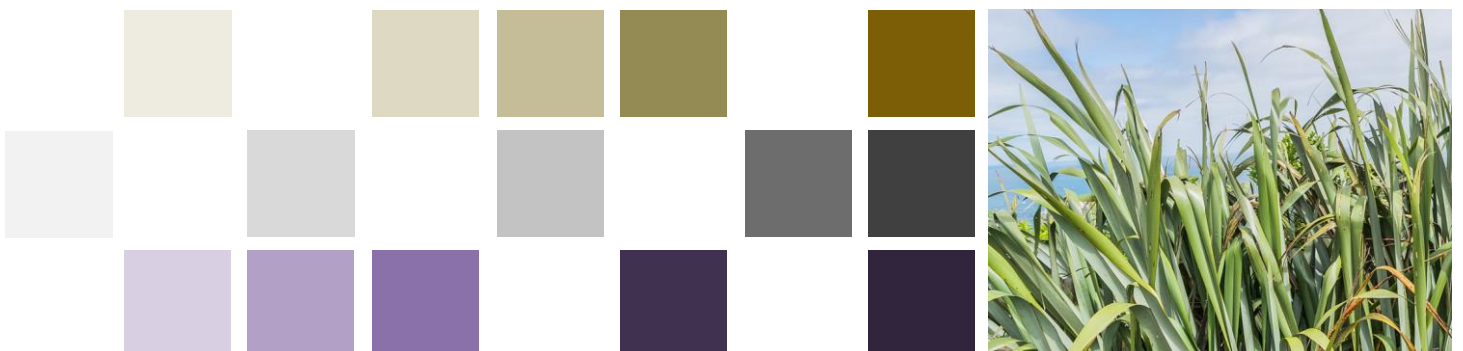


Methodology for Estimating the Underfunding of Māori Primary Health Care

Methodology and proof of concept with key results

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Acknowledgements

Tūngia te ururua, kia tupu whakaritorito te tupu o te harakeke. Clear the undergrowth so that the new shoots of the flax will grow.

This whakataukī reflects the opportunity to create approaches which support new thinking and ways of operating. It aptly reflects the opportunity afforded by this report to stimulate debate and discussion about equitable funding for Māori health and, importantly, wellbeing.

We feel fortunate that the Wai 2575 Claimants, through its Expert Advisory Group, commissioned us to complete this important piece of work, that reflects upon historic circumstances, but may also be a platform for future development, particularly in light of current health system reforms.

In this light, we wish to acknowledge the following Claimant stakeholders who commissioned this work:

Wai 1315

Taitimu Maipi and Hakopa Paul, for and on behalf of Ngāti Whaawhaakia, Ngāti Mahuta and Ngāti Pīkiao.

Lady Tureiti Moxon and Janice Kuka, for and on behalf of Te Kōhao Health, Te Rūnanga o Kirikiriroa, Taumarunui Community Kokiri Trust, Hauraki Primary Health Organisation, Waikato DHB Iwi Māori Council, Ngā Mataapuna Oranga, Te Manu Toroa Trust, Pirirākau Hauora, Turuki Health Care, Te Kaha o Te Rangatahi, Kotahitanga Limited.

Wai 2687

Simon Royal and Henare Mason, for and on behalf of the National Hauora Coalition.

We also wish to acknowledge the Expert Advisory Group to the Claimants, whose role is described in more detail in the body of this report.

This report is richer for the insights gained from the Claimants and the EAG.

Ngā mihi nui ki a koutou.

Executive summary

Sapere Research Group were asked by the claimants to respond to the Waitangi Tribunal's recommendation that a methodology be developed to measure the underfunding of Māori PHOs and providers. The Tribunal provides context to its recommendation:

We recognise that there is a compensatory aspect to this process, in that it responds to acknowledged historical underfunding. However, we make no recommendations at this stage as to the final destination of any such compensation... .. Our initial thinking is that, if a final sum can be agreed upon, first, it could be used in part to compensate those Māori primary health organisations and providers still in existence and, secondly, it could be future-focused, perhaps with a view to supporting the development of additional Māori primary health organisations and providers.

While the recommendation is specifically to develop a methodology, we necessarily have applied the methodologies we recommend as a proof of concept in order to ensure that they work and are fit for purpose. We therefore present both methods and tentative results. The scope of services we consider is that of Māori primary health care services providing care to Māori whānau – by Māori for Māori, accessible to all. However, some of the issues identified in the analysis apply to funding for Māori wherever they may be receiving services.

Methodological approach

The methodology that we propose has three components:

- We first measure the extent to which the funding formula determining capitation payments worked against Māori providers and Māori primary health organisations (PHOs). This first component identifies direct underfunding of primary health care organisations serving Māori populations, and shows the impact for providers with high enrolment of Māori in their populations.
- We then specify the primary health care team that could be implemented if the Crown were to meet the promise of the Primary Health Care Strategy set out in 2000. We identify the workforce that would be required and show how the cost of that workforce can be estimated. This offers an estimate of the cost of the funding needed to fulfil the promise of the Primary Health Care Strategy.
- Lastly, we set out a methodology by which the consequential health inequity for Māori arising from poor access to good primary health care might be identified and set out how this could be valued.

This last component of the methodology relies upon an approach to valuation of life and sickness that is founded in Western conceptions. The method we suggest for the calculation is based on Willingness to Pay and is widely used in assessing the cost-benefit of government projects. Thus, the methodology has validity in concept and application in NZ policy. However, the valuation of life and sickness is not founded in Te Ao Māori. Our suggestion is to consider this part of the methodology as an approximate estimation of the loss of mana caused by inappropriate funding of the health sector, and as an indication of the order of magnitude of the consequences of that loss. The estimation of the degree of illness and death in monetary equivalent terms is not an end in itself, but one contribution to the debate about the overall loss that has been sustained over generations.

Proof of concept results

We present results from applying each methodology as a proof of concept.

Results of direct underfunding methodology

As a demonstration of the magnitude of the estimates that our approach generates, we present a series of results for a group of organisations with a total population of 332,051, covering the enrolled populations of Ngā Mataapuna Oranga PHO, Hauraki PHO, Ngāti Porou Hauora, Ora Toa PHO and the National Hauora Coalition. We refer to this as the test population. The test population encompasses all of the Māori PHOs in the country and many, but not all, Māori practices in the country. These methods can easily be applied to different subsets or aggregates of Māori PHO and practice organisations as desired. Application will require the definition of populations of specific organisations at different times since the implementation of the Primary Health Care Strategy. The aggregate annual result is extrapolated back to 2003 and adjusted by the cost of capital to reflect the opportunity cost of the underfunding.

Result	Amount (\$ millions)
Total accumulated over time (since 2003)	\$283m
Total accumulated inflated by cost of capital (5%)	\$456m
High scenario (cost of capital = 6.5%)	\$531m
Low scenario (cost of capital = 3.5%)	\$394m

Results of the promise of the Primary Health Care Strategy

We present the results of modelling a comprehensive primary health care service for a) the populations of the Claimant organisations; b) the populations of the Claimant organisations if they had grown by 50 per cent; c) the cost of providing the service to 50 per cent of Māori in Aotearoa; and d) the cost of providing the service to all Māori in Aotearoa. These are annual costs in 2020 dollars. We note that costs of providing a comprehensive service encompass aspects not only of providing care to a Māori population, but also those of providing care as Māori, expressing Māori principles, in line with Te Tiriti. This means resources to respect Tikanga and protocol, and to support partnership with the community, as well as direct service provision.

	Cost for test population (\$000)	Cost for test population +50% (\$000)	Cost for 50% Māori population in Aotearoa (\$000)	Cost all Māori population in Aotearoa (\$000)
Upper estimate	\$412,452	\$618,679	\$530,695	\$1,061,390
Lower estimate	\$346,445	\$519,667	\$445,764	\$891,527

Results of valuing inequity in health outcome for Māori

The cost of underfunding and under-provision of primary health care for Māori is borne by Māori. For the 2018 Māori population aged under five, and between 45 to 64 – for whom ambulatory sensitive

hospitalisation (ASH) rates are prepared by the Ministry of Health – we estimate that the annual health loss in 2018 due to inadequate primary care is valued at \$5 billion.

Tribunal recommendations

The Tribunal noted that there is an element of supporting compensation discussions that will draw upon these methodologies. The Tribunal also noted a role for a future-focused discussion on supporting the development of additional Māori primary health organisations and providers. The methodologies proposed here can contribute to both historic and forward focused discussion:

1. We have estimated the direct underfunding of Māori primary health services in light of the core primary health care funding formula that is widely used for PHOs with high need populations. This will contribute to the kōrero on compensation.
2. We have estimated the cost of providing a comprehensive primary health care service to a Māori population. This can contribute both to an historical discussion on compensation (in light of the gap between actual funding and the funding needed to deliver upon the vision of the Primary Health Care Strategy), and to a more future-focused discussion on supporting Māori provider development and the future shape of services that should be funded within a comprehensive primary health care service for Māori.
3. We have estimated the monetised equivalent of the inequity caused by lack of access to effective primary health care services for Māori. This finding is relevant both for understanding the degree of consequential harm that has been caused and for discussion about compensation, but also for a future focused discussion about investment. The harm that is experienced by Māori in Aotearoa given the failings of primary health care presents a context in which to consider what the magnitude of future investment in primary care for Māori should be.

Overall, we have considered the Tribunal's recommendation to develop a methodology for estimating the underfunding of Māori PHOs and providers in several ways, which we believe will meet the goals of the recommendation both to inform discussions about compensation and to support a future-focused discussion about investment in Māori primary health care services. We hope that these methodologies will support a constructive discussion about the history and future of Māori primary health care in Aotearoa.

Glossary

Claimants	<p>Claimants to the Waitangi Tribunal under claims:</p> <p>Wai 1315 - Lady Tureiti Moxon, Janice Kuka, Taitumu Maipi, Hakopa Paul</p> <p>Wai 2687 - National Hauora Coalition</p>
Māori PHOs	<p>PHOs that are governed by Māori communities and provide services under a kaupapa Māori ethos.</p>
Māori practices	<p>Front-line primary health care practices with Māori governance, which deliver services with a kaupapa Māori ethos. Māori practices may or may not be part of a Māori PHO, and in some cases have moved between Māori and mainstream PHOs over their lifetime.</p>
Māori primary health services	<p>Māori primary health care/services/care services are primary health care/services/care services provided by Māori PHOs and/or Māori practices</p>

1. The origin of this mahi

This project was commissioned by the Claimants in Claim 2575 to the Waitangi Tribunal, with the advice and support of an Expert Advisory Group.

1.1 Waitangi Tribunal recommendations

In its report on Stage One of the hearings into health services and outcomes, the Tribunal made a number of recommendations, including:

- (a) Within the next seven months, the Crown and representatives of the Wai 1315 and Wai 2687 claimants agree upon a methodology for the assessment of the extent of underfunding of Māori primary health organisations and providers. The methodology should include a means of assessing initial establishment and ongoing resource underfunding since the commencement of the New Zealand Public Health and Disability Act 2000. We direct that the Crown and the Wai 1315 and Wai 2687 claimants file a joint memorandum by 20 January 2020 updating the Tribunal on progress. If the parties are unable to agree on filing a joint memorandum, they may file separate memoranda.
- (b) The Crown fund the process and provide the necessary secretariat support.

Key aspects of this recommendation are:

- that the Tribunal intended the development of a methodology to be developed rapidly
- that the methodology be agreed between the Crown and the Claimants
- that it address underfunding in the period since the commencement of the Public Health and Disability Act 2000.

The scope of the recommendation is underfunding for Māori primary health organisations and providers. We interpret this as being focused on primary health organisations and providers that are owned and operated by Māori organisations, and that provide care in a kaupapa Māori context. Some of the issues identified in this analysis also apply to Māori whānau receiving care from other kinds of primary health organisations, but the focus here is upon services that are by Māori for Māori, accessible to all.

The Tribunal provided additional context to its recommendation, considering how such a methodology might be used:

We recognise that there is a compensatory aspect to this process, in that it responds to acknowledged historical underfunding. However, we make no recommendations at this stage as to the final destination of any such compensation. Compensation is a matter that is complicated by the fact that many of the initial Māori primary health organisations and providers no longer exist. Our initial thinking is that, if a final sum can be agreed upon, first, it could be used in part to compensate those Māori primary health organisations and providers still in existence and, secondly, it could be future-focused, perhaps with a view to

supporting the development of additional Māori primary health organisations and providers. We think these matters should form part of the development of the methodology we recommend.

While the development of a methodology for historical underfunding is formally a retrospective exercise, the Tribunal anticipates a more forward-looking context for the work, considering the future of Māori primary health organisations and providers.

