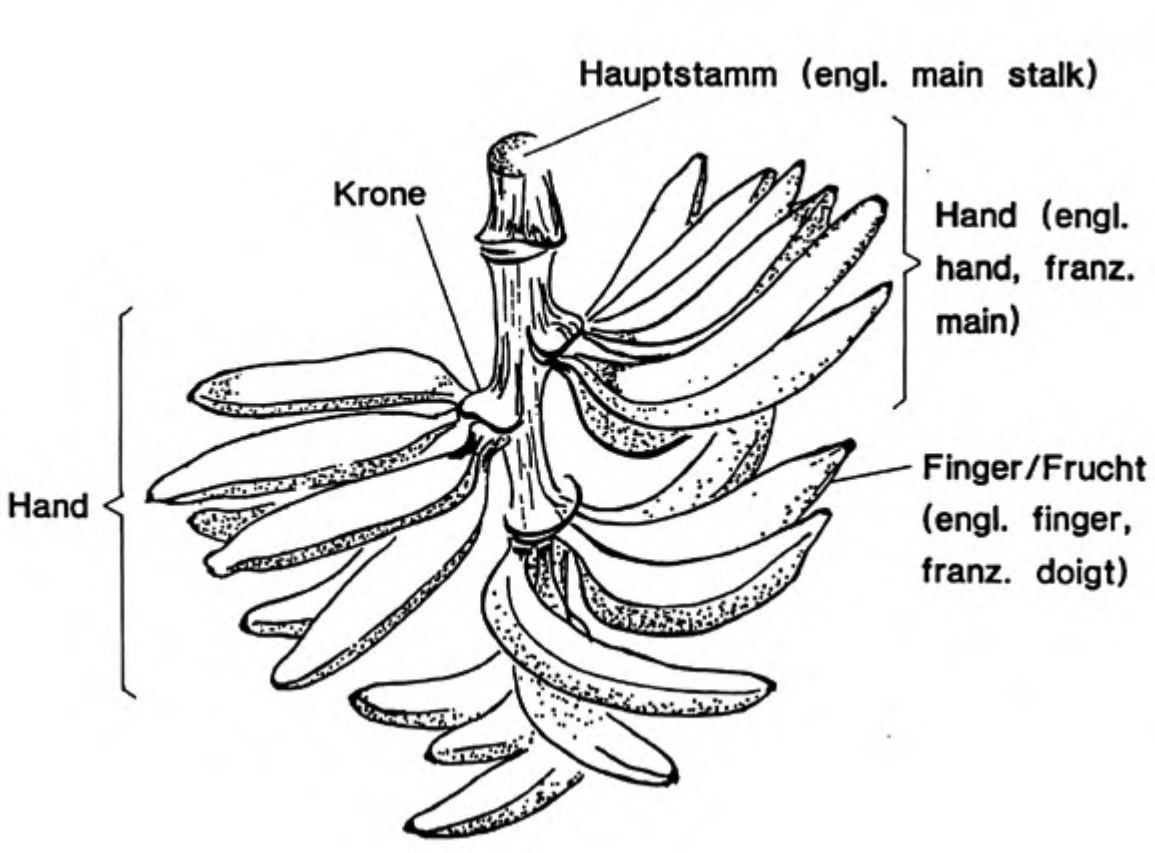

FIGURE 1

Morphology of a plantain bunch and designation of its parts in Englisch, French and German)

Through literature reviews and travel across Côte d'Ivoire, two urgent challenges emerged:

- **Large post harvest losses** caused by uncontrolled ripening
- **Few preservation techniques**, especially artisanal drying or chip production

These gaps shaped the agenda of our research: improving ripeness assessment and developing simple, reliable processing methods.

Living, learning, and collaborating in Côte d'Ivoire

My first weeks in Abidjan were lonely, but that changed quickly. The most significant shift came when I met Kouassi Koffi, an Ivorian agronomist who became my closest partner and friend throughout the project.

Life outside the laboratory was equally transformative. Days spent navigating Yopougon's lively but often precarious neighbourhoods taught me far more about Côte d'Ivoire than any formal briefing ever could. Joyous evenings in maquis contrasted with daily struggles: poverty, illness, and, strikingly, frequent snakebites among children.

These experiences reshaped my understanding of "efficiency." In a context marked by unpredictability, adaptability matters more than speed.

Simple methods, significant impact

Unlike sweet bananas, plantains are cultivated under diverse and variable conditions. Peel colour proved to be a poor predictor of ripeness. Instead, we found two inexpensive measurements that consistently worked:

- **Viscosity** of the homogenized pulp, reflecting starch breakdown
- **Refractometric sugar content**

These indicators helped identify the optimal stage for processing, which is critical because:

- Overripe plantains yield dark, unattractive chips
- Underripe ones result in bland, low quality products

Typical pattern of the evolution of total sugar content and total soluble solids in the fruit pulp during the maturation of plantains under tropical conditions (acetylene ripening).

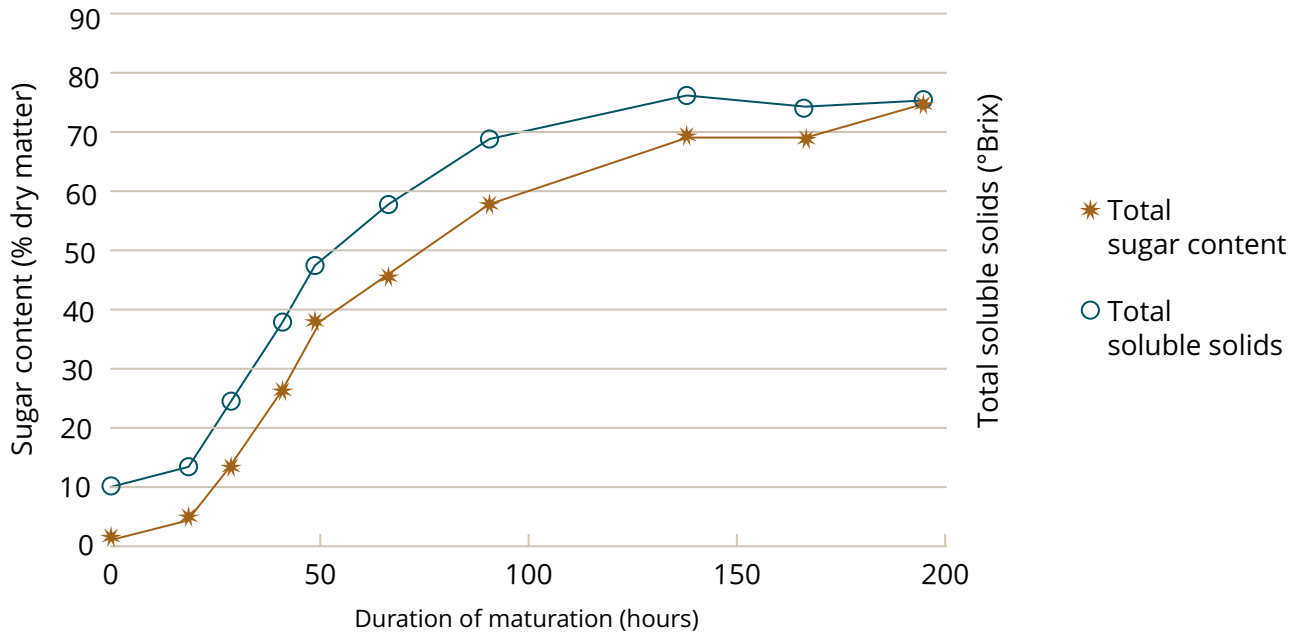

FIGURE 2

Typical maturation patterns of plantains)

Years later, while working at Agroscope in Switzerland, I was struck by the fact that these same simple measurements are standard tools in European fruit research. It was a quiet validation: rigorous science doesn't always require high tech equipment.

The realities of field research

Daily scientific work in Abidjan required constant troubleshooting—customs delays, generator failures, missing spare parts, and improvised logistics. Gradually, however, our resurrected lab evolved into a shared resource. Other groups at CSRS began to use it, and collaborations multiplied.

I also supervised ETH diploma students and hosted NADEL interns who examined the central role of women in food processing. Their insights echoed strongly years later, particularly in successful women led mango drying cooperatives in Burkina Faso.

Looking back: what four years taught me

I stayed nearly four years at CSRS, much longer than typical research postings. Only later did I fully grasp how much this period shaped my professional life.

Scientifically, my dissertation was sound. But in retrospect, its economic impact remained modest. Long term, co created research partnerships were lacking, and as a young doctoral student, I had neither the experience nor the authority to shape them. The project was, in many ways, still a Swiss endeavour carried out abroad.

Yet those years were foundational. They taught me humility, patience, and the importance of working *with* local partners, not just *in* their environment. They reinforced the value of women's leadership, the power of local knowledge, and the potential of context adapted, simple technologies to strengthen food systems.

Most of all, they showed me that real progress in development doesn't come from sophisticated equipment or elegant theories, but from genuine collaboration, curiosity, and respect.

CÔTE D'IVOIRE'S WILD PLANTS AND THEIR HIDDEN NUTRITIONAL WEALTH

EDIBLE BIODIVERSITY

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In Europe, people collect berries and mushrooms from the forest. What plants do people collect in West Africa? Wild, uncultivated plants might well contribute significantly to the diet of rural populations, which still partly rely on subsistence farming. To test this hypothesis, an interdisciplinary research project was conducted between 1988 and 1992 at the Centre Suisse de Recherches Scientifiques in Abidjan, Côte d'Ivoire (www.csrs.ci). The study region was the "V-Baoulé", a V-shaped incision of the savanna into the tropical rainforest inhabited by the Baoulé people. Because species from both habitats co-occur in this transition zone, it harbors a potentially large diversity of "plantes de cueillette", the wild plant species traditionally gathered for human nutrition. The core research team consisted of three doctoral students: Denise Gautier (Conservatoire et Jardin Botaniques Genève), Felix Herzog (Institute of Food Science, ETHZ), and Karin Müller (Ethnological Seminar, University of Zurich).

