



UNDERSTANDING MALNUTRITION IN THE SAHEL: MAPPING EXPLANATORY DRIVERS USING ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

FACT SHEET

✓ Highlights

The persistence of high rates of undernutrition in the Sahel has long been a critical challenge. This study applies Machine Learning methods on previously collected harmonised datasets to uncover complex, non-linear relationships among child, maternal, household, and environmental variables that contribute to undernutrition in children under five in the Sahel. The study provides a nuanced understanding of the interplay between these variables and the multifaceted nature of undernutrition, highlighting women's empowerment, healthcare access, and water supply, as consistently emerging significant drivers across various forms of undernutrition.

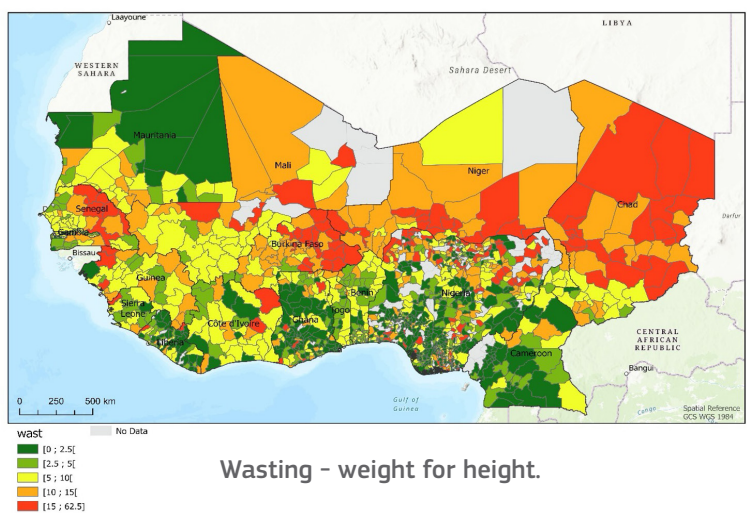
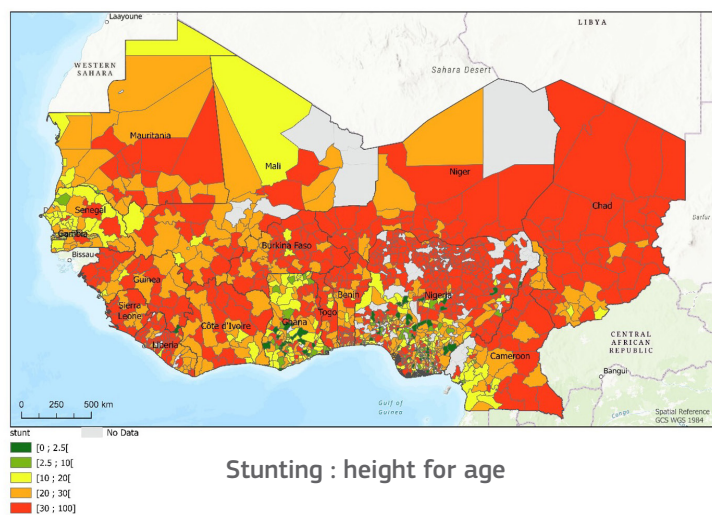
📄 Origin of the study

The Nutrition Research Facility (NRF) conducted a series of consultations with decision-makers in EU Member States, EU partner countries, within Delegations of the EU in partner countries and within the European Commission, in order to identify their current concerns in relation to nutrition issues in development contexts. This question arose from a consultation workshop focusing on African countries.

⚙️ Methodology

The study employed two Machine Learning algorithms — Random Forest and Boosted Regression Trees — to analyse undernutrition outcomes (stunting, wasting, and underweight). Data processing included pre-analysis standardisation, collinearity testing, model training and validation, performance assessment and error measurement. The Random Forest model demonstrated an overall higher performance and was selected to identify the most relevant variables affecting the spatial patterns of undernutrition outcomes.

- **Starting date :** October 2022
- **Duration :** 19 months
- **Partners of implementation:** University of Lisboa



Key results

The analysis revealed that key drivers of undernutrition differ depending on the specific outcome. Women's empowerment - including decision-making autonomy, literacy, and mobile phone ownership — and healthcare access - such as vigilance during pregnancy and family planning practices - emerged as significant predictors of improved nutritional outcomes for children in the Sahel. Environmental factors, such as water supply variability and the presence of grassland or vegetation, also play an important role in shaping undernutrition patterns.



Actionable recommendations

Machine Learning approach offer a valuable tool to address data gaps and inconsistencies, uncovering key drivers of undernutrition that conventional methods often miss. These insights can guide tailored recommendations for undernutrition reduction initiatives, adapted to specific conditions across countries and sub-regions in the Sahel.

For more information :

<https://www.nutrition-research-facility-studies.eu/Understanding-malnutrition-in-the-Sahel-Mapping-of-explanatory-drivers-using>



Areas for further exploration

By testing its adaptability to different regions and datasets, the approach could offer broader insights into nutrition outcomes and guide more targeted and effective policy measures. This would help inform better policies, interventions, and monitoring and evaluation efforts.



Relevance to the EU “Global Gateway” strategy

Improving child nutrition in the Sahel is a critical component of advancing health and development in the region. Better understanding of the interaction between key factors such as women's empowerment, access to healthcare, and water supply can help design more targeted and efficient programmes.