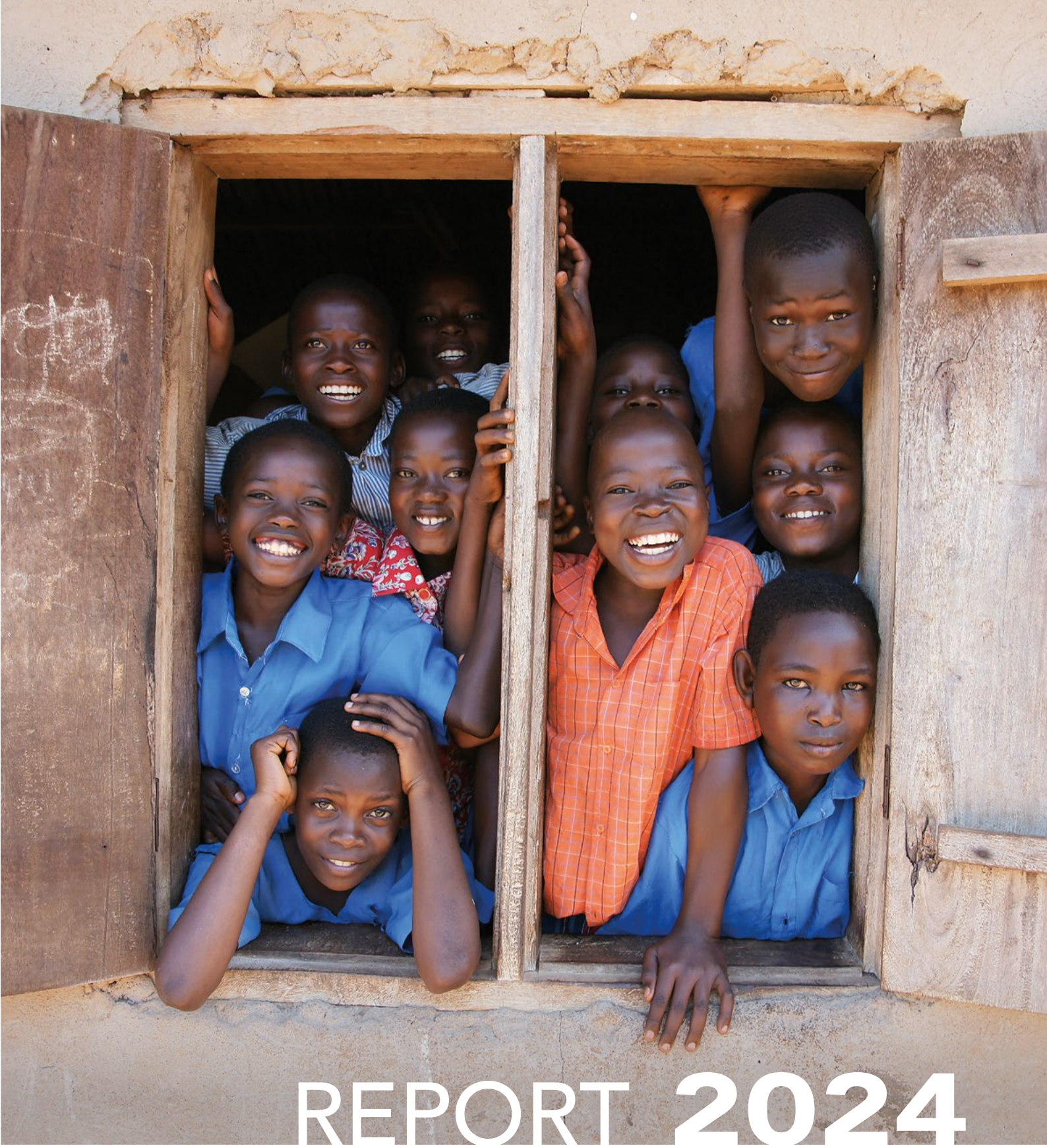

REPORT 2024

Nestlé Foundation

for the study of problems of nutrition in the world


"We make a living by what we get, but we make a life by what we give."
Winston Churchill

FOCUSED AND GLOBAL – THE FOUNDATION FOR THE STUDY OF THE PROBLEMS OF NUTRITION IN THE WORLD

HUMAN RIGHTS – FOCUS AND PRACTICE

RESEARCH – WITH HIGH-IMPACT FOR DEVELOPMENT

INNOVATION – FOR SUSTAINED SUCCESS

LOCAL CAPACITY BUILDING – AS THE FOUNDATION FOR IMPROVEMENT

LASTING IMPACT – A KEY MISSION

RESILIENT NUTRITION – THE RECIPE FOR SUCCESS

PUBLIC HEALTH – ORIENTED

THE FOUNDATION AT A GLANCE

EVIDENCE-BASED

LONG-TERM PARTNERSHIP – FOR SUCCESS

SOLUTION – ORIENTED RESEARCH


CAPACITY BUILDING


PUBLIC HEALTH ORIENTED

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TIMBERLAND

PRESIDENT'S MESSAGE

It is an honor to address you today on behalf of the Nestlé Foundation. We stand at a critical juncture in global health—one where the right investments and interventions can shape the future of millions of children, families, and communities worldwide. Yet, despite our efforts over the past two decades, we are not on track to meet the Global Nutrition Target of a 30% reduction in low birth weight (LBW) by 2030, in low- and middle income countries mostly caused by poor maternal nutrition. The Foundation must stay committed to funding research that addresses society's most pressing challenges, some of them outlined in the current annual report.

Malnutrition during key growth periods—adolescence, pregnancy, and infancy—can have lifelong consequences, making investment in child and adolescent nutrition imperative.

Breastfeeding is a cornerstone of child health. Research funded by the Nestlé Foundation explores its role beyond nutrition, highlighting its ability to reduce antimicrobial resistance and protect against infections. Supporting mothers with education and resources is essential to optimizing breastfeeding practices.

Maternal nutrition education is also key in reducing LBW. Well-nourished mothers are more likely to give birth to healthier infants, reducing the risk of stunting and developmental delays. Kangaroo Mother Care—skin-to-skin contact that promotes bonding and breastfeeding—has proven effective in improving outcomes for low birth weight infants.

Sustainable solutions must extend beyond health interventions. Global food systems should not only meet caloric needs but also provide high-quality, nutrient-rich foods. Industrialized agriculture prioritizes quantity over quality, while resilient agroecosystems rooted in local traditions offer a sustainable alternative. Supporting climate-smart agriculture and diverse, nutrient-rich crops will benefit both planetary and human health.

Capacity building remains central to our mission. The foundation is committed to supporting digital health innovation in LMICs, equipping local scientists and nutrition experts with the tools to implement context-specific solutions. By fostering research, training, and policy advocacy, we empower communities to address their own nutritional challenges.

The road ahead is demanding, but our commitment is unwavering. By aligning efforts, scaling evidence-based interventions, and investing in nutrition across the lifecycle, we can ensure a world where every child has the opportunity to thrive.

Thank you for your dedication. Let us move forward with collaboration and a shared vision for a healthier, nourished world.

Petra S. Hüppi
President

WELCOME MESSAGE OF THE INCOMING DIRECTOR

Dear Colleagues and Partners,

I am honored to introduce myself as the new Director of the Nestlé Foundation. With great humility and a deep sense of responsibility, I step into this position, dedicated to advancing our mission to improve global nutrition and health.

In our journey ahead, it is crucial that we not only continue our impactful work but also enhance the visibility and scope of our activities. By increasing our presence and broadening our initiatives, we can reach more communities, share our knowledge, and foster sustainable change on a global scale.

Our founders have always envisioned a significant focus on our partners in the Global South. By prioritizing these partnerships, we aim to bring about meaningful and lasting benefits that align with their original vision. Our commitment to these communities will be at the forefront of our initiatives, ensuring that our work has a tangible, positive impact.

I would like to pay tribute to my predecessor, Prof. Paolo Suter, who has directed the Foundation for over two decades. His unwavering dedication and visionary leadership have been instrumental in shaping the Foundation's path and success. We are deeply grateful for his contributions and the strong foundation he has built for us to continue our important work.

With my extensive experience in Manufacturing and R&D in the fast-moving consumer goods industry on a global level, having lived and worked in many different countries, and as an engineer from ETH Zurich, I am eager to work alongside all of you to foster innovative and sustainable initiatives. This diverse background has given me a unique perspective and understanding of the global challenges and opportunities we face.

As someone of Swiss nationality, with two grown children, my family has always been my safe harbor and my biggest challengers. Their unwavering support and encouragement have been invaluable throughout my career. I am also grateful for the support of my wife, Franziska.

In collaborating closely with the President, Prof. Petra Hüppi, all the Members of the Council, and my colleague at the office, Charlotte Terrier, I am confident that together we will build on the strong foundation established since 1966 and continue to strive for excellence in all our endeavors.

I look forward to working with each of you, sharing insights, and driving forward our shared vision for a healthier and more nourished world. Let's embark on this exciting journey together and achieve great things.

Warm regards,

Thomas Hauser,
Director, Nestlé Foundation

THANK YOU TO PROFESSOR PAOLO SUTER

In July 2024, Professor Paolo Suter stepped down as Director of the Nestlé Foundation after 21 years of dedicated service. Paolo has many passions, skills and interests, and these he enthusiastically brought to the benefit of the Foundation. As a Doctor of Medicine (University of Zurich, Switzerland) and a Master of Science in Nutrition (Tufts University, USA), Paolo has specialist interests in energy metabolism, malnutrition, obesity, ageing and the role of nutrition in the prevention of chronic diseases. Alongside his professional career, Paolo has a personal and deep interest in international affairs and nutritional concerns, especially in the context of health promotion, capacity building and human rights of disadvantaged peoples. Among his other talents, Paolo is an exceptional photographer and author of books and research articles. We shall miss him, as will readers of the Annual Report and the many students and scientists who have interacted with the Foundation since 2003. We invite you to read the following 'tribute of many voices' to his many qualities that made his contributions to the Foundation so profound.

Scientific capacity-building

The principle aim of the Nestlé Foundation is to promote excellence in human nutrition research in low- and middle-income countries by awarding project grants and training opportunities to students and scientists in local institutions. In his role at the Foundation, Paolo undertook extensive background research, read every application, and communicated, often repeatedly, with applicants to improve the proposal prior to review by the Council.

These tasks he undertook with great enthusiasm and dedication, as testified by the following tributes.

"Paolo Suter, known as Mr. Nestlé Foundation, has profoundly inspired a wave of inquiry in the field of nutrition, encouraging countless individuals to explore questions that have long gone unasked. His guidance has empowered researchers to craft impactful questions that resonate on a global scale, transforming these inquiries into compelling letters of intent and robust research proposals."

"Through his commitment, creativity, passion, dedication, vision and leadership, Paolo Suter has contributed performing his duty remarkably in supporting and advancing research and development in food and nutrition in low- and middle-income countries."

"He was deeply committed to finding solutions to the nutritional problems of the poor, particularly those of women and children, through high quality research, but preferred local researchers from national institutions to lead these efforts. No wonder these were core values of the Foundation!"

"He was very committed to assist and mentor young applicants from low-income countries, helping them resolve issues that would otherwise jeopardize their research application. I have no doubt that there are hundreds of young scientists around the world who would express a debt of gratitude to Paolo."

"Dr. Paolo Suter is a friend of Africa, and is passionate about capacity-building in Africa. He is an advocate for African scholars and academics leading and setting the research agenda in Africa. He is concerned that nutrition issues about Africa are often not led by Africans and thus his passions for capacity building. He has travelled widely across the continent encouraging young career nutrition scientists to make their research relevant to the needs of Africa. He has a keen interest in promoting the use of Africa's abundant food resources to address its nutrition problems, thus, his interest in food-based approaches. Paolo has encouraged many young African career scientists to apply for the Foundation's grant to be able to execute and complete their graduate research."

"He kept reminding students and potential investigators of the peculiar nature of the Foundation, dedicated solely to the funding of investigator-initiated proposals, in a 'bottom-up' fashion, with no other goal than promoting capacity building and the emergence of local talents."

"He was easily enthusiastic, fond of offering constructive suggestions to investigators, without ever being pushy or condescending. He in fact was easily irritated by the patronizing attitude of known scientists, bosses or authorities toward younger candidates. This explains why over the years, he had built a worldwide network of colleagues and friends who trusted and respected him."

"I shall be forever grateful to Paolo Suter for his enduring support of students and researchers in African and Asia, many of whom have developed successful professional careers after receiving an award from the Foundation. I have seen first-hand how he nurtures applicants through the funding processes, advising on applications and about the requirements of the Council."

Promotion of evidence-based nutrition

A basic tenet of the Nestlé Foundation is that evidence-based nutrition is the key to improving public health. Priority is given to research projects with strong elements of capacity building and where implementation is likely to be immediate and sustainable. This includes an emphasis on rapid publication and dissemination of research findings. This was particularly important to Paolo, who would keenly follow the publication of scientific papers and developed innovative ways to disseminate knowledge where other resources were not available.

"Many evidence-based strategies from research have been adopted to strategies implemented at global, national, local and community levels for nutrition and health benefits of vulnerable groups of population."

"Paolo is dedicated to democratizing knowledge in nutrition, ensuring accessibility for all. Through the

creation of enLINK, he has established a vital platform for local access to scientific resources, breaking down barriers to information."

"Paolo's dedication to the importance of evidence-based nutrition and health advice is particularly exemplified by his support of the late Dr. Courtejoie by facilitating, with Foundation funding, the distribution of Courtejoie's textbook for nurses throughout rural Congo."

"The outcomes have been clearly evident (as in the Annual NF Report) focusing on maternal and child nutrition, alleviation of macro and micro nutrient malnutrition, capacity development through research, training and graduate studies, the enLINK initiative including digital and mobile libraries."