What is the significance of these collected plants?

Approximately 50 collected plants were botanically described (Gautier-Béguin 1992; Figure 1). From these, we selected the 20 most important fruits and vegetables, as well as the sap extracted from four different palm species. Their ingredients were analysed in the former Nestlé Foundation laboratory, which had been transferred to the CSRS and rebuilt by my predecessor Franz Gasser (see his report). More sophisticated analyses were done at ETH Zurich and in the vitamin laboratory of Hoffmann-La Roche AG in Basel. In monthly interviews with women, men, and children in the village of Zougoussi, we surveyed which foods, and especially which wild plants, were consumed in what quantities throughout the year.

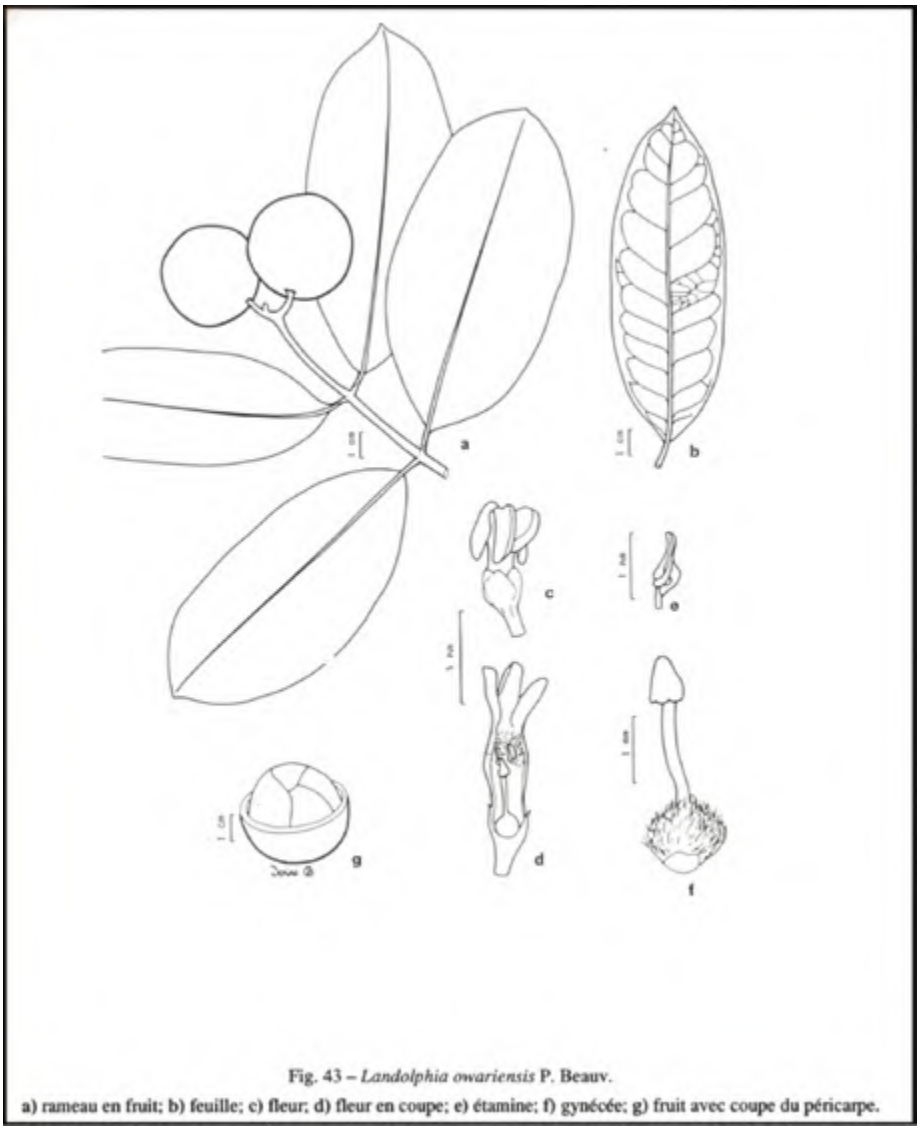

Fig. 43 – *Landolphia owariensis* P. Beauv.
a) rameau en fruit; b) feuille; c) fleur; d) fleur en coupe; e) étamine; f) gynécée; g) fruit avec coupe du péricarpe.

FIGURE 1

Landolphia owariensis P. Beauv. is a liana with red-orange fruits; its cores are surrounded by a refreshing acidic pulp. This is an illustration by Denise Gautier, from her ethno-botanical survey of "plantes de cueillette". (Gautier-Béguin 1992)

We found that, although the diet was based essentially on agricultural crops, wild fruits made an important contribution by providing rare nutrients, and were an important source of variation and of complementation, especially with vitamins and minerals (Herzog et al. 1994). Almost half of the fruits consumed were wild fruits, some of which are shown in Figure 2. Children, in particular, collected them when playing in the forest, in the savannah, or on their parents' crop fields. They covered up to 90% of their daily vitamin C requirement by eating wild fruits.

The oil palm (Elaeis guineensis Jacq.) is an endemic plant of the West African forest and the inhabitants of Zougoussi not only planted oil palms, but also harvested fruits and palm wine of their wild relatives. Some of the less well-known wild vegetables were "Akpi" and "Gnana". These are vernacular names of nuts from a forest tree and of berries of a weed that grows in crop fields. Both were used to cook dishes with a particular taste, providing variety to the diet. They were also sold at local markets, where the photos in Figure 2 were taken. Leafy wild vegetables contain proteins and mucilage, which make the dishes sticky, and go well with starchy staples such as yams (Diascorea alata L.), manioc (Manihot esculenta Crantz) or plantain (Musa x paradisiaca L.) (Herzog et al. 1993).

FRUITS

Aframomum alboviolaceum (Ridley) Schumann "Alosso"

Annona senegalensis Pers, subsp. oulotricha Le Thomas "Amlon"

Borassus aethiopum Martius "Kue"

Landolphia hirsuta (Hua) Pichon "Amani"

Landolphia owariensis P Beauv. "Ahu-pe"

Pseudospondias microcarpa (A. Rich.) Engl, "Adjoumani"

Salacia owabiensis Hoyle "Sui-nangoma"

Spondias mombin L., "Troma"

Thaumatococcus daniellii (Bennet) Benth, "Ngotro"

Vitex doniana Sweet "Ngbli "

VEGETABLES

Ricinodeiidron heudel otil (Baillon) Heckel "Akpi"

Solanum indicum L. "Gnagna"

Triplochiton scleroxylon Schumann "Samba"

FIGURE 2

Examples of wild fruits and vegetables gathered in Côte d'Ivoire with their scientific name and their local Baoulé name. They were a valuable source of vitamins and minerals and provided variety to the diet.

Palm sap, which is consumed either as fresh juice or as palm wine with various stages of fermentation, not only provided vitamins (vitamin C, niacin) and minerals (potassium) but also contributed to energy supply (Herzog et al. 1995). The palm trees die from the extraction of the sap and, especially of the characteristic Rônier palm (*Borassus aethiopum Martius*), more palm trees were used than were naturally regenerated (Mollet et al. 2000), which raised the question of the sustainability of their use.

For the farmers of the V-Baoulé, however, their crops—coffee and cocoa plantations—were the main focus. Coffee and cocoa are cultivated on cleared forest land after a first couple of seasons with arable crops. When clearing the forest, individual large trees are usually left standing. These provide some shade for coffee and cocoa, which is desirable for these trees that originate from the forest undergrowth. Farmers also explained that shading was not the only reason why forest trees were preserved, but that some are also left standing because they provide firewood and timber, edible leaves, flowers (as vegetables), and fruits (Herzog 1994).

Research in West Africa: much more than collecting and analysing data

So much for the scientific findings of the project. However, the experience of a research stay in West Africa goes far beyond results and publications. There was no internet at the time, and communication and access to scientific literature were limited as a result. Thus I had come up myself with a method to record food consumption. I decided to ask people what they had eaten in the past 24 hours. And I was lucky: in retrospect, I found out that the so-called "24-hour recall" is an established scientific method. The limited communication also gave us a lot of freedom and we were able to develop the original research project in different directions. For example, the nutritional ethnological studies by the University of Zurich were only added in a second phase to better evaluate the consumption of wild foods in the general context of human nutrition. Karin Müller joined us and selected a suitable village for participatory observation. She thus laid the foundation for today's CSRS field station in Bringakro. Numerous students did internships and wrote their theses in our project, including Florentine Djaha, the first Ivorian student at the CSRS.

But what really distinguishes research work in West Africa from a project at a Swiss university is the encounter with a different culture. Or, in my case, with several cultures. I got to know rural Africa with the help of two translators and I got to know the big city of Abidjan and became involved in the lives of the CSRS employees. This led to friendships that still exist today. I also got a glimpse of (post-) colonial Africa, had to find my role as a "petit blanc" and saw how the "vieux blancs" (today we would call them expats) lived in Côte d'Ivoire at that time. Under then-President Houphouët Boigny, Côte d'Ivoire had close ties with the former colonial power of France and was a haven of stability in West Africa.

What happened next?

More than 25 years after completing my dissertation project, I returned to Côte d'Ivoire for the first time. My former employer Agroscope and the CSRS drew up a memorandum of understanding, and I participated in the thematic workshop. The CSRS had undergone a complete transformation, evolving from a Swiss-African to an African-Swiss institution. The weekly coffee break on the CSRS lawn was mainly attended by students and teachers from universities of Abidjan and the wider region (Figure 3), whereas in the past, research had been carried out mainly by researchers sent from Switzerland. The CSRS now features a powerful and stable internet connection and the attendees of the coffee break reported on their involvement in various national and international projects.

FIGURE 3

Weekly coffee break at the Centre Suisse de Recherches Scientifiques (CSRS). Students and faculty from various universities are connected to the CSRS and take advantage of opportunities for international collaboration.

