BODE3 Interactive League Table Series: Prevention versus treatment, voluntary versus mandatory, targeted versus untargeted – can we generalize?

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In this fourth blog that features the BODE[3] Interactive League Table, we look at substantive findings across the interventions (so far) in the league table. We use graphs from the league table to cautiously explore (for fear of over-generalizing) what approaches might typically generate the most health gain and be best value-for-money.

In two of the previous blogs in this series we have overviewed the concept of league tables to compare health sector interventions, and provided a 'mini-user guide' for the BODE[3] Interactive League Table. Another blog has considered the tobacco control interventions in the BODE[3] Interactive League Table. In this blog, we tease out some themes using graphs generated from the BODE[3] Interactive League Table.

Prevention versus treatment

The figure below shows quality-adjusted life-years (QALYs; discounted at 3% per annum) gained for selected interventions. Substituting 25% of the salt in processed foods with potassium and magnesium salts, colorectal cancer screening and increasing tobacco taxation all dwarf treatments like trastuzumab (Herceptin), which is currently approved for treating early-stage breast cancer. We do not recommend foolishly jumping to abandon such treatments (!), and it must be noted that:

- The treatment interventions are for patients diagnosed in 2011 only, whereas the prevention interventions continue to benefit the population in future years. However, for discounted QALY gains, these particular preventive interventions will always have much greater QALY gains that Herceptin for breast cancer patients in the next 50+ years combined.
- The health gains from prevention are often decades away (although colorectal cancer screening gets big health gains relatively quickly), and society tends to value health gains closer in time (that's why discounting is standard international best practice for such analyses).

Figure 1: QALYs gained for selected preventive and treatment interventions
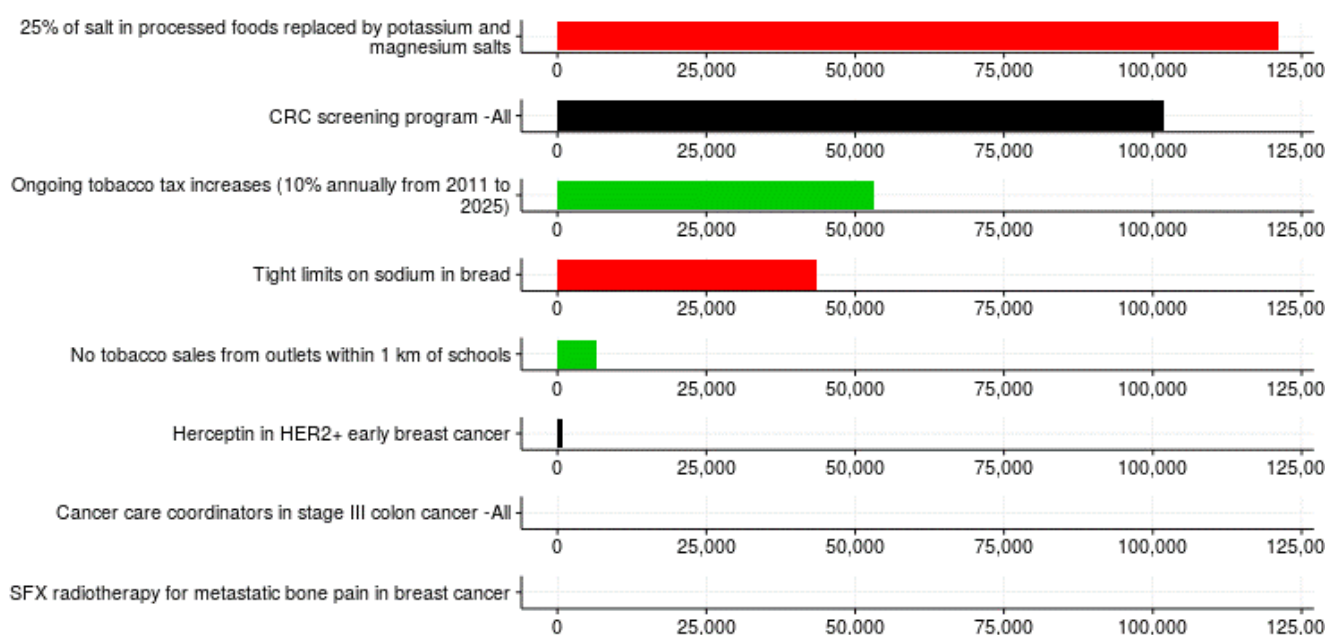
So let's look at the cost-effectiveness in terms of cost per QALY (figure below). The preventive interventions are often cost-saving because the future health system cost savings are (often much) more than the initial intervention costs – even with 3% discounting per year, and even with people living longer and so using some additional healthcare resources).