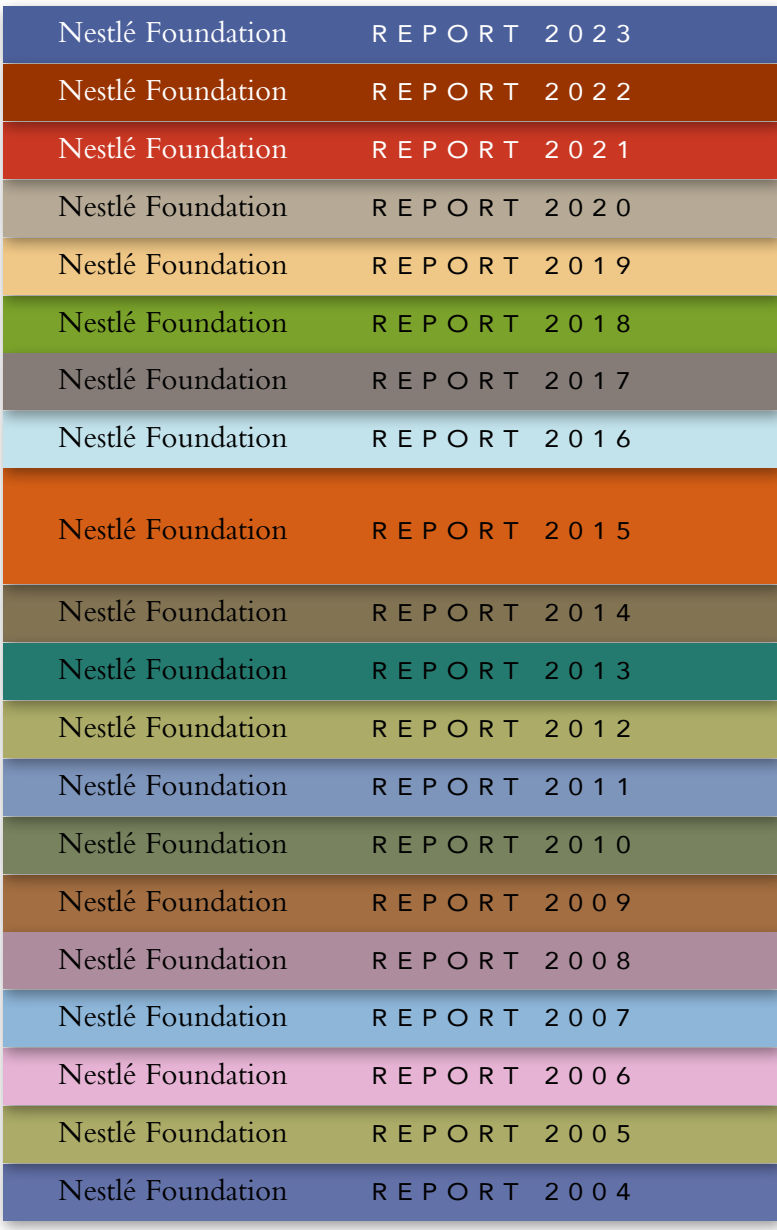
Photographic excellence and editorship

Paolo brought many of his private passions to the service of the Foundation. One of these was photography. During his many travels on behalf of the Foundation, he would use his keen eye to capture a special image about a specific place and time that would convey more meaning than words. These he would use to accompany the insightful commentaries in the Annual Report that he commissioned or wrote.

"His unique photographic perspective has elevated many deserving researchers, giving them visibility that often eludes them, featured prominently on the cover of the prestigious Annual Nestlé Foundation Report."

"It would be hard to find a NF activity in which Paolo was not involved. If you just looked at the cover of any NF Annual Report, most likely you will be seeing a photo taken by Paolo, a superb amateur photographer. Over the years, he contributed hundreds of photographs to the Annual Report, which he also edited."

"Thanks to Paolo's editorship, the NF Annual Report has become a jewel in the Foundation's crown, his beautiful photographs providing visual accompaniment to the interesting articles he included."



Philanthropy

Paolo brought his deep convictions about social justice to his work at the Foundation, always looking to consider the best way to achieve positive outcomes without exploitation.

> *"Working with Paolo was an education into the way philanthropy should work. He combined scientific rigour and medical excellence with compassion, along with a deep insight into what low and middle income countries really needed."*

> *"We became good friends and recall train rides where, upon finding that I grew up in banana plantations of the Standard Fruit Co. in Honduras, wanted to know my take on how such companies gained massive land concessions and influenced labour and trade policies of the so called "banana republics" of Central America. From these and other conversations, it was clear Paolo had a deep commitment to human rights."*

> *"Paolo Suter's contributions are not just fostering research; they are igniting a global movement towards improved nutritional knowledge and accessibility."*

Personality

Those of us who have had the privilege of working alongside Paolo, know what a very special person he is.

> *"I never had a greater opportunity to appreciate Paolo's scientific and human qualities than when I attended a meeting of the Federation of African Nutrition Societies (FANUS) in Kigali with him: we were not able to walk more than 10 m before being stopped by friends and colleagues of Paolo from all 5 continents. His appetite for knowledge and curiosity were obvious in his smile and brightly lit eyes when we met not only colleagues in science, but workers and students in the libraries, or even taxi drivers or intriguing characters in the food market. This was made possible not only by his talkative nature, but more importantly, by his benevolent, friendly attitude that made him accessible to younger investigators, regardless of their background."*

> *"A very good and wise friend with whom I was glad to be associated."*

> *"I gained a warm and caring friend as well as a scientific colleague when I joined the Council of the Nestlé Foundation. Thank you Paolo."*

> *"On behalf of the hundreds who have benefited from the Foundation's grant facility, we wish Dr. Paolo Suter all the best in his next phase of life."*

> *"To summarize, Paolo has been the heart and soul of the Foundation, and we saw him leave it with great sadness. Our hope as council members is that we are all inspired by his past accomplishments."*

We hope you have enjoyed this tribute to the work of Professor Paolo Suter by past and current members of the Nestlé Foundation Council. We wish him all the best for the future. The Foundation now has a new Director, Mr Thomas Hauser, and its work and funding opportunities continue unabated.

Ann Prentice
with contributions from

Benjamin Caballero
Dominique Darmaun
Petra Hüppi
Anura Kurpad
Anna Lartey
Reynaldo Martorell
Kraisid Tontisirin

NEW RESEARCH PROJECTS

In 2024 the Council decided to fund 11 research projects:

ADOLESCENT NUTRITION

GROWTH AND INTESTINAL HEALTH PROBLEMS

SPECIALIZED NUTRITION EDUCATION

BREASTFEEDING

COMPLEMENTARY FOODS IN CHILDREN

MATERNAL UNDER-NUTRITION

MATERNAL POOR DIETARY PRACTICE

NEW RESEARCH PROJECTS

IRON-FOLIC ACID FOR SCHOOL GIRLS

NUTRITION AND INFECTIONS DURING PREGNANCY

POST-CAESAREAN BREASTFEEDING

ADOLESCENT NUTRITION

Peer-led nutrition intervention to improve the dietary behaviour of adolescents in Ethiopia

Daniale Ekubagewargies, MSc, PhD Student
Faruk Ahmed, PhD, Professor
Patricia Lee, PhD, Associate Professor
Lisa Vincze, PhD, Lecturer

Griffith University
University of Gondar

$16,265

Adolescence marks a pivotal stage in physical and cognitive development, making a safe and nutritious diet essential for overall health, academic achievement, and compensatory growth after childhood deficits. Establishing healthy eating habits during these formative years is key to promoting lifelong wellness. In Ethiopia, however, many adolescents do not meet the recommended nutritional intakes, resulting in malnutrition that undermines immunity, academic performance, and future productivity. With adolescents representing about 22 percent of Ethiopia's population of over 120 million, targeted nutritional strategies could yield substantial social, political, and economic benefits.

Peer-led nutrition interventions have emerged as a promising, cost-effective approach to instilling lasting healthy dietary behaviours. The design of the interventions is based on a thorough literature review of similar initiatives in low- and middle-income countries, supplemented by surveys, focus groups, and interviews with Ethiopian adolescents. These efforts aim to capture current dietary habits, assess nutritional knowledge, and understand the influence of peers on eating behaviours.

The project will include a cluster randomised controlled trial involving 474 adolescents aged 15-19 years from both public and private schools. The intervention, delivered by trained peer leaders, combines nutrition education with practical skills training. Its feasibility will be evaluated based on acceptability, accessibility, affordability, sustainability, and scalability.

ADOLESCENT NUTRITION

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, PhD

Department of Human Nutrition and Dietetics
Michael Okpara University of Agriculture, Nigeria

$18,333

Adolescents are often susceptible to unhealthy eating habits, which can lead to malnutrition, making schools an ideal environment for nutritional education. However, in Nigeria, formal nutrition education is not prioritized in the school curriculum and is primarily theoretical. To address this gap, this project proposes the establishment of school nutrition clubs to actively engage students in nutrition-related activities and assess the impact on their nutrition knowledge and dietary behaviour. The aim is to enhance adolescents' understanding and consumption of fruits and vegetables by 15%. A pre-test/post-test intervention study will be conducted in four rural public secondary schools in two local government areas of Abia State, with schools randomly assigned to intervention or control groups. Students will be randomly recruited, and data on nutrition knowledge, dietary habits, and health metrics will be collected at baseline. The intervention will include various activities over six months, such as lectures, cooking demonstrations, and quizzes. Selected teachers will receive training to facilitate these sessions. The project's outcomes will be evaluated three months post-intervention to measure changes in nutrition knowledge and dietary behaviours. The project will provide evidence in how adolescent nutrition education can be approached in schools.

GROWTH AND INTESTINAL HEALTH PROBLEMS

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)

$50,000

This study investigates the gut microbiome in children from the southern Highlands of Tanzania, an area with a high rate of stunted growth. Gut bacteria play a crucial role in gut health, particularly in how the gut lining functions, which influences nutrition uptake and growth. Children with healthy guts generally have more beneficial bacteria, while those with gut problems may have more harmful bacteria, which can lead to conditions like Environmental Enteric Dysfunction (EED).

The current study will assess the microbiome of children from selected households through a community-based case-control approach. Parents or guardians will participate in structured interviews, and stool samples will be collected from the children three times over six months.

Genomic analyses will be performed by extracting DNA from the stool samples, using specific techniques to amplify and sequence the bacterial DNA. The study will compare the gut bacteria profiles of healthy children to those who are stunted, utilizing advanced statistical software for analysis. Ultimately, this research aims to provide insights into how gut bacteria contribute to child growth and health in this region.

SPECIALIZED NUTRITION EDUCATION

Maternal health, literacy and pregnancy outcomes: The role of specialized nutrition education

Ruthfirst E. A. Ayande, PhD, MSc, RD
Elena T. Carbone, DrPH, RD, LDN, FAND
Gloria E. Otoo, PhD

Yale School of Medicine
University of Massachusetts Amherst
University of Ghana

$51,714

Low birth weight (LBW) is a major health issue globally, affecting 16% of newborns worldwide and 29.6% in Northern Ghana. It increases the risk of infant death and chronic diseases later in life. Maternal health literacy, which impacts nutrition and pregnancy outcomes, can be improved through nutrition education (NE), particularly for women in rural and low-income areas.

A study in Tamale, Ghana, aims to address this by exploring barriers to nutrition education, assessing maternal health literacy among pregnant women, and testing how a nutrition education program can improve nutrition and pregnancy outcomes. Over two years, the research will include two phases. The first phase involves focus groups to both identify challenges to nutrition education and also refine traditional recipes into a community cookbook for education purposes.

In the second phase, underweight pregnant women in their second trimester will be recruited. Half will participate in a nutrition education program combining sessions at health facilities and home visits. Researchers will track maternal health indicators like weight and dietary habits and infant outcomes, including birth weight and overall health. This approach seeks to improve maternal and infant health in Northern Ghana.

BREASTFEEDING

A potential antidote to antimicrobial resistance carriage in infancy?

Chinenye Akpulu, MSc
Katy Thomson, PhD
Kirsty Sands, PhD

Ineos Oxford Institute for Antimicrobial Research
Department of Biology
University of Oxford

$17,452

Antibiotic resistance genes (ARGs) carried in bacteria, which contribute to the so-called resistome, pose a significant health risk, especially in infants whose immune systems are still developing. Each year, approximately 2.5 million infant deaths result from neonatal sepsis, with around 214,000 fatalities linked to antimicrobial resistance (AMR). Research has revealed that neonates possess a higher abundance of ARGs in their gut microbiome compared to their mothers, even in the absence of antibiotic exposure, raising questions about the origins and stability of these genes. While antibiotics' role in shaping the resistome has been studied, other influential factors—such as diet—remain underexplored, particularly in Africa where malnutrition and poor hygiene are prevalent. This project aims to longitudinally examine how breastfeeding affects the gut microbiome and resistome of healthy-term infants in Kano, Nigeria. Through metagenomic approaches, the study will analyse the taxonomic diversity and ARGs in infants' gut microbiomes, comparing those who are exclusively breastfed to those receiving complementary feeding. The findings will contribute valuable data to support the World Health Assembly's 2025 target of increasing exclusive breastfeeding rates during the first six months of life to 50%, thereby addressing AMR concerns.

NIGERIA

COMPLEMENTARY FOODS IN CHILDREN

Nutrient adequacy of complementary foods in children aged 6-23 months in Southern Ethiopia

Kidus Temesgen Worsa
Arba Minch University

$19,700

Nutrition during infancy and early childhood is essential for maximizing a child's development. By around six months, an infant's nutrient needs surpass what breast milk can provide, necessitating the introduction of complementary foods. The quality of these foods is crucial, as adequate nutrient intake supports optimal growth, cognitive function, immune health, and the prevention of malnutrition and diseases. However, many children under the age of two in sub-Saharan Africa, particularly in Ethiopia, suffer from malnutrition due to inappropriate dietary practices and inadequate nutrient intake.

This project aims to assess the nutrient adequacy of complementary foods for children aged 6 to 23 months in Southern Ethiopia through a community-based cross-sectional study. The study will enrol approximately 880 randomly selected children, collecting data via structured questionnaires and repeated 24-hour dietary recalls to account for seasonal variations. The nutrient intake will be compared to WHO recommendations to determine adequacy. By uncovering valuable insights into the dietary habits and nutrient intake of young children, this study hopes to inform and influence child nutrition policies and practices in the region, ultimately contributing to improved health outcomes for vulnerable populations.

MATERNAL UNDER-NUTRITION

Maternal under-nutrition and effect of amaranth grain bread on anaemia in the Northern Zone of the Sidama region, Ethiopia

Amanuel Yoseph Samago, PhD
Hawassa University School of Public Health

$20,000

Maternal malnutrition is a significant public health challenge in Ethiopia, with underweight and anaemia being prevalent nutritional disorders among pregnant women, often coexisting. Iron-deficiency anaemia (IDA) is a common form of nutritional anaemia linked to insufficient macro- and micronutrient intake, largely due to a diet dominated by cereal-based foods. This situation highlights the need for further exploration of underutilized nutrient-rich crops, such as amaranth, which has the potential to alleviate food insecurity but remains underrecognized by both communities and health professionals.

To address these issues, a community-based cross-sectional study involving pregnant women in their first trimester will examine anaemia prevalence and associated risk factors, along with the co-existence of anaemia and under-nutrition. Blood tests will be performed to measure C-reactive protein, a marker of inflammation and serum ferritin for diagnosing IDA. Following this, a randomised controlled trial will evaluate the impact of amaranth grain bread on haemoglobin levels in anaemic women over six months, comparing it to the commonly consumed maize bread. Amaranth is hardy and can grow in various climates, including arid and nutrient-poor soils, making it a promising crop in climate change. Its leaves are rich in vitamins A, C, and K, while the seeds are an excellent source of protein, fibre, and essential amino acids. Participants will be selected through multi-stage sampling, with data presented as frequencies, percentages, and means, analysed using multi-level mixed-effect regression models and intention-to-treat analyses, ensuring robust assessment of the intervention's effectiveness.

MATERNAL POOR DIETARY PRACTICE

Maternal poor dietary practice and its determinants among pregnant women in rural communities of Central Ethiopia

Addila Alemu Earsido, PhD
Wachemo University

$29,080

Inappropriate and inadequate maternal nutrition during pregnancy and lactation poses significant public health risks, leading to adverse outcomes such as maternal malnutrition, low birth weight, and poor child growth and development. While the Ethiopian government has made efforts to address these issues, the severity of the problem remains. Furthermore, there is a lack of scientific evidence regarding the effectiveness of integrated maternal nutritional interventions. This study aims to improve maternal and infant health outcomes through an integrated nutrition education intervention in rural Central Ethiopia.

