

DYNAMIC SIMULATION MODELLING

A 'WHAT-IF' TOOL TO TEST POSSIBLE RESPONSES TO COMPLEX HEALTH AND SOCIAL PROBLEMS BEFORE THEY ARE IMPLEMENTED IN THE REAL WORLD

Dynamic simulation modelling methods are being applied by the Sax Institute's Decision Analytics team to provide policy makers and program planners with decision support tools that can simulate policies and interventions, forecast their likely effect over time, and determine how and where to target them.

The Sax Institute applies a unique participatory approach to developing the models, enabling us to distil evidence, data, and real-world knowledge in a way that captures the complex and dynamic nature of so-called 'wicked' problems – problems that are complex, and persist despite previous attempts at policy solutions.

Bringing together multidisciplinary researchers with the end users of research means our models incorporate insights from policy and practice and are driven by policy priorities. It also ensures our models are more likely to be used than other sorts of modelling or analytic tools because policy makers are deeply engaged in the process.

Dr Jo Mitchell, Executive Director of the Centre for Population Health at New South Wales Health, said the participatory approach meant the tool was credible and trustworthy in helping to estimate the impact of different interventions on population health.

"It's a glass box rather than a black box, which is important in terms of believing the model," she said.

This work has been developed in response to issues raised by our policy partners regarding how to address complex problems that are caused by a dynamic interplay of individual, social, economic and environmental factors. Our interactive decision support tools provide a safe environment for testing potential solutions before they are implemented in the real world; saving time and resources.

THE MODELLING PROCESS

Complex problems have many inter-related causes and it can be unclear how these factors interact. There is often a broad range of possible interventions, applied individually or in combination, which must be considered in the light of their comparative costs, benefits and system implications over the short and longer term. There are also challenges posed by differing stakeholder and community views, limitations in research evidence, political considerations and industry lobbying.

Recent advances in modelling software capability and more user-friendly interfaces have meant that dynamic simulation modelling is now more powerful, sophisticated and accessible than ever. This has allowed us to embed stakeholder engagement, consultation and consensus-building processes in the development of our models. The process works as follows:

- Expert stakeholders from academia, policy and practice map the complex factors relating to the problem
- The model is built, combining best available research evidence, data and expert knowledge from the multidisciplinary stakeholders involved
- The model is tested, validated and refined, in consultation with stakeholders
- Stakeholders are provided with an accessible online interface, enabling them to 'play' with the model and experiment with different scenarios
- The participatory process has been shown to strengthen partnerships, build stakeholder capacity, trust and engagement, and facilitate cross-sectoral efforts to address the problem in question.

RECENT APPLICATIONS

The Sax Institute's Decision Analytics team have applied these methods across a range of areas to support appropriate investment and resourcing decisions at national, state and regional levels. Applications have included:

- Models to support strategic planning to reduce alcohol-related harms (both acute and chronic harms) in New South Wales and Tasmania
- A model to support the NSW Premier's target to reduce childhood overweight and obesity by 5% over 10 years
- A decision-support tool to inform commissioning decisions for suicide prevention by Western Sydney Primary Health Network
- Models for New South Wales and Queensland to support strategic planning for reducing smoking prevalence and related harms
- Healthcare resource management and service planning.

HOW ARE OUR DECISION SUPPORT TOOLS BEING USED?

Our decision support tools are being used to:

- Support recommendations in ministerial briefs
- Inform strategic planning and investment decisions by health and government departments and program commissioning decisions in primary care settings
- Facilitate the engagement of broader stakeholders in strategy dialogues and consensus building for action
- Help set realistic targets for impact / manage expectations regarding progress towards targets set
- Use as an advocacy tool and to add strength to business cases for longer term funding
- Demonstrate the consequences of disinvestment in programs
- Help identify priorities for further data collection / research.

CASE STUDY: HELPING QUEENSLAND MEET ITS AMBITIOUS TARGET OF REDUCING THE STATE'S SMOKING PREVALENCE TO 8% BY 2026

The Prevention Division of Queensland Health commissioned the Institute to develop a dynamic simulation model to inform its smoking reduction strategy. The model, developed by the Institute's Decision Analytics team, tested the likely impact of proposed policy interventions over time.

Queensland has made excellent progress reducing the number of smokers. Only 12% of Queenslanders currently smoke, down from over 25% a little over 20 years ago. Despite this impressive and life-saving reduction, the work is far from complete. Diminishing return on investments in smoking reduction strategies generates uncertainty about where limited resources should be focused to achieve a continued decline. In addition, low smoking rates may increase the risk of complacency toward continued investment in tobacco control.

The modelling process involved a series of workshops bringing together key stakeholders in tobacco control, including policy makers from various state government departments in Queensland and interstate, academics and others from the non-government sector. The final interactive decision-support tool can test and identify the most effective policy interventions the Queensland Government and Health Department can implement to meet their 2026 smoking reduction target, as well as demonstrate the adverse impact of complacency and disinvestment in tobacco control strategies. It is being used to support strategic planning, advocacy and consensus building for action.