

Q&A: OIA release of a cost benefit analysis of 5 extra days at COVID-19 alert level 4

Why was this analysis produced?

The Productivity Commission produced this analysis following conversations between Treasury officials and Commission staff about the techniques that might assist in evaluating policy options for responding to COVID-19. Cost benefit analysis (CBA) is a public policy tool, and the Treasury provides guidance to government departments about how it should be applied.

This paper used the Cabinet decision on 20 April 2020 to extend level 4 restrictions by 5 days to explore the CBA methodology. This example was chosen because it relates to a specific decision with well-defined options. The study was limited to exploring the marginal (ie, incremental) costs and benefits of the extension. It explicitly relied on information that was publicly available at the time.

The analysis was undertaken after the decision had been announced, but drew on data available at the time of the decision. Accordingly, it was not intended as an input to the decision nor as a critique. It also took as given the end objective of eliminating COVID-19 from New Zealand.

The paper was shared with the Treasury. It was not the Commission's intention to publish it.

Why a worked example?

In thinking about using CBA, it was clear that a concrete example would best serve the Commission's purpose. The decision to shift between alert levels offered a clear choice between two options. It was a suitably sized problem for analysis – not so simple as to be obvious, but not so complex that it would have taken months with the resources we had available. It enabled us to explore the data requirements, the nature of the judgements and assumptions required, and to explore the sensitivity of results to changes in key parameters.

Why was it made public?

The Commission received an inquiry from a journalist on 11 May 2020 that appeared to refer to this analysis. The Treasury handled this as an Official Information Act request.

Aren't pandemics and public health outside your normal areas of expertise?

The people who worked on this analysis have backgrounds in mathematics and statistics, cost-utility analysis and health economics. We did not attempt to model the likely spread of COVID-19 ourselves. Rather we drew on the modelling work that was publicly available.

Is this a standard analysis or does it break new ground?

CBA is a standard technique used in health policy decision-making. It is also the workhorse in other areas, such as transport infrastructure decisions.

What is involved in doing a CBA?

Doing a CBA involves:

- identifying and describing the options available to decision makers;
- identifying and describing the expected benefits and costs of each option, as experienced by individuals and society in general;
- converting those costs and benefits into common units, which are often (but need not be) current price dollars;

- calculating a summary figure for each option, for example a benefit–cost ratio (BCR) or total net benefit; and
- identifying and describing all the assumptions made in the analysis, and the consequences of varying those assumptions on the summary figures.

What are the strengths of CBA?

All complex policy decisions are, or should be, informed by consideration of expected costs and benefits. CBA is a formal process that, while rarely producing a precise result, makes transparent all the assumptions and data inputs used. Costs and benefits that can't readily be included in the formal analysis can also be identified and listed to further inform decision makers. Its primary strengths are:

- *repeatability*: different analysts should come up with broadly similar results (any differences should be able to be explained by the use of different assumptions); and
- *transparency*: others can examine, critique, refine and even replicate the analysis.

What are its weaknesses?

A weakness of CBA is that people may expect it to produce precise and/or complete results; or treat its results as if they are “the answer”. CBA is inherently approximate and should not be relied on for line-ball decisions – for example, a go-ahead for a 1.05 benefit/cost ratio (BCR) project and a no-go for a project with a 0.95 BCR.

CBA treats every individual equally, and so is silent on distributional impacts. This means, for example, that a dollar's cost for one person is treated as equivalent to a dollar's cost for another person, even when there may be differences in wealth, age, education or experience. This may or may not be reasonable, depending on the circumstances and cultural values.

A CBA is only as good as its assumptions and underlying data. Some relevant factors may be unquantifiable. CBA is unable to resolve ethical questions – though its skilled application can reveal such questions, and the consequences of different ethical stances.

Can you point us at any similar work?

[Economic evaluation of border closure for a generic severe pandemic threat using New Zealand Treasury methods](#) (2018), by Matt Boyd, Osman D. Mansoor, Michael G. Baker, & Nick Wilson.