In the 1990s, the enormous need for development in our study region had been obvious. Farmers practiced subsistence agriculture using traditional methods and almost exclusively manual labour, despite being integrated into the global market through the production of cocoa, coffee, rubber, etc. The prices paid for export products did not enable a decent standard of living for the farmers' families because most of the value added was generated in the "Global North". As a side-activity of our project, two associations called Sinzénou Djanfouè (www.sinzenou.ch) were founded, one in Côte d'Ivoire and one in Switzerland. In Sinzénou-Sud, nine villages around Bringakro joined forces, while Sinzénou-Nord consisted mainly of Swiss citizens who had a personal connection to the Sinzénou region. The two associations have been active ever since. They jointly implement modest infrastructure projects such as building schools and health centres. They also engage in societal development, health training, and adapted farmer schools for young agricultural entrepreneurs (Figure 4).

FIGURE 4

For 30 years, the two associations Sinzénou Djanfouè in Côte d'Ivoire and Switzerland have been supporting infrastructure, education, and cultural projects in nine villages in Côte d'Ivoire (www.sinzenou.ch).

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2009 - 2024

PRESIDENTS, COUNCIL MEMBERS AND FORMER GRANTEES EXPERIENCES

TURN OF THE CENTURY

ERIC JÉQUIER, M.D.
President of the Nestlé Foundation
1983-2009

The Nestlé Foundation's mandate is to contribute to improving the nutrition of populations living in developing countries. To reach this goal, the Nestlé Foundation supports research in human nutrition with public health relevance in low- and middle-income countries. An associated goal is the promotion of capacity building, which includes the transfer of scientific and technological knowledge to poor societies.

The question whether nutrition research is a luxury in low-income countries is often asked, because one could argue that we have enough scientific knowledge on the important nutritional issues. What is primarily lacking is the implementation of this knowledge in these countries to improve the nutritional status of their population. This is often true, and the implementation of adequate nutritional policies is successfully carried out by international agencies in developing countries. This is where the Nestlé Foundation, alongside similar organizations, plays a critical complementary role: supporting nutrition research and capacity building to ensure that such policies are grounded in robust evidence and adapted to local contexts.

In many low-income countries, there are specific nutritional problems to be studied which require specific solutions. Poverty, rapid population growth and environmental degradation are responsible for poor nutrition in many countries. These conditions lead to the coexistence of multiple nutrient

deficiencies. Often, supplementation programs only focus on the most evident deficiency, but other nutrients may become limiting. The results of these supplementation programs are therefore disappointing and this failure is usually attributed to poor compliance of supplementation. Research in these countries may show that in fact the cause of failure is the presence of a multiple micronutrient deficiency that has only been partly corrected. A first example is provided by a study in goitrous children from the Ivory Coast with concomitant iron deficiency anaemia. The results showed that the therapeutic response to oral iodine was impaired in these children, but if iron supplementation was added to iodine, the efficacy of iodized oil given orally to these goitrous children was improved. This therapeutic approach makes sense since iron is required for the synthesis of thyroid hormones. A similar supplementation using salt fortified with both iodine and iron was carried out to treat goitrous, iron-deficient children in a rural community of northern Morocco.

A second example of multiple micronutrient deficiency is illustrated by a study in pregnant Peruvian women. Scientists in Lima have shown that iron supplements given to anaemic pregnant women impair the intestinal absorption of zinc. Providing only iron supplements to pregnant women whose zinc status is also marginal may thus aggravate zinc deficiency. This, in turn, can have negative effects on pregnancy. The addition of zinc to the iron supplement was able to compensate the decrease in zinc absorption. This approach was initiated in a large-scale supplementation program in pregnant women. These two examples illustrate that nutrition research programs are needed in many developing countries to provide precise information on the nature of multi-nutrient deficiencies so that these deficiencies can be corrected by adequate supplementation, fortification, and/or food-based interventions.

From 1981 to 1986, the Foundation coordinated an international study on maternal energy requirements during pregnancy and lactation in five countries (Scotland, The Netherlands, The Gambia, Thailand and The Philippines). The total energy cost of pregnancy was estimated to be about 70,000 kcal. The results showed that this cost is not usually reflected in a net extra dietary intake of 70,000 kcal; small extra intakes of energy (about 100 kcal/day) were found to satisfy the energy requirements of a normal pregnancy. This is less than the recommendations in the FAO/WHO/UNU report of 1985 (of an extra energy intake of about 285 kcal/day). Energy-saving mechanisms must play a role during pregnancy, but the nature of these mechanisms is not yet fully understood. A reduction of physical activity towards the end of pregnancy can contribute to this economy of energy.

It is surprising to realise that in the 1980s, the energy requirements of adult individuals were not

clearly established. The question "How much food does a person require?" was the object of much debate. The reason for this uncertainty arose from studies reporting that the daily intake of energy can vary by a factor of two in adult individuals with a similar level of physical activity. In spite of these large differences in their measured intake of energy, the body weight and body composition of these individuals remained unchanged. These observations led to the concept of adaptation of energy expenditure. According to this concept, the daily energy expenditure of individuals could decrease when energy intake is constantly low, and on the contrary, increase in response to a chronic excessive energy intake. The aim of these adaptive responses would be to maintain a constant body weight and body composition. If this concept can be proved to be valid, this may have a major influence on the real energy requirements of populations living in developing countries. Particularly in Africa, rural populations are subjected to seasonal variations in the habitual energy intake resulting from the seasonal decrease in food availability because of depleted food reserves or poor harvests.

It is important to mention that the concept of adaptation of energy expenditure to various levels of energy intake was supported by studies on energy intake. It was, however, recognized that the results of these studies may be biased, because the fact of measuring energy intake can modify the habitual eating behaviour of the subjects. Instead of measuring the energy intake of individuals, international agencies (FAO, WHO) in charge of the recommendations on human energy requirements adopted the principle of using measurements of energy expenditure rather than energy intake to estimate human energy needs.

Very little was known about the adaptative capacities of persons living in developing countries whose dietary intake is chronically limited during the "hungry season". Studies on nutritional adaptation were needed to set the minimal energy requirements that have to be met to avoid signs of deficiency. These new data were also needed by the FAO to estimate the number of people in the world subsisting on food intake considered as insufficient. The Fifth World Survey reported that the number of persons at risk of malnutrition can change by a quarter of a billion according to whether or not adaptive physiological and behavioural processes are considered possible.

In 1985, the Nestlé Foundation decided to study human capacities to adapt to periods of chronic low energy intake, the "hungry season". From 1985 to 1995, a series of human investigations resulted from a fruitful collaboration between the MRC Dunn Nutrition Unit (Cambridge, UK and Keneba, The Gambia) and the Department of Physiology (University of Lausanne). These studies were carried out in a rural village of The Gambia (West Africa) by using a respiration chamber. This device is an airtight room in which a subject can spend 24 hours or more. Oxygen consumption and carbon dioxide production are continuously measured. From these measurements, the individual's energy expenditure and the substrate oxidation (carbohydrate and fat) can be calculated. In addition, 24-hour urine collections allow for the measurement of urinary nitrogen excretion, from which protein oxidation can be calculated.

These studies showed that rural Gambian men exposed to seasonal conditions of chronic low energy intake during the rainy season (June to October) presented a mean weight loss of 2.8 kg and a decrease in 24-hour energy expenditure of about 150 kcal/day. This economy of energy was mainly due to a decrease in both basal metabolic rate and in the thermic effect of food. These changes in energy expenditure are of modest amplitude and do not have a major influence on body weight regulation. The decrease in basal metabolic rate was entirely explained by the loss of lean body mass resulting from the deficient energy intake. The size of lean body mass was found to be a major determinant not only of basal metabolic rate but also of 24-hour energy expenditure under similar levels of physical activity.

These results were supported by another study which was designed to compare the 24-hour energy expenditure between a group of Gambian men with a low body mass index (<18.5 kg/m^2) and a group with a higher body mass index (>22 kg/m^2). The 24-hour energy expenditure of these two groups of men was found to be similar, once the results were normalized for fat-free mass or for body weight. These results do not show a decrease in energy expenditure per kg of lean body mass in the group with a low body mass index (i.e. men subjected to a deficient energy intake). This indicates that the efficiency of energy utilization is not increased during periods of food deficit. Therefore, the supposed metabolic adaptation does not play a significant role in subjects submitted to the "hungry season" and human energy requirements are not significantly reduced during these periods of dietary energy deficit.

Since the requirements for energy and protein are closely interrelated, the Foundation has been instrumental in evaluating new information on human protein needs. In children from low-income countries, it was reported that protein deficiency was often partially due to a deficient energy intake. The term “energy-protein malnutrition” was introduced, illustrating the importance of covering both energy and protein requirements adequately. It is of interest to mention that the same concept may also apply to the field of micronutrient deficiency. For example, children suffering from a deficit in energy and protein are more susceptible to develop iron deficiency anaemia than children with adequate energy and protein intake having the same iron intake. These examples show the importance of keeping an open mind in designing supplementation programs to prevent malnutrition, particularly in children. It is often not adequate to limit the nutritional intervention to the most evident deficit.

From 2003 to 2024, Professor Paolo Suter was the Director of the Nestlé Foundation. I had the privilege to work with him during these 21 years and I enjoyed this collaboration very much. I have always appreciated his dynamism and his creative mind. His enthusiasm to promote human nutrition research in countries such as Sudan and Eritrea was outstanding. The Nestlé Foundation is grateful to Professor Suter for his numerous contributions over more than 20 years. Several visits to universities in Africa have shown us a dramatic lack of scientific literature; the absence of scientific journals and of recent textbooks illustrates the gap in knowledge between developed and developing countries. To bridge this gap, Professor Suter created the enLINK digital library to offer free internet access to scientific journals in the field of human nutrition for scientists in low-income countries. He also produced the enLINK library trunk containing 120 books, brochures and guidelines covering the fields of human nutrition, hygiene and internal medicine. This trunk was offered to many universities in low-income countries and we received very positive feedback from them. Another achievement of Professor Suter has been to greatly improve the content and the presentation of the annual reports of the Foundation. These reports not only present the new research projects supported by the Foundation, but they also contain original scientific contributions from international experts covering new challenges in human nutrition.

