

## Establishing soil and agricultural variability in studies of micronutrient deficiency in maternal health: case study from rural Malawi

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Associated with the widespread issues of global food insecurity, micronutrient deficiencies, particularly of iron, iodine and zinc are of particular concern in young children and women of child bearing age. As part of an interdisciplinary study on micronutrient availability in the population, we present the outcome from a series of field studies which targeted two rural regions/districts of Southern Malawi, near to the city of Blantyre. The regions were physically close, but geographically distinct in landscape and development history. The population in each region were mainly subsistence farmers, supported by varying levels of developmental aid, education and access to medical and governmental infrastructures. Volunteers were recruited to provide access to land and crops farmed as well as health and lifestyle information. We report here on the results of the assessment of nutrient availability from the farmer food chain and its variability in a geographical context. Data were collected on soils and the major subsistence crop (maize) from approximately 50 locations in the two regions. The soils and maize samples were analysed for major and trace elements including priority targets Fe and Zn.

Distinct differences in soil type and associated element content were observed between the two regions. The link between the physical environment and health (i.e. link between iron in soil and blood), is identified but is difficult to distinguish from the impact of the social effects, e.g. distance to town, education level etc which shows higher variability than the nutrient concentrations in evidence from the food-chain. The staple food has low nutrient content, which is more consistent and no significant difference is seen between the two areas. The area which has lower iron levels and poorer health indicators does have low levels of iron in soil, but is also a remote location with poor access to health facilities and lower levels of education, which provide confounding factors in the study. It is clear that maize is not an effective 'transporter' of nutrients between the soil and humans and it may be that broader evaluation is required if diet remains maize based. Further research in the area of micronutrient malnutrition and interventions developed should be highly localised, and preceded by an ethnographic study finding out a range of the social as well as environmental factors contributing to health).

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