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Operationalising dietary acceptability: A systematic review on how acceptability is applied in dietary optimisation models

C. Baungaard¹, M.A. Martins¹, G.W. Horgan¹, D.C. Little², J. Hillier³ and B. de Roos¹

¹The Rowett Institute, University of Aberdeen, Aberdeen, UK

²Institute of Aquaculture, University of Stirling, Stirling, UK

³Global Academy of Agriculture and Food Systems, University of Edinburgh, Edinburgh, UK

The current environmental, climate and health challenges require critical transitions to diets and food production systems that are more sustainable, in turn providing diets that are adequate nutrition, affordable and environmentally friendly. Recent studies have identified cultural acceptability as an important dimension in sustainable diets⁽¹⁾. Mathematical optimization models have been developed to deal with the complexities of all the dimensions, yet diet acceptability has had limited successful integration into these models⁽²⁾. This systematic review explored two research questions in the context of dietary optimisation studies; how is acceptability defined and operationalised?; how does including acceptability impact dietary optimisation solutions?

A hybrid search strategy was implemented. The first used the PRISMA guidelines to conduct a systematic search on two electronic databases (PubMed, Embase) for articles published between January 2013 and April 2024. Search terms were developed through preliminary readings and included: diet OR diets OR dietary AND modelling OR modeling OR optimisation OR optimization OR optimize OR optimize OR linear programming AND acceptabl*. Articles in English optimising acceptable diets for adults (18+) were included. The second used the snowball method for identifying relevant articles from previous searches⁽³⁾. Backward snowballing was conducted by identifying references from the initial set and forward snowballing was conducted through Web of Science in June 2023.

Fifty-one studies fulfilled the inclusion criteria. European countries had the largest representation ($n = 41$; 20 from France, 7 from The Netherlands); 43 studies took a population-based modelling approach, 7 on individual-based modelling and 1 study used both approaches. The review identified 12 modelling approaches, where linear programming was most frequently used ($n = 26$), followed by non-linear programming ($n = 7$) and quadratic ($n = 6$). The majority of studies that optimised for acceptability used the minimal deviation from observed diet as the objective function ($n = 32$). Baseline dietary data for observed diets were primarily from National surveys ($n = 36$), followed by local surveys ($n = 5$), however, 25 studies used data that was 8–16 years older than the publication date. Majority of studies included at least one acceptability constraint ($n = 45$), ranging from setting boundaries on certain foods ($n = 34$), removal of certain foods/food groups ($n = 12$), limiting deviation ($n = 15$).

The full analysis of the studies is ongoing; however the current results highlight the varying methods used to operationalising 'acceptable' diets in diet optimisation literature. A conceptual framework for integrating acceptability into diet optimisation studies is currently under development, aiming to highlight the various ways in which 'acceptability' is operationalised through the modelling process from data inputs, models chosen to validation of the solutions. It is anticipated that this work will highlight new opportunities for further modelling for acceptable diets.

References

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