Alhassan Manu

GENERATING THE EVIDENCE FOR A LOCALLY FORMULATED COMPLEMENTARY FOOD FOR GHANAIAN

CHILDREN: THE CASE OF WEANIMIX

ANNA LARTEY, PhD
Foundation Council Member

Dedicated to the memory of my colleague, the late Alhassan Manu

In 1990, a young Ghanaian researcher, Alhassan Manu, began doctoral studies at the University of California, Davis, under the supervision of Professor Kay Dewey. Naturally, his research focused on child nutrition.

In 1987, the Ghana Ministry of Health introduced a complementary food called "Weanimix," a cereal-legume blend promoted as a solution to child malnutrition. Weanimix was considered nutritionally superior to the traditional fermented maize porridge, known locally as "Koko." At the time, child malnutrition was a significant concern: 30% of children under five were stunted, 22% were underweight, and 7% were wasted (Ghana Demographic and Health Survey 2003).

Despite its promotion, no intervention feeding trial had assessed Weanimix's impact on child growth. Alhassan Manu developed a grant proposal for a randomized controlled trial to evaluate the effects of Weanimix on child growth and micronutrient status. The study, funded by the Nestlé Foundation, was set in Techiman, Brong-Ahafo Region, Ghana, with fieldwork beginning in 1994. Tragically, Alhassan Manu passed away after a short illness in 1995.

In 1994, Anna Lartey, a Ghanaian doctoral student at UC Davis with experience in child nutrition research, took over the trial in Techiman. The Weanimix trial was significant, providing

REFERENCES: SEE PAGE 154

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evidence for an improved, locally formulated complementary food compared to traditional maize-only porridge. Weanimix consisted of 10–15% soybeans or cowpeas, 10% peanuts, and 75–80% maize. As a cereal-legume blend, it was high in fiber and phytate, which can interfere with mineral absorption.

The study included three additional improved complementary food formulations:

- Weanimix with added vitamins and minerals
- Weanimix with fish powder
- Koko with fish powder

Mothers and children received these foods free for six months. Results showed improved growth among children consuming the four improved foods compared to non-intervention children of similar ages. Notably, adding vitamins and minerals to Weanimix effectively prevented iron depletion (Lartey et al., 1999). The study's publication has received over 250 citations.

Recent progress in child nutrition in Ghana

Since the original Weanimix trial, Ghana has made notable progress in reducing child malnutrition. The 2022 Ghana Demographic and Health Survey reports that stunting among children under five has declined to **17.4%**, nearly halving the rate from the early 2000s. Wasting remains a concern at **6.8%**, and underweight prevalence averages **20.4%** nationally, with significant regional disparities. Only about a quarter of young children receive a minimum acceptable diet, underscoring the need for continued efforts to improve dietary diversity and feeding practices.

National initiatives, such as the Community-Based Management of Acute Malnutrition and expanded school feeding programs, have contributed to these gains. However, challenges persist, particularly in addressing anaemia among women and adolescent girls, and in closing the nutrition gap between regions and socioeconomic groups. Continued investment in nutrition-sensitive interventions and targeted support for vulnerable populations will be essential to sustain and accelerate progress.

Anaemia in women and children: current situation in Ghana

Anaemia remains a significant public health challenge in Ghana, particularly among women of reproductive age and young children. According to the 2022 Ghana Demographic and Health Survey:

- **Children aged 6–59 months:** The prevalence of anaemia is **48.9%**, a notable decline from 76.1% in 2003, but still affecting nearly half of all young children. The burden is highest among children aged 6–11 months and in poorer, less educated, and rural households. Regional disparities persist, with the Northern region reporting the highest prevalence (69%) and Ahafo the lowest (35%).
- **Nonpregnant women (15–49 years): 40.4%** are anaemic, with higher rates among those in the poorest wealth quintile and in the northern zone of the country. Multiparous women and those reporting poor health status are at increased risk.
- **Pregnant women: 51.4%** are anaemic, making this group especially vulnerable to adverse health outcomes, including increased maternal mortality and poor birth outcomes.

Despite progress, Ghana is not on track to meet the World Health Organization's target of a 50% reduction in anaemia among women of reproductive age by 2030. Addressing anaemia requires intensified, equity-focused strategies, including improved dietary diversity, iron supplementation, malaria control, and targeted interventions for high-risk groups.

Today, various cereal-legume blends using local ingredients—maize, millet, sorghum, rice, soybeans, groundnuts, tiger nuts, cowpeas—are common and accessible to Ghanaian households. The Nestlé Foundation grant was instrumental in generating evidence for a government-approved complementary food for Ghanaian children.

A PERSONAL JOURNEY

EMPOWERING CHANGE:

PROF. JEYAKUMAR HENRY
Global Centre for Asian Women's Health, National University of Singapore, Singapore; Fellow, American Society for Nutrition

NESTLÉ FOUNDATION'S ROLE IN ADVANCING GLOBAL NUTRITION

This narrative recounts my transformative encounter with the Nestlé Foundation, and how it profoundly influenced my life journey, professional development, and enduring passion for the science of food and nutrition.

As the Foundation's mandate states:
"The purpose of the Nestlé Foundation is to initiate and support research in human nutrition with public health relevance in low-income and lower middle-income countries. Research should lead to implementation and action and aim at enabling institution at enabling institution strengthening and capacity building in a sustainable manner in the host country."

My experience stands as a true testament to the dedication of the Foundation's Director, Staff, and Council in contributing to my personal growth and the advancement of global well-being.

I was born in Colombo, the Capital of Sri Lanka (formerly Ceylon, known as the "Pearl of the Indian

Ocean"), and grew up in Kandy. I attended Trinity College, Kandy, a private institution established by the British over a century ago. My upbringing and education in Sri Lanka significantly influenced my career path. My father, a biologist, fostered my early appreciation for nature and biology. During school holidays, we camped in the forest, engaging in bird watching, wildlife observation, and snorkelling. We relied on foraged and trapped food for our meals, which taught me to value food and use it with gratitude and dignity. These experiences also sparked my interest in food science, as I observed firsthand the transformation of foods through cooking into delectable dishes.

During the early 1970s, the academic landscape in Sri Lanka was notably devoid of institutions offering formal degree programs in Food Technology. Recognizing the imperative to pursue advanced studies in this emerging discipline, I elected to enrol in a Food Technology course at the University Department of Chemical Technology, University of Mumbai, which was widely regarded as one of Asia's most esteemed centres for scientific education. This strategic decision not only provided a rigorous foundation in food science but also positioned me within a vibrant academic community.

Following the completion of my bachelor's degree in food technology, I sought to further my expertise by applying to the prestigious London School of Hygiene and Tropical Medicine (LSHTM) for a Master of Science degree in Human Nutrition. My academic aspirations were supported by the award of a scholarship from the Nestlé Foundation, which enabled me to join LSHTM in the late 1970s, a period marked by intellectual vibrancy and a flourishing scholarly community. Immersed in this stimulating environment, I gained profound insights into food science, nutrition, and global health, knowledge that continues to inform my professional endeavours to this day.

Upon completion of my master's program, I was privileged to receive further encouragement and support from distinguished figures in the field. Under the mentorship of Professor John Waterlow, FRS, then Head of Nutrition at LSHTM, and with the backing of the late Serge Herzen, Director of the Nestlé Foundation, as well as Dr Roger Whitehead and Prof Eric Jequier, I was awarded a PhD scholarship to continue my studies at LSHTM. This opportunity set me on a lifelong path of inquiry, passion, and scholarly contribution to the field of human nutrition, fostering a commitment to advancing scientific understanding and addressing global nutritional challenges.

After completing my PhD, I was all set to return to Sri Lanka, but the civil war broke out and turned my plans upside down. With a family to support, I suddenly needed to secure a job quickly. I was lucky to find a lecturer position at Oxford Brookes University (OBU). What started as a necessity turned into a fulfilling career: I ended up spending nearly thirty happy years there, eventually becoming Head of the Department of Nutrition and Professor of Nutrition.

My earliest publication[1], based on my PhD thesis, provided new insights into how the human body responds to starvation. Traditionally, it was believed that during periods of starvation, the body switches its body fuel usage from protein to fat. However, by analysing data from Benedict's classical study on prolonged fasting, we demonstrated that there was no such fuel switch occurred during a 31-day fast. Additionally, we also reported that while the ratio of protein to fat (adipose tissue) breakdown varied between individuals during starvation, it remains constant for each person throughout their period of starvation.

During the early stages of my academic career at OBU, I was once again fortunate to receive support from the Nestlé Foundation, which ensured I had the necessary funding to initiate my research as a lecturer. My initial laboratory-based investigation was inspired by observations in Malaysia, where postpartum women traditionally consumed specially prepared foods containing spices such as ginger, garlic, and pepper, believed to promote fat loss and "cleanse the body."

To scientifically evaluate this practice, I conducted a controlled study in which participants consumed ginger, garlic, pepper, or chillies in random order. Interestingly the ingestion of chilli resulted in an increase in metabolic rate of up to 20% for nearly two and a half hours. This research, later recognized as a classic study on the effects of spices on metabolic rate[2], exemplifies how cultural practices can inform and advance scientific discoveries.