The research will employ a community-based cluster randomised controlled trial with two parallel intervention arms. Nurses and agricultural professionals will deliver the integrated nutrition education, based on the Health Belief Model (HBM), to couples in their homes. The intervention will occur five times during pregnancy and four times post-birth. A total of 1,280 pregnant women and their partners will be included, randomly assigned in a 1:1 ratio to the intervention or control group. The study will assess outcomes such as low birth weight and maternal under-nutrition, using a generalized estimating equations (GEE) model to compare outcomes between groups. Intention-to-treat (ITT) analysis will include all participants in the final evaluation, ensuring robust findings.

IRON-FOLIC ACID FOR SCHOOL GIRLS

Empowering weekly iron-folic acid (WIFA) supplementation program for adolescent schoolgirls in high stunting areas (year 2)

Ali Khomsan, PhD
IPB University

$34,564

Iron-folic acid (IFA) supplementation is a crucial intervention aimed at reducing anaemia prevalence among pregnant women and adolescent girls, and an important part of Indonesia's integrated stunting reduction initiatives. However, a 2018 Basic Health Survey indicated that only 1.4% of adolescent girls consumed the recommended minimum of 52 tablets annually. The goals of this study are set in two phases.

In the first phase, the focus will be on assessing the implementation of the weekly iron-folic acid (WIFA) program in schools, examining aspects such as procurement, distribution, storage, and coverage. Additionally, the study will evaluate knowledge regarding anaemia and WIFA among adolescent schoolgirls, assess their compliance with supplementation, and explore reasons for acceptance or rejection of WIFA. The research will involve a preliminary survey targeting 300 11th-grade girls in stunting-prone areas.

In the second phase, efforts will shift towards empowering the WIFA implementation by training teachers, Public Health Centre officers, and Health Office staff as key stakeholders. A comprehensive nutrition education and monitoring system will be created to enhance compliance, along with engaging peer motivators to encourage adherence among schoolgirls. The evaluation will assess the WIFA program's effectiveness before and after these empowerment activities, focusing on compliance rates and program management aspects including socialization, resource availability, and monitoring. Collaborating closely with local stakeholders, the study aims to significantly improve the health outcomes related to anaemia and nutrition for adolescent schoolgirls.

NUTRITION AND INFECTIONS DURING PREGNANCY

Interplay of Nutrition and Infections: The Impact of Maternal Nutritional Status and Sexually Transmitted Infections on Pregnancy Outcomes in Southern Ethiopia

Meskerem Jisso Ebido, PhD fellow
Hawassa University

$40,492

This project is focused on improving maternal nutrition and understanding its impact on pregnancy health in southern Ethiopia. Proper nutrition is vital for pregnant women to enhance their immune systems, as malnutrition can weaken their defences against infections, including sexually transmitted infections (STIs), which can lead to poor pregnancy outcomes. However, existing research on how maternal nutrition and STIs affect each other is inconsistent, often relying on limited assessments.

To address this gap, the study will conduct a prospective cohort analysis involving 743 pregnant women, beginning at their first antenatal care visit (before 16 weeks of pregnancy) and continuing until one week after childbirth. The project aims to assess maternal nutritional status using detailed dietary recalls and blood tests during their initial visit and subsequent assessments over eight visits. Additionally, participants will be screened for STIs through advanced laboratory testing.

The study will leverage existing health facilities to ensure sustainability and includes a capacity-building initiative that will engage one doctoral candidate and two postgraduate students from Hawassa University. Ultimately, the goal is to provide valuable insights into how nutrition affects maternal immunity and pregnancy outcomes, promoting better health practices for mothers and their infants.

POST-CAESAREAN BREASTFEEDING

Improving post-caesarean breastfeeding via lactation midwives in Southern Ethiopia: A randomised controlled trial

Mekdes Kondale Gurara
Arba Minch University

$42,580

The World Health Organization advises starting breastfeeding within the first hour after birth, exclusively breastfeeding for six months, and continuing with complementary foods for up to two years or longer. However, only 33% of babies globally are exclusively breastfed for six months, and about 78 million newborns miss breastfeeding in their first hour, with caesarean births being most affected. Delayed breastfeeding increases the risk of neonatal death by over 33%.

Cultural shifts toward formula feeding as a symbol of development and the rising rates of caesarean deliveries pose further challenges to breastfeeding practices. In Ethiopia, where over 80% of the population lives in rural areas with limited healthcare access, neonatal mortality remains high at 33 deaths per 1,000 live births. Although caesarean rates are low nationally, some hospitals report up to 45% of deliveries being by caesarean, often leading to delayed breastfeeding due to baby-mother separation.

To address these issues, a group of four midwife PhD students has proposed a training program for healthcare staff to improve breastfeeding support for mothers after caesarean deliveries. The program includes training on breastfeeding techniques, skin-to-skin contact, early initiation of breastfeeding, rooming-in practices, and counselling for mothers. A multicentre randomised controlled trial will assess the impact of this initiative on breastfeeding practices among caesarean mothers, with trained midwives providing hands-on support.

OTHER ACTIVITIES

Prof. George Ooko Abong, PhD

Nutrition and Technology University of Nairobi

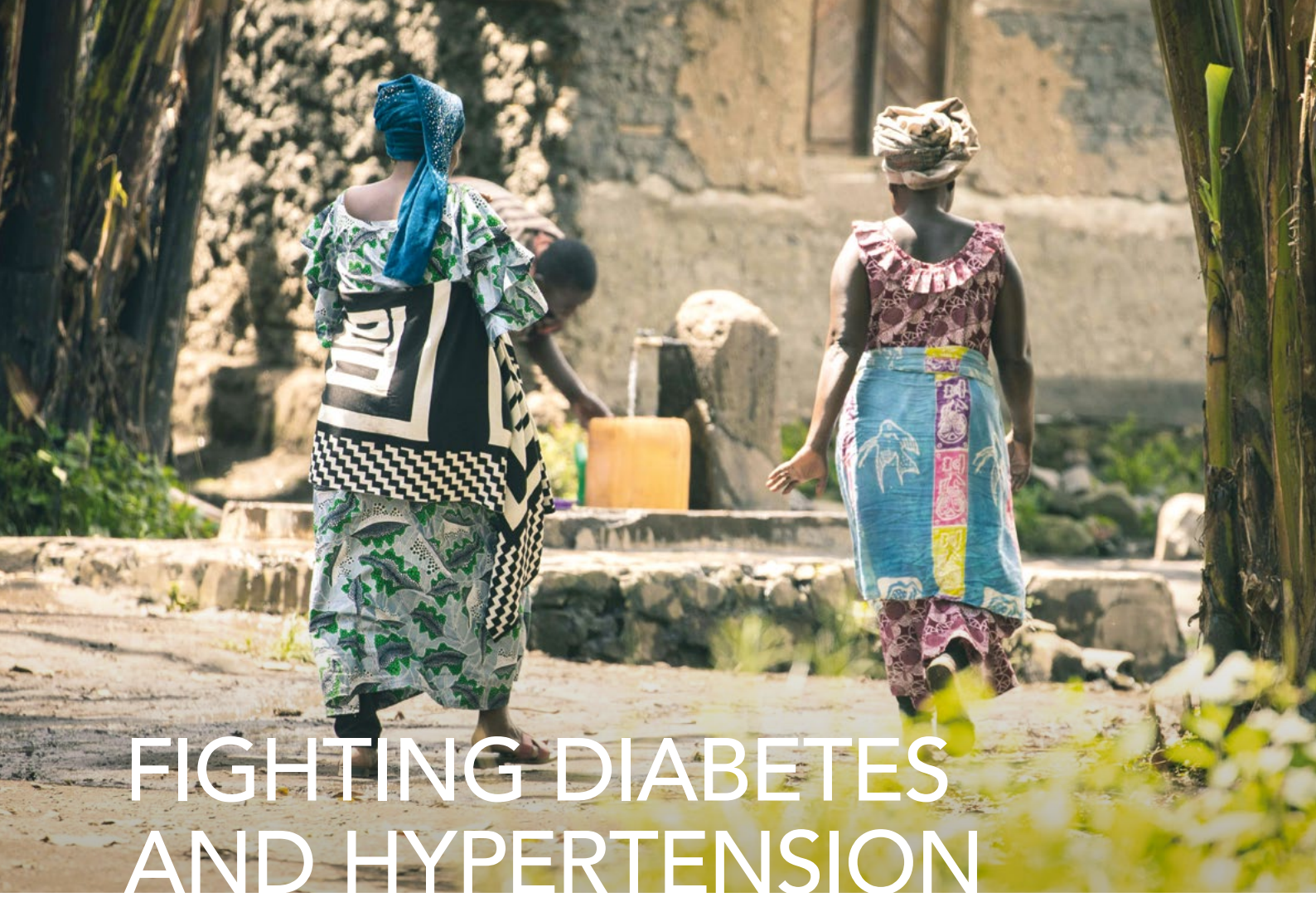
SOCIAL IMPACT OF FOOD AND NUTRITION CAPACITY-BUILDING ACTIVITIES AND INITIATIVES IN AFRICA: UNIVERSITY OF NAIROBI, KENYA

As part of its core mandate, the University of Nairobi takes a keen interest in capacity building and training of students, a skilled workforce, and the general public. One of the key areas in which the university has been able to make a significant contribution is in food and nutrition. Through the Department of Food Science, Nutrition and Technology (DFSNT), the university has been able to carry out training since 1976 through its programmes of Bachelor of Science in Food Science and Technology, Bachelor of Science in Food Nutrition and Dietetics, and Master of Science and Doctorate programmes in Food Science, Applied Human Nutrition, and Food Safety and Quality. The department is a leader in agri-food innovations in post-harvest management, value addition and product development in all plant and animal value chains. The pilot plant has equipment used for training and for processing different food products and currently runs fruit, milk, and milk products businesses. Fresh milk, yoghurt, and cheese are its main products that are sold to the public. The Department also has a mini-bakery and water plant used for training and value addition of products sold for profit. The Department also houses a production hub for fruits and vegetables and runs an incubation programme for promising student and public

entrepreneurs. It offers practical and experiential learning to students and training to interested members of the public.

There are a number of research results that have been translated to policy, while some have not only been patented, but also commercialized. The thesis and publications of the Department are freely available in the digital repository at https://erepository.uonbi.ac.ke. Commercialized therapeutic products are currently being used by the public and are available through the physical store and online orders.

Every year, our masters' students in food and nutrition carry out a community diagnosis exercise which involves assessing the nutrition and morbidity status and food security and food safety of a chosen vulnerable community, and they provide much needed community awareness and sensitization. The university also takes pride in carrying out outreach activities that aim to sensitize the public on nutrition and food safety and provide a platform for training the public.



FIGHTING DIABETES AND HYPERTENSION

Dr Pierre Lukombo Nzawanene, promoteur de l'UNADIC Matadi
Dias Dialungana Kiangani, linguiste
Lukombo Bateza Gradi, graphiste
Roger Mabiala Zimuangu, directeur

Centre pour la Promotion de la Santé de Kangu, République démocratique du Congo

THE FIGHT AGAINST THE COMORBIDITY OF DIABETES AND HIGH BLOOD PRESSURE IN THE DEMOCRATIC REPUBLIC OF CONGO

Issue

Previous epidemiological surveys in the Democratic Republic of Congo (DRC), part of the diabetes and hypertension control program, show that more than half of diabetic patients also have high blood pressure, with approximately 80% of diabetics being hypertensive and 20% of individuals with high blood pressure also being diabetic. The morbidity and mortality rates remain very high across Africa in general and in the DRC in particular, making these diseases major public health concerns in the country. They damage the walls of the arteries and can increase the risk of developing other diseases.

Nearly 40 million people worldwide die each year due to high blood pressure and diabetes. These diseases are often asymptomatic and sometimes difficult to diagnose; however, patients must be referred as quickly as possible to prevent serious complications or even death. People with high blood pressure are at a higher risk of developing diabetes, and diabetic individuals are also at an increased risk of high blood pressure. When these two conditions are combined, they can significantly raise cardiovascular risks and lead to further

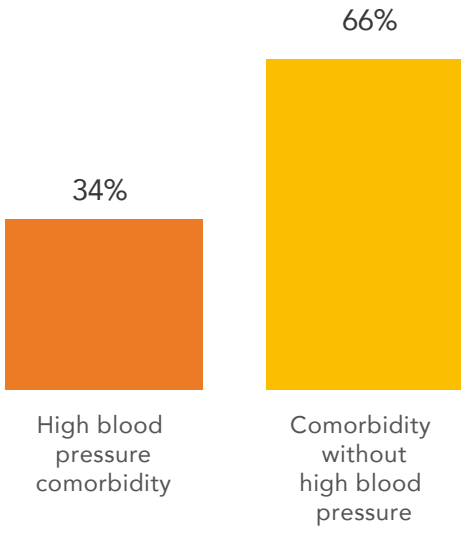
complications such as ischemic or even hemorrhagic strokes.

The fight against this comorbidity remains essential to reduce its resurgence and the associated risks.

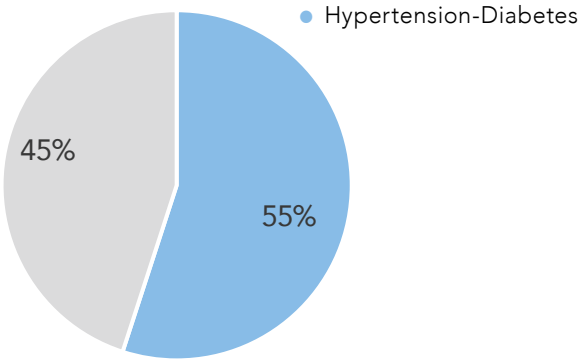
It should be noted that within the framework of the Health Promotion Center, various publications from the Health Promotion Research Bureau, in partnership with the **Nestlé Foundation**, play an essential role for stakeholders, including researchers, teachers and students, as well as universities, higher education institutions, and NGOs in the fight against diseases. Among these resources are key publications such as: **Santé personnelle et communautaire**[1], **L'écolier et la santé**[2], **Santé, meilleure source de progrès**[3], **Nourriture saine, meilleure santé**[4], **Alimentation et santé**[5], **Nutrition et santé**[6], **et le Dictionnaire médical pour régions tropicales**[7]. These publications have been widely used despite certain academic limitations and overall, they have been very valuable.

Statistical data

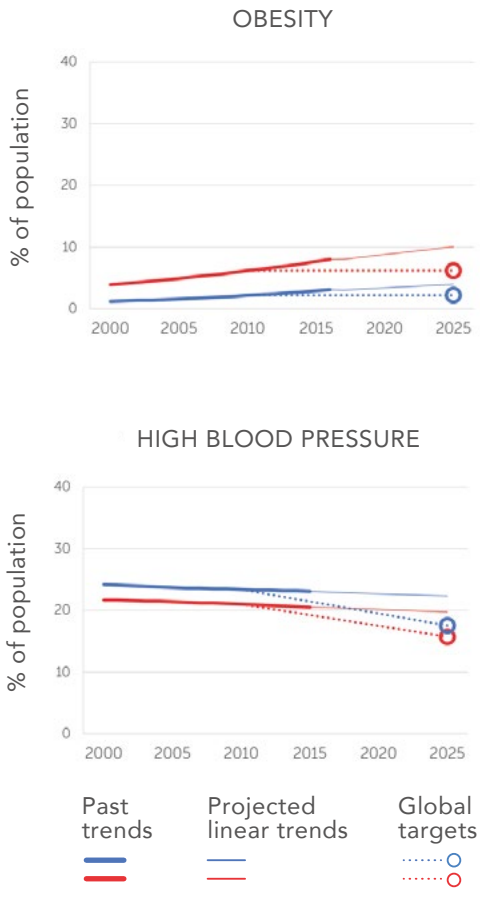
According to the September 2023 issue of *African Journal of Medicine and Public Health*, on the topic of Diabetes Patient Progression and Care in Internal Medicine Services in the DRC, approximately 34% of diabetic patients had high blood pressure as a comorbidity[8].