1.2 Methodology has been commissioned

This work was commissioned by the claimant group, with a contribution from the Ministry of Health. Key elements of the mahi are that:

- It should align with Te Tiriti obligations and expectations, recognising the context in which it has been commissioned, and the underlying Treaty Principles that the process seeks to honour.
- It should acknowledge the historical and intergenerational trauma linked to colonisation and associated intergenerational and cumulative disadvantage that lies behind.
- It should recognise and value Māori delivery models, including the Te Ao Māori, kaupapa and mātauranga that underlie Māori approaches to primary health care.
- It should recognise the innovation and leadership of Māori primary health services.

1.3 The Expert Advisory Group directed the mahi

The Claimants established an Expert Advisory Group (EAG) to assist fulfilment of the Tribunal's recommendation. All members of the EAG were carefully chosen for their skillset and sector reputations; they are widely acknowledged as experts in many fields. These fields range from primary care finance and accounting through to policy, population health, general practice, equity, system design, kaupapa Māori and mātauranga Māori inspired primary health and wellbeing models of care.

EAG membership comprised the following people:

Who	Organisation	Role
Neil Woodhams	Claimant Representative, Wai 1315 (Te Kōhao Health and Ngā Mataapuna Hauora)	Chair
Tammy Dehar	Claimant Representative, Wai 2687 (National Hauora Coalition)	Member
Joyce Maipi (or Aroha Haggie)	Claimant Representative, Wai 1315 (Timi/Hakopa)	Member
Professor Peter Crampton	Independent	Member
Dr Jim Primrose	Independent	Member
Sharon Shea	Shea Pita & Associates Ltd	Project manager and advisor

The EAG adopted four key principles to drive their work (which also underpinned discussions of the Claimants with the Crown). They were:

- Hauora: the concept of holistic health and wellbeing intrinsic to Māori people.
- Mana motuhake: the right to Māori self-determination in the policy and governance of Māori primary health and the provision of services.
- Kaupapa Māori models of care: Māori have a right to be cared for by Māori providers through kaupapa Māori models of care.
- Te Tiriti o Waitangi: the Treaty partnership between Māori and the Crown in accordance with:
 - the guarantee of tino rangatiratanga
 - the principle of equity
 - the principle of active protection
 - the principle of options
 - the principle of partnership.

During the course of this project, the EAG provided Sapere with guidance, strategic advice, insights and peer review of multiple draft reports. The EAG also approved the final draft report for Claimant sign-off.

1.4 The approach taken to the mahi

Broadly, this analysis has adopted three approaches to considering the underfunding of Māori primary health services since the year 2000, noting in particular the implementation of the Primary Health Care Strategy in 2003, with the advent of primary health organisations.

Direct underfunding of Māori primary health services

We consider the effect that the core funding formula for primary health care in PHOs has upon organisations with Māori enrolment, identifying systematic effects that do not recognise well established patterns of health need. These are systemic biased impacts of the primary health care funding system for Māori, and are concentrated when Māori PHOs have exceptionally high levels of Māori and high need enrolment, as they are intended to do. We consider aspects of establishment and working capital, drawing upon estimates of working capital made by the Ministry of Health, and quantify the level of revenue lost to GMS clawbacks from providers in Māori PHOs due to serving a more mobile population. These findings represents an estimate of loss arising from design decisions made in the implementation of the Primary Health Care Strategy.

The hope and promise of the Primary Health Care Strategy

We estimate the overall quantum of funding required to deliver a comprehensive health service that reflects a holistic approach to health, drawing upon a wide range of professionals to deliver a service, without co-payment, that can respond to need. These findings represent an estimate of the loss with respect to the expectation of policy settings arising from the Public Health and Disability Act and the Primary Health Care Strategy.

The avoidable burden of health inequity

We estimate the monetised equivalent of health burden for Māori that could potentially be avoided by the delivery of effective comprehensive primary health care services. These findings represent an estimate of the consequential loss of a primary health care system that does not respond to Māori.

Applying to calculate results

Our direction was to develop a methodology. But in developing and testing methodologies, it is necessary to apply them in order to establish that they work, as a proof of concept. We have therefore applied the results to a set of test Māori PHO populations with an enrolled population of 332,051. The methods can be applied quickly and straightforwardly to different populations of Claimant organisations as desired.

Our estimate of the value of inequity applies to all Māori in Aotearoa.

2. Direct funding inequity

This section considers the evidence around the level of health need for Māori, the responsiveness of funding mechanisms to that need, and the impact on the level of resource available for Māori providers to meet the needs of their populations.

2.1 Funding and responsiveness to need

In this section we quantify the underfunding for patients who are enrolled at Māori PHOs, and in primary health care services more generally. The underfunding is manifest in distinct ways.

Where Māori have a higher than average rate of primary care utilisation, the capitation funding formula systematically underfunds providers who have more than the average population proportion of Māori enrolled patients. The estimation of this underfunding requires adjustments for age and sex characteristics included in the capitation funding formula.

At this level, the gap occurs due to differences in output. The demand for practices with a large enrolled Māori population is greater than the demand for the rest of the population, and becomes progressively larger when a higher proportion of a service's enrolled population are Māori or otherwise high need. This report identifies three key areas where the needs of Māori practices are overlooked and there is quantitative evidence of systematic underfunding. These include:

- Very Low Cost Access (VLCA) underfunding, where VLCA practices are insufficiently funded to achieve equitable funding relative to non-VLCA practices. Māori-operated practices are disproportionately likely to be VLCA funded;
- distribution morbidity, in that practices are insufficiently funded for the substantially different age distribution of Māori population compared to the New Zealand population overall; and
- socioeconomic deprivation funding, where higher levels of socioeconomic deprivation among Māori are overlooked by the capitation formula. We note that there is an overlap between morbidity and socioeconomic deprivation, which is difficult to separate.

It should be noted that this analysis focuses on the structural elements of the existing funding formula. When originally developed, that formula was very much focussed upon averaging historic general practitioner consultation rates, although the previous practice nurse subsidy was included within the overall capitation amount. The role of nursing in primary care has extended considerably since the early 2000s, and Māori providers often use extended primary care teams that are not recognised by the core first contact funding formula. The level of funding needed to support extended care teams, and to recognise the role of nurses, is analysed in section 3, which considers the cost of providing a comprehensive primary health care team.

The VLCA formula does not adequately recognise need for Māori

The capitation formula¹ provides direct funding to primary care health practices. This funding is used for practice expenses such as premises, utilities, and staff. Completing the revenue available to practices comes from co-payments charged to patients, revenue from ACC, and funding for specific services such as vaccinations.

VLCA practices receive higher rates of capitation funding but are restricted in their ability to charge co-payments.

Prior work by the National Hauora Coalition has demonstrated that high need VLCA practices face the following issues (Woodhams, 2016):

- higher fee-for-service deductions
- higher patient turn-over
- higher patient complexity
- more visits (annually) by high needs patients
- lower per cent of income generated from patient co-payments
- higher levels of non-payment for co-payments.

We consider differences in funding for a VLCA practice relative to a non-VLCA practice. Most Māori practices are VLCA. To qualify as a VLCA practice the composition of the enrolled population must be at least 50 per cent Māori, Pacific people or a socioeconomic deprivation decile of 9 or 10. The difference in funding between the two types (VLCA and non-VLCA) is an important factor to quantify the first instance of Māori underfunding at the population level.

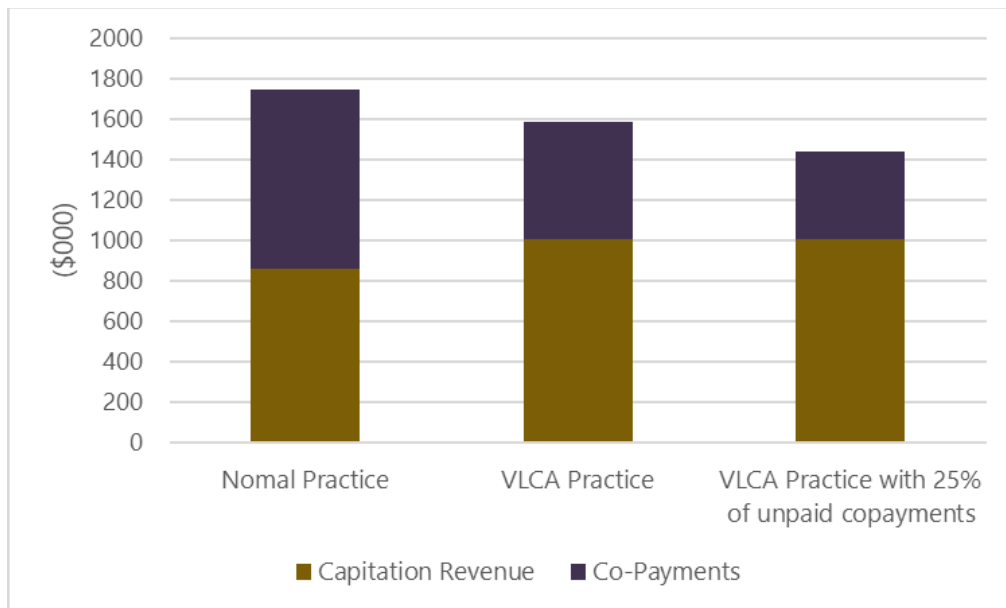
We find there to be a positive total funding difference in favour of the non-VLCA practice. Since VLCA practices are restricted in the fees they can charge, capitation funding is insufficient to accommodate for the reduced co-payments they receive, implying there needs to be an increase in funding if fees are going to be restricted to the current level.

Essentially there is a cap on the revenue that a VLCA practice can earn, which is not the case for non-VLCA practices except insofar as they must – unless with justification – keep their fee increases within a reasonable level as defined in the Annual Statement of Reasonable Fee Increases.²

¹ See <https://www.health.govt.nz/our-work/primary-health-care/primary-health-care-subsidies-and-services/capitation-rates>

² See for example <https://tas.health.nz/assets/Uploads/Annual-statement-of-reasonable-GP-fee-increases-2020-update.pdf>

Figure 1: Funding for a hypothetical non-VLCA practice relative to a VLCA practice with 5,000 patients



To demonstrate the impact of the funding differential between the two practice types in concrete terms, we propose a hypothetical practice of 5,000 people, with the same age distribution as the population of New Zealand. The funding for a normal practice is then calculated using a replica capitation funding model, as seen in Figure 1. This yields co-payments to the value of \$884,390 (based on industry averages) and capitation revenue of \$859,777. Next, the VLCA practice's funding is computed, resulting in co-payments of \$578,821 (based on capped fees) and capitation funding of \$1,005,288.

The total funding differential is obvious. The difference lies in favour of the non-VLCA practice by an amount totalling \$160,058. This shortfall works out at \$32.02 per enrolled patient over the age of 14 in terms of overall revenue for the practice.

For the 258,559 patients enrolled at the test PHOs over the age of 14, this works out an annual total of \$8.3m of underfunding.

On some interpretations the loss of co-payment revenue for VLCA practices may be less than the gross quantum represented here, particularly if non-VLCA co-payments were not high or were frequently written off because they were unaffordable by the community. While the loss of co-payment may be lower in practice, this can be countered by considering the two-tier system that has eventuated, whereby communities with resources are able to fund services more comprehensively than communities that lack resources. This represents an instructive comparison to some aspects of school funding.

Māori age and morbidity patterns are not recognised in funding

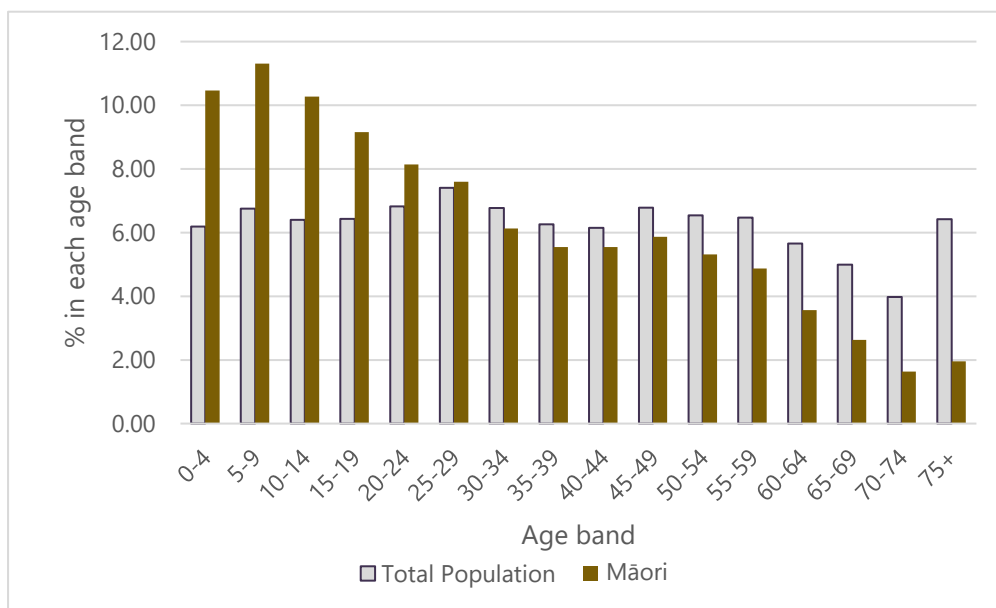
We consider population level underfunding impacts arising from the difference in age distribution of the Māori population relative to the total New Zealand population. Figure 2 demonstrates this widely documented disparity: Māori are significantly overrepresented in the younger population and under-

represented in the older population. This is evident with Māori having a seven-year lower life expectancy and 11-year lower median age comparatively (Walsh & Grey, 2019).