Figure 2: Cost-effectiveness (cost per QALY gained) for selected preventive and treatment interventions
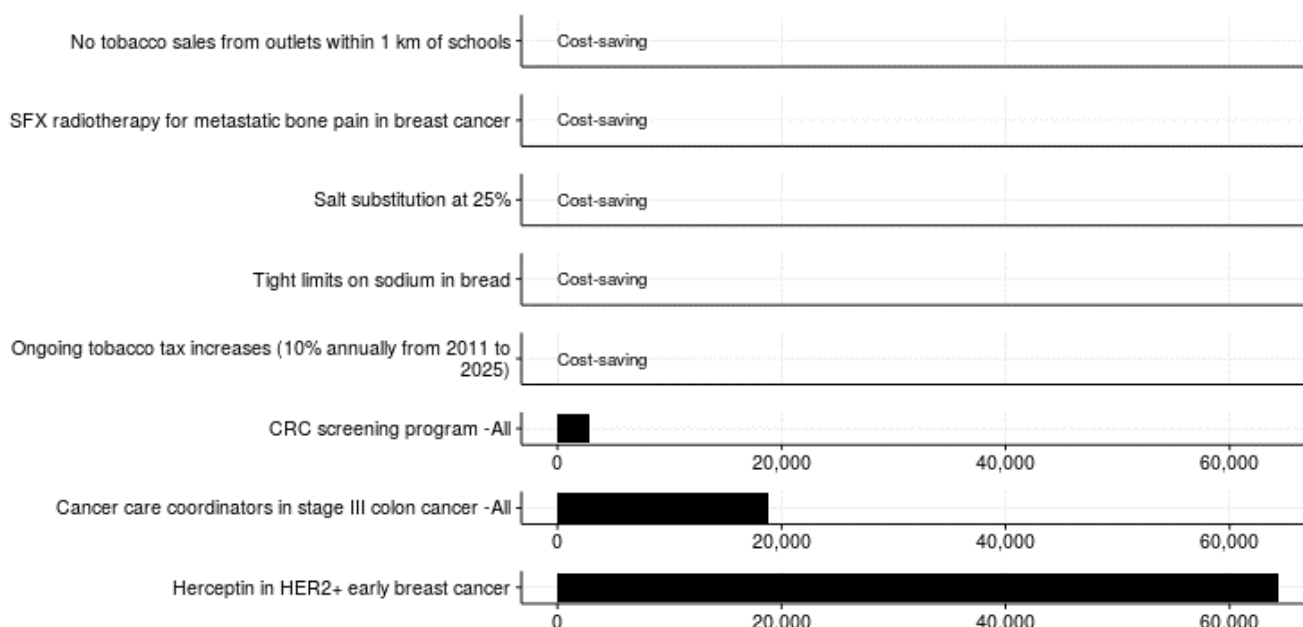
Voluntary versus mandatory interventions

In BODE[3] we have started to compare voluntary with mandatory versions of the same intervention. No surprises, mandatory interventions gain (somewhat) more health, and more cost-effectively even when the mandatory intervention includes the cost of passing a new law. Nevertheless, voluntary interventions might still sometimes be the best choice eg, if there was a genuine need for intervention feasibility to be tested by a progressive industry (but in this sodium case we known that industry can easily achieve major reductions in sodium levels in processed foods – from both NZ and extensive international experience). Furthermore, we suspect that some laws might not necessarily be best for public health overall (e.g., perhaps compulsory cycle helmets discourage cycling and reduce the viability of bike-share schemes – a topic that needs research).