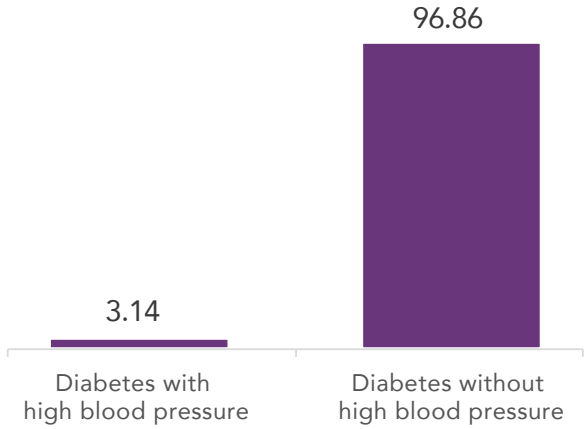
According to Prof. Benjamin Longo from UNIKIN in 2021, the frequency of the hypertension-diabetes association was 55%, with a predominance among women and an average age of 58.6 years[9].



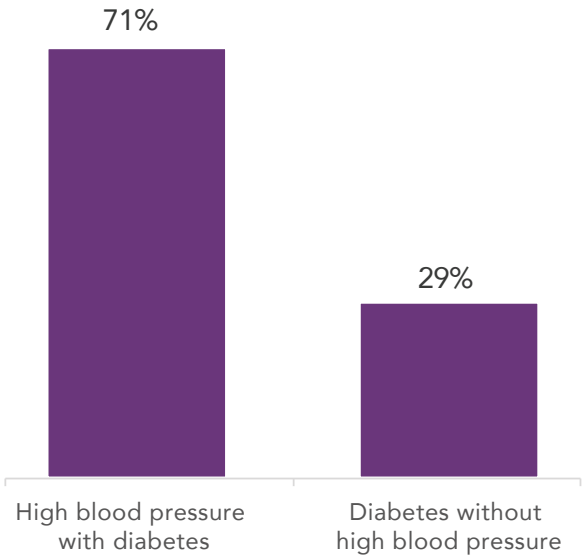
The World Health Organization (WHO), in its 2018 report on country profiles for non-communicable diseases (NCDs), projected linear trends in the Democratic Republic of Congo (DRC) could reach 10% obesity rates among women and around 5% among men by 2025. Furthermore, a linear projection indicates that 20% of women and 24% of men in the Congolese population could be affected by high blood pressure[10].



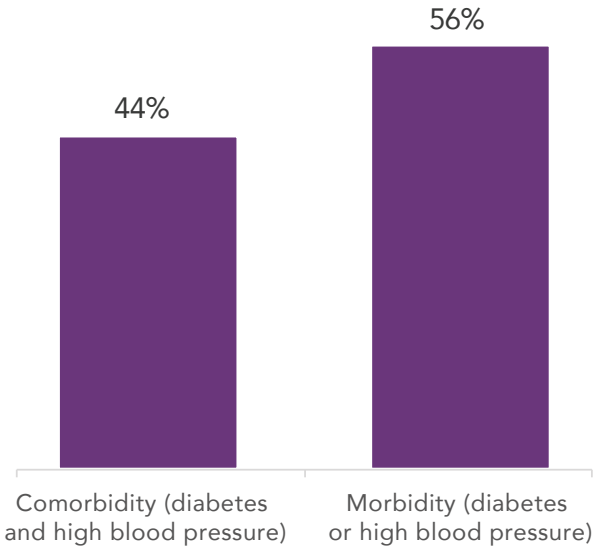
A study conducted by **DR. LUKOMBO NZAWANENE** at the Kinkanda Provincial Referral Hospital in 2018 reported that 3.14% of diabetic patients also suffered from high blood pressure[11].



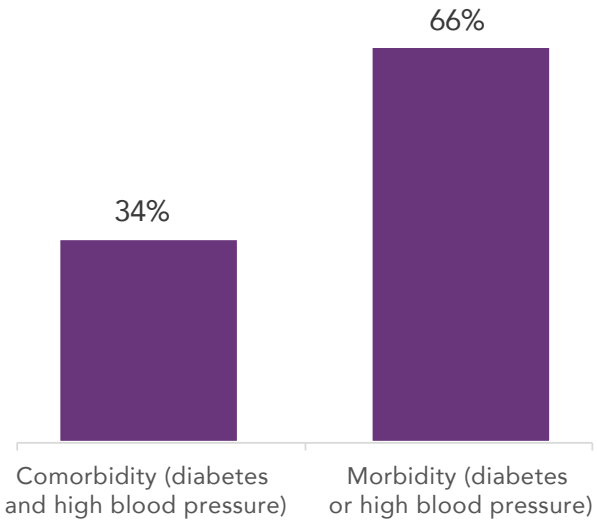
The NGO/NPO Diabetic Solidarity in Kimpese advocates in its third-quarter 2024 report for its diabetic members, 71% of whom also suffer from high blood pressure[13].



The Kongo Central province, through its diabetes control program in 2022, reported over 200,000 cases of diabetes, 44% of which involved comorbidity (diabetes and high blood pressure)[12].

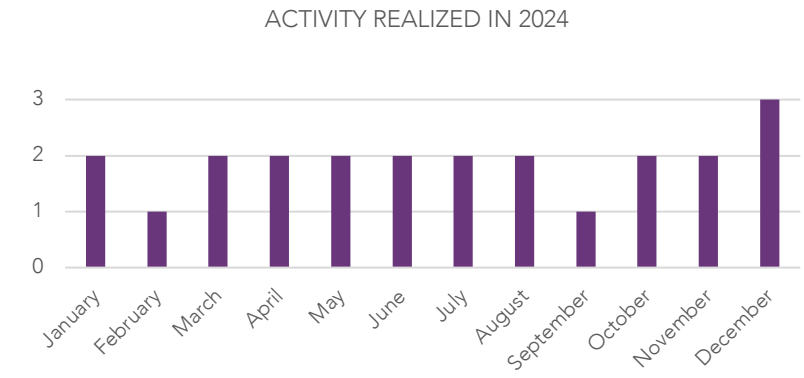


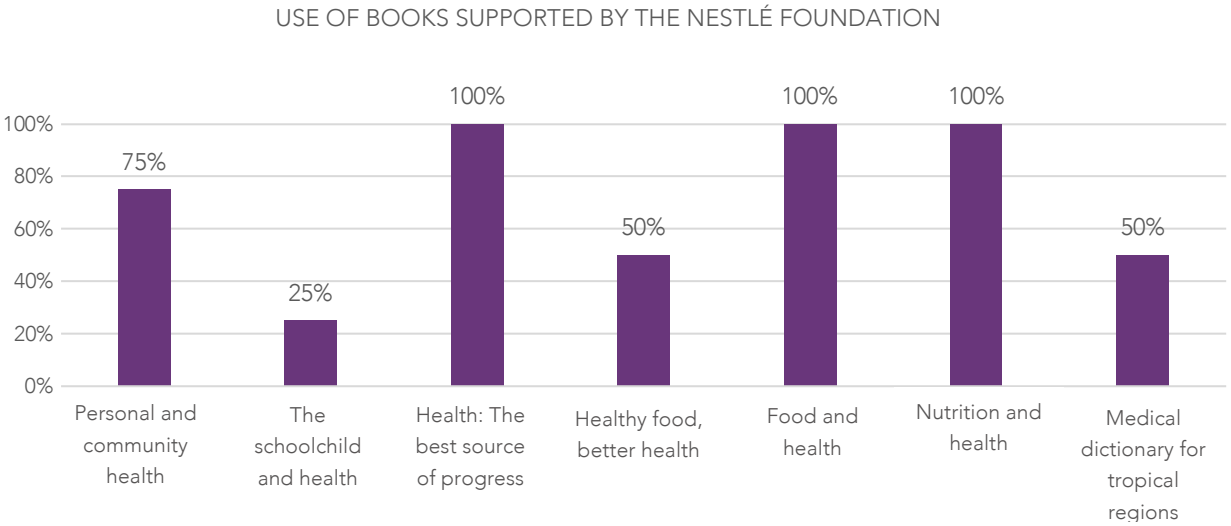
The NGO/NPO UNADIC, through its higher education institution in health sciences and development in Matadi, Kongo Central, organized, with its own resources, an event in November 2024 to screen for hyperglycemia and high blood pressure. Of the 328 people screened, 97 were found to have hyperglycemia, meaning they were diabetic, among whom 33 also had high blood pressure. This indicates that 34% of the individuals had comorbidity (diabetes and high blood pressure)[14].



Resources to combat diabetes and high blood pressure

The theater group ACCENT GRAVE UAIDC (United for the Actions of Integral Development of the Congolese Community) performed 23 plays during various festive and cultural events throughout 2024. The central message of these performances focused on the fight against diabetes and high blood pressure, emphasizing the importance of reducing sugar and salt consumption and avoiding overeating, which can lead to obesity, diabetes and hypertension[15].





There are a number of publications developed by the Health Promotion Research Bureau in partnership with the Nestlé Foundation which are designed to be essential tools for spreading knowledge related to health and nutrition.

The publications **Health: The Best Source of Progress; Healthy Food, Better Health and Nutrition and Health** have a 100% usage rate, reflecting their use by all the groups included in the analysis. The publication **Personal and Community Health** is mainly used by researchers, churches, and NGOs; these groups account for 75% of the use of these publications. **Healthy Food, Better Health** and **Medical Dictionary for Tropical Regions** are more commonly used by researchers and universities, who account for half of the use of these resources. Lastly, the publication **The Schoolchild and Health** is exclusively used by researchers.

While useful overall, many users, particularly researchers and universities, have reported limitations in these publications. These limitations include outdated data, a lack of updated resources and gaps in thematic coverage, particularly regarding the management of diabetes and hypertension.

Strengths

Non-profit organizations and higher education institutions in health sciences are actively engaged in the fight against this comorbidity. However, they face logistical limitations. Despite these challenges, students and researchers continue to conduct studies, but the prevalence of both diseases keeps increasing in our communities.

One key strength lies in the use of the previously mentioned publications. These resources provide essential information and practical strategies to raise awareness and educate the population about the risks associated with diabetes and hypertension. For example, **Personal and Community Health** offers insights on the importance of a holistic approach to health, while **Healthy Food, Better Health** highlights the connection between nutrition and the prevention of chronic diseases. These publications are not only valuable educational tools for researchers and students but also important references for healthcare professionals working in the field.

The Congolese community in general, particularly students and schools, continues to trust the publications from the Health Promotion Research Bureau KANGU MAYOMBE. Their demand for these resources and their suggestions for improvements remain significant.

Weaknesses and constraints in the fight

Despite the clear commitment of the community, including the government, NGOs, students and professors, several weaknesses and constraints hinder the effectiveness of the fight against diabetes and hypertension in the Democratic Republic of Congo:

1. Lack of logistical support: The absence of adequate equipment and financial resources limits the ability to conduct surveys and organize health screening days.

2. Irregular patient follow-ups: Insufficient follow-up care for patients leads to severe complications and makes it difficult to evaluate progress.

3. Limited access to health care: The high costs of consultations and treatments prevent disadvantaged patients from receiving regular medical care.

4. Lack of specialized publications: Available resources are often outdated and not well adapted to the local context, reducing their usefulness.

5. Poorly designed resources: Available publications are often poorly conceived or not suitable for academic contexts. Additionally, several important topics are not adequately covered.

Recommendations

- Advocacy: A call is made to both national and international partners, as well as to the government, to provide support to the KANGU MAYOMBE Health Promotion Center, as well as to scientists and organizations fighting diseases by offering them material, financial, and logistical resources.
- Equip organizations and institutions: Health-science organizations and educational institutions should be provided with appropriate libraries to enhance their capacity for research and learning.
- Create a research commission: Establish a commission of researchers and support them through training and refresher courses in the field of research and publication.
- Large-scale screening campaigns: Organizations are encouraged to conduct large-scale screening campaigns for both diseases (hypertension and diabetes) and run awareness campaigns to combat overeating.
- Government involvement: The government should establish diabetes clinics at all urban levels and major rural centers to ensure proper follow-up care for diabetes and high-blood-pressure cases.
- Updating reference publications: It is essential to regularly develop and update reference books and practical guides on managing diabetes and hypertension. These resources should be tailored to the local and academic context and made accessible to healthcare professionals and patients to ensure reliable and relevant information.

Conclusion

The comorbidity between diabetes and hypertension poses a major public health risk within our community. It is imperative that political and administrative authorities, as well as the international community, take concrete measures to support vulnerable individuals affected by these diseases. An integrated and coordinated approach is necessary to raise awareness, conduct screenings, and provide treatment for these conditions in order to reduce their impact on individuals' quality of life.

Moreover, it is essential to make educational resources on diabetes and hypertension available. These documents must be adapted to local contexts and accessible to everyone, particularly learners and healthcare professionals. By providing reliable and up-to-date information, we can improve the understanding of these diseases, promote healthy behaviors and encourage prevention. This will also strengthen the capacity of healthcare providers and ensure effective patient care.

We sincerely express our gratitude to the Nestlé Foundation for its valuable support in producing these essential publications. Nutrition is a key factor in development, and we look to the Nestlé Foundation

to further boost activities related to this crucial topic of nutrition, contributing to the development of the Congolese community in particular and the regional community in general.

In addition, the comorbidity between diabetes and hypertension remains a major public health challenge in our community. It is essential that political and administrative authorities, as well as the international community, take concrete steps to assist vulnerable individuals affected by these diseases.

Finally, it is crucial to make educational resources on diabetes and hypertension available, adapted to the local and academic context and accessible to everyone.

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BREASTFEEDING

Dr. Omotola Ogundairo Yetunde[1], Adepoju Oladejo Thomas[1], Adesola O. Olumide[2]

[1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

[2]Institute of Child Health, Faculty of Clinical Sciences, University of Ibadan and University College Hospital, Ibadan, Oyo State, Nigeria

A REFLECTION ON MY DOCTORAL RESEARCH EXPERIENCE ON BREASTFEEDING PRACTICES OF RURAL PREGNANT WOMEN IN NIGERIA

My research project entitled "Effect of a drama-based intervention on breastfeeding self-efficacy and breastfeeding outcomes of rural pregnant women in Ibadan, Nigeria" focused on breastfeeding self-efficacy, initiation, exclusive breastfeeding practices, infant growth patterns, and the breastfeeding experience of rural women. This study was conducted in selected rural communities in Ibadan, Oyo State, Nigeria. It employed the use of a four-episode drama as an intervention tool for the promotion of exclusive breastfeeding practices. This study recruited a total of 200 second-trimester pregnant women in selected communities and obtained data at baseline and endline (one month, three months and six months postpartum). Using a multidisciplinary approach, the study reinforced the impact of drama as an intervention strategy in promoting breastfeeding self-efficacy, breastfeeding knowledge, initiation and exclusive breastfeeding, as well as providing valuable insights into infant growth patterns and the breastfeeding experience of women.