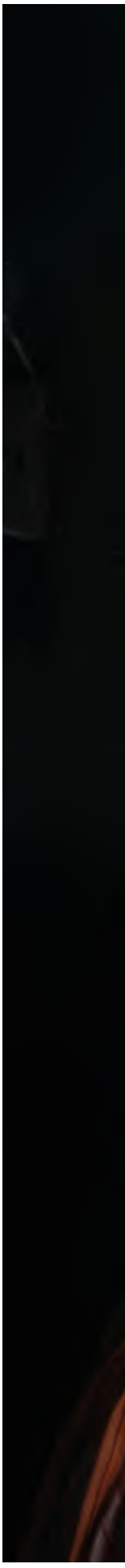
For the next 18 years, my research focused on energy metabolism, particularly basal metabolic rate (BMR). Schofield et al. developed widely used predictive equations for BMR that formed the foundation of the 1985 FAO/WHO/UNU guidelines on Energy Requirements. However, their database was heavily weighted towards Italian subjects and included few individuals from tropical regions, resulting in an overestimation of BMR and energy needs in these populations. By reanalysing global BMR data, we developed the Henry (Oxford) BMR equations[3, 8, 9], which are now considered the most comprehensive and widely applicable for predicting BMR in diverse populations across the EU, UK, and Asia.

Growing up on a tropical island but now living in the UK, I still maintained a lasting passion for international nutrition and a genuine compassion for those facing food insecurity. This commitment truly took shape in the early 1980s, when I was presented with my first major opportunity: a large group of refugees from Mozambique arrived in Malawi, and I was invited by colleagues from the Save the Children Fund UK and the UNHCR to help address a serious outbreak of pellagra and other micronutrient deficiencies among the population.[4]

Working closely with the team, we designed a locally based food fortification program using the basic rations available at the time: beans, rice, oil, and maize. Seeing the positive impact of this initiative on the health of the refugee community was deeply rewarding, and it was inspiring to know that our approach could be adapted for use in other emergency situations.[4] With funds secured from the UK Department for International development (DFID) and Malaysian palm oil, We were able to demonstrate the use of red palm oil (rich in Beta Carotene) as a dietary source to increase the Vitamin A levels in breast milk in lactating mothers in Tanzania.[5]

Building on this experience, along with Dr Steve Collins I went on to help develop a low-cost, ready-to-eat therapeutic food (RUTF) that could rehabilitate malnourished children. We made sure to use locally available ingredients like peanuts, wheat or rice, and multivitamins, so the solution would be both affordable and sustainable.[6, 11]

My inaugural international collaborative research endeavour, generously funded by the Nestlé Foundation, was undertaken in partnership with the Universiti Kebangsaan Malaysia. The focus of this project was to investigate the factors influencing changes in basal metabolic rate in adolescence, a subject that was both innovative and



forward-thinking for its time. Throughout the course of this research, I had the privilege of collaborating with Professor Ismail Noor. Our joint efforts resulted in a series of scholarly publications,[7] which were subsequently presented at the Asian Congress in Kuala Lumpur in 1991. The significance of our work was further underscored by the attendance of the late Beat Schurch at the Congress in 1991, who was then serving as Director of the Nestlé Foundation.

In 2000, I continued my professional engagement in the field of nutrition through a unique opportunity facilitated by UNICEF. I was invited to spend three months at various UNICEF offices in New York, Beijing, and New Delhi. The purpose of this assignment was to study how locally available foods could be utilized to develop appropriate and nutritious weaning foods for infants and young children. This experience was profoundly enriching, as it allowed me to explore the scientific, cultural, and practical needs of diverse societies, deepening my understanding of the intersection between nutrition science and local traditions.

2000 was also the year I was appointed by the British Government to serve on the inaugural Board of the Food Standards Agency, the first governmental body established in Europe to examine food security and safety in the United Kingdom. Chaired by Sir John Krebs, the Board convened monthly. My tenure (2000-2003) provided valuable insight into how science policy must also address community needs, significantly shaping my understanding of government policy development. This appointment marked a pivotal moment in my career, reinforcing my commitment to advancing public health through evidence-based policy and collaborative leadership.

In 2011, I received an invitation from the Singapore government (A*STAR) that changed the course of my career: to build the country's largest centre for clinical nutrition research. What began as an empty space and an ambitious idea grew, over 18 intense months, into the Clinical Nutrition Research Centre. In January 2013, I stepped into the role of founding Director. From the start, our mission was clear: to answer the questions that mattered most to Asia. We studied foods that could lower blood glucose in a region facing a rising tide of type 2 diabetes. [10, 12, 13] We explored natural ingredients that could boost metabolism and support weight loss. We used food technology to create products that were both delicious and genuinely good for health.[14]

The Centre quickly became a place where new ideas took root. Multinational companies from around the world came to us, eager to understand how Asian bodies responded to their products—something long overlooked, as most clinical trials had focused on Western populations. What inspired me most was knowing we were filling a critical gap. We were giving Asia its own evidence, its own insights, its own scientific voice. And watching the Centre grow from a blueprint into a global leader remains one of the most meaningful chapters of my journey.

I continue to reside in Singapore, serving as Senior Advisor at the Global Centre for Asian Women's Health (GLOW). My dedication to research and education remains steadfast. Together with Professor Cuilin Zhang and the GLOW team, we have established the region's first MSc programme in Human Nutrition and Lifestyle Medicine at the National University of Singapore, a landmark achievement that advances nutrition science and healthcare education in Asia.

Together, we are paving the way for future generations to lead healthier lives, strengthening the foundation of nutrition science and empowering communities across Asia and beyond.

The enduring support of the Nestlé Foundation has been pivotal in shaping my pursuit of excellence in global nutrition. From the award of a scholarship cultivating my early scholarly aspirations to enabling pioneering research and international collaboration, the Foundation's unwavering commitment to scientific progress and community well-being has greatly influenced my career. As I carry forward this legacy, I remain deeply appreciative of the mentorship and opportunities provided, and my dedication to innovation, scientific rigor, and the advancement of public health worldwide.

Finally, as my narrative will testify, serendipity has played a major role throughout my journey; it is fitting to recall that the word itself is derived from 'Serendib,' the ancient name for my homeland, Ceylon, now known as Sri Lanka!

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THE HISTORY OF CHILDHOOD IN SOCIETY

PROF. DR MED. SUSANNE SUTER

FROM THE ROMAN EMPIRE TO MODERN TIMES

The history of childhood in society, which has rarely been addressed in a systematic way in the literature, was the subject of two volumes edited by Egle Becchi and Dominique Julia, *L'histoire de l'Enfance en Occident*, covering Antiquity to the present day (1998). The two authors systematically examined the ways in which adults speak about children, children's objects, and a few texts in which children speak in the first person. Drawing on these writings, on historical texts referring to sick children, and on my own experience as a paediatrician and mother of three, I attempt to highlight what most clearly separates the past from the present.

At the beginning of this period, what most strongly shaped the child's position in society was infant mortality. Mortality among infants and very young children was extremely high; until the end of the nineteenth century, it was estimated at 25% or more. Mortality began to decline at the end of the nineteenth century, more as a result of general improvements in living conditions than of medicine: cleaner water and better hygiene in general. By the end of the twentieth century, official

statistics in France and Switzerland indicated figures of less than 0.4% for mortality among children under one year of age. However, these are figures from Western countries, and there remains a huge gap compared with the rest of the world. The United Nations estimates that in the twentieth century, mortality among children under five costs humanity at least one third of each new generation. These deaths were considered a matter of fate, and society's attitude toward the newborn child was very different from today's. Yet children's survival did not depend solely on natural causes: in Roman society, where the father was omnipotent, he had the right to accept or reject the newborn. Infanticide was a reality at that time. There were few ceremonies surrounding the death of a very young child: the child was not cremated, and only a short period of mourning was permitted. These rules can be interpreted as an attempt to come to terms with the death of a young child. They suggest that it was too risky to become too attached before the child had passed beyond the period of high mortality.

Subsequently, especially in affluent families, infants were often entrusted to a wet nurse in the countryside to ensure "optimal" breastfeeding. They returned to their families at the age of two or three. Contact between the infant and the family was limited to a few visits to ensure that the child was thriving; daily mother-child closeness was not considered essential to the child's well-being. In Egle Becchi's terms, the child was more an "object" than a "subject."

Childhood did not last long, and this remained true until the Middle Ages: nubility was set at twelve years for girls and fourteen for boys. Guardianship ended at twelve, which also corresponded to entry into the world of work.

Many children grew up in conditions that were far from optimal: poverty was widespread, and there was no protection for single mothers. Educational principles for all children were lacking, and hygiene remained a problem for a long time.

But during the Renaissance, everything changed. Educators—well before physicians—began to consider the child as a full-fledged individual. Under their impetus, perspectives shifted. Erasmus of Rotterdam, probably the most famous Humanist, approached the child as "a person in the making, to be guided, who must learn all aspects of life well before being exposed to them." He sought to lead children toward better living and better speaking, making him a true educator. A general turning point was reached, and schooling gradually extended to

increasingly younger children. The English became pioneers of preschool education, followed by the Germans. Gradually, the age at which schooling began declined throughout Europe. Little by little, the notion of children's rights gained ground. Although during the Renaissance not all children were yet regarded as full individuals, the idea of children's rights emerged in the eighteenth century, though it only became concrete in the nineteenth. It was also at this time that books began to appear in which children were the heroes, for example in the works of Victor Hugo in France and Charles Dickens in England. Teaching methods gradually adapted to the child's age.

Despite all this progress, early childhood mortality remained high. There were no means to combat infectious diseases, whose origins were largely unknown, and society was powerless in the face of epidemics. For this reason, the following remarks focus more on the development of more effective medical care for children than on the history of childhood itself, particularly in Geneva, as an example for other children's hospitals.

