

Medical Decision Making

Authors' response to: "Health Opportunity Costs and Expert Elicitation: A Comment on Soares et al." by Sampson, Firth and Towse

| | |
|------------------|--------------------------------|
| Journal: | <i>Medical Decision Making</i> |
| Manuscript ID | MDM-20-561.R1 |
| Manuscript Type: | Letter to the Editor |
| | |

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Authors’ response to: “Health Opportunity Costs and Expert Elicitation: A Comment on Soares et al.” by Sampson, Firth and Towse

Authors: Marta O. Soares, PhD¹; Mark J. Sculpher, PhD¹; and Karl Claxton, PhD^{1,2}

Author Affiliations:

¹Centre for Health Economics, University of York, York, Yorkshire, UK

²Department of Economics and Related Studies, University of York, York, Yorkshire, UK

Corresponding author:

Marta O. Soares
Centre for Health Economics,
University of York
York, Yorkshire, UK
marta.soares@york.ac.uk

Word count: 1,150

Funding: None

Dear Editor:

We read with interest Sampson, Firth and Towse's commentary letter¹ on our article, "Health Opportunity Costs: Assessing the Implications of Uncertainty Using Elicitation Methods with Experts"². Our article presents the design, implementation and results of an elicitation exercise aiming to quantitatively gather the (uncertain) beliefs of individuals on a set of quantities. We use methods that our research team is well versed in³⁻⁷. The quantities elicited relate to a set of key uncertainties identified in a previous piece of work -- Claxton et. al. 2015⁸ -- which evaluated the available evidence on health opportunity costs for the UK NHS (HOC), a quantity that is important for supporting policy decisions over investments using public health system funds. Claxton et al. (2015)⁸ identified evidence on the effects of changes in expenditure on the life year burden of disease, but no evidence on the likely effects of expenditure on quality-adjusted life-years (QALYs). Linking the effects of expenditure on mortality burden of disease to QALYs is hence the focus of our work.

The letter commends our study for its policy value, and for its methodological quality and rigour but, at the same time, raises methodological concerns. The authors provide no references to support their view that these concerns minimise the policy relevance of our findings. In this letter, we respond to these concerns.

The first methodological concern regards the expertise of the individuals recruited, and we rebut this on three grounds. Firstly, health care practitioners (the substantive experts recruited into this study) directly observe the health effects of the activities of the health system (linked to expenditure), and hence we argue are best placed to evaluate the quantities of interest. Secondly, we followed best practice⁹ in including, in our sample of experts, representatives with specialism in all the different clinical areas of interest (for example, cardiologists, who have the relevant experience in circulatory disease), and also individuals with expertise across clinical areas (for example general practitioners, radiologists, anaesthetists and public health specialists). The authors claim that those without a specialism have no expertise, but this is incorrect as these individuals complement those with specialisms by providing breadth across the different clinical areas, across the types of technologies and services covered by NHS expenditure, and across settings of care. Finally, the authors claim the policy experts possess no substantive expertise. This is true and has been made clear in our study: policy experts were convened separately and asked to elicit by reconciling the information elicited from clinical experts with their own judgements. The fact that some drew entirely on the judgements of substantive clinical experts is a result in itself, and was expected, indicating that these individuals trust the judgements of individuals with substantive expertise. This does not, in any way, impair the validity of the elicitation exercise.

The second claim by the authors is that the elicited quantities are not meaningful. It should be noted that our paper carefully lays out the definitions of the quantities elicited, and in supplementary material we provide the extensive materials used for training the experts and the full questionnaire used in the elicitation. A number of arguments were presented supporting the authors' claim. It is asserted that we have not used an existing framework for elicitation, such as SHELF¹⁰. A recent review identified that none of the existing frameworks for elicitation has been developed specifically for health care⁶. The protocol we used for this exercise (which was defined *a priori*) was developed in accordance with a number of these frameworks, including the principles set out in SHELF¹⁰. It was developed for the health care context and tailored to the specific needs of our exercise. The authors also claim that the level of heterogeneity within disease areas compromises the definition of the quantity of interest. We argue that heterogeneity is unavoidable and clinicians are used to integrating it into their judgements. Moreover, many elicitations have been conducted over heterogeneous quantities, such as in attributing global foodborne disease to specific foods¹¹ or

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

in defining the relationship between future climate change and the increased risk of armed conflict¹². This is not to say that eliciting under heterogeneity is without its challenges and we acknowledge, in the discussion of our paper, that this may have resulted in the high level of observed within-expert uncertainty (see third claim below).

The authors of the commentary also claim that the assumption of conditional independence (used in defining the quantities for the elicitation) cannot be sustained, and justify this by the possibility of spillover effects. This argument is, however, flawed. First, conditional independence is well established in the elicitation literature as an alternative to eliciting correlation.⁹ Whilst the validity of conditional independence may be difficult to demonstrate, eliciting absolute quantities independently, as proposed by the authors of the letter, is certainly not a valid approach. Finally, in our study, spillover effects were explicitly excluded by requesting individuals only to consider expenditure, and its health effects, in the same disease area.