The multidisciplinary nature of my work meant that I required expertise from other disciplines such as

Theatre Arts (for the drama series), Geographical Information Systems (to map the houses where study participants resided), and Language (for the translation of the questionnaire in Yoruba, the dominant language in the study area, and the sub-titling of the drama series). Moreover, it was important to build trust and relationships in a longitudinal study such as this. Therefore, I sought the combined effort and support from community leaders, who are important gatekeepers, along with other stakeholders such as primary health centres and Traditional Birth Attendants, and this led to successful data collection. For the follow-up, it was envisaged that the data collection could be staggered as a result of anticipated delivery time differentials. To address this challenge, I created a peer support group whose members were drawn from the study locations. These peer support groups worked with the Research Assistants to monitor the research participants and to provide instant information on delivery day and time.

As a longitudinal, public health and multidisciplinary study, the research required human and financial commitment that was difficult to come by, especially for a student in a low- and middle-income country such as Nigeria. Therefore in 2018, I applied to the Nestlé Foundation's program which provides small research grants for low-income and lower-middle-income countries. This grant facilitated the successful implementation of my research project, including the production of the drama used for the intervention, the purchase of research equipment, and the recruitment and training of Research Assistants (RAs) drawn across the different departments of the Faculty of Public Health in my university. These RAs were trained in important field research skills such as community entry, qualitative and quantitative data collection using Computer Aided Personal Interviews, and mapping of houses with GIS. Lastly, for sustainability, some of the equipment purchased (televisions, DVDs and the recorded drama) were donated to the Primary Health Facilities in the various study communities.

I have been able to disseminate findings from this research through several academic conferences, including the International Union of Nutritional Sciences (IUNS-ICN) held in Tokyo, Japan in 2022, where I had a poster presentation on "Drama as a Tool for Improving Breastfeeding Self-efficacy of Rural Pregnant Women in Selected Communities of Lagelu and Egbeda, Ibadan, Nigeria"; the Micronutrient Forum's 6th Global Nutrition Conference held in The Hague, Netherlands in 2023; and the 5th Federation for African Nutrition Societies Conference in Dakar, Senegal in 2023, where I discussed parts of my findings on "Nutrients Intake and Dietary Diversity" and "Determinants of Exclusive Breastfeeding", respectively. My participation at the 9th African Nutrition Conference (ANEC/ANC IX) held in Cape Coast, Ghana, was one of the highlights of my research dissemination activities. I presented additional research findings on "Drama Series Intervention in Two Local Government Areas of Ibadan: Implications on Infant Growth Status in the First 180 Days of Life". Attending this conference was significant to me as I benefited from the discussion of my research. Incidentally, it was at the 8th ANEC conference held in Addis Ababa, Ethiopia, that my conceived research idea was first discussed during a breakfast meeting with experts, attended by Nestlé Research Foundation representatives. This initial discussion played a key role in better conceptualizing the research and its successful implementation. My presentation at the 9th ANEC meeting garnered significant interest among many of the conference attendees who showed interest in seeing the drama. Moreover, in 2024, I published an article titled *"Use of drama for improving breastfeeding initiation, exclusive breastfeeding and breastfeeding self-efficacy among rural pregnant women in selected communities from two Local Government Areas (LGAs) in Ibadan, Nigeria"* in *PLoS ONE*, 19(8): e0290130. https://doi.org/10.1371/journal.pone.0290130.

The award from the Nestlé Research Foundation has been highly rewarding and has improved my research capacity in many ways. Firstly, I was able to complete my doctoral studies in 2024. My research network has also been strengthened through attending the various conferences and interacting with scholars and professionals in the field of nutrition. The Foundation has also continued to offer important support to enhance my career progression.

"As we work to create light for others, we naturally light our own way."

Mary Anne Radmacher

VISION

TECH FOR WELLBEING

FIGHTING CHILD
STUNTING IN RWANDA

IMPACT ON CHILD GROWTH

COMPLEX AGROECOSYSTEMS

KANGAROO METHOD
AND NUTRITION

TECH FOR WELLBEING

Prof. Dr. Christian Wolfrum
Vice President for Research
ETH Zürich

Dr. John Griffin
Office of Research
ETH Zürich

Dr. Cornelia Schauz
Office of Research
ETH Zürich

EMPOWERING WELLBEING: DIGITAL TOOLS IN LOW- AND MIDDLE-INCOME COUNTRIES

Introduction

Low- and middle-income countries (LMICs) face intertwined health and nutrition challenges, contributing to high disease burdens and reduced life expectancy. In 2022 alone, malnutrition impacted over 231 million children under five, with nearly half of deaths in this age group linked to preventable undernutrition[1-3]. In parallel, healthcare systems in LMICs struggle with inadequate infrastructure, workforce shortages, and financial constraints, especially in rural areas[4,5]. Together, these challenges perpetuate cycles of poverty and poor health.

Traditional solutions have faced challenges in scaling effectively but new technologies, particularly artificial intelligence (AI), offer transformative opportunities to address systemic gaps in health, nutrition, and food security across LMICs. Although many early studies with AI tools have encountered obstacles in accuracy, scalability, and implementation, the lessons learned are now driving even more effective large-scale applications. By adapting these innovations to local needs and resources, LMICs can build resilient systems that overcome longstanding barriers and significantly improve quality of life for millions.

Digital health innovations: Bridging healthcare gaps

Digital technologies are already transforming health and agriculture in LMICs[5-7]. Mobile health (mHealth) apps and telemedicine platforms leverage widespread mobile phone and internet access to provide medical analysis, diagnosis, treatment, and education[5-9]. Such interventions can empower patients and improve care, particularly in remote areas with workforce and resources shortages. For example, mNutrition programs have provided families in underserved areas with personalized text-based guidance on feeding practices, offering advice based on local diets, environments, and personal health conditions[8,9]. Machine learning models have the power to enhance health surveillance, enabling early detection and better public health resource allocation[5, 10-12]. For example, the UNICEF-backed, AI-powered smartphone-based software METRON was deployed in Kenya to detect child malnutrition by analyzing images of skin and eyes, enabling rapid, low-cost screening and early intervention. Rwanda's commercial Babyl Health platform further demonstrates the power of digital health by enabling remote consultations, reducing the need for costly travel to healthcare facilities[13]. AI-powered chatbots, combined with human expertise, can provide efficient triage and management of common illnesses, reserving in-person visits for critical cases and easing pressure on under-resourced medical systems[13 -18].

Smart agriculture technologies optimize food production and distribution, reducing waste and improving resilience against environmental and market shocks, a critical component of the WHO's sustainable development goals[19,20]. Satellite monitoring, AI-powered data analytics, climate models, and smart agriculture technologies can equip farmers with real-time insights to optimize irrigation, soil health, pest control, and crop yields, strengthening food security and resilience to environmental threats[19-22]. For example, the agritech company FarmCrowdy supports farmers in Nigeria by providing such environmental and market insights while also connecting them to much-needed capital, resources, supply chains, and expertise.

Overcoming barriers to AI adoption in LMICs

While digital tools hold immense promise, AI remains an emerging technology in LMICs. Most applications have been limited to small-scale pilot projects with limited scalability, and systematic analyses of AI's performance and cost effectiveness in LMICs are rare. However, the available data highlights some critical barriers which must be addressed to unlock AI's full potential[23]:

- **Infrastructure challenges:** Unreliable internet connectivity and limited computational resources are common issues.
- **High costs and technical expertise:** High implementation costs, inadequate deployment training, and a lack of local AI talent slow progress.
- **Ethical concerns:** Algorithmic bias can exacerbate inequities, leading to misdiagnoses or excluding marginalized groups. Weak data privacy frameworks further erode trust in digital health solutions.
- **Localization issues:** Many AI tools are not adapted to local languages, cultural contexts, or health systems, reducing their effectiveness.
- **Digital literacy:** Communities and healthcare workers unfamiliar with AI tools may struggle to use them effectively, slowing adoption and reducing impact.
- **Scalability and sustainable integration:** While informative, small-scale pilot projects have relatively little impact; initiatives must be scalable and optimized for local conditions.

To overcome these barriers, AI interventions must be designed with local optimization in mind—accounting for specific infrastructure, resources, language, and cultural contexts. Collaboration among governments, technology providers, and local non-profit organizations is essential to ensure solutions are both practical and sustainable. Additionally, capacity building, such as access to technical resources, investments in digital literacy programs, and community engagement will be key to building trust and ensuring these transformative tools can be adopted widely. Leveraging local languages in AI applications and ensuring user-friendly interfaces is essential to enhancing accessibility and engagement. While the application of AI in LMICs remains in its early stages, optimism continues to grow as these powerful tools are increasingly deployed and scaled to meet the needs of vulnerable populations.

ETH for Development: Research for the Good of Society

Interdisciplinary research and cross-sector collaboration play a crucial role in designing and scaling sustainable innovations. Initiatives like ETH for Development (ETH4D) exemplify how partnerships between academia, civil society, industry, and policymakers can drive impactful solutions tailored to

LMICs' unique challenges. ETH4D emphasizes training future leaders in sustainable development, equipping engineers and scientists to develop, implement, and scale impactful innovations. For example, data-driven national and regional development plans are essential to mitigating the impact of climate change on agricultural productivity. ETH4D collaborates, for example, with local partners in Ethiopia to provide an AI-supported analysis of climate-crop and climate-agroecological interactions, helping to inform risk management, water, and soil planning for resilient rainfed agriculture.

ICAIN: Bridging the AI divide

The International Computation and AI Network (ICAIN), spearheaded by ETH Zurich, EPFL, Data Science Africa, members of the ELLIS network, and other founding partners, under the patronage of the Swiss Federal Department of Foreign Affairs, aims to democratize artificial intelligence (AI) development by breaking down barriers to AI adoption in LMICs[24]. By providing access to advanced computational resources, software infrastructure, and expert guidance, ICAIN enables researchers in LMICs and Europe to jointly tackle critical health, nutrition, and agricultural challenges. At the core of this initiative is the ALPS supercomputer, a cutting-edge system within the Swiss National Supercomputing Centre (CSCS) network. Equipped with NVIDIA A100 Tensor Core GPUs, ALPS is one of the world's most powerful public computing infrastructures, optimized for AI-driven research. Its capabilities include rapid data analysis, machine learning, and large-scale simulations—resources essential for addressing systemic challenges in LMICs. A key feature of ICAIN is its bottom-up approach, matching selected projects that create the desired positive impact with resource providers in terms of compute, talent and data. This model ensures AI is deployed efficiently and impactfully.

An example of ICAIN's transformative potential is its partnership with Data Science Africa (DSA). One of their most promising projects focuses on enhancing agricultural resilience and food security through AI-powered weather prediction[24]. Climate change poses a severe threat to crop yields across Africa, making accurate forecasting essential for farmers to plan effectively, reduce losses, and improve food availability. By harnessing ICAIN's supercomputing capabilities, researchers can develop advanced models that deliver precise, localized weather forecasts, directly supporting sustainable farming practices.

Another groundbreaking ICAIN initiative involves AI-driven early disease detection in crops using spectroscopy. With nearly 40% of global crop production lost to pests and diseases, sub-Saharan Africa is particularly vulnerable to agricultural threats. Traditional disease detection methods rely on experts traveling to remote farms to visually inspect plants, a slow and resource-intensive process. To overcome this, researchers are developing a 3D-printed smartphone spectrometer that can detect plant diseases before visible symptoms appear[24]. This portable, AI-powered device integrates with a smartphone app, allowing farmers to diagnose crop health instantly and take preventive measures before outbreaks spread. By improving disease detection, this technology enhances food security, strengthens agricultural productivity, and directly impacts nutritional health in LMICs.

The ICAIN-DSA partnership exemplifies how AI can transcend traditional healthcare applications to address fundamental determinants of well-being, such as food security and agricultural sustainability. By democratizing access to world-class computational resources and fostering effective collaborations, ICAIN is empowering LMICs to create tailored, AI-driven solutions to their unique challenges. With continued investment and global partnerships, ICAIN is paving the way for a more equitable AI landscape, ensuring that cutting-edge technology becomes a tool for global good rather than deepening existing divides.

Conclusion

Digital and AI technologies hold the power to transform healthcare, nutrition, and food security in LMICs, offering solutions to some of the world's most pressing challenges. By addressing barriers like infrastructure gaps, ethical concerns, and digital literacy, LMICs can unlock the full potential of these tools to improve lives and promote equity.

The path forward demands bold investments, cross-sector collaboration, interdisciplinary research, continuous and rigorous evaluation, and a commitment to community-driven approaches. By integrating digital solutions into national strategies and supporting local innovation, LMICs can create a healthier, more equitable future—one where technology empowers individuals and communities to thrive.

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FIGHTING CHILD STUNTING IN RWANDA

Habimana Jean de Dieu[1]

[1]Department of Human Nutrition and Dietetics
School of Public Health
College of Medicine and Health Sciences
University of Rwanda
Kigali P.O. Box 3286, Rwanda

ADDRESSING STUNTING AMONG CHILDREN FROM RWANDA'S POOR HOUSEHOLDS

Childhood stunting—defined as impaired linear growth and development in children due to poor nutrition, inadequate care, and repeated infections—remains a critical public health issue in Rwanda[1]. With a stunting prevalence of 34.1% among children aged 6–23 months from low-income households[2], above the national average of 33.1% and far from the 2024 target of 19%[3], its long-term impacts on physical and cognitive development are alarming. This brief summarizes the findings from studies conducted in Rwandan poor households[2, 4] to better explore promoting or preventing factors, community perceptions, and barriers to prevention, offering evidence-based guidance for policymakers to design effective interventions.

Methods

This study used both quantitative and qualitative design and was conducted in the Rutsiro, Burera, Nyaruguru, Kayonza, and Gasabo districts from the Western, Northern, Southern, and Eastern Provinces and Kigali City, respectively. Quantitative analysis used univariate, bivariate and multivariate analysis, and qualitative analysis used thematic analysis using open coding.

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Key Findings

1. Age Factor: Children aged 19–23 months were over four times more likely to be stunted compared to those aged 6–12 months.

2. Household Resources: Lack of a household vegetable garden was associated with a more than twofold increase in the likelihood of stunting.

3. Parental Employment: Children whose fathers were employed had a significantly lower risk of stunting.

4. Maternal Well-being: Exposure of mothers to physical violence was linked to a higher risk of stunting in their children.

5. Hygiene Practices: Good maternal handwashing practices were associated with a reduced risk of stunting.

6. Community Understanding: Stunting is recognized through physical indicators like short stature, developmental delays, and weakness. It is strongly associated with malnutrition and inadequate maternal nutrition during pregnancy.

7. Root Causes:
   - Socioeconomic factors: Poverty, food insecurity, and resource mismanagement.
   - Maternal and child health: Poor breastfeeding practices, unbalanced diets, and inadequate maternal care.
   - Cultural practices and violence: Harmful traditions, alcohol misuse, restrictive dietary beliefs, and household disputes and violence.
   - Environmental challenges: Poor hygiene, lack of kitchen gardens, and limited access to clean water.

8. Barriers to Prevention: Economic hardship, family resistance to health education, and improper utilization of government-provided resources hinder the effectiveness of stunting interventions.