This journal article by University of Otago epidemiologists and others uses CBA to evaluate the costs and benefits of a protracted border closure to protect New Zealand from an overseas pandemic. Like the Commission's analysis, this article converts freely between quality-adjusted life years (QALYs) [see What is a QALY? below] and economic costs expressed in dollars.

[He Kāhui Waiora: Living Standards Framework and He Ara Waiora COVID-19: Impacts on Wellbeing](#) (2020). Diana Cook, Phil Evans, Hana Ihaka-McLeod, Kara Nepe-Apatu, Jez Tavita, Tim Hughes. New Zealand Treasury.

This discussion paper by Treasury officials identifies and discusses a wide variety of costs and benefits attributable to the COVID-19 pandemic and New Zealand's response. It does not, however, express costs and benefits using common units, nor does it consider any options under the past or future control of decision makers.

[When to release the lockdown: a wellbeing framework for analysing costs and benefits](#) (2020). Richard Layard, Andrew E. Clark, Jan-Emmanuel De Neve, Christian Krekel, Daisy Fancourt, Nancy Hey, & Gus O'Donnell. CEP Occasional Papers (49). London School of Economics and Political Science.

This occasional paper by wellbeing expert Richard Layard and others describes a CBA with its summary result expressed in wellbeing years (“WELLBYs”). This paper converts freely between

dollar-denominated, QALY-denominated and WELLBY-denominated costs and benefits. The problem, method and assumptions are a close fit to those of the Productivity Commission's CBA.

What is a QALY?

QALYs – quality adjusted life years – are a standardised unit of health benefits. QALYs measure the quantity and quality of life gained from healthcare interventions. Implicit is that:

- two extra years of life is better than one;
- a year of life with high quality (e.g, less sickness or disability) is better than a year with low quality (e.g. more sickness or disability).

QALYs are an important input into health policy decision-making when resources are constrained. It aims to ensure that resources are best expended on people or treatments that create the greatest benefit, reflecting both life extension and life quality. This use includes, for example, input into Pharmac's decisions on drug purchases.

Are you putting an economic value on people's lives?

Yes. That is how policy judgements are made when faced with allocating scarce resources to competing needs in many fields. Those judgements are made both at the national/governmental level, and at the individual or family/whānau level.

We all put an implicit value on our own lives when we undertake risky activities and choose whether or not to take precautions. Some people invest in having an emergency locator beacon for when they go tramping, although carrying a locator beacon when tramping is not mandated by regulation. Governments similarly place an implicit value on peoples' lives when making decisions about what road safety improvements to fund, and in regulating minimum standards for child car seats and bike helmets.

Judgements that put an implicit value on fatalities or injuries/impairments can't be avoided in policy analysis or as we go about our daily lives. A good CBA makes them explicit.

Does your analysis remain current? What would you change if you were writing it today?

Clearly a lot has changed and continues to change as the pandemic unfolds.

It is likely that there are improved estimates for some of the health parameter values used in the original analysis. We also now have actual data on the effects of alert level controls on economic activity; and could use these rather than Treasury's April forecasts.

We could also include other costs and benefits of the lockdown extension. For example, the costs of students being unable to attend school, as per the Layard et al. paper.

Does it reflect badly on the Government's decision to delay moving to alert level 3?

No. The Government made its decision in an environment where new information, and views about the reliability of past and current information, were appearing daily.

- The Government faced a difficult decision based on incomplete and potentially unreliable information. Whatever choice they made would have both positive and negative health and economic consequences.
- The Commission's analysis arrived too late to inform the Government's decision.
- The analysis speculated as to what information was, and was not, available to the Government at the time of the decision. The actual information available to Government may well have differed.
- The Government had many sources of advice, and no doubt some of it was contradictory.

Why is the worst-case outcome for COVID-19 deaths in your analysis so low (just 30 extra deaths)?