Further inequities exist in the prevalence of disability, which is higher among Māori, and contributes to the need for primary health care (Ministry of Health, 2019).

To calculate the impact of this disparity, we again use a method comparing two theoretical practices of 5,000 people. We consider the maximum difference: a practice identical to the previous practice with an age distribution equal to New Zealand’s total population age distribution, and a Māori practice, with an age distribution equal to the Māori age distribution (effectively a practice with 100 per cent Māori enrolment). Both practices use 2018 census figures for age distribution.

Figure 2: New Zealand’s Population Age Distribution by Māori and all of population



It should be noted that for the purpose of this analysis we treat these two practices as VLCA practices, given the high proportion of Māori practices that are VLCA. Inputting these distributions into our capitation model yields the following:

Figure 3: Total funding of the Māori practice relative to the population practice (5,000 patients)

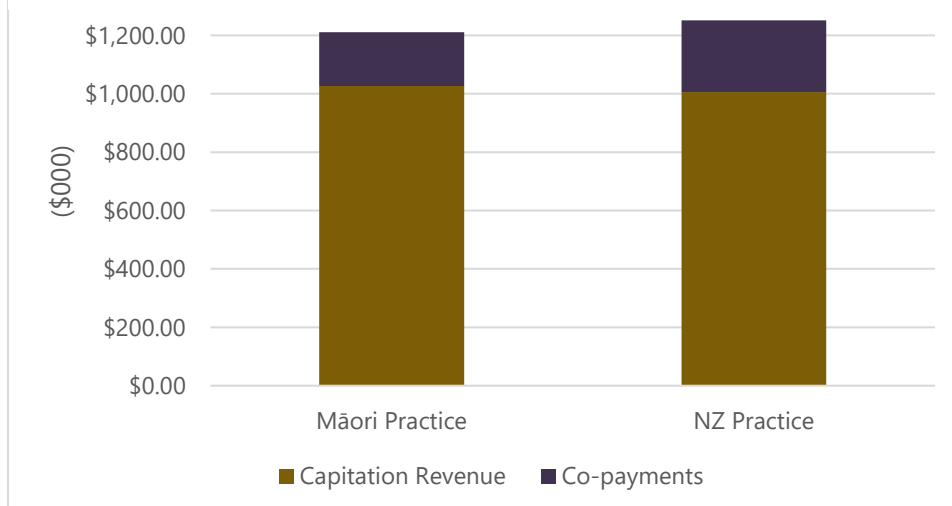
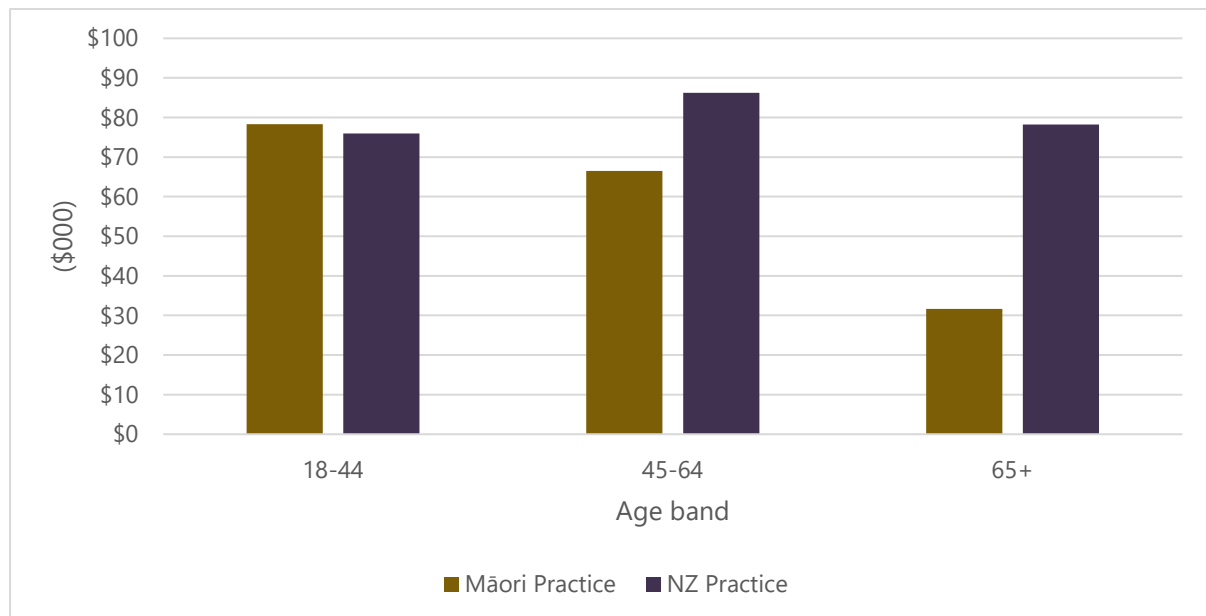


Figure 3 shows that the Māori practice earns \$21,752 more in capitation revenue relative to the population practice. The reason for this is that the 0-14 year-olds generate the highest capitation revenue per person. Because the Māori population is younger, a VLCA practice with a high proportion of Māori earns relatively more capitation revenue. However, practices do not charge fees for 0-14 year-olds, meaning the Māori practice earns \$62,315 less in co-payments. This is a disproportionately large figure that results in a total funding gap of \$40,462. The capitation formula therefore fails to compensate Māori health practices for their differing age profiles relative to population practices, further suggesting that the formula is inequitable.

This discrepancy works out at \$8.11 per enrolled patient per annum.

For the population of the test PHOs, this shortfall works out at \$2.7m per annum, over and above the earlier calculation of the impact of the VLCA formula.

Figure 4: Annual total co-payment revenue for patients aged over 18 (5,000 patients)



Observing Figure 4 of the co-payment funding received by practices for patients aged over 18, there is a significant disparity between the Māori and the population practice. Under 18 year-olds are omitted due to policy enabling free access to healthcare for children. The clear discrepancy over the three age brackets amounts to \$64,027, largely due to the disproportionately low numbers of older people in the Māori population. This discrepancy works out at \$12.81 per enrolled patient over the age of 18, or \$3.2m per annum.

There is a significant difference in funding source for both practices due to their contrasting age distributions. Although the capitation formula funds Māori practices to an extent greater than the non-Māori practice, this level of funding is insufficient to compensate Māori for their young generation relative to their counterparts. Thus, it can be said the capitation formula fails to consider the needs of the Māori population, resulting in insufficient funding for Māori practices.

The disparity in average funding arising from age distribution only matters if the underlying distribution of need across age is different for Māori. But it is clearly established that such differences do exist and are important. The capitation formula does not account for the early onset of chronic

cardiac, respiratory and diabetic disease, impacting Māori and Pacific individuals 10 to 20 years earlier than the equivalent European population.

A number of reviews over the years have proposed that differential rates be introduced for Māori in the funding formula in order to reflect the differing need and age distribution. These include at least the Working Group that reported to the Minister of Health in 2006, and the Moodie Report on primary care funding in 2015.

Variations in funding from the capitation formula are primarily driven by the age distribution of practice populations. Since the formula does not take into account the different age distribution of Māori from the general population, and the different distribution of morbidity with age for Māori, the formula fundamentally underfunds general practice services for Māori.

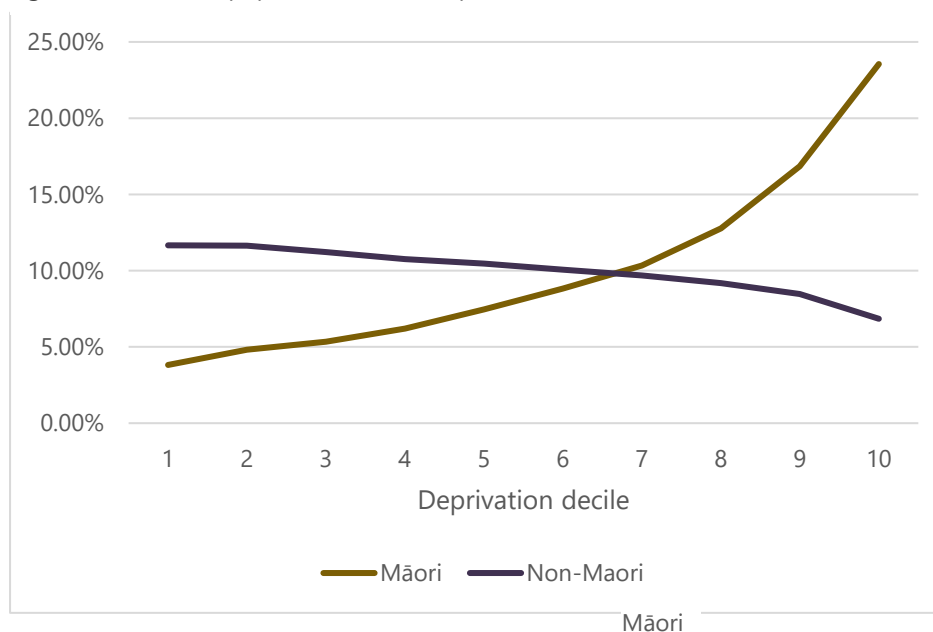
Socioeconomic deprivation for Māori is not recognised

As well as age distribution, there is a socioeconomic deprivation distribution component of underfunding that is not accounted for in the capitation formula. The high positive association between socioeconomic deprivation and consultations (HURA, 2006), alongside the high socioeconomic deprivation of the Māori population, is a basis to further analyse the extent of systemic underfunding.

We show below the well-known distribution in socioeconomic deprivation deciles for both Māori and non-Māori populations of New Zealand. We drew data on the number of consultations required for the average person at each socioeconomic deprivation decile from HURA (2006). The HURA study was based on a general population of mainstream general practices, and so represents the utilisation of Māori and deprived people in mainstream general practice in the early 2000s.

Using these figures, we find that the Māori population requires 3.5 per cent more consultations than the rest of the population due to socioeconomic deprivation alone.

Figure 5: Per cent of population in each deprivation decile



Source: University of Otago NZDep13

The Māori population of New Zealand is over-represented in the higher socioeconomic deprivation deciles and significantly under-represented in the lower (least socioeconomic deprivation) deciles. Māori are 343 per cent more likely than non-Māori to be in decile 10. Given that greater socioeconomic deprivation indicates a greater need for healthcare, Māori populations will require an increased number of consultations for an equitable outcome to be achieved.

The first step in attaining the difference in consultations is to calculate the average socioeconomic deprivation deciles for the population and Māori practices. To do so, we consider our hypothetical practice with a Māori and non-Māori population. We multiply out the practices' populations in each decile by the average doctor consults for each decile, resulting in the expected number of consultations for each practice (given the extent of their socioeconomic deprivation). From here, we calculate the average number of consultations per person, resulting in 3.96 average consultations for the Māori practice and 3.83 for the population practice: 3.5 per cent more for Māori.

If we assume that it costs a practice around \$70 to deliver a consultation, this implies a funding discrepancy of at least \$9.30 per enrolled patient or \$3.1m per annum.

Māori unmet need for primary health care is not recognised

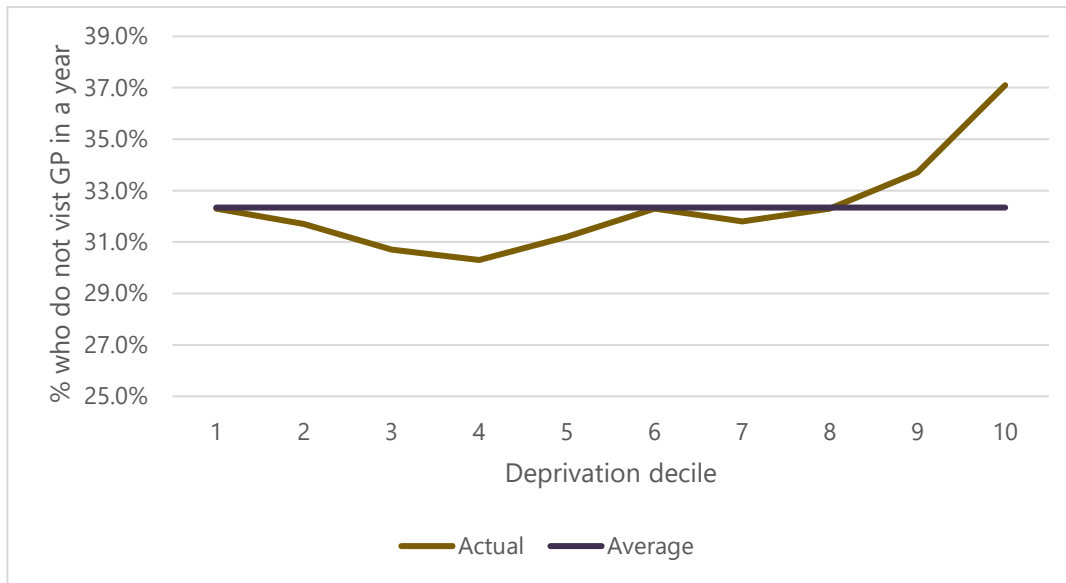
Unmet need is a notoriously difficult concept to measure. Eurostat performs a survey and measures unmet need and notes the causes as due to "costs, distance or waiting lists".³

HURA (2006) shows that there is a positive relationship between higher socioeconomic deprivation levels and the likelihood of not visiting a GP in a one-year period. Figure 6 shows that over 37 per cent of the population in decile 10 do not see a GP in a year, compared to around 31 per cent of the population in decile 5. This positive relationship between decile and not visiting a GP is the inverse of what would be expected: i.e. people in higher socioeconomic deprivation deciles are more likely to have accumulated health issues and do need to see a GP more often.