Key Recommendations

1. Promote Household Vegetable Gardens: Encourage and support low-income families to establish and maintain vegetable gardens to improve access to nutritious foods.

2. Enhance Employment Opportunities: Implement programs aimed at increasing employment opportunities for parents, particularly in low-income communities, to improve household food security and overall well-being.

3. Prevent Domestic Violence: Strengthen initiatives to prevent intimate partner violence, recognizing its impact on child health and development.

4. Improve Hygiene Education: Develop and disseminate educational programs that promote proper handwashing and other hygiene practices among mothers and caregivers.

5. Targeted Interventions for Older Infants: Design nutrition and health interventions specifically for children aged 13–23 months, who are at higher risk of stunting.

6. Strengthen Maternal and Child Nutrition Programs: Scale up prenatal and postnatal nutrition education and provide targeted food assistance to vulnerable families.

7. Promote Community-led Initiatives: Support kitchen gardens, enhance food security, and implement locally driven hygiene campaigns to address environmental challenges.

8. Address Socioeconomic Barriers: Expand social protection programs and empower communities to manage resources effectively.

9. Cultural and Behavioral Change: Develop culturally sensitive campaigns to address harmful traditions and promote positive caregiving practices.

Conclusion

Tackling stunting in Rwanda requires a multi-sectoral approach that addresses its socioeconomic and psychosocial, cultural, and environmental drivers. By implementing these evidence-based strategies, Rwanda can ensure healthier futures for its children.

IMPACT ON CHILD GROWTH

Phuong H Nguyen[1,2], Lan Mai Tran[3], Melissa F. Young[3], and Usha Ramakrishnan[3]

[1]Thai Nguyen University of Pharmacy and Medicine, Thai Nguyen, Vietnam;

[2]International Food Policy Research Institute, Washington, DC;

[3]Emory University, Atlanta, Georgia, USA

THE FIRST 1000 DAYS AND BEYOND: LONG-TERM EFFECTS OF PRECONCEPTION NUTRITION ON CHILD DEVELOPMENT

Poor growth and developmental delays in early childhood remain critical public health challenges, particularly in low- and middle-income countries. Globally, over 30% of children under five years old are stunted, and 249 million children are not reaching their full developmental potential[1]. The importance of the first 1,000 days of life—spanning from conception through the first two years—is well recognized, with numerous maternal and child nutrition-related exposures linked to child growth and development[1, 2]. Although interventions such as providing prenatal micronutrient supplements have the potential to improve child growth and intellectual functioning, this may be too late in settings where maternal malnutrition is common[3,4]. Research indicates that preconception maternal nutritional status plays a pivotal role in fetal growth and development, with life-course effects on health and cognitive outcomes[5]. Micronutrients like iron and zinc and essential fatty acids play critical roles in neurodevelopment, influencing processes such as synaptic development, myelination, and cognitive processing[6,7]. These findings underscore the importance of improving maternal nutrition prior to conception. Providing nutrient supplements to address maternal underweight and micronutrient

deficiencies during sensitive periods of fetal brain development have been shown to improve birth outcomes and postnatal linear growth[8]. However, less is known about the long-term effects on child development.

Study overview: Assessing the impact of preconception micronutrient supplementation on child development in Vietnam

Our research in Vietnam provides a unique opportunity to examine the long-term effects of preconception micronutrient supplementation on child development. We conducted a large randomized controlled trial (PRECONCEPT) in rural Vietnam in which 5,011 women of reproductive age who were planning to get pregnant were randomly allocated to receive weekly supplements containing either multiple micronutrients (MM, containing 15 micronutrients, including IFA), or iron and folic acid (IFA), or only folic acid (FA)[9] preconceptionally. All women who got pregnant during the study (n=1,813) continued to receive daily supplements containing IFA during pregnancy through delivery and were followed up for pregnancy outcomes. A total of 1,599 offspring of these women were followed up from birth through age 10-11 years. Developmental outcomes were assessed at ages 2 years (using Bayley Scales for Infant Development III), at 6-7 years (using Wechsler Intelligence Scale for Children®-Fourth Edition, WISC-IV®), and at 10-11 years (using WISC-IV® and academic achievement tests).

Impact of the intervention

Key findings of the impact of the preconception intervention on child development are summarized below.

- **At age 2 years,** we found that preconception supplementation with IFA significantly improved child development, especially fine motor development (0.41 score, effect size 1.3 SD) compared to those in the FA-only control group[10].

- **At age 6-7 years,** children born to mothers who received MM or IFA supplementation had significantly higher scores for full-scale IQ (1.7 scores), working memory (1.7 scores), and processing speed (2.5 scores) compared to those in the FA-only group[11]. These differences were even greater for children whose mothers had consumed supplements for at least six months before conception, highlighting the importance of adequate maternal nutrition well before pregnancy. We also found greater differences among children living in households with lower socioeconomic status, underscoring the potential of preconception nutrition interventions to reduce developmental disparities.

- We also found that **motor development at age 2 years was associated with cognitive development at 6-7 years**[12], indicating the importance of early childhood for later cognitive outcomes.

- **At age 10-11 years,** the impact of preconception supplementation on cognitive function remained significant. Children whose mothers received MM or IFA supplementation before conception had higher scores in perceptual reasoning, a key aspect of intellectual functioning, compared to the FA group (mean difference of 1.60 score for MM and 1.93 for IFA)[13]. However, no significant differences were observed in academic achievement.

Unique contribution of the study: Our study provides valuable insights into how maternal nutrition before conception can shape cognitive development over time by using data that were prospectively collected from preconception through the school-age years on a large number of mother-child pairs. Most notably, the high rates of follow-up and use of a randomized controlled trial design to evaluate the benefits of providing micronutrient supplements prior to conception are unique contributions. To our knowledge, this is the first study to evaluate and demonstrate the lasting impact of preconception micronutrient supplementation on child development at ages 6-7 years and 10-11 years. Additionally, this study also shows that preconception nutrition may help mitigate socioeconomic disparities in cognitive development.

Conclusion

Our findings provide compelling evidence that preconception micronutrient supplementation can positively influence cognitive development across multiple stages of childhood. These results highlight the importance of maternal nutrition before conception in optimizing child development, and support the need for policies and programs that focus on women of reproductive age, especially in regions with high levels of malnutrition and micronutrient deficiencies. Expanding access to micronutrient supplements before and during pregnancy could have far-reaching benefits for public health and contribute to the achievement of global nutrition and development goals. Public health policies aimed at improving the nutritional status of women of reproductive age, including through micronutrient supplementation, could have a profound and lasting impact on child health, learning, and development, contributing to the formation of human capital from early childhood through adolescence.

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Mỗi ngày đến trường là một ngày vui
LỚP 1C
BASE

COMPLEX AGROECOSYSTEMS

Dr. Uma Khumairoh, S.P., MSc
Dr. Ir. Jeroen C.J. Groot

Faculty of Agriculture, Brawijaya University, Indonesia

Farming Systems Ecology Group, Plant Science Department, Wageningen University and Research, The Netherlands

A PATHWAY TO STRENGTHEN FOOD SOVEREIGNTY AND SECURITY AND BIOCULTURAL DIVERSITY

Biocultural diversity is the result of the continuing co-evolution and adaptation between biological and cultural diversity. This includes food culture that has both shaped and has been shaped by traditional farming and its local food systems. In traditional agriculture, farmers integrate multiple crop and animal species to meet all the needs of the households, thereby providing diverse diets, medicine, shelter and clothing, while simultaneously expressing socio-cultural, aesthetic and spiritual values linked to the land (Figure 1). This way of living has firmly underpinned the resilience of farming systems and socio-cultural systems and allowed for the maintenance of community identity as well as food sovereignty and security within local food systems. In contrast, current industrialized agriculture stimulates mass food production to feed the increasing global population quantitatively but may not do so qualitatively. This industrialized agriculture is characterized by the mechanized production of monocultures with high agrochemical input rates and is supported by subsidies, incentivizing more farmers to cultivate monocultures. However, these monocultures have reduced the diversity of consumed staple food and created a huge reliance on only a few staple foods such as rice in developing

countries, mainly in Asia. Although improved wealth has reduced the rate of rice consumption per capita, still more than 50% of the daily diet of rural households consists of rice, making them susceptible to nutritional deficiencies. Although globalization allows consumers worldwide to access diverse food, this also leads to new problems, especially when it is difficult to cultivate such commodities in a certain region, for example wheat to make bread and instant noodles in Southeast Asia. This new reliance on a foreign staple food not only weakens the local food systems but also puts the country into vulnerable situations, for example when there is a war, natural disaster, global economic crisis or climate changes. Therefore, there is an urgent need to protect biocultural diversity to safeguard local food systems and to enhance food sovereignty and security.

Figure 1
Diverse plants on rice bunds, enhancing ecosystem services.

Complex Agroecosystems: Nurturing nature and biocultural diversity while safeguarding local food systems

The development of Complex Agroecosystems (CA) is an attempt to restore and conserve biocultural diversity. CA combines modern science and traditional knowledge, for example in Complex Rice Systems (CRS) and Complex Maize Systems (CMS). CRS raises ducks, fish, azolla and border plants together with rice. Ducks and fish eat rice-plant enemies such as weeds, insects, molluscs and fungi, and their excreta provide nutrients for rice. Azolla is a nitrogen-fixing fern, providing nitrogen for rice and feed for fish and ducks. Border plants consisting of trees, legumes, vegetables, fruits and medicinal plants provide diverse human and animal nutrition while serving as a habitat for natural enemies to deter plant enemies. In CMS, a local maize variety that is more palatable, has a long shelf life, and is adaptive to a local condition is cultivated together with legumes and chickens to accelerate maize growth and development while providing diverse products. Overall, CAs contribute to restoring ecosystem services, increasing smallholder incomes, and enhancing food and nutrition diversity and security, thus improving food sovereignty and security and socio-economic stability.

Transition towards Complex Agroecosystems

The development of CA is an example of how biocultural diversity can be restored in contemporary agriculture. Since much indigenous knowledge has been lost since the green revolution, transitioning towards CA should be done in a stepwise approach. Time and material investment are required to restore, implement and mainstream indigenous knowledge on redesigned farms. This may follow iterative learning cycles of understanding the local context, exploring interventions, redesigning farming activities and adapting to upcoming challenges. An example of this stepwise method adopted from the CRS case is as follows:

1. Understanding the local context
   Methods to help understand the local context include (i) identification of land-use and land cover (LULC) to map the current situation of investigated farming systems to be transformed and to explore potential future scenarios; (ii) collecting baseline data to characterise crops, farms, households and communities; (iii) constructing farm typologies to easily classify existing farming types and to better understand the local context and resources to formulate appropriate interventions; and (iv) identifying strengths and weaknesses, exploring potential solutions and opportunities as well as threats.

2. Interventions and redesign
   This step can include simulation models or on-farm experimentation. Redesign includes experimentation on several individual farms or farm clusters, guided through on-farm training or farmer field school (FFS) that uses adult learning methods (Figure 3). The experimental and training topics focus on problem-solving for the major problems—such as infestation by weeds and pests and constraints in the supply of soil nutrients to crops—by using local resource approaches inspired by indigenous knowledge inventoried in the previous step, combined with input from modern science. Choosing species to integrate into the CA involves identification of desirable food crops which contribute to diverse nutrition as well as high economic, ecological, cultural, social and spiritual values.

3. Adaptation of the design

Selected species in the initial design may not be suitable for every farm. Therefore, insights and feedback from the stakeholders should be collected. Listening to their responses may inspire other farmers to be critical or to simply adopt, test and adapt the feedback on their own farms, which later may evolve into a different version of the same concept, resulting in even better performance.

Figure 2
Farmer field school to support transition towards complex rice systems.

These three steps provide a generic framework that can be used for a physical redesign of farming systems and can be divided into sub-steps to guide the transition to detailed actions. The involvement and commitment of communities, researchers, authorities, agricultural agencies, business and other stakeholders is important support for farmers by providing information, consultancies, initial capital, markets and policy. These will ensure the sustainability and resilience of the initiatives and the local food systems, which is needed for transition programmes to meet their objectives for biocultural diversity conservation: to contribute to the diversity of human nutrition; food security and sovereignty; livelihoods; and the expression of socio-cultural and spiritual values of smallholder farmers and their communities in the long term.

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KANGAROO METHOD AND NUTRITION

Dr. Nathalie Charpak, Paediatrician

Director of the Kangaroo Foundation, Bogota, Colombia

KANGAROO MOTHER CARE AND NUTRITION IN PREMATURE OR LOW-BIRTH-WEIGHT INFANTS: A HAPPY UNION

Introduction

Millions of premature or low-birth-weight babies face health risks every year. Many struggle to grow properly despite hospital care, which affects their overall development. Ensuring the right nutrition from the start is crucial to their health and long-term outcomes.

What is the Kangaroo Mother Care (KMC) method?

The KMC method was developed in the 1970s in Colombia as a solution to a shortage of incubators.

It consists of three key components:

1. Keeping the baby in direct skin-to-skin contact with the mother (kangaroo position)
2. Feeding the baby exclusively with breast milk whenever possible
3. Early hospital discharge with strict follow-up care

The World Health Organisation (WHO) adopted KMC and in 2023 published a global position paper on the necessity to initiate KMC at birth and an implementation strategy guide for scaling KMC up

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to the country level . An update to the practical guide on KMC will be available in a few months.

The kangaroo position

Once the baby is stable, they are placed in the kangaroo position (KP) on the mother's chest for direct skin-to-skin contact. This helps maintain body temperature, supports breastfeeding, and strengthens bonding. Depending on their weight and gestational age, the baby may stay with the mother in the maternity ward or be transferred to neonatal care.

Kangaroo nutrition: A key component of KMC

KMC emphasizes exclusive breastfeeding whenever possible. Initially, feeding is scheduled every two hours. Once adequate growth is achieved, usually around 37 weeks' gestation, feeding schedules become more flexible to meet the baby's needs. If weight gain is insufficient, supplemental preterm formula is provided using a dropper or spoon to avoid interfering with breastfeeding. The goal is exclusive breastfeeding by 40 weeks' gestation.

This method is a safe, cost-effective alternative to expensive commercial supplements that may not be widely available.

KMC discharge policies and follow-up

Infants can be discharged once they are stable, regardless of weight or gestational age, as long as they can suck and maintain body temperature. At home, they remain in the kangaroo position until they no longer accept it, typically after 38 weeks' gestation. Daily monitoring continues until they regain their birth weight and achieve a weight gain of at least 15-20 grams per kilogram per day. Weekly checkups follow until term (40 weeks) and then every six weeks until 12 months of corrected age.

During follow-up visits, paediatricians assess growth, psychomotor development, vision, and hearing.

Proven benefits of Kangaroo Mother Care

Research has shown that KMC provides numerous benefits:

- Reduced neonatal mortality
- Shorter hospital stays
- Lower risk of infections
- Stronger mother-infant bonding
- Increased breastfeeding rates
- Better brain development in both the short- and long term

Studies suggest these benefits can last up to 20 years.

Twenty-eight years of KMC follow-up: Key findings

Between 2001 and 2016, over 31,000 preterm or low-birth-weight infants were followed in KMC programs. Findings showed:

- Consistent growth improvements
- Lower rates of respiratory and neurological conditions
- Positive psychomotor and auditory development
- High adherence to follow-up visits

The importance of breastfeeding in premature infants

Low birth weight and intrauterine growth restriction (IUGR) increase the risk of developmental issues. Studies show that breast milk significantly reduces infections and supports brain development better than formula.

