



# Agent-Based Model of Farmer Livelihoods and Food Security in Ethiopia

TECHNOLOGY NUMBER: 2020-077

## OVERVIEW

Simulates smallholder farmers' decision-making to enhance food security predictions.

- Captures detailed household-level dynamics and responses to environmental stressors.
- Policy planning, resource allocation, and disaster response enhancement.

## BACKGROUND

Food security has long been a critical issue, particularly in regions prone to environmental instability like Ethiopia. Traditional models often fail to capture the complex interplay between various factors such as crop production, livestock dynamics, and income from wages that influence a household's ability to secure food. Historically, these models have focused on broader regional or national scales, lacking the granularity needed to accurately reflect the decisions and constraints faced by individual smallholder farmers. Existing technologies often overlook the intricate decision-making processes at the household level, leading to less effective policy-making and resource allocation. An improved method is necessary to address these challenges by simulating farmer behavior and environmental interactions more accurately. This would enable better predictions of food security outcomes and enhance resilience planning against adverse events like droughts.

## INNOVATION

The innovation is an agent-based model that simulates decision-making processes of smallholder farmers, focusing on Ethiopian households. This model advances current technology by intricately replicating household dynamics, incorporating variables such as crop yield, livestock health, and wage-based income. By analyzing these variables monthly, it produces detailed predictions of food security and resilience at both household and regional levels. Unlike traditional models, it captures the nuanced responses to stressors like drought, providing a clearer picture of affected populations and recovery timelines. This allows for improved disaster response and resource allocation strategies. Real world applications include governmental and NGO use for policy formulation, enhancing agricultural practices, and devising targeted interventions to reinforce food security amidst climate uncertainties.

## ADDITIONAL INFORMATION

### Technology ID

2020-077

### Category

MOSS - Michigan Open Source Software

### Inventor

Timothy Williams  
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### Learn more



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DEPARTMENT/LAB:

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