Figure 3: QALYs gained for selected mandatory (*M*) and voluntary (*V*) salt reduction interventions
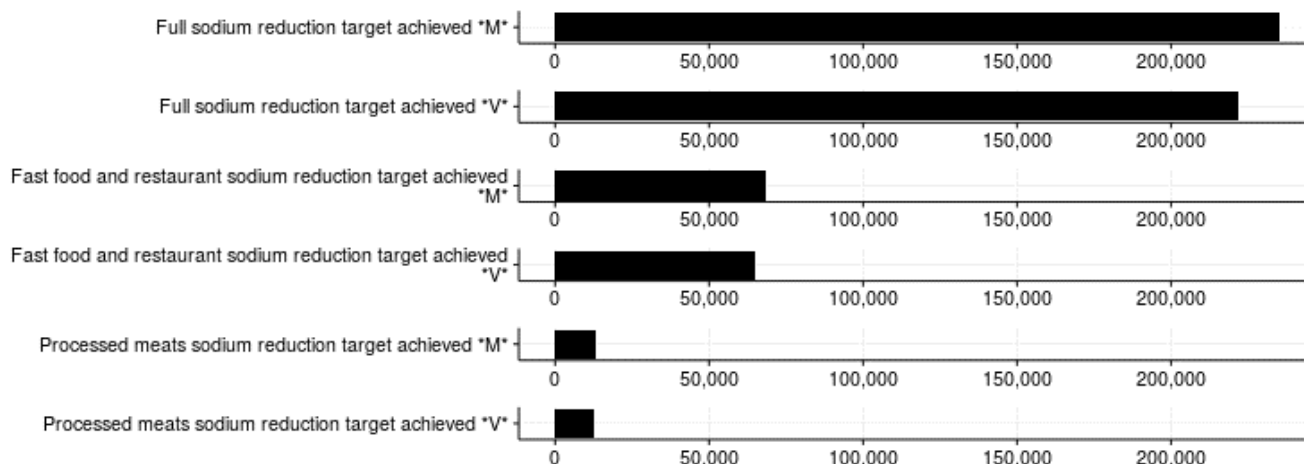
Targeted versus untargeted

We target health interventions all the time. For example, dietary counselling to obese people only, or a screening programme to ages where the cost-effectiveness is maximal (e.g. 50-74 year olds for colorectal cancer). More of these examples will be in the BODE[3] Interactive League Table in due course. In this blog, we just focus on trastuzumab (Herceptin) and targeting by biological type of breast cancer. Only women with the HER2 receptor (should) get trastuzumab, but effectiveness in terms of QALYs per woman treated varies enormously based on hormone receptor status of the breast cancer. A 'good prognosis' breast cancer that is both oestrogen and progestogen receptor positive already has good five-year survival, and therefore there is less to gain …. and therefore is less cost-effective. The figure below shows this variation in cost-effectiveness. This variation, or what we call 'heterogeneity', also varies by age – see a past blog on this for trastuzumab. The points here are that the league table allows you to see this heterogeneity (where we have modelled it), and there are implications for the health system – in a precision medicine world we should also have more precise funding decisions so that where additional health benefits are small, resources can be freed up to use on other interventions that will bring relatively bigger health benefits for the population.

Figure 4: Incremental cost-effectiveness (cost per QALY gained) for trastuzumab (Herceptin) by hormone status of the breast cancer
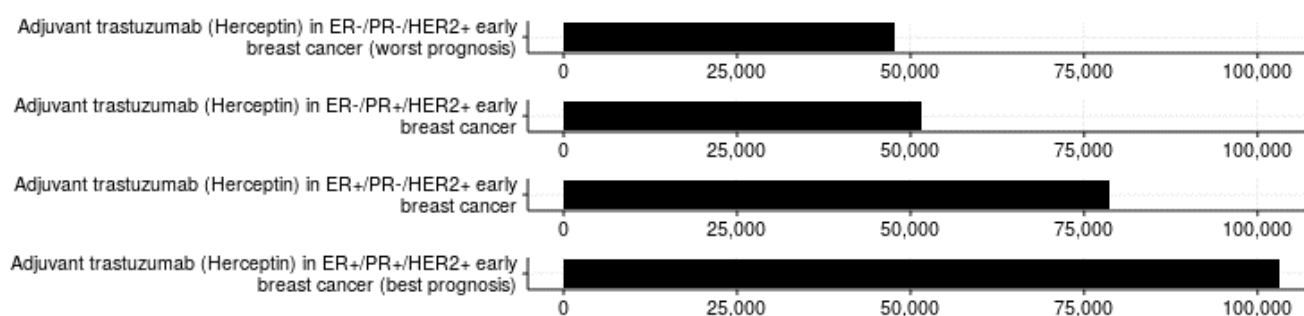
Summary

In this blog we have show-cased some themes that are suggested with current interventions at the BODE[3] Interactive League Table. Some themes are obvious, for example an intervention for people with an uncommon disease in one calendar year only is unlikely to generate (anywhere) near as much health gain as an intervention across the whole population and/or for many years. Other themes may be obvious if you had already

thought about it, for example that mandatory interventions tend to have bigger impacts than voluntary interventions. But other themes – or perhaps findings – you may not have realized without looking further, for example the huge variation in the cost-effectiveness of trastuzumab (Herceptin) when targeted by age and biological type of the breast cancer.

There are of course exceptions to these patterns and which we hope to consider further in future work. You may wish to discover more yourself [here](#).

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