A study of 11,409 infants with IUGR found that those who received breast milk had higher developmental scores at 6 and 12 months of corrected age.

KMC research and future studies

Since 1997, the Kangaroo Foundation has conducted extensive research on preterm infant nutrition. Studies have developed predictive models to determine when supplemental feeding is needed and examined the composition of breast milk in preterm mothers. Clinical trials have also investigated kinaesthetic stimulation and its effect on early growth.

In 2021, a study began evaluating growth, neurodevelopment, and morbidity in preterm infants diagnosed with extrauterine growth restriction. Additionally, research is ongoing on KMC and its relationship to overweight/obesity in former preterm infants.

Publications on Kangaroo Nutrition Policy

- "Predictional Need for Supplementing Breastfeeding in Preterm Infants under KMC". Acta Paediatrica, 91:1-5, 2002.
- "Application of a Predictive Model to Identify the Need for Supplementing Breastfeeding in Preterm Infants under Kangaroo Mother Care". Journal of Pediatric Gastroenterology and Nutrition, 2004, 39, S24-S25.
- "Influence of Feeding Patterns and Other Factors on Early Somatic Growth of Healthy, Pre-Term Infants in Home-Based Kangaroo Mother Care: A Cohort Study. J Pediatr Gastroenterol Nutr, 2005 Oct;41(4):430-437.
- "Breast Milk Composition in a Cohort of Pre-Term AGA Infants' Mothers Cared for at an Ambulatory Kangaroo Mother Care Program in a Developing Country". Acta Paediatr, 2007 Dec;96(12):1755-9.
- "Randomized Controlled Trial on the Impact of Kinesthetic Stimulation on Early Somatic Growth of Preterm Infants in Kangaroo Position". Acta Paediatrica, 2019 Jul;108(7):1230-6.
- "Systematic Review and Meta-Analysis Suggest That the Duration of Kangaroo Mother Care Has a Direct Impact on Neonatal Growth". Acta Paediatrica, 2020 Sep 17.
- "Follow-Up of Kangaroo Mother Care Programmes in the Last 28 Years: Results from a Cohort of 57,154 Low-Birth-Weight Infants in Colombia". BMJ Global Health, 2023.

Conclusion

Kangaroo Mother Care is a highly effective, low-cost method that helps premature and low-birth-weight infants survive and thrive. The combination of skin-to-skin contact, breastfeeding, and strict follow-up has proven to be a safe and beneficial approach worldwide. Implementing KMC from birth can make a significant difference in the lives of these vulnerable infants.

Acknowledgment

Since 1997, the Kangaroo Foundation has received various research grants from the Nestlé Foundation to study Kangaroo Nutrition Policy within KMC programs. The research has always been conducted independently, ensuring unbiased analysis and discussion of the results. These grants have always been cited in articles relating to this research.


tetfund
COLLEGE OF
APPLIED FOOD
SCIENCES &
TOURISM
(CAFST)

PROFILE OF A NUTRITION INSTITUTE

UNIVERSITY OF AGRICULTURE, UMUDIKE

Patricia Ogechi Ukegbu[1]
Associate Professor, Human and Experimental Nutrition

Augusta Amaeze[1]
MSc Student

Joy Chinemerem Sopuru[2]
PhD Student

Juliana Uchenna Anyika-Elekeh[1]
Professor of Nutrition and Dietetics

Maduebibisi Ofo Iwe[2]
Vice Chancellor and Professor of Food Science and Technology

[1] Department of Human Nutrition and Dietetics, College of Applied Food Sciences and Tourism, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

[2] Department of Food Science and Technology, College of Applied Food Sciences and Tourism, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

DEPARTMENT OF HUMAN NUTRITION AND DIETETICS, COLLEGE OF APPLIED FOOD SCIENCES AND TOURISM (CAFST), MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE

Introduction

Michael Okpara University of Agriculture, Umudike is one of the three universities of agriculture established on 13 November 1992 by Edict Nr. 48 of the Federal Government of Nigeria. The Institution effectively took off on 3 May 1993, when the University admitted its inaugural students. The University has a central mandate and mission of "imparting agricultural education in a scientific and practical way, undertaking applied research and such extension services as would assist the achievement of national self-sufficiency in food production, and catalysing, as well as sustaining, rural development".

Michael Okpara University of Agriculture, Umudike is situated on an axis along the road from Umuahia to Ikot Ekpene. Its location is ten kilometres east of Umuahia, the Abia State Capital. Umudike and other host neighbours are agrarian communities. This brings to fore the role of the University as one specializing in agriculture and related programs.

NIGERIA

AREA

Total:	923,768 km^2
Agricultural land:	77%
Arable land:	37.31%

POPULATION

Total (2025 est.):	237.500.000
Urban population:	55%
Under age 15:	43%
Median age:	18.1 years Male 17.9 years/ Female 18.3 years)
Rate of urbanization (annual rate of change 2024):	3.79%

POPULATION GROWTH RATE

Total (2024):	2.39%
Total fertility reate:	4.38 births per woman

GDP

(per capita, PPP) (2024 est.)	USD 6,543

LIFE EXPECTANCY AT BIRTH

Total:	56 years
Male: Female:	54.7 years 57.4 years

MORTALITY RATES

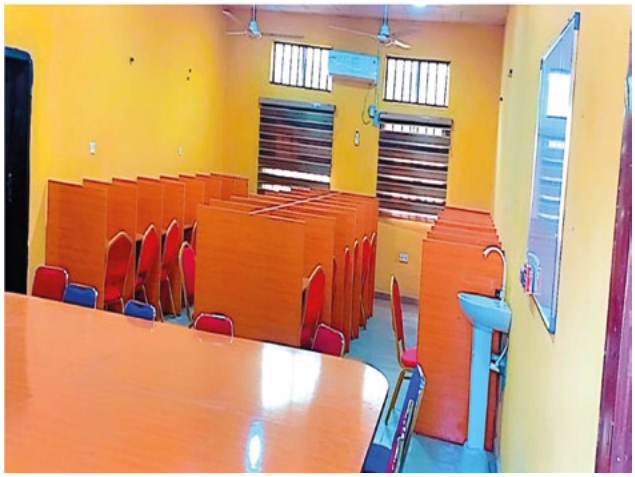
Neonatal mortality rate:	36.8/1,000
Infant mortality rate (at birth):	53.7/1,000
Under-five mortality rate (2024):	107.2/1,000
Maternal mortality rate (2024):	1,047/100,000 live births

MICRONUTRIENT DEFICIENCIES

Household consuming iodized salt:	97%
Vitamin A supplementation (full coverage 2022):	67%
Prevalence of anemia among women of reproductive age:	55.1%

OTHER PARAMETERS

Population below poverty line (2025):	40%
Mother's mean age at first birth:	20.4 years
Contraceptive prevalence (2023):	18%
Health expenditure (% of GDP 2024):	4.08%
Physician density per 1,000 population:	0.38
Immunization, measles (% of children ages 12-23 months) (2023):	60%
Proportion of children <5 years sleeping under insecticide-treated bed nets:	52.2%
Total adult literacy rate:	62%
Proportion of Population using at least basic drinking water services	
National:	78%
Urban:	91%
Rural:	64%
Adult HIV prevalence (2025):	1.3%
Obesity (adult prevalence rate (2024)	14.5%
Internet users (% of the population) (2025)	44%



Dietary intake assessment using the INDEXX24 App

The College of Applied Food Sciences and Tourism (CAFST)

The College of Applied Food Sciences and Tourism is one of the eight Colleges and two Schools approved at the inception of the University, then known as the College of Food Processing and Storage Technology (CFPST). At inception, the University approved the following departments for the College:

1. Brewing and Fermentation Technology
2. Food Science and Technology
3. Home Economics
4. Hotel Management and Tourism
5. Human Nutrition and Dietetics

The Department of Home Economics was the first to commence, in the 1993/1994 academic session, followed by Food Science and Technology in the 1994/1995 academic session. The Human Nutrition and Dietetics area was introduced as a programme in the Home Economics Department in the 1995/1996 academic session, but later elevated to a full Department in the 2004/2005 session. Hotel Management and Tourism was also introduced as a programme under the Home Economics Department in the 2002/2003 academic session, but became a full department in 2021. The name of the College was changed from College of Food Processing and Storage Technology (CFPST) to College of Applied Food Sciences and Tourism (CAFST) in 2008 in response to the growing need to capture the various programmes of the College.

The College is strategically positioned within the University and surrounding communities to add value to local foods and develop food processing, storage, and packaging technologies. In addition, the College boasts well-equipped laboratories and facilities, including a food analytical lab, microbiology lab, food processing lab, food sensory evaluation lab, diet therapy lab, nutrition assessment lab and clothing and textile lab; seed storage silos; state-of-the-art food processing equipment and facilities such as a bakery, smoking kiln, dehuller, miller, parboiler and dehydrator; as well as a tourism village, home management facility and a crèche. These laboratories and facilities provide quality services to students, staff, communities, small- and medium-scale enterprises and research institutions in food processing and nutrition. The College partners with various national and international organisations to ensure national food security.

Brief history of the Department of Human Nutrition and Dietetics (HNUD)

The Bachelor of Science (B.Sc.) in Human Nutrition and Dietetics was accredited by the Nigerian Universities Commission (NUC) in 1999. At the time, Human Nutrition and Dietetics was a degree option in Home Economics. It grew into a full Department in the 2004/2005 academic session. The Dietetics aspect of the programme was fully accredited by the responsible professional body, the Nigerian Dietetic Association (NDA), in 2005. The Department also offers programs at the M.Sc. and PhD levels, as well as a Postgraduate Diploma (PGD) with specializations in Nutrition and Dietetics, Human and Experimental Nutrition, and Community and Public Health Nutrition.

Philosophy

The philosophy of the department is geared towards producing graduates who will apply the knowledge and principles of the multifaceted scientific domain of Human Nutrition and Dietetics in tackling the current and future food, nutrition and health challenges of society to enhance sustainable development.

Vision

To be recognized as a leading centre in Nutrition Science and Dietetics in Africa, committed to the delivery of nutrition services to enhance community and national development.

Mission

To initiate and implement quality applied-science programs in Human Nutrition and Dietetics relevant to society that will produce competent graduates and contribute to attaining food and nutrition security.

Objectives

The objectives of the department are to:

1. Train competent nutritionists and dieticians who are able to:
   i. assess the nutritional problems of population groups, identify the causes, and design interventions for their solution
   ii. plan, implement, monitor and evaluate nutrition programmes
   iii. exhibit the necessary understanding of the scientific basis of health and disease
   iv. provide a skilled workforce in the area of Nutrition and Dietetics to take up management and leadership positions in the public and private sectors
   v. create small- to medium-scale businesses in the areas of Nutrition and Dietetics
   vi. promote scholarship and high-quality research aimed at solving contemporary nutrition problems as well as expanding the frontiers of knowledge in Human Nutrition and Dietetics
   vii. contribute to the global discourse on Nutrition and Dietetics and international perspectives of nutrition challenges
2. Improve the nutritional knowledge and status of the host communities through extension and research programmes

Research activities

The Department of Human Nutrition and Dietetics is one of the leading training institutions in nutrition in Nigeria, with a strong focus on teaching, research and community service. It is a dynamic department, with staff members who are passionate about teaching and who engage in innovative research relevant to the nation.

Some of the notable research, projects and programmes conducted in the department are:

- Qualitative and quantitative studies on exclusive breastfeeding knowledge, beliefs and practices among rural mothers in Abia State.
- Assessment of anaemia and iron status of school-age children (aged 7-12 years) in rural communities of Abia State.
- Assessment of the macronutrient and micronutrient intake/status of different population groups.
- Food recipe development, collection of dietary data and nutrient analysis of local foods that were included in the Nigerian Food Composition Tables.
- The use of the INDEXX24 App for the collection of 24-hour dietary recall data.
- Assessment of the energy needs and nutritional status of adolescent girls using the Doubly Labelled Water technique.
- Assessment of physical activity patterns using wrist-worn accelerometers.
- Development of policy documents for integrating gender-specific adolescent nutrition considerations in the National Policy on Food and Nutrition in Nigeria.
- Use of technological innovations to add value to locally available foods to enhance nutrition and food security.
- Promotion of local foods, nutrition and a healthy lifestyle through radio programs

These activities have helped to improve the nutritional status of the Nigerian population. For instance, exclusive breastfeeding rates in Abia State have increased progressively from 17% in 2008 to 29% in 2023, according to the Nigerian Demographic and Health Survey (NDHS, 2023). This

may be attributable to the intervention 'Information and education to promote exclusive breastfeeding practices in rural communities in Abia State', carried out by the Department between 2008 and 2012. Similarly, the department supported the collection, development and nutrient analysis of standard recipes for the Nigerian Food Composition Table (2017) and database (NFCMS, 2021). In 2023, the Nigerian Atomic Energy Commission (NAEC) included Nutrition Priorities in its Country Programme Framework (CPF) for 2024-2029. This was achieved through the efforts of the department, whose staff serves as the Project Counterpart in the program. Presently, the department is leading in the application of stable isotopes (Doubly Labelled Water) in nutritional assessment in the country. In addition, the department remains the foremost in the country in the use of a computer-assisted 24-hour dietary interview software (INDEX24) in the collection of dietary intake data, through the assistance of Dr. Busie Maziya-Dixon and Mr. Samuel Ofodile of the International Institute of Tropical Agriculture (IITA), Ibadan.

Some human nutrition and dietetics department staff members

Community service

The fact that the university is the only University of Agriculture in the southeastern geopolitical region and is located in a rural setting where agriculture is predominant makes the Department of Nutrition unique in reducing malnutrition in the region through nutrition-sensitive agricultural practices. The department is very visible in communities within its catchment areas because of its research and community-engagement activities. The department partners with the Centre for Gender Youth and Child Development, the Centre of Excellence for Root and Tuber Crops, the Michael Okpara University Extension Centre (MEC) and the University Health Centre (UHC) to build capacity within communities and schools through food and nutrition research, nutrition education, food demonstrations and value addition.

Staff and students working in the food analytical laboratory

Nutrition leadership

Members of the Department have supported various bodies, committees and civil-society organisations through the provision of nutrition leadership and support in national nutrition programs including the National Food Consumption and Micronutrient Survey (NFCMS), the Federal Ministry of Health National Nutrition Technical Working Committee group for national food- and nutrition-policy development, the Trans-Fat-Free Nigeria Coalition, the National Sugar Sweetened Beverage Tax Coalition (NSSBTC) and the State Committee on Food and Nutrition. Graduates from the department currently hold key leadership positions in the area of nutrition in the country, and have been employed

Packaging of biological samples in the laboratory

in other Nigerian universities and polytechnics to establish Human Nutrition programs. Some staff are council members of key nutrition associations within the country and in Africa, notably the Nutrition Society of Nigeria (an association that unites all nutrition professionals in the country) and the Federation of African Nutrition Societies (FANUS), while some are alumni of leadership programs like the African Science Leadership Program (ASLP), African Women in Agricultural Research and Development (AWARD), the African Nutrition Leadership Program (ANLP), and the Leadership Development for Accelerated Progress in Nutrition in Nigeria (LEDA-NN).

