

Assessing geospatial controls on the soil-crop-health nexus in western Kenya

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Hidden hunger exists in many Sub-Saharan African countries where diets are dominated by maize, wheat, and cassava (~50-75% of calorific intake) thus lacking nutritional diversity¹. Food insecurity and malnutrition are widely prevalent amongst Kenyan peri-urban communities, and previous studies have revealed a significant risk of deficiency (>90%) in the diet of western Kenyans for Se, Zn and Ca². The variation of nutrient availability to crops is influenced by a large number of factors including soil physicochemical properties such as pH, organic matter and aluminium/iron oxide minerals. Previous studies in western Kenya have shown that the variance in maize element concentrations can be explained by soil predictor variables, accounting for up to 29% of the variance for Se². Therefore, additional research into the physio-chemical properties controlling bioavailability is key for effective agronomic intervention strategies. To date total elemental concentration soil data has been used to create predictive maps highlighting the spatial distribution of chemical elements across western Kenya, providing a baseline for the agri-community, academics and public health officials³. However, further predictions are required to map the elemental concentration of staple crops which will provide critical knowledge for local farmers. This research aims to investigate how the availability and transfer of essential elements from soils to crops will impact human health status in western Kenya. Here we show that the nutritional quality of staple crops varies geospatially in western Kenya and that understanding the variation of micronutrients is important at subnational scales. Assessing food and nutrition security is vital to address the UN sustainable development goals 2 (zero hunger), 3 (good health and well-being) and 15 (life on land). The data produced here feeds into a web tool that can inform policy decision-makers seeking intervention strategies addressing human health, food and nutrition security and conservation of the environment in Kenya.

References

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