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**Understanding food insecurity in Africa through data-driven causal inference methods.**

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**Abstract**

The current situation regarding food insecurity in the continent of Africa, and the Horn of Africa in particular, is at an unprecedented risk level triggered by continuous drought events, complicated interactions between food prices, crop yield, energy inflation, and lack of humanitarian aid, along with disrupting conflicts and migration flows. The study of a food-secure environment is a complex, multivariate, multiscale, and non-linear problem that cannot be explained with canonical data science methodologies. We propose an alternative approach to understanding and predicting food insecurity by using causal inference, which allows us to discover the causal relations and evaluate the likelihood and potential consequences of specific interventions. In particular, we demonstrate the use of causal inference for understanding the impact of humanitarian interventions on food insecurity in Somalia. We collect a wide diversity of potentially explanatory data. In particular, we analyse and harmonise time series at a district level in Somalia of the global acute malnutrition (GAM) index, food market prices, crop production, conflict levels, drought- and flood-driven internal displacements, as well as climate indicators such as the NDVI index, precipitation or land surface temperature. Then, we infer causation by applying different causal methods, such as PCMCI and Granger causality. A second approach to the problem considers intervention analysis: assuming a causal graph between the main drivers causing food insecurity, we estimate the effect of increasing humanitarian interventions on the GAM index, considering the impact of a changing climate, migration flows, and conflict events. We show that causal estimation with modern methodologies allows us to quantify the impact of humanitarian aid on food insecurity. The study proposes data-driven causal inference that facilitates evidence-based policy-making, which can help policymakers, governments and NGOs.

**Keywords**

causality, food security, malnutrition, climate change