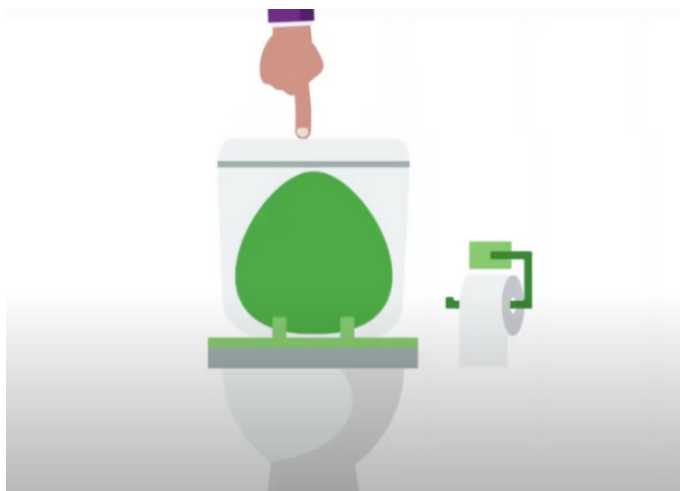


Nationwide Colorectal Screening in New Zealand: a tricky balance of improving overall population health and addressing inequalities

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In this blog we will discuss a paper recently published in *Cancer Epidemiology Biomarkers and Prevention* [1] by the BODE3 team, which modelled a nationwide colorectal cancer (CRC) screening programme for New Zealand. We used multiple data sources, ranging from the results of the New Zealand pilot screening programme through Waitemata DHB, New Zealand cost and epidemiological data on colorectal cancer, and outputs of screening trials internationally. Similar to modelling from other countries, we found that a national CRC screening programme is highly likely to be cost-effective, and will offer health gains to all screened population groups. However, because Māori in New Zealand are less likely to get CRC, and because screening programmes have been less successful in engaging with Māori, the health gains for the Māori population in New Zealand will be lower, meaning that this screening programme will increase inequalities in overall health for Māori compared to the rest of the population.

From 1 July 2017, the New Zealand Ministry of Health began the staged rollout of a national colorectal cancer (CRC) screening programme, offering free CRC screening (with the faecal

occult blood test every two years) for those aged 60-74 years of age. The implementation of a national CRC screening programme in New Zealand follows the lead of a number of other developed countries who have found such a programme reduces both the incidence of and mortality from CRC, and has been shown to be cost-effective [2-5]. Note the reduction in incidence – unlike breast cancer screening that ‘just’ detects cancer earlier, CRC screening also finds pre-cancerous polyps, removes them, and therefore lowers incidence rates. It is for this reason that it is particularly effective and cost-effective.

Is a national biennial CRC screening programme likely to be cost-effective?

In short, Yes.

To assess the cost-effectiveness of an intervention the BODE3 team use national Gross Domestic Product as a threshold, as suggested by the World Health Organization [6]. This means that any intervention that returns a full year of healthy life (one quality adjusted life year or QALY) for less than \$45,000 NZD is considered – as a rule of thumb, or starting point – to be cost-effective.

We modelled a screening programme that took the New Zealand population aged over 35 years in 2011, and followed them over their entire lifetime, screening them for CRC between the ages of 50-74 years (as in the Waitemata pilot programme [7], but a wider age range than the national rollout). We took a health systems perspective, considering the costs and savings to the health system of a nationwide CRC screening programme compared to current health services without a screening programme. The modelled cost per QALY for the total population was \$2,930 (uncertainty interval ranged from ‘cost saving to the health system’ to \$6,850 per QALY gained). For Māori the cost per QALY was \$10,500 (uncertainty interval \$4,500 to \$17,900). The finding that a national CRC screening programme is likely to be cost-effective is in line with evidence from other similar countries such as Australia, England [3-5, 8].

What health gains can we expect from a national CRC screening programme?

In our modelling we use QALYs to measure health gains. This metric takes into account both how long a person is expected to live and with what quality of life. In our model we found that national CRC screening would generate health gains for all sex by ethnic groups. The modelled average gain in health to an individual aged 50-54 years of age from CRC screening was 0.055 QALYs – which is equivalent to an extra 20 days of healthy life. This may not sound like much, but remember this applies to everyone invited to screening (including those not participating) and when summed up across the whole population it is ‘not bad at all’. However, the per capita gains for Māori were lower than for the rest of the population (non-Māori) being around half of the gain for the non-Māori population at age 50-54 years (0.031 vs 0.058 QALYs per capita, or 11 vs 21 additional health days of life). The difference in health gains between Māori and non-Māori is driven by: lower incidence of colorectal cancer for Māori (so less disease to prevent and treat); lower modelled screening coverage for Māori (assumed to be 45% of Māori and 58% for non-Māori in accordance with the pilot findings); and because Māori have a lower overall life expectancy than non-Māori, so a smaller window of time to model improvements to their health.