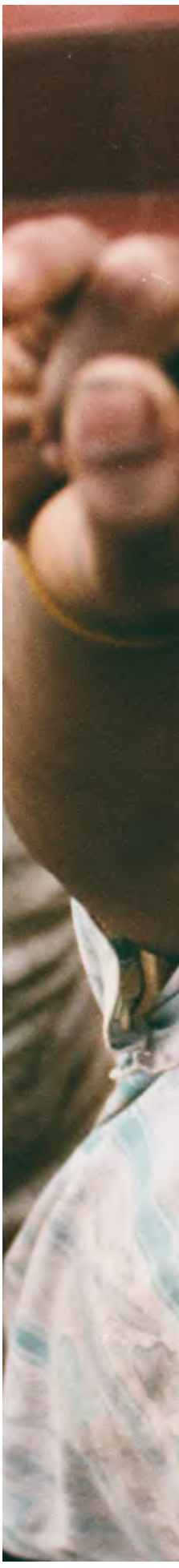
In the nineteenth century, several physicians in Geneva realized that books specifically devoted to children's diseases were needed. Among them were Ernest Barthez and Frédéric Rilliet, who contributed significantly to this goal. Like most Geneva physicians, they trained in Paris. Knowing that they intended to publish a paediatric textbook, Minister Villemin, responsible for health, granted them two additional years of hospital training. During this time, they systematically recorded all symptoms, their progression, and the histories of hospitalized children to document their illnesses as precisely as possible. At the same time, they compared their findings with those published in other European works. The result was the *Traité clinique et pratique des maladies des enfants*, published in 1843 and revised in 1853, with a later edition in 1877 revised again in 1900.

But this story of success was not without difficulties. While Rilliet and Barthez were teaching pediatrics in the city, it was Antoine d'Espine who taught paediatrics at the Faculty of Medicine, though he saw no reason to separate it from adult medicine. He drew criticism from authorities in Bern, who required faculties to provide teaching specifically dedicated to paediatrics. Geneva initially refused, and the Faculty of Medicine had to be threatened with the loss of its right to grant medical degrees if it did not introduce paediatric instruction. It was only in 1908 that a chair of paediatrics was granted to d'Espine, allowing the Faculty of Geneva to continue awarding Swiss medical diplomas.

In the years that followed, paediatrics continued to flourish, particularly with its remarkable expansion in the United States and also in Switzerland with Guido Fanconi at the Children's Hospital in Zurich, which attracted disciples from across Europe.

Thus, medicine for children progressed in parallel with the evolving position of the child in society. It integrated medical advances beneficial to children, and mortality at all ages declined dramatically. Yet medical progress alone will not suffice to safeguard children's health. Today, children's health will depend even more on humanity's effectiveness in limiting the causes and effects of climate change and environmental degradation, which represent the greatest threat to the health of all, children first and foremost.

If the author of these lines could choose one message to retain above all, it would surely be this final word.



PERSPECTIVES
FROM TWO FORMER COUNCIL MEMBERS

PROF. ANN PRENTICE, PhD
& **PROF. DOMINIQUE DARMAUN,** MD, PhD

1

When we ask ourselves why we joined the Scientific Council of the Foundation:

PROF. DARMAUN

I can list a myriad of reasons. True, I had long been immersed in the world of clinical nutrition. As a trained pediatrician, I had been involved in the 80's and 90's, in France and in the USA, in the care of children with diabetes or chronic diseases that hinder growth, such as sickle cell disease or cystic fibrosis. Later on, as a professor of nutrition in France, I was teaching students and residents, raising awareness of nutrition-related problems among fellow physicians and staff. I met undernutrition on a daily basis—over 40% of adult patients admitted to my hospital (like in any other in Europe) were undernourished, whether they were elderly or treated for cancer, or undergoing major surgery, for instance short gut syndrome after a large resection of the small intestine, impairing intestinal absorption. Our 'magic' wand was artificial nutrition via nasogastric or gastrostomy tubes (enteral nutrition), or intravenous catheters (parenteral nutrition): after a mere couple of weeks, exhausted patients would be able to sit up in bed again or even walk, and their immune system was stronger, able to fight severe infection, survive chemotherapy, or a bone marrow transplant.

From a research standpoint, I had long used stable isotopes, non-radioactive probes that allow us to trace the fate of nutrients in the bloodstream in a harmless fashion in either adults or infants and children. My research focused on amino acids (the building blocks of protein)—exploring, for instance, how altered glucose metabolism or intravenous

amino acid supply would impact the synthesis rate of body protein or antioxidant molecules such as glutathione, or whether delivering specific amino acids such as glutamine or citrulline would enhance protein accretion. Those issues clearly were relevant to maternal and infant health since protein accretion is a prerequisite for growth, and oxidative status contributes to inflammation and chronic diseases.

Finally, as a head of a research unit focused on the long-term health effects of undernutrition in the first 1,000 days of life, we used both animal models and cohorts of infants with low birth weight due either to preterm birth or intra-uterine growth restriction. With fellow pediatricians and neonatologists, I spent large chunks of my time applying for grants to support our research.

Yet I felt some frustration. I felt it unacceptable that undernutrition still was highly prevalent and inflicted a tremendous amount of suffering and death among children in low- and middle-income countries, and I longed to address research topics closer to 'real life', that is, the world outside of the Western 'cocoon' of university hospitals. So part of me longed to help those who have a direct impact on children in the third world.

Last but not least, the one who asked me to join the Council in 2013 was Jehan-François Desjeux, my mentor, for whom I had the utmost respect and admiration, and who had long been involved in pediatric undernutrition and diarrhea in the world, and was a member of the Foundation Council, so I accepted with enthusiasm.

PROF. PRENTICE

The Nestlé Foundation was well known to me, and highly valued, long before I was invited to join the Council. I had worked for many years in The Gambia alongside West African scientists and doctors who were supported by the Foundation in the early stages of their careers through training and project grants. Similarly, in the years after China had emerged from the Cultural Revolution, I was involved as a mentor to several Chinese scientists and technologists, funded by the Foundation for specific projects and periods of training, some of which were spent at my laboratory in Cambridge, UK. I also refereed grant applications and reviewed institutes receiving funding from the Foundation in other parts of the world, from West Indies to Thailand. Through these interactions, I became aware of the time and effort that the Directors of the Foundation, Mr Beat Schurch and subsequently Mr Paulo Suter, gave to support and encourage scientists from low- and middle-income countries (LMIC), to give them the best opportunity in their applications and success with their projects.

The same was true of the many eminent Council members who I knew had a deep-felt commitment to fostering excellence, self-reliance and capacity building in LMIC for nutrition research. Among these were my Unit Director, Professor Roger Whitehead; my friend and colleague Professor Prakash Shetty; and Professor Janet King who, like me, had a long-standing research interest in micronutrient metabolism of women in LMIC during pregnancy and lactation. So when Prakash approached me to consider becoming a Council member myself when Janet King's term of office ended, it was an invitation I could not refuse.

2

During our tenure as a members of the Scientific Council

PROF. DARMAUN

I knew the names of most former and current members of the council; they had long been role models for me as a younger scientist in the 80's. So I was awed and honored to be asked to join them, though upon joining I felt like an imposter since, unlike most of the other members, I was neither born in nor had any research experience in low- and middle-income countries.

Working in the Council, however, I felt welcome, and was thrilled to develop camaraderie and friendship with the group, while I learned from their diverse expertise. As a matter of fact, I learned most from reviewing the grant applications assigned to us. Upon opening an application, I would often 'waste' a lot of time reading about the context of the grant applicants, their country's geography, economy or current events, spending hours drifting in the internet daydreaming about the rolling hills of Kenya or the vast expanses of the altiplano... I also was guided by the immense knowledge of Paolo Suter, the director of the Foundation at the time, who seemed to know everybody in so many universities across the world. I was amazed by the diversity of the grants that emerged from Benin, Chad, Congo, Eritrea, Ethiopia, Ghana, Mozambique, Nigeria, Senegal, Tanzania, Uganda, India, Indonesia, Laos, Sri Lanka, Vietnam, Colombia, or Mexico, just to name a few.

Deep inside, I wondered how legitimate I was/ we were, judging applications that were the fruit of hard work from scientists often working under harsh circumstances, fighting prejudice (particularly regarding female scientists), injustice, lack of resources, or oppression in many countries run by inept or corrupt governments, or crushed by the greed of big corporations from the Northern hemisphere. I felt more and more admiration for these fellow scientists from faraway lands fighting for research under much less privileged conditions than those I had enjoyed in the Western world.
Yet, unlike other funding agencies, we spent hours within the council in animated discussions, considering not only the quality of statistical analysis in such and such grant, or its scientific merit, but how it could or might be a life-changing event, allowing a young, enthusiastic student to achieve his or her dream of obtaining a Masters or a PhD. Such discussions, I felt, made us somehow legitimate.

Among the topics addressed, I realized that

(a) malnutrition and/or 'hidden hunger' correction of nutrient deficiencies remained a major topic, with projects initially using either 'classic' mineral and vitamin powders, but with a strong trend toward the used of locally available, more affordable and sustainable food sources rather than mineral powders. As overweight and obesity are an additional burden in low- and middle-income countries, we reviewed an increasing number of grants addressing those topics as well

(b) an emerging number of applications addressed the production of more suitable local food, for instance using sustainable methods of agro-ecology

(c) a growing number of projects aimed at fostering nutrition literacy, which may be a preventive tool, more effective than treatment to mitigate nutritional deficiencies

(d) many applicants addressed specific groups at risk such as pregnant or lactating women, infants and children under five (preschool age) but, increasingly, long-neglected groups such as teenagers

(e) relationships between nutrition and infection remain a common topic

(f) and, last but not least, the follow up of cohorts to assess the long-term impact of nutrition teaching and/or intervention has been emerging.

PROF. PRENTICE

In the decades before I joined the Council in 2014, nutrition research in LMIC was often initiated by established researchers in high-income countries, seeking to determine the nutritional requirements of mothers and infants in resource-poor communities in order to avoid malnutrition and improve their health. In many LMIC, research capability at an advanced level was scarce; in The Gambia, for instance, there was no university until 1999. Grants to local researchers for specific projects in these 'North-South' collaborations provided opportunities to learn research skills, gain a Masters or PhD degree, and publish in scientific journals.

