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Improving children's nutrition: A decision-analytic approach to school meal interventions in Vietnam

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Abstract

This study advances the evidence base for school meal policy by applying a structured decision-analytic framework to assess the effectiveness, trade-offs, and risks of school-based nutrition interventions in Vietnam. We developed a conceptual model based on expert judgment, literature, and policy review to capture the complex causal pathways linking interventions, such as canteen changes and nutrition education, to child health, learning outcomes, and long-term social benefits. This initial framework served as a structured hypothesis, organising intervention pathways and identifying key costs, benefits, and risks at the school level. In November 2024, we held a workshop with 10 nutrition and school experts and policy advisors to characterise and refine the intervention. We generated bounded estimates for uncertain parameters, which were used to populate a probabilistic simulation model with 10,000 iterations. To validate the conceptual model, we built a semi-automated evidence synthesis framework in R, treating our corpus of policy and literature documents as a virtual team of reviewers. This framework systematically searched for evidence supporting, refuting, or missing from our model components, including canteen regulation, staff training, and nutrition lessons. We scored each component for the strength and direction of evidence, synthesizing these findings into a refined, evidence-informed model. This approach transformed our initial estimates into a structured decision framework, supported by the available evidence. We applied Pareto optimisation to our model results, to identify non-dominated intervention scenarios. By integrating diverse sources of evidence and stakeholder insights, our work offers a practical, replicable method for forecasting intervention outcomes and supporting data-driven policy decisions in complex school food environments. This approach informs context-specific strategies for improving children's nutrition and offers broader insights for decision-making in education and public health systems.

Keywords: Causal modelling, decision analysis, evidence synthesis, nutrition policy, Pareto optimisation, probabilistic simulation, school meal interventions, structured decision making

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