# Navigating complexity: A framework for updating and monitoring forecasts of nutrition interventions in evolving food environments

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## Abstract

Malnutrition in all its forms, including undernutrition, micronutrient deficiencies and overnutrition, is a leading cause of disease and death around the world. Economic growth and urbanisation in Vietnam have led to changes in food environments and subsequent changes in dietary patterns and types of malnutrition present, especially in cities. Models that forecast the effectiveness of nutrition interventions offer a holistic approach to addressing nutrition issues in the context of uncertainty and complexity. Theories of change and impact pathways are operationalized to support clarifying relationships between important factors related to decisions, accounting for the system complexity of food environments. Uncertainty and variability within these complex systems require monitoring to gather information, refine ex-ante analyses and update models. In this study, we formulate a protocol for this continuous data collection and model adaptation for nutrition interventions. We use real-world observations of pilot interventions to food environments and a qualitative adaptation of expert knowledge elicitation techniques to narrow our knowledge gap on important variables with high values of information and enhance the robustness of models for forecasting nutrition outcomes. The result is a monitoring framework to guide the systematic evaluation of intervention implementation and continuous model adaptation. We showcase this method for intervention monitoring within the context of the Nutrition Intervention Forecasting and Monitoring (NIFAM) project in our work with school garden interventions across private and public schools in Hanoi. Our approach encourages skepticism in extrapolating intervention outcomes, emphasising the need for tailored adaptations to suit diverse educational settings. Through a focus on learning from actual interventions, our work contributes to developing adaptable models, specifically fit for the complexity of food environments. Our monitoring framework can be widely applied for adaptive management, ensuring the effectiveness of interventions within the broader scope of sustainable food environment initiatives to combat malnutrition.

**Keywords:** Adaptable models, expert knowledge elicitation, impact pathways, monitoring framework, theories of change

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