By 2014, this had changed substantially because by then there were many more researchers at MSc and PhD level in well-established universities

and institutes in LMIC. Consequently, the focus had largely switched to 'South-North', with LMIC scientists leading the research initiatives but with training opportunities and collaborations, especially access to sophisticated techniques, requested from institutions in high-income countries. The need at that time was for capacity building, not only for scientific training and equipment but also for development of skilled support resource and local community participation.

In 2015/2016, I gave a perspective about this in an article for the Foundation's Annual Report entitled 'The need for local people', in which I described the critical importance of local representation in LMIC nutrition research (REF). It is pleasing to me to realise that, by the end of my time on Council, this is much less of a concern, because well-trained local support resources and community participation are now more readily available in many LMIC. Increasingly, the requests for Foundation funding are now for single-country projects or for 'South-South' collaborations between LMIC institutions across Africa, Asia, and the Americas with little involvement from high-income countries.

Reference

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3

Our hopes for the future of the Foundation

PROF. DARMAUN

As I am leaving the Council, I hope the Foundation will retain its fundamental principles, trying to focus on a 'bottom-up approach', in which the topics of the grants are decided not by supposedly omniscient scientists from 'above', but by scientists who cope on a daily basis with the nutritional needs and issues of their own countries. We indeed aim at giving a voice to the voiceless, opportunities to those who feel powerless and have limited funding for research. Such an approach should help ensure the independence of the Foundation, be it from lobbies, from the pressure of industry, or from political decisions.

A long-term hope and goal of the Foundation should be to foster the emergence not only of young, promising researchers, but also of networks of successful scientists across countries and continents in the global South.

Sure enough, the number and scale of the problems related to nutrition in the world are daunting, and the Foundation has limited resources, but we have honestly, and modestly tried, and the Foundation will hopefully remain committed, to address the needs of research in nutrition in the countries that need it most, one issue at a time, one grant at a time, one calorie at a time, one emerging scientist at a time.

PROF. PRENTICE

Another change that occurred during my years on Council has been in the nature of the priority research questions. While these are still focussed predominately on undernutrition of mothers and children, the emphasis has shifted from studies to determine nutritional requirements by characterising the underlying metabolic mechanisms and identifying biomarkers of insufficiency, to translational studies designed to improve nutrient intakes through food fortification, use of indigenous plants and insects, modified agricultural practices, and innovative nutrition education methods. As a result, my expertise as a nutritional physiologist on Council became less relevant over time, and signalled the importance of selecting incoming members with a deeper knowledge of these and other emerging areas. In recent years, this has been achieved and the Council is now well set up to review proposals on a wider range of research topics than previously, especially on food systems and food security issues, as well as those that incorporate use of new technologies, social media, and artificial intelligence.

Council membership of the Nestlé Foundation requires, as would be expected, a considerable commitment of both time and intellectual effort. However, it also has many rewards. Not least are the twice-yearly meetings in Lausanne which combine intensive debate on issues of governance and grant selection with the legendary Swiss hospitality. One delightful tradition of the Foundation is to hold a farewell event for members when they leave the Council. For Dominique and me this was a very special organ recital prepared for us by organist Carlo Massimo on the famous Grand Organ in Eglise Saint-Francois in Lausanne. Although I am sad to have now left the Council, I take many happy memories and friendships with me, and I wish the ongoing Council every future success.

2024 -

THE FUTURE

THE NEXT 10 YEARS:

DRIVING NUTRITION IMPACT THROUGH NESTLÉ FOUNDATION PROJECTS

PETRA S. HÜPPI, MD
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VIRGILIO CARNIELLI, MD, PhD
Scientific Chair, Nestlé Foundation

Nutrition is a cornerstone of health and human development. Adequate and balanced nutrition is closely linked to improved infant, child, and maternal health; stronger immune systems; safer pregnancy and childbirth; lower risk of non-communicable diseases such as diabetes and cardiovascular disease; and increased longevity. Healthy children are better able to learn and thrive in school, while well-nourished adults are more productive and better equipped to create economic opportunities. In this way, improved nutrition contributes not only to individual well-being but also to breaking intergenerational cycles of poverty and hunger.

However, malnutrition in all its forms continues to pose serious threats to global health. The world today faces a "double burden" of malnutrition, particularly in low- and middle-income countries (LMICs).[1] This includes both undernutrition—such as wasting, stunting, and deficiencies in essential vitamins and minerals—and overweight and obesity, along with diet-related non-communicable diseases.[2] The developmental, economic, social, and medical consequences of this burden are profound and long-lasting, affecting individuals, families, communities, and entire nations.[3]

What becomes increasingly important *in the future* is not only generating evidence, but building durable local ecosystems that can keep producing evidence, translating it into action, and training the next generation of leaders. The Foundation's stated approach already points in that direction: it supports projects where results **ideally provide a basis for implementation and action with sustainable effects** in the studied populations.

Below is a future-oriented framing of what the Nestlé Foundation is positioned to strengthen—based on the way its programs are structured today.

1

A future anchored in local-investigator-driven research

One of the strongest pathways to sustainable impact is locally led research, where the questions, methods, and interpretation are shaped by investigators who understand the cultural, economic, and health-system realities on the ground. The Foundation's research grants program is explicitly built around supporting public-health-relevant nutrition research in LMIC settings.

Looking forward, this model can do three things at once:

- **Improve relevance:** locally defined research questions are more likely to match real bottlenecks (e.g., complementary feeding constraints, affordability, school food environments, or anaemia drivers in a specific region).
- **Accelerate translation:** implementation-ready evidence—designed with local decision-makers in mind—supports faster uptake into programs and policies.
- **Build ownership:** local leadership increases the likelihood that interventions persist after external funding ends.

2

Capacity building as a "built-in" outcome, not a side benefit

The future of global nutrition depends on national and regional capacity: research methods, ethics and data systems, implementation science, and partnerships between universities, ministries, and communities.

The Foundation's guidance emphasizes that funded research should ideally lead to sustainable effects, and its grant approach is widely described as valuing capacity-building components.

Future-facing capacity building:
To address these issues, the Foundation launched a major initiative aimed at supporting more structured and complete grant applications. This includes the development of a new, interactive application system that guides applicants step by step and provides real-time prompts to ensure that all required information is clearly and comprehensively addressed. In addition, the Nestlé Foundation will soon support a MOOC designed to equip applicants with essential skills for developing high-quality research proposals.

This future-facing capacity building allows for:

- embedding graduate students and early-career staff into core project roles (analysis, field coordination, dissemination)

- strengthening local labs and field surveillance (dietary assessment, biomarkers, anaemia screening where appropriate)
- supporting open, reusable datasets and locally owned protocols that can be adapted across regions

3

Local career development: from "project staff" to "future leaders"

A critical barrier in LMIC research ecosystems is the "leaky pipeline": talented trainees leave research or leave their countries due to limited opportunities. The Nestlé Foundation directly addresses this with **Re-Entry Grants**, designed to encourage the return and re-establishment of postgraduate researchers in their home-country careers—paired with an expectation that the host institution guarantees a post and supports career development.

Looking ahead, Re-Entry-style mechanisms can be expanded into a broader leadership pathway, for example:

- small "bridge funding" that helps early-career investigators publish and compete for larger national/international grants
- mentorship networks linking current grantees and alumni across regions
- structured support for dissemination skills (policy briefs, stakeholder engagement, implementation roadmaps)

4

MOOCs tailored for LMICs: Scaling skills at low cost

While the Foundation's public materials focus on research funding and re-entry support, there is a clear opportunity to strengthen *career development* at scale through **accessible, LMIC-relevant online learning** that complements funded projects (methods, nutrition epidemiology, implementation science, grant writing, research ethics, mixed-methods evaluation, etc.).

A future-oriented model:

- **MOOCs co-created with LMIC universities and investigators** (so content matches real constraints and case studies)
- **micro-credentials** aligned with Foundation-funded projects (e.g., "dietary assessment in low-resource settings," "school food environment evaluation," "anaemia program design and monitoring")
- **project-integrated learning:** requiring learners to produce outputs that directly strengthen ongoing studies (analysis plans, implementation theories of change, stakeholder maps)

5

What success looks like in the next 5 to 10 years

The Nestlé Foundation will continue to support investigator-initiated grants, strengthen capacity building and career development pathways, organize workshops and local networking events focused on nutritional research, and promote the publication and dissemination of research findings through scientific journals and the Foundation's Annual Report.

With that the future impact will provide:

- **locally adopted interventions** (implemented by ministries/schools/health systems)
- **reduced evidence-to-action time** (faster translation)
- retained talent (more researchers staying and leading in-country)
- **regional research networks** that persist beyond any single grant cycle

In short: the Nestlé Foundation's next chapter is well positioned to be about more than funding research—it can be about **building durable, locally led nutrition science and implementation ecosystems** that tackle the double burden of malnutrition with solutions designed, tested, and scaled from within LMICs.

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CONCLUSION

A legacy of enduring impact

Since its inception, the Nestlé Foundation has played a distinctive and influential role in advancing nutrition science, particularly low- and middle-income countries. Its early pioneering research, combined with a long-standing commitment to **methodological soundness, capacity building, and partnership**, has generated evidence that continues to shape policies, inform health interventions, and support sustainable improvements in population well-being.

The Foundation's support for emerging scientists has contributed to the establishment of robust research environments, strengthened national and regional expertise, and facilitated the development of **future leaders** in global nutrition. Its collaborative approach has further ensured that scientific insights are translated into **meaningful impact**, benefiting communities across diverse geographical and socio-economic settings.

As the Foundation looks ahead, its legacy - rooted in **scientific integrity, global engagement**, and an unwavering commitment to improving nutrition - remains central to its mission. The path forward will undoubtedly present new scientific and societal challenges, yet it equally offers significant opportunities for innovation, leadership, and continued contributions to the advancement of global nutrition research.

60 YEARS OF IMPACT

THE FOUNDATION

Established in 1966, the Foundation is an independent philanthropic institution based in Lausanne, Switzerland. Its mission is to advance **Maternal, Child and Adolescent Nutrition in low and middle income countries** (LMICs) through high-quality, capacity-building.