Collaborations

The Department has established scientific collaborations with similar institutions around the world including North-West University, Potchefstroom, South Africa. We have adopted a curriculum on Nutrition Leadership for postgraduate students developed by North-West University. The department, in partnership with the International Atomic Energy Agency (IAEA) and selected institutions from Africa (North-West University, South Africa; University of Ghana; International University of Rabat, Morocco; and Université Cheick Anta Diop, Senegal) under the umbrella of the African Regional Cooperative Agreement (AFRA) for research, development and training related to nuclear science and technology, developed a Master of Science in Human Nutrition and Nuclear Techniques curriculum for Africa. The aim of developing the MSc curriculum in Human Nutrition and Nuclear Techniques is to build capacity of African researchers in the assessment of nutrition outcomes as related to diet, nutrient quality and related nutritional and health outcomes using nuclear and isotopic techniques and other approaches of nutrition outcome assessment. This collaboration led to the inclusion of Nutrition Priorities in the 2024-2029 Country Programme Framework (CPF) of the Nigerian National Atomic Energy Commission (NAEC) which ab initio was not captured in the framework. The Department partnered with the Food and Agriculture Organization (FAO) to pilot the Education for Effective Nutrition in Action (ENACT) module for teaching nutrition education in Nigerian schools. This module is currently being used to teach the course "Nutrition Education and Communication" at the undergraduate level in the department. In addition, the department is currently partnering with Professor Herman Pontzer of Duke University, USA, in building capacity of departmental staff and students in the use of stable isotopes (Doubly Labelled Water) in the assessment of the energy needs and nutritional status of adolescent girls, funded by the Bill and Melinda Gates Foundation. The INDEXX24 App, which is a novel app for the collection of 24-hour recall dietary data developed by INTAKE (Centre for Dietary Assessment), is currently being piloted and used in the department for the collection of dietary data of individuals and groups, under the guidance of Dr. Busie Maziya-Dixon and Mr. Samuel Ofodile of the International Institute of Tropical Agriculture (IITA), Ibadan.

Research grants

Departmental staff members have been awarded research grants from the Bill and Melinda Gates Foundation, the Nestlé Foundation, the Food and Agriculture Organization (FAO), the National Research Foundation (NRF) / The World Academy of Science (TWAS), USAID and the CGIAR GENDER Impact Platform Funds through the African Women in Agricultural Research and Development (AWARD) GRASP Fellowship, along with other national grants (e.g. TETFUND) to conduct research in various fields of human nutrition.

Acknowledgement

The department acknowledges the efforts of Emeritus Professor A.C. Uwaegbute, Professors I.A Onimawo, J.U. Anyika-Elekeh, C.A Echendu and V.U Asumugha, the pioneer staff of the department, for their immense contributions to the growth and development of the department. The support the department received from the current Vice Chancellor of the University, Professor M.O Iwe, who tirelessly ensured the provision of a supportive environment and facilities for various departments in the College to function, is also gratefully acknowledged.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ONGOING PROJECTS

	TITLE	PRINCIPAL INVESTIGATOR
BREASTFEEDING	1 2020 / Promotion of exclusive breast feeding and young child feeding practices through m-Health: A randomized controlled trial	Rozina Nuruddin / Aga Khan University, Department of Community Health Sciences, Karachi, Pakistan
	2 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
	3 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
	4 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
FOOD SYSTEMS	5 2020 / Enhancing nutritional benefits and safety of maize to improve the health of Africans	Archileo N. Kaaya / Makerere University, College of Agricultural and Environmental Sciences, School of Food Technology Nutrition & Bio-engineering, Department of Food Technology and Nutrition , Kampala, Uganda
	6 2020 / A methodological framework to transform monoculture into a complex rice system landscape in East Java, Indonesia	Khumairoh Uma / Brawijaya University, Department of Agronomy, Malang, East Java, Indonesia
	7 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
	8 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

FOOD SYSTEMS

	TITLE	PRINCIPAL INVESTIGATOR
9	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
10	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

INFANT AND CHILD NUTRITION

	TITLE	PRINCIPAL INVESTIGATOR
11	2020/ Effect of composite-foods powder intake on the nutritional anemia and growth status of young Ghanaian children	Egbi Godfred / Noguchi Memorial Institute for Medical Research (NMIMR), College of Health Sciences, University of Ghana, Legon (Ghana)
12	2020 / Assessing causal relationship between environmental enteric dysfunction (EED) and growth failure in children from Rukwa-Tanzania: A cross talk between EED and stunting	Modern Grantina / Nelson Mandela African Institution of Science and Technology (NM-AIST), Tengeru, Arusha, Tanzania
13	2020 / Positive deviance in linear growth of children aged 6-23 months in Rwanda	Jean de Dieu Habimana / University of Rwanda, Department of Human Nutrition Remera Campus, Kigali, Rwanda
14	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
15	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
16	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

	TITLE	PRINCIPAL INVESTIGATOR
INFANT AND CHILD NUTRITION	17 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
	18 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
	19 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
	20 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
	21 2023 / Intra-household Decision-Making Status, Barriers and Association with Child Nutritional Status	Kassahun Fikadu Tessema / Arba Minch University, Arba Minch, Southwest Ethiopia, Ethiopia
MATERNAL NUTRITION	22 2020 / An urban picture of overweight, gestational weight gain and pregnancy outcomes among slum and non-slum dwellers in Pune, India	Deshpande Swapna / Hirabai Cowasji Jehangir Medical Research Institute, Pune, India
	23 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

MIRCONUTRIENTS

24	2020 /Folate and vitamin B12 assessment among women of reproductive age in Eritrea: A 2020 population-based study	Kidane Amanuel / Xi'an Jiaotong University, Department of Epidemiology and Biostatistics, Xi'an, Shaanxi, P.R.China
25	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
26	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
27	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
28	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
29	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

NUTRITION EDUCATION

30	2020 / Enhancing food literacy among Sri Lankan adolescents: Effect of school gardens in promoting healthy diets, behaviours and knowledge	Renuka Silva / Wayamba University of Sri Lanka, Department of Applied Nutrition, Makandura, Gonawila, Sri Lanka
31	2020 / Effect of an educational intervention about child nutrition on the knowledge, attitude and practice of village doctors	Li Lei / Xiamen University, Public Health School, Xiamen, PR China

TITLE

PRINCIPAL INVESTIGATOR

NUTRITION EDUCATION

32	2022 / Developing a nutrition educational program for burn survivors in Ghana: A pilot study	Jonathan Bayuo / Presbyterian University College, Agogo, Asante-Akyem, Ghana
33	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
34	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
35	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
36	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
37	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

OTHER RESEARCH AREAS

38	2020 / Long-term effects of acute malnutrition on physical function: A 5-year prospective cohort study in Ethiopia	Getu Gizaw / Jimma University, Department of Human Nutrition, Jimma, Ethiopia
39	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

40	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), Laboratory of Valorization and Quality Management of Bio-Ingredients (LABIO), Cotonou / Abomey-Calavi, Benin
41	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

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The publications are available free of charge upon request.

The Nestlé Foundation for the Study of Problems of Nutrition in the World was established in 1966 by a donation from the Nestlé Company on the occasion of its centenary. So far, the Foundation has been operationally independent from the Nestlé Company and is managed by a self-constituting Council consisting of at least five internationally well-known scientists as Council Members. The offices of the Nestlé Foundation are in Lausanne, Switzerland.

THE FOUNDATION

GUIDELINES FOR GRANT SUBMISSIONS TO THE NESTLÉ FOUNDATION

PURPOSE

The Nestlé Foundation initiates and supports research in human nutrition with public-health relevance in low-income and lower-middle-income countries according to the World Bank classification (see http://www.worldbank.org). The results of the research projects should ideally provide a basis for implementation and action which will lead to sustainable effects in the studied populations as generally applicable to the population at large. They should facilitate the sustainable strengthening of institutions and the development of capacity within the host country. Additionally, they should promote greater cooperation and collaboration between institutions in developed and developing nations.

The Foundation expects research proposals to be primarily the initiative of local researchers from the global south. However, the Foundation will be inclined to consider favorably those applications

made jointly by scientists from developed countries with those from developing countries provided the initiative will result in capacity building and human-resource development in the latter and that the bulk of the budget is spent in the developing country.

CURRENT POLICY

Sustainable improvement in human nutrition is one of the major issues in the portfolio of the Foundation. During more than 50 years, the Foundation has supported basic and applied research in nutrition in over 50 developing countries. The Foundation recognizes that the public health relevance of the supported research as well as aspects of sustainability, capacity building and educational issues deserve higher attention. Thus, priority is given to projects which lead to developments with strong elements of capacity building, and results should be immediately and sustainably implemented. Highly sophisticated nutrition research of mainly academic interest without public health relevance has lower priority for support as well as solely laboratory-based studies or animal experimentation.

RESEARCH TOPICS

At present the Foundation's work is primarily concerned with human nutrition research in:

(1) maternal and child nutrition, including breastfeeding and complementary feeding

(2) macro- and micronutrient deficiencies and imbalances

(3) interactions between infection and nutrition

(4) nutrition education and health promotion

The priorities and goals of the Foundation are modified from time to time to meet emerging public- health and nutritional needs in LMICs.

Studies in other areas of human nutrition research might also be considered, if they are dealing with problems of malnutrition in eligible countries. Other areas of research (e.g., obesity, non- communicable diseases) may be considered for support if the applicants can offer specific and convincing evidence and justification for the choice of the research topic, especially when an innovative approach is suggested. The Foundation prefers a food-based approach suggesting sustainable local solutions which are affordable for the whole target population. Projects with limited sustainability or projects with branded or commercial products are not supported.

Funded projects are usually of one- to three-year duration. Projects with a high potential for effective and sustainable improvement of nutritional status as well as a high capacity-building component will be funded preferentially. The budget for the projects must be appropriate and reasonable and must be justified in detail.

One of the Foundation's main aims is the transfer of scientific and technological knowledge to target countries. In cases where Foundation-funded research projects are realized in collaboration with scientists at universities and research institutes in high- income countries, at least 75% of the budget must be earmarked for use within the low-income country.

Research grant applications from high-income countries are only considered under exceptional circumstances.

The Foundation does not normally fund:

(1) projects with low public-health relevance

(2) projects with doubtful sustainability

(3) projects lacking transfer of scientific, technical, and educational knowledge, i.e. lacking a capacity-building component

(4) nutrition surveys or surveillance studies (except when needed as a basis for a specific intervention study)

(5) research on food policy, food production, and food technology, except when linked to an intervention with high potential for sustainable improvement of the nutritional status

(6) non-food-based approaches (commercial drug- or product-dependent interventions lacking sustainability)

(7) in vitro and/or animal experiments

ELIGIBLE INSTITUTIONS

Eligible institutions are departments or institutes from universities, hospitals, and other institutions for higher education in LMICs. Joint applications from more than one institution (especially South-South) are welcomed. Joint applications from more than one institution involving a North-South collaboration may also be considered. For project applications demonstrating North-South collaboration, it is important that the following criteria are fulfilled: (i) the Principal Investigator is from the South and the proposal has relevance to nutritional problems of the South; (ii) most of the budget is earmarked for the South; and (iii) demonstration upon completion of the project of institution- and capacity building in a sustainable manner in the South.

Capacity building is a central focus for all applications submitted to the Foundation. Hence, all applications must include a component dedicated to training, human resources, and capacity building for the developing world. Ideally, graduate students or young investigators should play a key role and, where possible, be designated as Principal Investigator (PI) or Co-PI. Established researchers may apply but must clearly indicate the capacity-building component and beneficiaries. Established investigators alone are generally ineligible unless they address innovative, well-justified research questions in developing countries. These applications must state the capacity and educational components in the host country and the long-term sustainability of research in the host institution. Applications from non-affiliated researchers can be considered only in exceptional cases.

TYPES OF AWARDS

The Nestlé Foundation offers various award and grant categories, some with a modular approach. For example, the Pilot Grant Program serves as a preparatory phase for submitting a full grant proposal All applications must meet the eligibility criteria, research objectives, and topic relevance, regardless of the award category (see the section 'Specific Information for Applications' for details).

Grant type	Description	Budget (in USD)
Training Grant (TG)[1)]	The TG program funds a small research project (e.g. MSc or PhD thesis) or another training endeavor.	≤20'000
Pilot Grant (PG)	The PG program presents the starting module for a potential Full Grant Research Application (SRG or LRG) later. It creates data for a SRG or LRG.	≤20'000
Small Research Grant (SG)	A SRG provides support for a small research study. It may represent a continuation of a TG or a PG.	≤50'000
Large Research Grant (LG)	Full Grant application of a complete research proposal according to the guidelines for mx. 3 yrs	≤100'000/yr or ≤300'000 in total
Re-entry Grants[2)]	A REG facilitates the return and re-establishment of a post-graduate student in their own countries	≤50'000

[1)]Training and Pilot Grants typically run for 1 to 2 years.

[2)]Re-entry Grants support postgraduate students returning to their home countries. The Foundation will support a research program for eligible candidates where a host institution guarantees a post and ensures career development within its own institution. Support from the host institution is essential, and collaboration from the overseas training institution is also beneficial. Re-entry Grants may run for up to 3 years.

Institutional Support
Institutional support aids research or educational projects in LMICs, fostering capacity building, know-how, and human-resource development within the institution.

HOW TO APPLY

Interested scientists submit a Letter of Intent (LI) in which they describe briefly the kind of project they would like to undertake, including the applicant's personal data and affiliations, a short description of the project, the targeted objectives, timeline and budget. Instructions for the LI are available on the Foundation website at www.nestlefoundation.org. For submission of an LI, the link on our website must be used. Upon positive assessment of the proposal by the Scientific Committee of the Foundation, applicants may than submit a full grant proposal, which will be reviewed as described below. The guidelines for the submission of a Grant proposal are also available on our website. Submissions that do not follow the specified format will not be considered.

Both the Letter of Intent and Grant Proposal must include detailed, evidence-based information on the project's public health relevance, potential impact, and sustainability. This section is equally important as the scientific part of the application.

Research Grant submissions are reviewed twice a year by the Foundation's Council of independent international scientists, are funded based on scientific quality, public-health relevance (both short- and long-term), sustainability, capacity-building, and budget considerations. Grants are disbursed exclusively in US Dollars (USD).

Applications are accepted year-round. Early submissions are encouraged to allow ample time for internal and external reviews. Upon invitation after the approval of a LI, all proposals should be submitted electronically. Final submission deadlines are January 10 and June 10, aligned with the Spring and Fall Council meetings.

The Nestlé Foundation is committed to supporting impactful research in public health nutrition. We thank all applicants for their dedication to improving nutrition in low- and middle-income countries.

For more information consult
www.nestlefoundation.org

The Council of the Foundation consists of at least five Council Members and Advisors. All Council Members and Advisors 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 and the President of the Foundation.

THE COUNCIL

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Former Director MRC Human Nutrition Research Elsie Widdowson Laboratory, Cambridge, UK

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Legon, Ghana

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FIDUCIARY
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Nestlé Foundation

for the study of problems of nutrition in the world

Place de la Gare 4, PO Box 581, 1001 Lausanne, Switzerland
+41 21 320 33 51 • nf@nestlefoundation.org
nestlefoundation.org