The third claim by the authors relates to the level of uncertainty in responses. In the discussion to our paper, we acknowledge the challenges in eliciting policy-relevant, but broad-ranging, quantities, which are by definition uncertain. To support this claim, the authors question the validity of some of the responses. At the end of every section of the elicitation, participants were asked whether they were *confident* the answers they had given reflected their views and uncertainties. Response options were ‘yes’, ‘not sure’ and ‘no’. We examined the qualitative feedback from participants and there was no suggestion that the answers lacked face-validity (see section ‘Face Validity and Qualitative Feedback’ of our paper², and supplemental material). Additionally, results were largely unchanged when those that responded ‘no’ or ‘not sure’ were removed.

For these reasons we dispute the substantive points raised by Sampson, Firth and Towse¹. The authors conclude by making the point that estimates are uncertain. There is uncertainty surrounding both the causal effects of changes in expenditure on mortality outcomes (which is reported in a sequence of publications¹³⁻¹⁵) and how these are likely to translate into QALY effects (reported in this paper²). The use of expert elicitation, which elicits uncertainty as well as point estimates, is key to making the judgements required to support policy explicit.¹⁶ This allows for scrutiny, discussion and accountability, which promotes the advancement of methods and applications to inform policy choice and unavoidable decisions; such as: how much can a health care system afford to pay for the benefits offered by a new pharmaceutical? As with estimates of any policy relevant parameter, the question is what does the balance of evidence suggests? We maintain our conclusion that the balance of evidence suggests that the health effects of changes in expenditure are, if anything, likely to be greater than suggested by the mounting empirical estimates (evolving from Claxton et al. 2015⁸) of the effect of changes in health expenditure on mortality outcomes.¹³⁻¹⁵

References

- 1 Sampson, C., Firth, I. & Towse, A. Health Opportunity Costs and Expert Elicitation: A Comment on Soares et al. . *MDM (forthcoming)*.
- 2 Soares, M. O., Sculpher, M. J. & Claxton, K. Health Opportunity Costs: Assessing the Implications of Uncertainty Using Elicitation Methods with Experts. *Medical Decision Making* **40**, 448-459, doi:10.1177/0272989x20916450 (2020).
- 3 Soares, M. O. *et al.* Methods to elicit experts' beliefs over uncertain quantities: application to a cost effectiveness transition model of negative pressure wound therapy for severe pressure ulceration. *Stat Med* **30**, 2363-2380, doi:10.1002/sim.4288 (2011).
- 4 Bojke, L. & Soares, M. Encyclopedia of Health Economics. *Elsevier* (2014).
- 5 Soares MO, Sharples L, Morton A, K., C. & Bojke L. Experiences of structured elicitation for model based cost-effectiveness analyses. *Value in Health* **21**, 715-723 (2018).
- 6 Bojke L *et al.* Developing a reference case for expert elicitation in healthcare decision making. (NIHR, London, UK, 2019).
- 7 MO., S., G., N. & L., B. *Eliciting expert judgements in HTA. Report commissioned for the NICE methods update.*, <https://www.york.ac.uk/media/che/documents/Elicitation-NICE-final-report-York_01042020.pdf> (2020).
- 8 Claxton, K. *et al.* Methods for the estimation of the National Institute for Health and Care Excellence cost-effectiveness threshold. *Health Technol Assess* **19**, 1-503, v-vi, doi:10.3310/hta19140 (2015).
- 9 Anthony O'Hagan *et al.* Uncertain Judgements: Eliciting Experts' Probabilities. *Wiley* 338 (2006).
- 10 O'Hagan T & Oakley J. The Sheffield Elicitation Framework (SHELF). (2008).
- 11 Hoffmann, S. *et al.* Attribution of global foodborne disease to specific foods: Findings from a World Health Organization structured expert elicitation. *Plos One* **12**, e0183641, doi:10.1371/journal.pone.0183641 (2017).
- 12 Mach, K. J. *et al.* Climate as a risk factor for armed conflict. *Nature* **571**, 193-197, doi:10.1038/s41586-019-1300-6 (2019).
- 13 Martin, S., Lomas, J. & Claxton, K. Is an ounce of prevention worth a pound of cure? A cross-sectional study of the impact of English public health grant on mortality and morbidity. *Bmj Open* **10**, e036411, doi:10.1136/bmjopen-2019-036411 (2020).
- 14 Lomas, J., Martin, S. & Claxton, K. Estimating the Marginal Productivity of the English National Health Service From 2003 to 2012. *Value in Health* **22**, 995-1002, doi:10.1016/j.jval.2019.04.1926 (2019).
- 15 Claxton, K., Lomas, J. & Martin, S. The impact of NHS expenditure on health outcomes in England: Alternative approaches to identification in all-cause and disease specific models of mortality. *Health Economics* **27**, 1017-1023, doi:https://doi.org/10.1002/hec.3650 (2018).
- 16 Morgan, M. G. Use (and abuse) of expert elicitation in support of decision making for public policy. *Proc Natl Acad Sci U S A* **111**, 7176-7184, doi:10.1073/pnas.1319946111 (2014).