STRATEGIC FOCUS

The Foundation supports research addressing:

- Early-life growth and development
- Food based and sustainable dietary interventions
- Macro- and micronutrient deficiencies
- Nutrition education and health promotion
- Precision nutrition and gut health
- Infection-nutrition interactions
- The triple burden of malnutrition
- Functional foods with health benefits

The Foundation does not fund projects with low public health relevance, with limited sustainability, or which lack capacity building; in vitro/animal studies; research on commercial products; studies of food policy/production unrelated to nutrition impact; agriculture only projects; or budgets above USD 100,000/year.

ELIGIBLE INSTITUTIONS & COLLABORATION

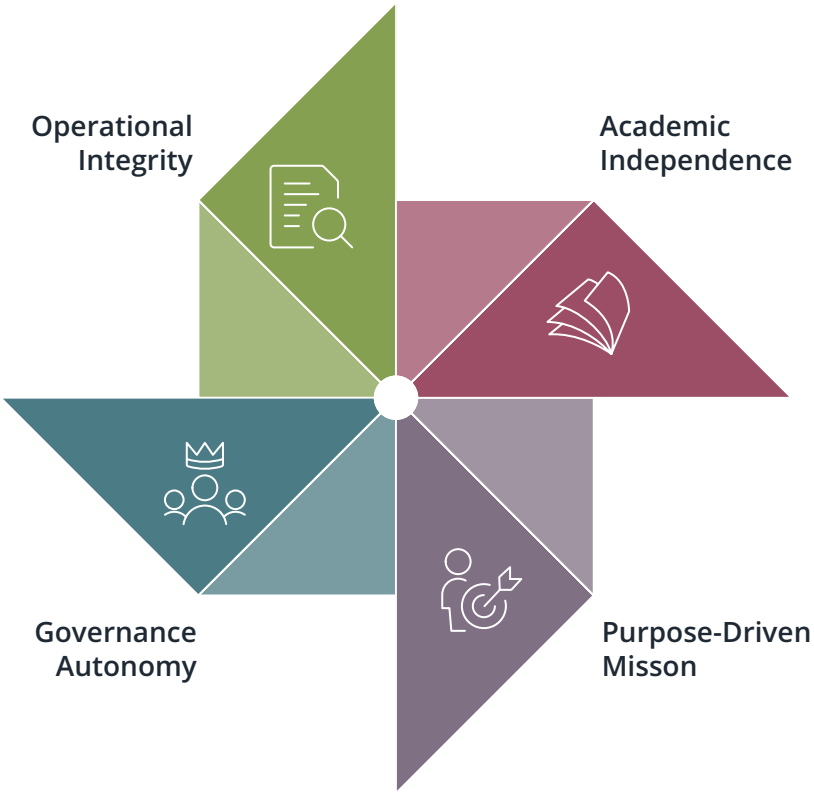
Eligible applicants are universities, hospitals, and higher education institutions in LMICs. Strongly encouraged are:

- South South collaborations
- North South partnerships led by LMIC based investigators with ≥75% of the budget retained locally

All proposals must include robust, measurable capacity building elements.


Dealers in: SPICES. DRY FRUITS.
CASHEW NUTS etc...

OUR VALUES


Operational Integrity
Academic Independence
Governance Autonomy
Purpose-Driven Misson

TYPES OF GRANTS

Innovation-Oriented Research Grants
Funding for high-impact, innovative projects addressing critical nutrition challenges

Applied Research Grants
Support for applied research with strong potential for improving maternal, child, and adolescent nutrition in LMICs.

Grants can be labelled as:

- **Regular Research Grants (RRG)**
  Full grant application of a complete research proposal according to the guidelines.
  Duration: Up to 3 years
  Funding: USD 100,000/year, up to a total of USD 300,000
- **Training Grants (TG)**
  Support young investigators conducting MSc, PhD, or other training-related research.
  Duration: Up to 3 year
  Funding: Up to USD 20'000 year
- **Mobility Grants (MG)**
  Support for acquiring skills, training or techniques not available locally.
  Duration: Up to 12 months,
  Funding: Up to USD 30,000

Additional Support
MOOCs, fellowships, workshops, alumni networks.

APPLICATION PROCEDURE

Applications begin with a Letter of Intent (LI). Full proposals are invited upon LI approval. Deadlines:

- **January 10** (for evaluation and decision in March)
- **July 10** (for evaluation and decision in October)

Possible outcomes: acceptance, fast track, resubmission, or rejection. Funding is provided in USD.

Commitment to impact

Funded projects must demonstrate sustainable implementation, capacity strengthening, and public health relevance. A follow up one year post completion is required.

WHAT WE SUPPORT

- Early life nutrition & growth
- Food based, sustainable interventions
- Macro-/micronutrient deficiencies
- Health promotion & nutrition education
- Precision nutrition & microbiome research
- Infection-nutrition interactions
- Addressing the triple burden of malnutrition
- Functional foods with public health potential

WHAT WE DO NOT SUPPORT

- Projects without public health impact
- Studies lacking capacity building
- In vitro/animal research
- Commercial/branded product studies
- Food policy/production projects without nutrition impact
- Agriculture only projects
- Budgets > USD 100,000/year
- Research led by high income country institutions (except in rare cases)

PURPOSE-DRIVEN RESEARCH
SUSTAINED IMPACT

THE COUNCIL

The Council of the Foundation consists of five Council Members. All Council Members are internationally well-known scientists with specific expertise in different fields of nutrition. The Council is self-constituting and operates independently. The Foundation is directed jointly by the Director in close collaboration with the President of the Foundation.

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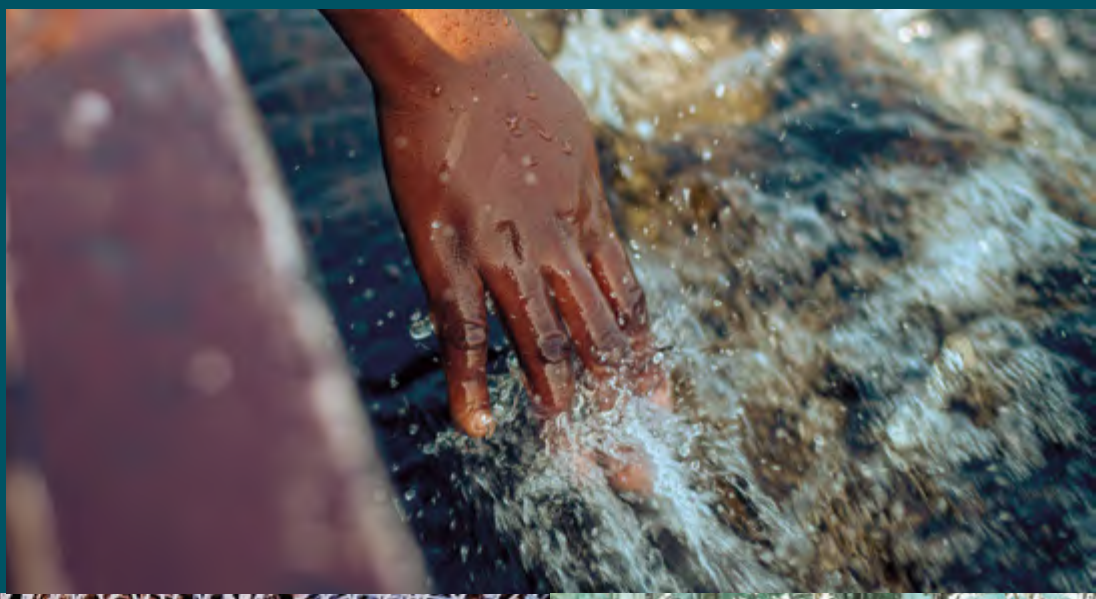
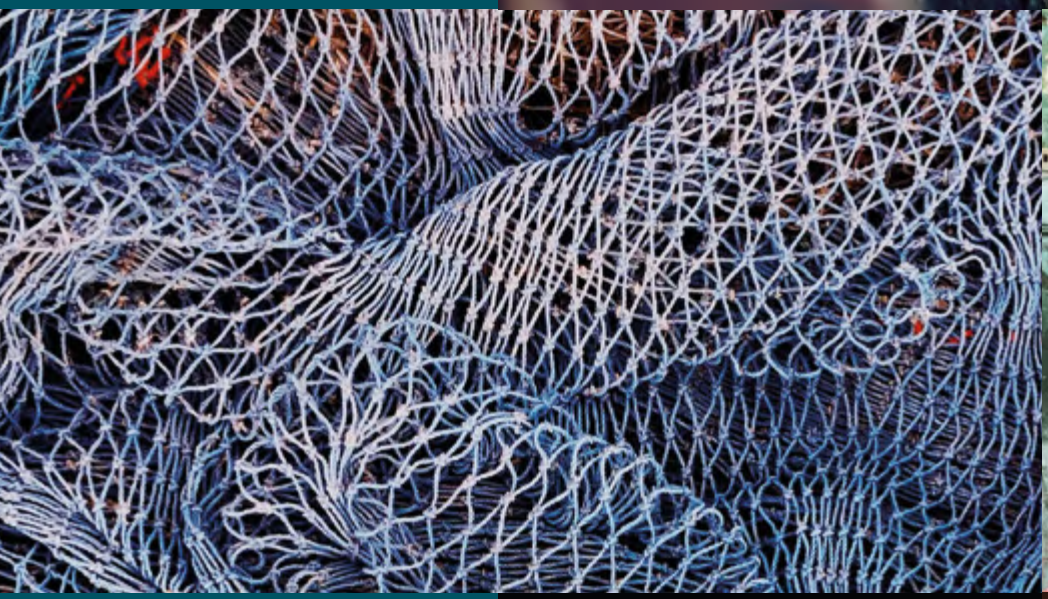
Throughout The Report 2025 all gender-specific terms are to be considered to refer to both the feminine and the masculine form – except when referring to a particular person. In addition the singular denotes the plural.





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