

INNOVATIVE ENRICHMENT FOR FOOD AND NUTRITION SECURITY: THE ROLE OF MORINGA AND SPIRULINA IN COMPLEMENTARY FOODS IN CHAD

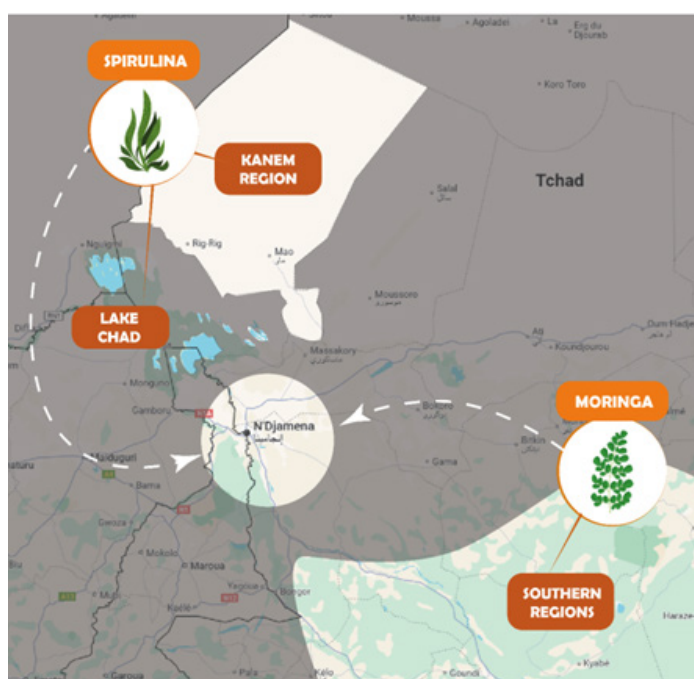
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Micronutrient deficiencies remain a public health issue in sub-Saharan Africa, disproportionately affecting young children and pregnant or lactating women. Infants and young children often rely on cereal-based complementary foods that do not meet their nutritional needs, leading to deficiencies in key nutrients. This inadequate diet, combined with frequent infections, contributes to growth faltering and micronutrient deficiencies during early childhood.

Industrial vitamin mineral premixes are a proven solution to address these gaps. But their use by small and medium enterprises (SMEs), Economic Interest Groups (EIG) and cooperatives faces structural challenges such as global price volatility, reliance on hard currency and long supply lead times, which weaken the adoption and long-term sustainability of fortification programmes.

As nutrient-rich products that are climate resilient, moringa and spirulina are locally available in many sub-Saharan African countries, including Chad (Figure 1). They offer an opportunity to complement foods and partly replace imported premixes. Pending consumer acceptability, better valorising such ingredients in complementary infant foods could not only contribute to enhancing child nutrition, but also to strengthening local value chains, generating rural jobs and reducing vulnerability to global market shocks.

Figure 1: Moringa and spirulina production zones in Chad



In this context, as part of the Knowledge and Research for Nutrition project of the European Commission, the Nutrition Research Facility (NRF) conducted a [study](#) to assess the role of moringa and spirulina in meeting the nutritional requirements of complementary foods of young children, compared to industrial premixes, and to evaluate their nutritional effects. Furthermore, the [costs and feasibility](#) of the moringa and spirulina value chains in Chad were assessed.

Moringa and spirulina can be promising complements, but insufficient alone

Nutritional gaps in unfortified cereal porridges: Unfortified cereal-based porridges provide energy and protein but are inadequate in key micronutrients for young children. Adding moringa or spirulina improves micronutrient density but the micronutrient levels remain insufficient to reach nutrient adequacy.

The need for comprehensive approaches: Addressing micronutrient deficiencies requires complementing cereal enrichment with moringa and spirulina by adding complementary foods such as groundnut paste, animal-source foods, fortified products, or vitamin A-rich ingredients.

Moringa as a promising option: Moringa-enriched porridges were highly acceptable to children, making it a viable, culturally acceptable strategy for improving diets. In contrast, evidence on spirulina's acceptability is limited.

Non-significant nutritional and health effects: Current evidence shows no significant effects of moringa or spirulina enrichment on hemoglobin, iron and vitamin A status, growth, or child health outcomes.

Research gaps: Variability in study populations, design, dosage, and enrichment methods highlights the need for further research to identify effective, scalable strategies.

Moringa and spirulina as local alternatives to industrial premix in Chad: Value Chain Assessment

In Chad, the use of moringa and spirulina by local SMEs is limited by three interconnected bottlenecks, as shown by the field assessment:

- **Logistically:** Production zones are far from N'Djamena, roads are often unusable in the rainy season and drying, storage, transport and testing facilities remain rudimentary. This prevents regular supply and leads to high contamination risks.
- **Economically:** Raw material prices are volatile and production volumes are small. Additionally, adequate logistical infrastructure is lacking, keeping production and transport costs too high.
- **Institutionally:** Quality standards, toxicology labs and SME/ELG/cooperative governance are still nascent, discouraging investment from large buyers.

These constraints are country-specific: in a better-connected economy with reliable roads, accredited labs and stronger support to agriculture, many of the costs and risks identified for Chad would drop significantly, making local spirulina and/or moringa-based enrichment more competitive.

Key messages

1. Local enrichment requires a holistic approach

Enriching cereal-based flours with nutrient-dense, locally-sourced foods such as moringa and spirulina can contribute to improving diets by bringing essential micronutrients but so far does not suffice to cover the nutritional needs of children aged 6-24 months. Thus, such local food complements can be valorised within a broad nutrition strategy but not substitute industrial premixes in fortified infant foods.

2. Promising concept faces operational barriers

Broader use of such local food complements is constrained by operational challenges such as weak road infrastructure, weak quality control, and fragmented supply chains. Addressing these barriers through the production of artificial spirulina and solar-dried moringa leaves closer to markets and urban centres can cut losses, guarantee safety and improve uptake.

3. Alignment with EU priorities is strong

By supporting short supply chains, sustainability, local economic development, as well as climate-smart food systems, investing in moringa and spirulina value chains supports EU Green Deal and Farm-to-Fork objectives. In addition to their interest in terms of nutrition objectives, such investments may contribute to sustainable food systems, economic development and job creation.

Policy options for programming and decision-making

Unlocking the potential of moringa and spirulina as well as other nutrient-dense local foods requires a long-term vision and a phased approach:

Short term (0-2 years):

- Support the development of pilot infant food formulations (e.g. 5% moringa/spirulina with complementary ingredients such as groundnut paste, animal-based foods or vitamin A-rich foods);
- Support local testing and community-based trials to assess nutritional impact, acceptability and safety;
- Conduct toxicology and shelf-life tests;
- Combine enrichment with nutrition education, including food safety, breastfeeding, child care and overall diet quality.

Medium term (3-5 years):

- Invest in value chain structuring, including improved processing facilities, packaging and SME financing;
- Support national standard agencies to issue standards and certification seals;
- Finance spirulina farms and moringa leaf powder hubs via blended finance facilities;
- Integrate dedicated support for local enrichment value chains into agri-food programmes.

Long term (5+ years):

- Promote regional demand and integration of enriched products into institutional and commercial food systems;
- Advance research on optimal formulations and scalable enrichment strategies using local inputs;
- Integrate enrichment into climate-smart nutrition programming across the Sahel and the Horn of Africa.



More information

<https://www.nutrition-research-facility-studies.eu/Moringa-and-Spirulina>
<https://www.nutrition-research-facility-studies.eu/Moringa-and-Spirulina-in-chad>

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