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Decision Analysis Tools Reveal Benefits of Fruit Trees for Enhanced Nutrition Security in Kenya

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Abstract

Decision analysis tools can help to utilise available data and expert knowledge rather than requiring hard data from costly long-term fieldwork and experiments. They allow for the incorporation of disparate data sources and what might be considered 'imprecise' inputs to create a representation of the current understanding of cause and effect relationships within the target system. Such tools were applied to provide evidence-based support for policy decisions regarding planting varieties of mango (*Mangifera indica* L.) and avocado (*Persea americana* Mill.) trees in Kenya. A group of twenty experts, including representatives of government and non-government organisations, agricultural technicians and practitioners, academics and analysts, collaboratively modeled the potential livelihood impacts of planting fruit trees on smallholder farms in Kenya. The critical determinants of the effectiveness of these trees for household nutrition were established. Estimations on variables and relationships were generated from expert knowledge and available data. These were used to programme four comprehensive Bayesian Network models of around 60 variables each to show the difference in the annual dietary gap in terms of estimated average requirement of energy, iron, provitamin A and zinc per person in smallholder households. Model results indicate that planting fruit trees can benefit the nutritional status of households, decreasing risks of hunger and micronutrient deficiency. The results show substantial differences in potential nutrition outcomes between planting vs. not planting fruit trees. Overall the results suggest that planting fruit trees may result in a lower per person dietary gap for provitamin A (median 58,871 vs. 204,060 mcg retinol activity equivalents/yr), iron (-332 vs. 759 $mg\,yr^{-1}$), zinc (1,424 vs. 2,299 $mg\,yr^{-1}$), and energy (341,070 vs. 364,270 $kcal\,yr^{-1}$). Results can be used to inform policies related to fruit tree planting and to plan for potential outcomes of development actions in Kenya.

Keywords: Avocado, bayesian network, energy, iron, mango, provitamin A, small-holder farmer

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