The analysis examines the differences in outcomes between two scenarios, both of which converge after 5 days. In other words, New Zealand moved to level 3 controls under both scenarios. Because the analysis was solely about the *difference* in outcomes between the two scenarios, it did not need to factor in a worst-case outcome that, if it occurred, would have happened in both cases.

Wasn't the country facing a situation where thousands could have died?

Yes, and this is still a real possibility. The analysis concludes that staying at alert level 4 for 23 to 28 April, of itself, made it no more or less likely that an uncontrolled outbreak would occur at some point in the future.

Does your analysis make unreasonable assumptions about the course of the pandemic? Were you assuming that the R number was below 1 and would stay that way?

The analysis makes no such assumption. It relied on then current evidence that (a) the R number was below 1 in New Zealand on 20 April, and (b) alert level 4 controls were sufficient to keep it below 1. The key unknown was whether alert level 3 controls would be sufficient to keep the R number below 1.

As this was unknown, the analysis considered three possibilities for the average R number over time with level 3 controls.

- (a) An R number of 1.
- (b) An R number above 1.
- (c) An R number below 1.

While the analysis considered it highly likely that possibility (c) would eventuate (and indeed it ended up being correct on that point), it did not assume that to be the case. Rather, it calculated the health benefits (in terms of cases, hospitalisations and deaths avoided) of each of the three possibilities, and then used the largest of the calculated benefits. This avoids making the analysis dependent on the specific R number outcome.

Is your analysis of benefits biased by assuming that only people in rest homes with dementia would die of COVID-19?

No. The analysis notes that rest home residents accounted for the majority of deaths, specifically residents with dementia. But it does not use that observation to calculate the average QALY loss per COVID-19 death. Rather it uses 5 QALYs, the number suggested by University of Otago epidemiologists.

By your analysis, the costs of the lockdown extension massively outweighed the benefits. Why?

Five million people bore the costs of lockdown extension, whereas the benefits, as calculated by the analysis, accrued to at most 2 738 people (i.e. those that would have caught COVID-19). This disparity drives the apparently "lopsided" result.

What if the goal of extending the alert level was to "lock-in" elimination of COVID-19?

Our understanding of the modelling that was publicly available at that time was that an extra 5 days at level 4 was not sufficient to make a substantial difference between achieving elimination and failing to achieve it. That is one of the reasons why we found the benefits of the extension to be relatively small.

A key criticism of the analysis is that it failed to account for the possibility that even though the 5-day extension was not sufficient to achieve elimination, it may have significantly increased the likelihood of elimination being achieved under level 3 controls.

As the benefits of elimination are large, we agree that if the 5-day extension did increase the likelihood of elimination being achieved, our analysis will have understated the benefits of the extension.

However, even if the 5-day extension made a meaningful difference to our ability to eliminate COVID-19, if elimination of community transmission is not a 'once and for all' thing, the benefits of elimination would need to be discounted.

Does your analysis suggest that the goal of elimination was not the right approach?

No. Our analysis took the goal of elimination as a given.

Does your analysis suggest that the initial lockdown was unnecessary or unreasonably costly?

No. Our analysis looked solely at the costs and benefits of the 5-day extension of level 4. It says nothing about the initial decision to introduce a lockdown.

What would you like to happen now?

We understand that that the use of CBA remains contentious in many public policy contexts. We hope that this Q&A helps demystify CBA and explains its strengths and weaknesses.

Sporadic outbreaks of COVID-19 in New Zealand may be inevitable. If so, the Government needs to be able to evaluate the costs and benefits of the options to stamp it out, based on the best available information.

Other considerations such as the public acceptability of measures, the likelihood of compliance, and the innate cautiousness that comes from being faced with the possibility of large negative consequences are also important.

We hope that CBA will be undertaken more regularly going forward, as one of the inputs into evaluating policy options for responding to COVID-19.