To try to estimate the effect of unmet need and quantify it, we have taken deciles 9 and 10 and how many consultations would be taking place if barriers to attendance were removed, i.e. that people in higher socioeconomic deprivation deciles went to see a GP at a rate based on their need. For example, if there are 100 patients in decile 10, then we assume that around 10 of them are not seeing a GP in a year because of barriers. If they were to visit a GP, we would expect that the number of consultations would match the average for their age range.

³ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Unmet_health_care_needs_statistics#Unmet_needs_for_health_care

Figure 6: Percentage of population that does not visit a GP in a year versus socioeconomic deprivation decile



Taking the revised number of consultations and using the value of a consultation estimated at \$70 (the value is calculated as a combination of capitation and co-payment), then we would estimate about \$10.63 per enrolled patient, or \$3.5m per annum across the five test PHOs.

This effect augments the socioeconomic deprivation findings: not only do those in high socioeconomic deprivation visit a general practice more frequently across the whole population (which is not acknowledged in the capitation formula), but there is evidence that this is generated by a smaller overall proportion of the population in socioeconomic deprivation, since a higher proportion of this population do not visit in a year. The socioeconomic deprivation disparity should be even higher than it is, by at least the minimum amount we estimate here.

Caveats

We note some other issues that may merit further consideration, although robust data are unlikely to be available:

- Unpaid co-payments are likely to be higher at practices where there are higher levels of socioeconomic deprivation.
- There are other reasons why a VLCA practice's actual revenue might differ considerably from modelled revenue, including complex and multiple family member consultations being charged at a single rate.
- While there is targeted funding for PHOs in the form of services to improve access (SIA) funding, this funding goes to PHOs and does not necessarily improve the finances of a practice.
- We note that for CSC and HUHC card holders, extra funding to practices does not address the underfunding at practice level: the funding for CSC and HUHC card holders is to reduce the fees to their bearers and is, in principle, revenue neutral to the practice.

Estimating the effect of clawbacks as a proxy

When a patient visits a practice where they are not enrolled, that practice has not had a share of the capitation funding that was provided to the practice that they were enrolled with. In this case, if the patient has a Community Services Card the non enrolled practice can claim a subsidy, which is then clawed back from the enrolled practice.

it generates a clawback payment that is levied from the practice where they are enrolled. While this system means that funding follows a patient, and is a benefit from a population perspective, clawbacks represent a loss of capitation revenue from a provider perspective.

We have looked at the relative rates of clawback across different practices. The comparative rates are:

- New Zealand population - \$3.30 per person per annum (2018)
- Test PHOs - \$9.57 per person per annum (2018)⁴
- Difference is \$6.27 per enrolled patient.

We also note that 39 per cent of the practice population visits another practice each year for the test PHOs, versus 13 per cent across the New Zealand population. In other words, a patient enrolled at one of the five test PHOs is three times more likely to visit a practice where they are not enrolled.

Possible reasons for not going to one's own practice are also indicative of negative outcomes:

- Practices might not have capacity to see their patients.
- Enrolled patients may have to use a practice close to their place of employment because they cannot get time off work, meaning that they consult in a service that is different from their enrolled provider.
- Temporary living arrangements mean that a patient is often moving between practices.
- Unpaid co-payment fees at a home practice may have the impact of encouraging a patient to consult at a practice where they do not have a debt.

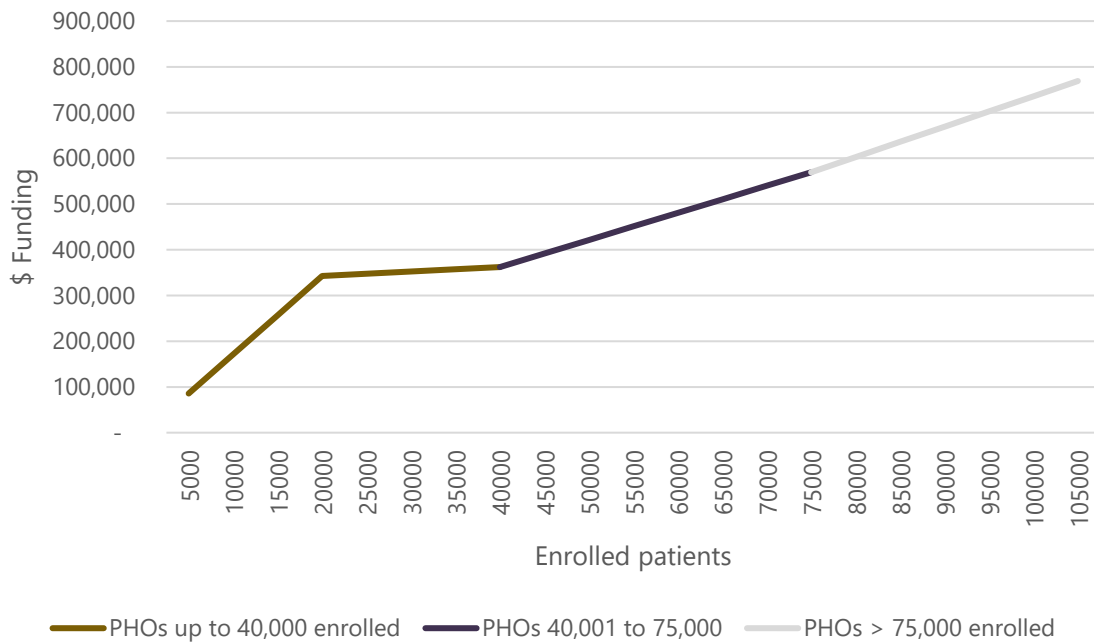
What is important to note is that the practice where the patient is enrolled is missing out on funding because of this clawback mechanism. We estimate for the test organisations that this amounts to \$2.1m per annum based on 332,051 enrolled patients times \$6.27.

⁴ Note that NHC is excluded from this calculation because of a discontinuity in the data series.

2.2 PHO management funding is distorted by size

We have also considered the issue of resourcing PHO management capability. The PHO funding formula has an unusual distribution as shown below:

Figure 7: PHO management funding



For practices of less than 20,000 patients there is a high per-patient contribution, but no recognition of the – significant – fixed costs involved in operating a PHO.

For smaller PHOs this may mean that funding is insufficient to cover the costs of providing services. Two of the test PHOs, Ngā Mataapuna Oranga and Ngāti Porou Hauora, have only around 10,000 enrolled patients each (10,665 and 9,141 respectively). Because of their small size they receive around \$341,000 per annum less than the implied fixed cost structure of a PHO. Ora Toa gets about \$35,000 less than it would otherwise.

The formula disincentivises small PHOs, and reflects a specific government policy around the year 2009 of encouraging PHO amalgamation. Since many Māori PHOs are at the smaller end of the scale, this represents a systemic funding bias against Māori PHOs. For example, a smaller Māori PHO that would like to retain its identity and look after the specific needs of its population either has to seek additional funding to make up the shortfall or look to form a merger with a larger organisation.

Table 1: PHO management funding and scale

	Fixed provision	Funding for one additional patient within band
0 to 20,000 patients	\$0	\$17.1192
20,001 to 40,000 patients	\$322,632	\$0.9876
40,001 to 75,000 patients	\$125,160	\$5.9232
More than 75,000 patients	\$70,530	\$6.6516

There is evidence that PHOs with higher proportions of Māori enrolled patients are smaller than other PHOs. The average size of a PHO where the enrolled population is more than 20 per cent is 65,202; the average enrolled population where the proportion of Māori is less than 20 per cent is 172,838.

Figure 8: PHO patient enrolments by size (percentages in each band)

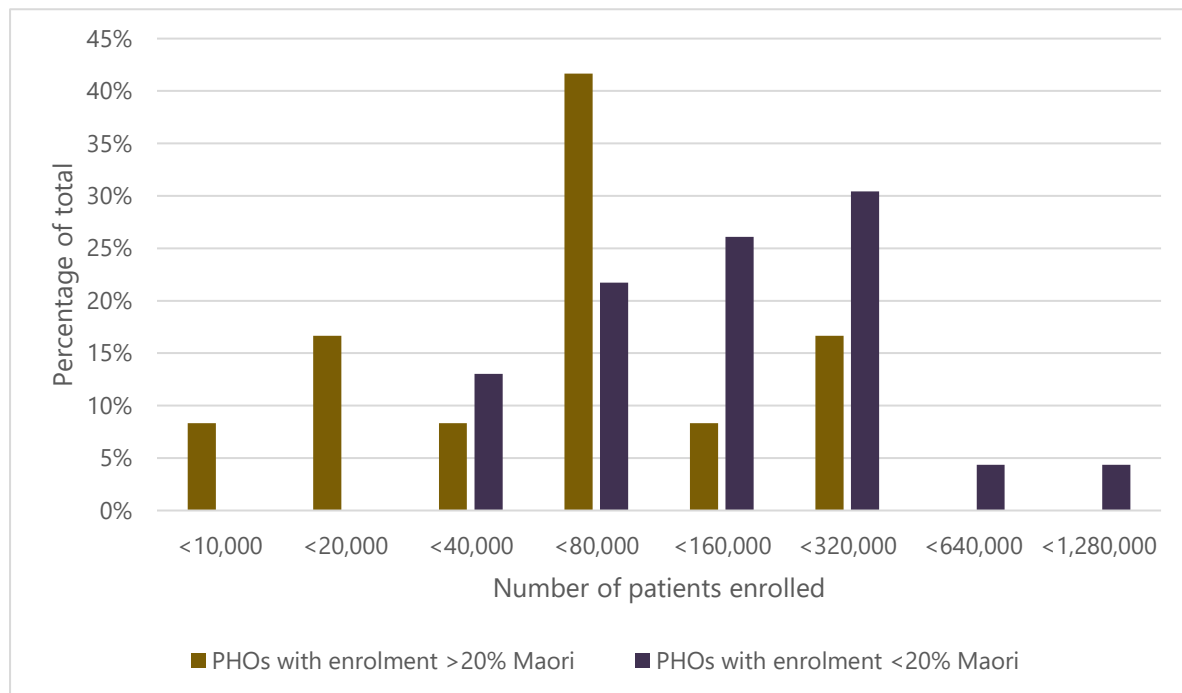


Figure 8 illustrates the distribution of PHOs by size and percentage of enrolled patients who are Māori. The chart shows that the only PHOs that have less than 20,000 enrolled patients have a high Māori population. Also there are very few PHOs with populations larger than 80,000 enrolled patients with a high proportion of Māori enrolled patients. This finding would indicate that if the funding formula is unfavourable to small PHOs, then this has a disproportionate effect on Māori.

2.3 Establishment funding and working capital are challenges for Māori PHOs

When PHOs were established under the Primary Health Care Strategy, funding for the establishment phase was provided by local DHBs, which had authority over the establishment process. Different

DHBs provided significantly varying levels of establishment support for PHOs. There was no national policy or guidance on appropriate levels of PHO establishment resource at the time, or consideration of the working capital that a PHO would need to operate in a sustainable manner.

The issue is compounded by the different origins of different PHOs. Those PHOs that formed from existing organisations brought existing management capacity, and often existing cash reserves which in some cases proved to be substantial. PHOs forming from scratch did not have existing resources to draw upon for the substantial task of setting up a new, complex organisation. No Māori PHOs had any form of existing reserves or accumulated assets.

The inadequacy of the establishment funding that was made available for new Māori PHOs has been clearly articulated by claimants to the Tribunal. However, there is no benchmark against which to assess what an adequate level of funding would have been, and Ministry of Health funding documents are silent on the issue.

Subsequent to the founding of PHOs, around 2009 the Ministry of Health took an interest in PHO reserves, as it became aware that some PHOs had accumulated significant funds that may not be used for patient services. Material released by the Ministry of Health at the time under the Official Information Act provides data on the working capital held by PHOs. This can act as an indication of the resources that different PHOs draw upon for their regular operations, how sustainable they are, and to some extent is likely to reflect the resource available from the time of establishment.