What is the likely impact on health inequalities for Māori?

Population screening programmes generate small health gains across a large number of people, and are therefore able to influence both the outcomes from the target disease (in this case CRC), but can also impact upon the overall health status of populations. In the paper we looked at the impact that a population CRC screening programme may have on overall health inequalities for Māori compared to non-Māori, by examining the change to quality-adjusted life-expectancy (QALE): which is just like normal life expectancy, but removes some time to take into account the burden from illness. Our modelled population CRC screening programme had a measurable impact on overall health inequalities as measured by QALE, with non-Māori gaining additional healthy days of life Māori for all age groups, (ranging from 7 to 25 additional days of healthy life, varying by age group).

What are ways that we can mitigate the likely increase in inequalities for Māori from CRC screening?

Colorectal cancer screening presents a dilemma. On the one hand it looks to be a cost-effective intervention that will improve total population health, but in the other it will likely have measurable negative impacts on inequalities in health between Māori and non-Māori. The decision has been made to progress with the national rollout of screening (which is appropriate), so now our attention must turn to how to best mitigate the likely inequality impacts of CRC screening. This can be done by leverage within the CRC screening programme itself, as well as more broadly considering mitigation strategies that sit outside of the CRC screening programme (e.g. more investment in tobacco control).

The CRC screening programme offers an opportunity to provide a screening programme that is equitable in terms of access and quality of services for Māori [9]. The table below shows our best prediction for non-Māori and Māori in the first two rows Based upon coverage levels achieved in the pilot programme [7]). For example, 32% of non-Māori eligible to be screened will never be screened on any round (based upon a combination of the first two rounds of the pilot programme). For each round of screening, 58% of eligible non-Māori will be screened, with the remaining 48% not being screened in that round. Note Māori have lesser participation than non-Māori, as per the Pilot findings and the lower per capita QALY gains for Māori.

Table 1: Varying the level of screening coverage for Māori

	Percentage never screened (based on the proportion not screened in round one OR round 2 of the pilot programme)	Percentage of eligible persons not screened per round	Percentage of eligible persons screened per round	Per capita QALY gain
Non-Māori	32%	42%	58%	0.047
Māori	39%	55%	45%	0.027
Māori	29%	41%	59%	0.036

Māori	20%	27%	73%	0.048
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Could increasing Māori participation in the CRC screening programme (but not altering non-Māori participation) get the same QALY per capita gains for Māori? In theory, yes, if the proportion of Māori never being screened drops to 20% and 73% of Māori are screened in each round (last row of table). But this seems unlikely in practice, and is well outside the range of screening coverage achieved internationally [10].

Another way of improving the health gains for Māori would be to use a wider screening age range. Our modelling suggests that given current levels of differential screening coverage, the age range would need to be 10 years wider for Māori to compensate for the lower incidence in CRC, lower screening coverage and lower life expectancy. However, such a strategy is not without risks. Screening a younger age group for Māori introduces greater risks given the lower incidence in younger age groups, as well as Māori having lower incidence to begin with. In addition there is an interesting ethical dilemma around extending the age range for a population group with a lower risk of the target disease, in order to address overall inequalities in health.

The gains in health that can be made for Māori within the CRC screening programme itself are limited due to the lower incidence of CRC cancer in this group. Therefore it is worth thinking about strategies **outside** of the CRC screening programme where larger gains for Māori health could be made. In other screening programmes, gains for Māori larger could be made through improvements to breast and cervical screening coverage, given the higher incidence for Māori of these diseases. Thinking more broadly than this, greater gains could be made for Māori by further addressing the diseases and health risks that are large contributors to ethnic health inequalities, such as cardiovascular disease and tobacco control.

Whilst attention to how the equitable performance of, and outcomes from, individual health interventions is important, we must keep in mind the bigger picture and think about the social systems that create and maintain differential health and social outcomes for Māori. If New Zealand is to truly address inequalities in health for Māori, action within one intervention or even across the health system alone will be insufficient. Removing existing inequalities in health for Māori and preventing further inequalities in health from being generated requires attention to the many and various systems of racial and ethnic discrimination that systematically result in Māori social and economic disadvantage, and reduce the access and quality of healthcare provided to Māori [11].

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