

## Modelling the cost effectiveness of alcohol interventions - methodological hurdles

The National Institute for Health and Care Excellence (NICE) is the agency in England responsible for creating guidelines on the treatment of diseases and prevention of illnesses.<sup>1</sup> Over the years, NICE has developed a widely recognised reputation based on the robustness of the methodology it applies in the appraisal of clinical interventions. However, in 2005 it also acquired the remit to produce guidelines for public health interventions.<sup>2</sup> Through its Centre for Guidelines (CfG), NICE makes recommendations for England based on a thorough review of what is known from research and practice about the effectiveness and cost effectiveness of interventions and broader programmes.<sup>3,7</sup>

Although the value of economic evaluation as a tool to determine value for money is hardly in doubt, actual implementation in the context of public health interventions presents a unique challenge. This is because the applied methods were originally developed for constructing clinical guidelines and are based on the principles of evidence-based medicine (EBM),<sup>4</sup> rather than the relatively newer concept of evidence-based public health. Cost-effectiveness analysis of public health interventions is made difficult by the breadth of the evidence base for such interventions, different analytic levels of possible explanations, and length of the causal chain between interventions and the desired public health outcomes.<sup>2</sup>

To manage these difficulties, NICE adopts a 'social determinants and health inequalities' approach when designing public health guidelines.<sup>3</sup> Furthermore, the framework within which such guidelines are developed ensures the multiple analytical levels of explanation for an observed effect are accounted for, and that four specific vectors (population, environment, society and organisations) are used to articulate the mechanisms of cause and interventions.<sup>3</sup>

Discussions at a recent meeting of a NICE Public Health Advisory Committee (PHAC) further illustrates the adaptation of economic modelling approaches for public health interventions. As part of the development of a new NICE guideline, the meeting participants discussed the effectiveness and economic evaluation of various school-based alcohol interventions (targeting children and young people aged between 11 and 18 years)<sup>6</sup>

The same general principles for modelling the cost-effectiveness of clinical interventions (including medicines) also apply when building a fit-for-purpose economic model that enables an assessment of the effectiveness of targeted school-based alcohol interventions. This is reflected in the sort of questions the meeting participants indicated would need to be answered before building such a model:<sup>6</sup>

- What is the baseline prevalence for alcoholism in the target population?
- What is the uptake rate of each of the interventions that are to be considered?
- Would an intervention affect the chosen short-, intermediate- or long-term outcomes and if so, how?

Two main economic modelling approaches were proposed (see Table 1).

**Table 1**

|                                | Generalised  | Specific   |
|--------------------------------|--|--|
| <b>Over-arching framework</b>  | A range of cost-effectiveness ratios for different scenarios are generated | A base cost-effectiveness ratio is generated   |
| <b>Pros</b>                    | Accommodates uncertainty and variability in interventions                  | Estimates cost effectiveness of specific interventions                                   |
| <b>Cons</b>                    | Does not generate a base case Incremental Cost effectiveness ratio (ICER)  | Requires more data, and there is significant uncertainty when such data is not available |
| <b>Handling of uncertainty</b> | Can be explored easily   | Too many uncertain inputs will require a complicated analysis                            |

Source:<sup>6</sup>

Any economic modelling approach that is adopted will have to take the following concerns<sup>6</sup> into consideration:

- Dealing with the uncertainty in the link between interventions and the measures of alcohol use (units of alcohol use, alcohol-free days, binge sessions etc.)
- Demonstrating a distinction (or lack thereof) between the outcomes attributable to an alcohol intervention and those attributable to other factors unconnected to the interventions
- Managing a potential skew in the cost-effectiveness analysis resulting from the inclusion of relatively rare outcomes (e.g. road traffic accidents), which are usually high-cost
- Achieving consensus on how the cost of certain outcomes are to be determined. For instance, the cost incurred by the criminal justice system due to alcohol use
- Prioritising between short, intermediate and long-term implications of alcohol use. This is particularly important because these short-term implications (e.g. pregnancy, social trauma etc.) are meaningful in the context of alcohol use in school-age pupils/youths.

An updated NICE guideline, covering school-based interventions to prevent and reduce alcohol use among children and young people, is due to be published in January 2019 (12 years after the publication of the existing guideline<sup>5</sup>). The way society and young people respond to stimuli has evolved since the publication of current guidelines. The economic evaluations performed to ascertain cost-effectiveness of public health programmes should be robust enough to match this evolution, as well as the complex interplay of different inputs that affect public health outcomes. Although published data should underpin the choice of approach and final model plan in the case of alcohol interventions, qualitative sanity checking by appropriate experts will be required to validate the chosen approach.

## References

1. NICE. Methods for the development of NICE public health guidance. 2012. Available at: <https://www.nice.org.uk/process/pmg4/chapter/introduction> (accessed May 2018).
2. Kelly M, Morgan A, Ellis S, et al. Evidence based public health: A review of the experience of the National Institute of Health and Clinical Excellence (NICE) of developing public health guidance in England. *Social Science & Medicine* 2010;71(6):1056–62. doi: <https://doi.org/10.1016/j.socscimed.2010.06.032>.
3. Morgan A. The benefits and challenges of evidence based public health: the experience of the National Institute for Health and Care Excellence. *Gaceta Sanitaria* 2013;27(4):287-9. Available at: <http://www.gacetasanitaria.org/es/the-benefits-challenges-evidence-based/articulo/S0213911113000873/> (accessed May 2018).
4. Kelly MP, Atkins L, Littleforg C, et al. Evidence-based medicine meets democracy: the role of evidence-based public health guidelines in local government. *Journal of Public Health* 2017;39(4):678–84. doi: <https://doi.org/10.1093/pubmed/fox002>.
5. NICE. Alcohol: school-based interventions. 2007. Available at: <https://www.nice.org.uk/guidance/ph7> (accessed May 2018).
6. NICE. Agenda - Public health advisory committee meeting (Committee C). 2018. Available at: <https://www.nice.org.uk/event/phacc-may-2018> (accessed May 2018)
7. NICE (2018) *Structure of NICE*. Available at: <https://www.nice.org.uk/about/who-we-are/structure-of-nice>. available at: <https://www.nice.org.uk/about/who-we-are/structure-of-nice> (accessed June 2018).