The Ministry's calculation of working capital for PHOs in 2011 finds nine PHOs with negative estimated capital:

- Manaia Health
- Coast to Coast PHO
- East Health Trust
- Alliance Health Plus Trust
- Midland Health Network
- Ngāti Porou Hauora
- Hawke's Bay PHO
- Tamaiti Whāngai PHO
- Ngā Mataapuna Oranga.

In the case of East Health Trust, Midland Health Network, Alliance Health Plus Trust and Coast to Coast PHO, the negative estimate may reflect the trust arrangement of the organisations, in which the funding is channelled from the PHO entity to the operating entity, so no working capital is held. In the case of Hawke's Bay PHO, the negative working capital in the accounts is thought to be a short-term artefact of recent PHO merger activity. In the case of most of these PHOs there are substantial cash balances (up to \$17,978,964 for Midlands Health Network).

The remaining PHOs are Māori. As well as negative working capital they have small cash balances, all under \$1 million, and in two cases less than \$2,000. The exception to this is Manaia, which has a significant cash balance of \$3,321,080.

The Ministry of Health historical calculations of PHO working capital have limitations – they don't necessarily reflect the true underlying financial position of PHOs, particularly when there are complex interactions between different entities. They were also calculated after a period in which there had been an active policy of consolidating PHOs, further complicating the financial position of some of the resulting entities. However the combination of estimated negative working capital and low cash balance applies almost entirely to Māori PHOs, indicating the precarious level of resource available and the challenge of establishing a PHO with limited resources.

The effects of underfunding accumulate over time

Since the widespread introduction of capitation funding in 2003 primary care practices derive their revenue from several sources: capitation funding (an annual payment for each enrolled patient directed through primary health organisations – PHOs); other funding administered via PHOs such as for vaccinations and meeting particular targets; co-payments (the patient fees); and ACC payments.

New access to VLCA funding has been restricted to practices where either 50 per cent of the enrolled population is of Māori or Pacific ethnicity, or in deciles 9 or 10 of the socioeconomic deprivation index. While extra capitation funding is available to these practices, the ceiling placed on co-payments means that VLCA practices are systemically restricted in their ability to raise revenue (as we have shown).

Other initiatives to improve access have since taken place:

- Initially, in 2003 zero fees were available to children under five with a higher capitation payment calculated to compensate practices.
- Zero fees have progressively been added for age groups under 14 years of age.
- Capitation was also increased for the 65+ age group in the early years of capitation funding as observed consultation numbers in this age bracket increased.

Since 2005, the base funding model has been relatively stable. This is shown in Figure 9, which shows that relative funding levels across age brackets have remained the same over the 2005-2020 period.

When casting back from the present period we are confident that the gaps that we have calculated based on today's population mix can be assumed in similar proportions in prior years adjusted for population and price.

Figure 9: First level health services – relative funding by age bracket

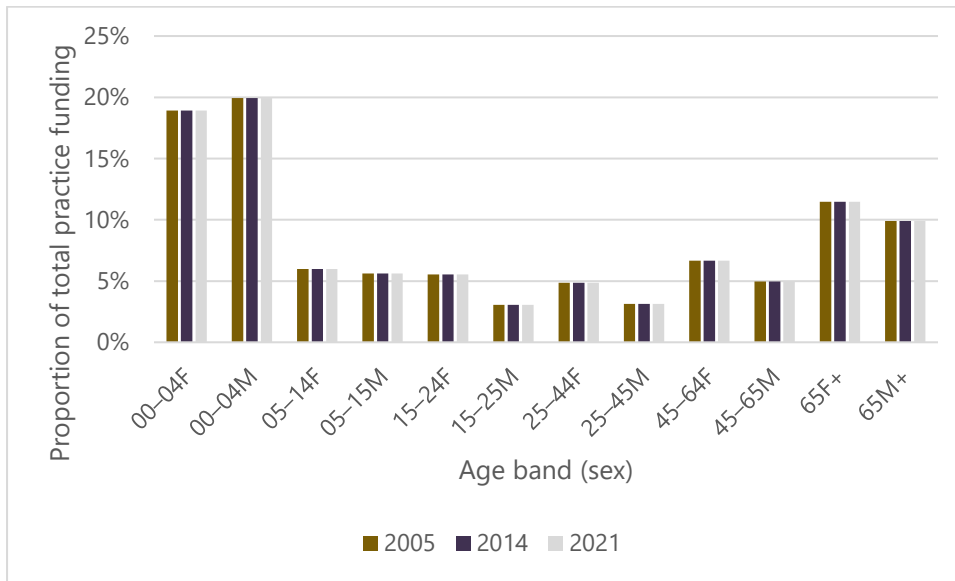
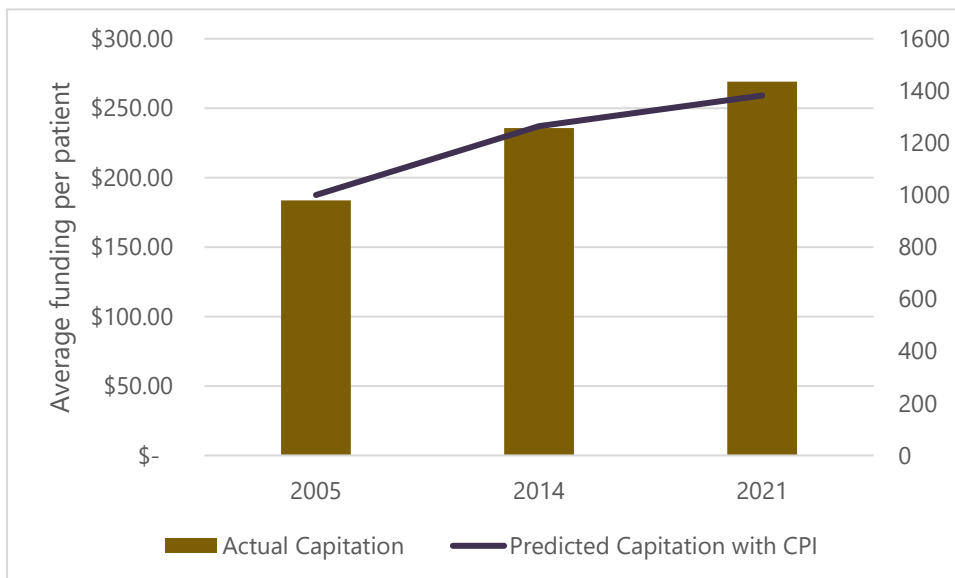


Figure 10 shows that capitation rates have broadly remained in line with consumer price movements. In recent years, however, adjustments have been made in line with cost pressures of practices so that funding is marginally ahead of consumer price movements.

Figure 10: Capitation rates versus CPI



However, if we compare the increases in capitation to the increases that have been available to practices through the reasonable fee increase process, we find that, whereas capitation rates have increased by 46.4 per cent since 2005, the reasonable fee increase process has provided increases of at least 57.8 per cent (between 2006/07 and 2020/21). This has the effect of practices with high capitation revenue as proportion of total revenue (i.e. VLCA practices) being disadvantaged. We have calculated this effect in the first section on VLCA using a different method, but the effect is the same.

We suggest that these changes have had a mixed effect:

- On the one hand, zero fees for younger age groups improve access.

- Greater funding for the over 65s, while welcome, does little to improve access issues for the 45-64 age group, where Māori see higher prevalence of Ambulatory Sensitive Hospitalisations (ASH) than New Zealand Europeans.⁵ Funding for over 65s generally has a lesser funding impact for Māori providers with a younger than average population.

2.4 Summary of underfunding effects

We have looked at underfunding from a number of angles:

- VLCA underfunding
- morbidity gap
- socioeconomic deprivation gap
- unmet need
- clawback
- PHO formula.

We show the combined effect of these effects with sensitivities in the analysis for cost of capital.

Table 2: Summary of underfunding effects – annual

Category	\$ per patient	Subsegment applied to	Total annual value
VLCA underfunding	\$32.01	All Māori VLCA enrolled patients (assume 75%)	\$8.3m
Morbidity gap	\$12.81	All Māori enrolled patients over 18	\$3.2m
<i>Socioeconomic deprivation gap</i>	<i>\$8.11</i>	<i>All Māori enrolled patients</i>	<i>\$2.7m</i>
Unmet need	\$10.63	Māori enrolled population in deprivation deciles 9 and 10	\$3.5m
Clawback	\$6.27	All Māori enrolled patients	\$2.1m
PHO formula underfunding	n.a.	Small PHOs	\$0.4m
Total (not including deprivation gap to avoid double counting)			\$17.4m

⁵ The inequity in ASH rates is explored further in Section Four

Table 3: Summary of underfunding effects – modelled from 2003

Result	Amount (\$ millions)
Total accumulated over time (since 2003)	\$283m
Total accumulated inflated by cost of capital (5%)	\$456m
High scenario (cost of capital = 6.5%)	\$531m
Low scenario (cost of capital = 3.5%)	\$394m

The results show that the accumulated underfunding, expressed in 2020 dollars is \$283m. This calculation is simply the sum of damages adjusted for CPI inflation. However, this calculation does not fully capture the damages.

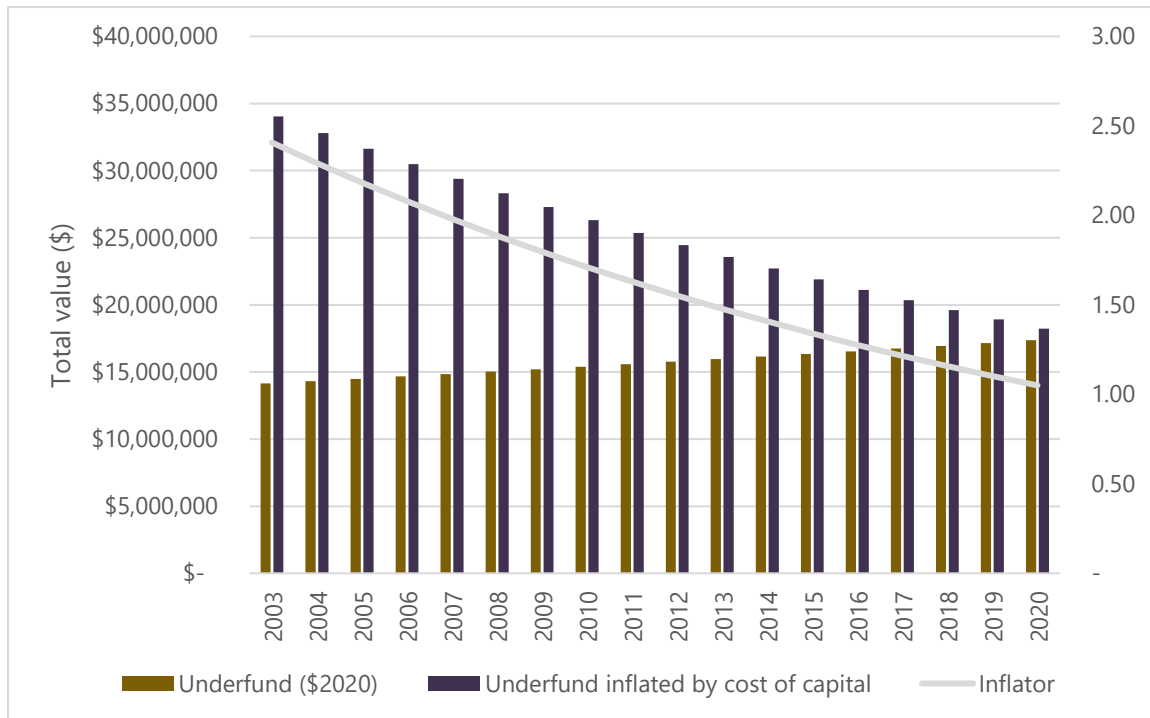
We also need to inflate the shortfall by factoring in a cost of capital. By this we mean that we will express results in today's dollars as if interest had been earned on any additional amount that should have been funded. The weighted average cost of capital takes account of both the interest rate on borrowing for a practice and an appropriate return on equity that measures the risks involved with owning a practice. We have used, for our central estimate, a real discount rate of 5 per cent, which is the Treasury discount rate for health sector investment.⁶

Figure 11 shows the underfund over time. In today's dollars, the total underfund amounts to \$283m since 2003. However, based on the assumption elaborated above about the time value of money, we find that this would be worth up to \$456m if that funding had been provided at the time and invested into health services. Equivalently, it could be seen as a loss to the health system, where the underfunding may have been observed in the form of unmet need, contributions from volunteers, or charitable giving. We have also provided a sensitivity analysis using alternative discount rates of 6.5 per cent and 3.5 per cent.⁷

⁶ <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates>

⁷ Note that the central discount rate we have used here differs from the discount rate used in section 4. The reason for this is that we are using a discount rate to express a financial loss. The Treasury rate implies that a project must have a return that exceeds 5 per cent to proceed: the rate has been set higher over most years going back to 2003. The implication of this threshold is that withdrawing necessary funding will have a negative impact of at least the same percentage, which is what we have calculated. While there are good arguments for using a lower discount rate to commission projects (and we use such a discount rate to annualise willingness to pay in the sense of how people value health looking forward), the reality is that this is the benchmark that has been used to commission past projects and therefore the discount rate that should be used.

