

## Systematic review of system dynamics and agent-based obesity models: Evaluating obesity as part of the global syndemic

In light of its high - and growing - global prevalence, obesity is often referred to as a pandemic. It is a complex challenge, stemming from inter-connected and multiple causes. As they are closely related with common root causes, the pandemics of obesity, undernutrition and climate change are collectively called a global syndemic. As with obesity the global syndemic is complex and systemic, categorised by multiple interactions that alter over time. Computational models are used to gain insight into how common causes of the global syndemic operate and the best ways to address them. Agent based modelling attempts to capture the behaviour of individuals within a system. System dynamics modelling attempts to capture generalised patterns of behaviour within a system. The objective of this research was to determine to what extent existing models of obesity provide insight to the reasons driving the global syndemic.

Following a systematic selection process, 38 studies, including 30 distinct models, were included in the review (14 agent based models and 16 system dynamics models). The majority of models represented high income countries, dominated by the US (67%). Overall most agent based models focused on social-network based influences, and the built and food environment. System dynamic models mostly focused on population weight in relation to health status, and examined the causes in relation to policy.

The usefulness of the models for providing insight to the reasons driving the global pandemic is mixed. They are good building blocks but significant gaps remain. Using longer timescales within models is important for understanding the global syndemic, but only a few computational models employed longer timescales. Additionally, there was a lack of modelling for how governance of food systems and changes in natural systems interrelate with obesity.

Nevertheless, scope was found for adapting models that had been applied at a national level to different geographical contexts. Existing models could also be expanded to link mechanisms of climate change with undernutrition and obesity. The study concluded that it is currently difficult to synthesise computational modelling studies, and there should be official guidelines created to increase transparency and usefulness.

Reference: Morshed AB, Kasman M, Heuberger B, Hammond RA, Hovmand PS. A systematic review of system dynamics and agent-based obesity models: Evaluating obesity as part of the global syndemic. *Obesity Reviews*. 2019;20(S2):161-178. [doi:10.1111/obr.12877](https://doi.org/10.1111/obr.12877)