Figure 11: Value of underfund



This analysis sets out for discussion what we see as the key systemic elements of underfunding for the Māori population in the core general practice funding formula. There are important elements of the formula that have the effect of reducing funding for general practice services for the Māori population compared to the general New Zealand population.

We have illustrated the impacts of these systemic elements at a practice scale, and shown how they can be aggregated to a national level and estimated over time in a standard economic framework.

This analysis shows a view on underfunding primary care for Māori that is largely driven from a population perspective.

The methodologies set out here demonstrate that several cumulative impacts on underfunding are deeply embedded in the first line general practice services capitation formula. Aspects of these have been recognised by a number of parties over the years, but have not been addressed by any government.

The sustainability of VLCA funding has been widely known to be problematic for some time. The effect that we document here is that the structure of this funding formula has a disproportionate impact on primary health care providers with a high proportion of Māori enrolled in their service – the exclusion of ethnicity and socioeconomic deprivation as a weighting factor means that higher Māori need is not recognised, and that primary health care services that seek to provide care to Māori do not receive funding in proportion to the greater need for their service. This is an inherent bias in the design of the

funding formula, that has the impact of creating a differential impact on people of different ethnicities, meeting some definitions of systemic or institutional racism.⁸

⁸ See for example: Smith C, Tinirau R, Rattray-Mana H et al (2021) Whakatika: A survey of Māori experiences of racism. Te Atawhai o Te Ao Charitable Trust, p16

3. The promise of the Primary Health Care Strategy

This section describes a counterfactual based upon the stated aims of the Primary Health Care Strategy. It describes a world in which effective Māori-developed and -delivered primary health care services arose from the strategy, and considers the investment that would be needed to support that development.

3.1 Health strategy in the early 2000s pointed towards Māori provider development

The health strategic environment in the early 2000s is articulated in several key documents. Aspects relevant to Māori provider development, and to primary care funding are summarised below.

The New Zealand Health Strategy

The context for the Primary Health Care Strategy was set by the New Zealand Health Strategy (NZHS), launched in December 2000. The NZHS identified Māori development in health as a key strategic goal, and set out five objectives to support that goal (NZHS p10):

1. Build the capacity for Māori participation in the health sector at all levels.
2. Enable Māori communities to identify and provide for their own health needs.
3. Recognise the importance of relationships between Māori and the Crown in health services, both mainstream and those provided by Māori.
4. Collect high-quality health information to better inform Māori policy and research and focus on health outcomes.
5. Foster and support Māori health workforce development.

These objectives articulate an intention to develop Māori provision of health care at all levels, from partnership arrangements at the Crown level, to supporting the development of Māori in the health workforce. Among the specific short to medium term areas of development for Māori outlined in the strategy, it identifies a number of work areas that are relevant to Māori health equity, including:

- increased Māori participation at all levels of the public health sector
- increased participation and involvement of Māori health providers across the health sector.

He Korowai Oranga

He Korowai Oranga was the Māori Health Strategy that emerged from the NZHS, launched in November 2002. It refers to monitoring and benchmarking DHB investment in Māori health, and articulates a key expectation for the Crown: that under the newly developed health system structure DHBs would:

address the access barriers that exist for many Māori: cost; availability of quality; culturally appropriate services; travel; referral patterns for major operations; the way outpatient services are organised; and the assumptions health professionals make about the behaviour of Māori.⁹

The Primary Health Care Strategy

The primary Health Care Strategy (PHCS) refers to Māori primary health care provision in several key places. It notes that it is essential that recent gains in Māori health care provision are not lost, and sets out an expectation that:

District Health Boards will continue to contract with Māori providers, and support their further development, so that Māori communities have control over their health and wellbeing. (PHCS p11)

The specific actions it envisages to support this direction are:

- Māori providers and Pacific providers may form primary health organisations in their own communities where it is appropriate for the population.
- District Health Boards will be required to continue to support and further develop Māori providers and Pacific providers.

The PHCS has several specific comments on funding for health services for Māori. It specifically envisages ethnicity as a factor in funding:

Primary Health Organisations will be funded according to a formula that reflects the relative need of their enrolled populations, taking account of factors such as age, sex, deprivation level and ethnicity.

The PHCS envisaged specific service funding for Māori:

...additional services and funding may also be required for some hard-to-reach populations such as Māori and Pacific peoples, refugees and those in remote areas. The costs of reaching such populations are often not sufficiently taken into account in funding formulae.

And notes the importance of reducing co-payments:

...the full benefits of population-based funding will not be realised while a large percentage of providers' revenue is generated through user part charges – the fee-for-service nature of user part charges encourages the continuation of episodic treatment.

Among the specific actions that the PHCS envisaged on funding issues are:

- A national funding formula that reflects the relative need of populations for primary health care services will be finalised.
- Primary health organisations will be not-for-profit entities but will be able to contract for services from private, for-profit providers.

⁹ He Korowai Oranga, p6

- The Government is committed to ensuring that people can afford primary health care services and will move to reduce costs as funds become available.
- Primary health organisations will be encouraged to develop innovative ways of providing services that people can afford.

Broadly, health policy settings in the early 2000s sought to increase the provision of health services for Māori, and especially health services delivered by Māori for Māori, and intended that health service funding be allocated on the basis of need.

3.2 Māori providers offer a comprehensive range of Hauora services

Māori providers in Aotearoa offer a comprehensive range of services, beyond the usual mainstream primary health care services typically funded in a PHO. Moreover, there are emerging practitioner roles that are specific to kaupapa Māori based services. Examples include Rongoa practitioners, and Manawaroa (Resilience) practitioners, who are increasingly found in PHOs and NGOs across Aotearoa. Wairua Practitioners provide support from a distinctive Māori perspective that cannot be found elsewhere. These developments illustrate the innovation that is taking place, and the desire to develop roles that are founded in mātauranga Māori.

Beyond specifically primary health care activity, Māori primary care providers can engage in wider social support, for example by engaging with housing and health initiatives to prevent respiratory illness, or by working with Whānau Ora collectives.

A recent study provides detail of the range of activity provided in a number of contemporary primary health care services.¹⁰ These illustrate the range of professionals involved in current models of comprehensive primary health care.

Ngā Kete Mātauranga Pounamu Charitable Trust

The Trust provides a comprehensive range of services for a high need population with a wellbeing approach.

- Addiction Services – adults 17-years and up and affected whānau
- Problem Gambling Counselling and Health promotion – adults (18-years and older)
- Aronui – Art Therapy Programme using art to explore why participants use substances and to reduce the harm of alcohol and drug use
- Ka Awatea – a programme to reduce burglary recidivism – it has two arms of its service, rehabilitation facilitated by Corrections and an intensive mentoring coach programme facilitated by NKMP
- Te Waka Tūhono – Te Ao Auahatanga Hauora Māori: a Māori Health Innovation Fund programme that builds cultural resiliency and wellbeing for rangatahi aged 14-17 years

¹⁰ *Te Piringa Whānau-centred Māori and Pacific Led Primary Health Care Case Studies*; Te Puni Kōkiri, Ministry of Health, Ministry for Pacific Peoples, 2020

- Restorative Justice conferences directed by judges – focus on redressing the harm experienced by victims
- Iwi Community Panels – a supported resolution process for low-level offenders
- Building Financial Capability Plus – support whānau to manage finances
- Disability Services – support and information for clients with disability
- SOAR – Securing Our Aspirational Realities – helping whānau with disabilities to understand more fully the service options and needs they have to live a full life
- Rongoā/Natural Therapies: including mirimiri, nutrition/hydration advice, lymphatic drainage, relaxation massage and reflexology
- Southern Stop Smoking Service
- Mauri Ora Community Nursing Service
- The Māori Cancer Kaiārahi Service – designed to support Māori and their whānau with high suspicion of/or diagnosis of cancer
- Tauria Tautoko Student Support Centre – NKMP founded and facilitates the centre at Southern Institute of Technology
- Kia Piki te Ora – Māori Suicide Prevention
- He Poha Oranga – Māori Public Health; Child health and parenting, Mental health promotion, nutrition and obesity, Infrastructure: workforce and organisation development, Māori health promotion outcomes framework
- He Puna Waiora – A GP/Nurse/Hauora Service with over 3,500 registered patients and subsidised doctor and nurse appointments
- Three Whānau Ora Navigators are available to assist whānau with social issues, problem solving, connection and linkage to other agencies.

Te Kāika

Te Kāika is an integrated health service based in Dunedin. Its services include:

- Mauri Ora Community Health Services
- Mauri Ora Disease Management
- Tamariki Ora
- Mobile Clinics
- Kaiārahi Māori Cancer Service
- Family Centred Services: Family Violence works with victims of family violence providing information, advice, advocacy, referrals and the development of a safety plan
- Whānau Ora Navigation – building upon whānau capacity
- Middle Eastern Integrated Support Services – supporting Syrian and Muslim families
- Whānau Ora Connect – co-ordinating and planning structured connections for individuals and whānau to increase confidence and awareness of services relevant to need aimed at helping improve whānau wellbeing
- Mokopuna Ora – aimed at families with children aged up to five years old to provide pre-school, education
- opportunities for tamariki

- Hinengaro Hauora Kaiārahi (B4) Youth Suicide – support rangatahi between 14-25 years and their whānau who have self-harmed and/or attempted suicide
- Strengthening Families Lead Agent (MSD)
- Refugee Support Services
- Music School – music lessons for people of all ages and ability.

Ngā Mataapuna Oranga

The Ngā Mataapuna Oranga network of providers works within a Tūāpapa framework, embedded in the values of the local tangata whenua; aspirations of whānau and constitutional goals of Te Tiriti o Waitangi claim: WAI1315.

The range of services provided across the network include:

- Alternative Resolution Enhancement Model – Whānau Ora Navigator/Kaiārahi
- Before School Check Service
- Cervical Smear Taking Services for Priority Women
- Community Based Dietician
- Community Mental Health Services
- COVID-19 Community Outreach and Support
- COVID-19 Immunisation Programme
- COVID-19 Supported General Practice Assessments & Swabbing
- Diabetes Retinal Screening Services
- Family Harm Prevention Service
- Family Start Service
- General Practices – urban and rural
- Hāpainga Stop Smoking Service
- Health Promotion Service
- Home and Community Support Service
- Identity and recovery workshops
- Kaupapa Māori Adult Mental Health Services
- Kaupapa Māori Community Based Alcohol & Other Drug Specialist Services
- Kaupapa Māori Community Respiratory Nursing Service
- Kaupapa Māori Family and Whānau Support, Education, Information and Advocacy
- Kaupapa Māori Infant, Child, Adolescent and Youth Mental Health Services
- Kaupapa Māori Mental Health Workforce Development Service
- Kaupapa Māori Needs Assessment and Service Coordination
- Kaupapa Māori Primary Mental Health
- Kaupapa Māori Respite Flexi Care (Kaumatua Support Service)
- Kaupapa Māori Specialist Nursing Services
- Kaupapa Māori Youth Alcohol and Drug Service
- Long Term Conditions Management Programme

- Māori Champion Services
- Māori Influenza and Measles Vaccination Program 2021
- Mild hyperbaric oxygen therapy
- Mirimiri service
- Nurse Led Kaupapa Māori Community Based Services
- Pulsed electromagnetic field therapy
- Regional Childhood Immunisation Support Service
- Rongoā service
- Smoking Cessation Services
- Supported General Practice, CBACs and Popup Swabbing Initiatives – COVID-19
- Te Waka Niho (Mobile Oral Health Services for infants, children & youth)
- Teen Parenting Service
- Tūāpapa System of Care
- Well Child Tamariki Ora Service
- Whānau Ora – Māori Community Health Service
- Whānau Ora – Kaiārahi Services
- Whānau Resilience Service

The enormous range of activities provided in these services demonstrates the depth of the ambition of Māori health providers in Aotearoa, and the breadth of the concepts of Hauora that are being implemented in services today.

3.3 A comprehensive service by Māori for Māori

If the intent of the health strategy in the early 2000s had been implemented in the succeeding years, it would have been expected both that primary care funding more generally would be well aligned with need, and that Māori health providers would have been strongly supported to develop a comprehensive range of services for their communities. This analysis develops a counterfactual model that indicates what range of roles and services would likely be included in such a model, and estimates the cost of provision for the model.

We provide estimates for two cases: a) an exemplar provider with a population of 5,000 patients and b) for a population equivalent to that of the combined test organisations (332,051).

Based on these respective populations, each PHO is designated a number of professional FTEs that would allow them to offer a comprehensive primary care service. All inclusion criteria for these FTEs are based on:

- The services highlighted in the New Zealand Health and Disability Review as the comprehensive offering that should be available to people in any locality;
- The range of workers employed in Māori health providers captured in the Māori Provider Development Fund.

The total cost of providing care is then extrapolated using MECA agreements to estimate salaries, and the assumption that overheads account for a further 20 per cent of total PHO costs. Sources and estimates for FTEs are discussed in the assumptions section below.

Table 4 details the results of this approach. This figure sets out the estimated cost of delivering the key components of a comprehensive service to a population. Significant elements of this cost are already funded but through other mechanisms rather than via PHOs (for example community pharmacy, or midwifery), but the level of proposed FTE and funding may not be to the level that we propose here.

Age Related Residential Care is not always seen as a core component of primary health care, but the Health and Disability System Review includes it within the definition of comprehensive Tier One services, and we have followed that lead (Health and Disability System Review, 2020).

Table 4: Comprehensive primary care PHO

Profession	FTEs (5,000 population)	Cost 5,000 population (\$000)
Admin – Business managers	2.0	\$240
Admin – Reception staff	6.0	\$312
Admin – Office managers	2.0	\$160
ARC Activities coordinators	0.8	\$39
ARC Caregivers	7.4	\$330
ARC Enrolled nurses	0.8	\$45
ARC Registered nurses	1.4	\$92
Behaviourist	0.5	\$40
Dental hygienists	3.0	\$219
Dental technicians	0.3	\$20
Dentists and dental specialists	2.1	\$375
General practitioners	4.0	\$711
Nurse practitioners	2.5	\$251
Healthcare assistant	2.0	\$90
Kaumātua/Kuia	2.0	\$161
Kaiāwhina	6.0	\$351
Midwives	2.1	\$157
Nurses	4.2	\$338
Psychologists/counsellors	2.0	\$214
Pharmacist	1.3	\$98
Pharmacy interns	0.3	\$15
Physiotherapists	0.3	\$20
Podiatrists	1.5	\$122
Rongoā practitioners	2.6	\$213

Total	57.0	\$4,611
Total cost (inc. overheads)		\$5,764

This model is agnostic to the organisation and means of delivery of services – different providers may organise the specific range of service in a different manner to each other, may prioritise the available FTE resource differently across specific services, or may use different organisational arrangements to manage individual services. The aim of this analysis is not to specify a model, but to estimate a total amount of resource required to deliver a comprehensive primary health care service, conceived as a holistic model with a wider range of services than usual mainstream primary health care services.

3.4 Key assumptions underpin the model

Administrative staff are essential for a comprehensive service

Three forms of administrative staff were deemed essential. These staff included business managers, reception staff, and office managers at rates of two, six, and two (respectively) per 5,000 enrolled patients. These numbers were derived from existing services and doubled to account for high needs populations and the many different services required to be comprehensive. These roles are likely to include elements of service development and quality improvement to support the range of activity across the whole enterprise.

Annual salaries for these staff were estimated at \$120,000 for business managers, \$52,000 for reception staff, and \$80,000 for office managers. The FTEs and salary assumptions resulted in the total costs for admin stated above, which, when combined, represent over 8 per cent of the total cost.

Key source: benchmarked against existing services, using data from Integrated Family Health Centres

Aged Residential Care (ARC) require numerous types of FTEs

ARC staffing requirements were derived from the New Zealand Aged Care Association industry profile. The report provided information on the total number of New Zealanders receiving ARC, split into the type of care each of these patients received i.e. in rest home, hospital, dementia, and psychogeriatric. Further, it detailed the average daily hours each patient required from each type of FTE, in each type of care. For example, each day a patient in a rest home requires 0.36 registered nurse hours, 0.21 enrolled nurse hours, 1.88 caregiver hours, and 0.21 activities coordinator hours.

These figures were used to estimate the annual hours required from each FTE worker, for patients in each type of care. Next, we estimated the total number of patients in each type of care. This step involved calculating the per capita rates of patients in each type of care (for all of New Zealand) and applying these rates to our populations. This calculation estimated the total number of patients that require each type of care, which when used in conjunction with the hours each patient requires, results in total annual hours required from each profession. Dividing these required hours by the hours equivalent to an FTE role results in the FTE requirements stated in our table.

Using the FTE requirements and the ARC specific wages sourced from a New Zealand Aged Care Association survey, the total cost figures were estimated. Notably, there is a significant cost associated

with caregivers. This cost arises from the high FTE account, as patients in each type of care require a high number of caregiver hours.

Key sources: New Zealand Aged Care Association industry profile and a New Zealand Aged Care Association survey.

Behaviouralists/counsellors are required in high needs populations

The number of behaviouralists/counsellors required for high needs populations was explicitly stated in General Practice NZ's discussion paper on workforce and resources for future general practice. This number has already adjusted for high needs populations, meaning no further changes are necessary. Taking this number (given per 10,000 patients) and applying to our populations resulted in the stated FTE requirements.

Salaries were derived from the Allied Public Health MECA. The salary used was taken from the highest annual progression, Step 8. Applying this salary to the number of FTEs for behaviouralists/counsellors yielded the total cost figure seen in our table.

Key sources: General Practice New Zealand – workforce and resources for future general practice, the Allied Public Health MECA.

Dentistry services account for a high proportion of total costs

A comprehensive dental service will require dentists, dental hygienists, and dental technicians to meet the needs of a high needs population. These roles and their numbers were confirmed through consultation with professionals in the industry.

The various dentistry roles' total employee numbers were taken from the Dental Council's annual report. These were then scaled down to avoid dual registering of individuals – by the proportion of total individual dentists to the sum of total registries in each role. Similarly, these were further scaled down by the average FTE counts for the roles, observed from the DHB Multi-Employer Agreements (MECA). This method resulted in total FTE counts for each dentistry role in New Zealand, which were then calculated on a per capita basis and applied to the two exemplar populations. However, after consultation with professionals in the industry, dental hygienists were increased to three per population of 5,000 patients. This was deemed necessary given the significant comorbidities affecting dental health in Māori populations, i.e. type 2 diabetes.

The salary figures for these roles were taken from numerous sources, including the Allied Public Health MECA, the New Zealand Dental Hygienists Association, and the Association of Salaried Medical Specialists. Where appropriate, these figures were inflated to 2021 dollars using the CPI. Combining these with the FTE counts resulted in the total costs for each specified role. As expected, dentists' and dental specialists' high FTE requirements and high salaries meant they represent a significant portion of total costs.

Key sources: the Dental Council's annual report, consultation with professionals, the Allied Public Health MECA, the New Zealand Dental Hygienists Association, the Association of Salaried Medical Specialists.

General practitioners are included in the proposed service

General practitioner requirements for a high needs population were stated in General Practice New Zealand's workforce and resources for future general practice. Given these were adjusted for high needs populations, no further changes were required. This number was applied to our two example populations to get the stated FTE requirements for general practitioners.

The average salary figure for GPs in New Zealand was taken from the New Zealand medical association. This salary figure was used with the estimated FTEs to obtain the cost figures in the above table.

Key sources: General Practice New Zealand – workforce and resources for future general practice, New Zealand Medical Association.

Healthcare assistants are required

The FTE counts for healthcare assistants were derived using Integrated Family Health Centres data, resulting in estimates of 2.0 healthcare assistants per practice population of 5,000. Salaries for these professionals were taken from the Allied Public Health MECA for health assistants. The average salary was estimated by assuming 80 per cent of patients were on the highest step, and the remaining 20 were spread evenly over the preceding steps. Multiplying the FTE count by this average salary yielded the total cost estimates stated in Table 4.

Key source: benchmarked against existing services, using data from Integrated Family Health Centres, Allied Public Health MECA.

Kaumātua/Kuia are essential

The stated FTE counts of 2.0 per population of 5,000 are Sapere's proposal. For salary estimates, these Kaumātua were treated as Rongoā practitioners. Combining these two figures together resulted in the total cost estimates.

Key source: Sapere's suggestion.

A comprehensive service requires a high number of Kaiāwhina

The FTE counts for Kaiāwhina were assumed to be 1.2 for every 1000 enrolled patients. This figure was extrapolated from FTE data provided by Ora Toa – resulting in six FTEs for the example population. Our estimates inflated Ora Toa's populations by 20 per cent to acknowledge current levels of underfunding.

The salary for this service was taken from Local Government New Zealand's salary information for community development workers. Using this figure and the estimated FTEs resulted in the total cost for Kaiāwhina.

Key sources: Ora Toa, Local Government New Zealand.

Midwives are essential in a comprehensive service

For FTE requirements for midwives, we assumed that one midwife is required per 40 births. The birth rate for a high needs population was inferred from Ora Toa's population by taking 20 per cent of the under 5's population. This estimated number of patients under one was then increased using the Māori infant mortality rate (observed from Statistics New Zealand) of 5.18 per 1,000. This adjustment resulted in the FTE counts stated in Table 4.

Salaries for midwives were estimated using the Midwifery Employee Representation and Advisory Service's MECA. This salary estimation assumed 80 per cent of midwives to be on Step 7 of the salary scale and the remaining 20 per cent to be split evenly over the Steps 1-6. The total cost for this service represents just under seven per cent of total costs (including overheads).

Key sources: benchmarked against existing services, the Midwifery MECA.

Both nurse practitioners and nurses are essential

The required FTE numbers for nurse practitioners and nurses were stated in General Practice New Zealand's *workforce and resources for future general practice*. Having already been adjusted for high needs, these found that 5.0 and 8.4 FTE for nurse practitioners and nurses (respectively) were required for a population of 10,000. We adjusted these for our exemplar population. Tamariki Ora services are likely to be nurse led, and may require additional resource.

Salaries for each nursing type were observed from the Mental and Public Health Nursing Ratified MECA. Registered and enrolled nurses were treated similarly to mental health nurses, whereby 80 per cent of these nurses were assumed to be on Step 7 and the other 20 per cent to be split evenly over the preceding steps. However, for nurse practitioners, given the range of salary steps and the unknown numbers of nurse practitioners at each level, the average salary was taken to be Step 5, 2 – an assumption balancing the risk of over/underweighting each end of the scale. Using these salaries and FTE requirements resulted in the figures stated in Table 4.

Key sources: General Practice New Zealand – workforce and resources for future general practice, the Mental and Public Health Nursing Ratified MECA.

Two pharmacy professions are part of the comprehensive service

The number of pharmacists was sourced from a workshop with primary care clinicians and academics – this found a consensus estimate of one per 3,000-5,000 individuals in high needs populations. Pharmacist interns were sourced from the Pharmacy Council's annual reports, calculated on a per capita basis for New Zealand and also applied to the exemplar population.

The salaries for these two professions were estimated using the APEX Pharmacy MECA. For pharmacists, we assume 100 per cent of people are on Step 7 of the scale. Given there were 17 salary steps, with Steps 1 to 7 being achieved through automatic progression, this assumption balances the risk of overweighting and underweighting the salary steps. Interns' salaries were given as a single rate in the MECA. Using these salaries and corresponding FTE numbers, we estimated the total cost figures.

Key sources: consultation with key stakeholders, the APEX pharmacy MECA.

Physiotherapists are necessary to provide a comprehensive service

Physiotherapist FTE numbers were estimated in General Practice NZ's discussion paper on workforce and resources for future general practice. Given these numbers had already been adjusted for high needs, no further adjustments were necessary. These requirements were estimated at 0.5 per 10,000 patients.

Salary figures were taken from the Allied Public Health MECA. To represent a sufficient balance between the risk of overweighting or underweighting each salary step, the highest annual progression step of Step 8 is used. The total cost is then estimated for physiotherapists.

Key sources: General Practice NZ – Workforce and Resources for Future General Practice, the Allied Public Health MECA.

Podiatrists are included as part of the service

Given there is published evidence on the shortage of podiatrists (Carroll, Jepson, Molyneux, & Brenton-Rule, 2020), podiatrist numbers were estimated using approximate per capita ratios of Australia and the United Kingdom. This per capita ratio was inflated by 50 per cent (to account for high needs) and applied to the populations of the two example populations.

The salary for podiatrists was observed from the Allied Public Health MECA. Similar to pharmacists and physiotherapists, the salary was taken at the highest annual progression step, in this case Step 8 – representing a balance between overweighting and underweighting the salary steps. The total cost of podiatrists was then calculated to be just under three per cent of total costs.

Key sources: Research Square – The New Zealand Podiatry Profession a workforce in crisis, the Allied Public Health MECA.

A comprehensive service needs clinical psychologists and counsellors to provide mental health services

Clinical psychologists/counsellors were included for the provision of mental health services. The total number of psychologists was proposed by Sapere.

Salaries for these psychologists were taken from the APEX Psychologists MECA. Given there were merit or designated position salary steps, the average psychologist's salary was assumed to be on the highest annual progression step. This salary was used in conjunction with the FTE estimate to estimate the total cost stated in Table 4.

Key sources: Sapere suggestion, the APEX Psychologist MECA.

Rongoā practitioners are an essential part of the service

The total number of Rongoā practitioners was estimated with some basic assumptions. To estimate the demand for the service, we assume each enrolled patient requires one 20-minute consultation annually, with half the population assumed to have a chronic illness and requiring an additional three. To estimate the FTEs required, we used this demand, along with the capacity of Rongoā practitioners.

The practitioners are expected to spend seven hours each day in consultations, working 45 weeks annually – accounting for four weeks annual leave, two weeks sick and wellbeing leave, and one week for continuing education. This process estimated 2.6 Rongoā practitioners were required for a population with 5,000 enrolled patients.

Rongoā practitioners were treated as enrolled nurses for their remuneration, meaning their salaries were calculated from Mental and Public Health Nursing Ratified MECA. Similar to mental health nurses, we assumed 80 per cent received the top annual progression step, with the remaining 20 per cent split evenly over the preceding steps. This salary information was used with the FTE requirements to estimate the total cost of Rongoā practitioners.

Key sources: benchmarked against existing services, the Mental and Public Health Nursing Ratified MECA.

3.5 Estimated overall funding needed

To gain an overall understanding of the quantum of funding that is needed to deliver this range of services to this level of intensity, we consider four different scenarios:

- the funding needed for the population of the test PHOs
- the funding needed if the test PHOs attracted a larger population, by a factor of 50 per cent
- half of the population of Māori in Aotearoa
- the whole population of Māori in Aotearoa.

Population estimates for the Māori populations are derived from Statistics New Zealand data, using their composition of New Zealand’s total population in the 2018 census and taking 2021 population projections.

These funding levels provide a starting point for establishing a level of underfunding, by comparison with the specific historical funding for providing services that has been made available to any one Māori health provider. To some extent, funding for the roles that we have identified will already flow (for example, fee for service community midwifery, or fee for service subsidies for Agreed Residential Care), but may not be rolled up into a comprehensive package of funding with flexibility for a provider or PHO to manage the resources for their population. An underfunding calculation for a specific provider would require calculating the counterfactual presented here for that population, and comparing with the range of services and funding provided historically for that provider.

Table 5: Total cost

Profession	Cost test populations (\$000)	Cost test populations +50% (\$000)	Cost 50% Māori population (\$000)	Cost all Māori population (\$000)
Admin – Business managers	\$15,938	\$23,908	\$20,508	\$41,015
Admin – Reception staffs	\$20,720	\$31,080	\$26,660	\$53,320
Admin – Office managers	\$10,626	\$15,938	\$13,672	\$27,344
ARC Activities coordinators	\$2,581	\$3,872	\$3,321	\$6,642
ARC Caregivers	\$21,924	\$32,886	\$28,209	\$56,418

ARC Enrolled nurses	\$2,992	\$4,488	\$3,850	\$7,700
ARC Registered nurses	\$6,093	\$9,139	\$7,840	\$15,679
Dental hygienists	\$14,522	\$21,783	\$18,685	\$37,371
Dental technicians	\$1,339	\$2,009	\$1,723	\$3,446
Dentists and dental specialists	\$24,873	\$37,309	\$32,003	\$64,006
General practitioners	\$47,218	\$70,826	\$60,754	\$121,508
Nurse practitioners	\$16,645	\$24,968	\$21,417	\$42,834
Healthcare assistant	\$5,999	\$8,998	\$7,718	\$15,437
Kaumātua/kuia	\$10,677	\$16,016	\$13,738	\$27,477
Kaiāwhina	\$23,310	\$34,965	\$29,993	\$59,985
Midwives	\$10,415	\$15,623	\$13,401	\$26,802
Nurses	\$22,422	\$33,634	\$28,851	\$57,701
Psychologists	\$14,193	\$21,289	\$18,262	\$36,524
Pharmacist	\$6,519	\$9,778	\$8,388	\$16,776
Pharmacy interns	\$1,000	\$1,500	\$1,287	\$2,573
Physiotherapists	\$1,333	\$2,000	\$1,715	\$3,430
Podiatrists	\$8,096	\$12,144	\$10,417	\$20,834
Rongoā practitioners	\$14,123	\$21,185	\$18,172	\$36,345
Total	\$303,559	\$455,338	\$390,583	\$781,167
Total cost (inc. overheads)	\$379,448	\$569,173	\$488,229	\$976,459

3.6 Sensitivity analysis

A sensitivity analysis will provide an understanding of how the uncertainty of our estimates can influence our results. To calculate the upper/lower estimates, we add/subtract 25 per cent from the total cost of the five most expensive professions in our model – these included general practitioners, psychologists, dentists and dental specialists, kaiāwhina, and nurses. This calculation was completed for the four example populations, resulting in the figures shown in Table 6.

Table 6: Sensitivity of costs for the four example PHOs

	Cost for test population (\$000)	Cost for test population +50% (\$000)	Cost for 50% Māori population in Aotearoa (\$000)	Cost all Māori population in Aotearoa (\$000)
Upper estimate	\$412,452	\$618,679	\$530,695	\$1,061,390
Lower estimate	\$346,445	\$519,667	\$445,764	\$891,527

Results are relatively stable around the total cost, with only moderate level shifts between the upper and lower estimates.

4. The cost of underfunding borne by Māori as health burden

This section develops a novel approach to estimating the cost of underfunding primary health care for Māori. This cost is seen in the avoidable burden of disease for Māori compared to the rest of the New Zealand population.

It is widely known that Māori experience broad health inequities (amongst other social outcomes and areas) in New Zealand. For instance, Māori not only experience higher rates for many chronic and infectious diseases, but their prognoses for these are often worse. At an overall level, Māori life expectancy is lower.¹¹

The Ministry of Health uses the following definition of health equity.¹²

“In Aotearoa New Zealand, people have differences in health that are not only avoidable but unfair and unjust. Equity recognises different people with different levels of advantage require different approaches and resources to get equitable health outcomes.”

We focus on the first part (avoidable, unfair, and unjust differences) in estimating the cost of health inequities. However, the importance of the second part should not be passed over. That is, *equal inputs* do not result in *equitable outcomes*.

4.1 Framework – how we can approach a valuation of the degree of outcome inequity

The starting point to valuing *inequity* is to define what *equity* would look like. We take a broad view and define equity as where the average health status (and outcome) for Māori individuals is *equal* to the average health status (and outcome) of non-Māori individuals. For equity to be achieved, this definition requires the net combination of incidence/prevalence with prognosis across all diseases and disabilities to be equal. That is, it is not enough for just the rate of incidence or prevalence to be the same, or the relative prognosis of a person with the same disease to be the same.

The approach we have developed is based upon publicly available data. These data are typically in absolute figures, that is, counts or sums for a population. While these give an idea of overall health status and health burden, the area of interest here is inequity. We therefore use differences in *rates* between Māori and non-Māori to represent the inequity, or ‘excess’ health loss.

There are some updates and further work that might further refine the model, which we detail later in this section. There are three primary steps in the approach we have developed.

There are three main steps in our methodology:

¹¹ <https://www.health.govt.nz/our-work/populations/Māori-health/tatau-kahukura-Māori-health-statistics/Ngā-mana-hauora-tutohu-health-status-indicators/life-expectancy>

¹² <https://www.health.govt.nz/about-ministry/what-we-do/work-programme-2019-20/achieving-equity>

1. Estimate the total burden of health inequity experienced by Māori. This is estimated using the disability-adjusted life year (DALY) framework. We use the New Zealand Burden of Diseases, Injuries and Risk Factors Study (NZBD) as the basis for this estimate.
2. Estimate the proportion of this burden that might be avoidable had primary health care for Māori been adequately funded. We use a combination of hospital discharges (disaggregated by primary diagnosis) and mortality (disaggregated by primary cause of death) to generate the proportions.
3. Translate this burden into monetary terms to enable simple understanding of the scale and size of the health inequity burden. We use the value of statistical life estimate from the Ministry of Transport as the basis for this conversion.

For our proof of concept, we estimate the cost of health inequity due to underfunding in primary health for the year ended June 2018. This is the most recent year that the required data is available to (required data detailed further later).

To value the total cost from lack of underfunding since the implementation of the PHCS, we would adopt this approach detailed here for each relevant year. On balance, we suggest the timeframe should start from 2011. This would have enabled time for changes to primary health care to be implemented, and health impacts from these would start to be seen. We note that some health impacts are seen earlier, although many may not have been seen until much later, depending on the intervention and relevant diseases and disabilities. On the other hand, some health events/outcomes seen in the period may have arisen from lack of adequate health care prior to the introduction of the PHCS.

4.2 Disability-adjusted life years and what they mean

Disability-adjusted life years (DALYs) are commonly used to measure the burden of disease and disability in health economics. They are a unit of measure of lost health and account for both losses in length (mortality) and quality of life (morbidity). Therefore, the DALY is made up of two components:

- Years of life lost (YLL). This component represents the loss in health from premature mortality. It is estimated as 'remaining life expectancy' at the age of death.
- Years lived with disability (YLD). This component represents the loss in health from decreased quality of life. It is the combination of the length of time lived in a 'health state' (measured in years) and the severity of that health state, the 'disability weight'. A disability weight is measured on a scale from 0 (perfect health) to 1 (a health state equivalent of death).

The zero to one scale for disability weights means that YLL and YLD are commensurate. For instance, under the DALY framework, one year of life lost due to premature mortality is equivalent to two years of life lived in a health state with a disability weight of 0.5. The two components add together to form the DALY loss.

We use 'Excess DALYs' to represent an estimate of the inequitable health burden faced by Māori. Excess DALYs (and their components) are estimated as the difference between:

- the DALYs experienced by Māori; and

- the DALYs Māori would have experienced if the DALY loss per capita were the same as non-Māori.

The DALY framework is a narrow, individualistic, and Western conceptualisation of health burden. However, we use this approach due to the availability of data, and to enable comparability and comprehension of our results. The Māori view of health is much broader, and based on the wider concept of wellbeing, relating to both the individual and whānau.

4.3 The 2013 NZ Burden of Disease Study

For our proof of concept, we use the data from the NZBD to form the basis of our total health inequity burden, measured in DALYs (Ministry of Health, 2013). Results of this study were first published in 2013 and are based on data from 2006. However, this is the most recent study that estimates and details health loss for Māori and non-Māori separately.¹³ We also note that the estimates are specifically for Māori and non-Māori and do not detail other ethnicities. This approach may underestimate the full health inequities faced by Māori as non-Māori includes Pacific ethnicities, which are another group that faces large health inequities (Ryan, Grey, & Mischewski, 2019). DALY based analysis can also be criticised as ableist, since it places differential values on states of disability.

As the NZBD outputs are based on 2006 data, we adjust the inputs for population and epidemiological trends. For population, we adjust our estimation by population growth, for each five-year age band for Māori and non-Māori separately.¹⁴ We then apply epidemiological growth trends estimated by the Ministry of Health NZBD to the YLL and YLD components for each age band.¹⁵ This increases the original inequitable DALY burden of approximately 68,000 DALYs to 100,000 DALYs.

Table 7: DALY and Excess DALY estimations

	Māori			Non-Māori		
	2006	2018	Change	2006	2018	Change
Population	624,000	793,000	27%	3,560,000	4,010,000	13%
DALY	159,000	234,000	47%	796,000	1,007,000	27%
YLL	90,000	132,000	47%	396,000	494,000	25%
YLD	69,000	102,000	48%	400,000	513,000	28%
Excess DALY	68,000	100,000	48%			

¹³ We understand that the Ministry of Health are now working with the World Health Organisation using the Global Burden of Disease approach to develop burden of disease estimates by ethnicity for New Zealand. This includes using more recent data and an updated approach. However, this is not available as at the time of writing

¹⁴ 2006 population data is from the 2006 Census, while 2018 data uses the Ministry of Health population projections 2019 update for the 2017-18 financial year.

¹⁵ We take the 2006-2016 percentage differences, convert to a CAGR, and then adjust to 2018. This equates to an increase in YLD of 7.7% and decrease in YLL of 1.0%. This methodology assumes that the epidemiological changes are similar across age and ethnicity. Whilst this is unlikely, we do not have these estimates at the more granular level.

	Māori			Non-Māori		
	2006	2018	Change	2006	2018	Change
Excess YLL	49,000	72,000	47%			
Excess YLD	19,000	28,000	48%			

Source: NZBD, Statistics New Zealand, Ministry of Health, Sapere calculations

The table above shows values at the aggregate level. However, the calculations were applied by five-year age band.

4.4 Estimating the impact of primary health care delivery

Based on the adjusted NZBD outputs, our approach decomposes the overall health burden into that which might be avoided with access to comprehensive and effective primary health care. We estimate this proportion for YLD and YLL separately. The two calculations use different data sources but are similar in approach. The overall approach develops a fraction where the denominator represents the health inequity faced by Māori. The numerator represents the inequity faced by Māori which could have been avoided by adequate primary care, as described by the PHCS.

We use the below definitions in the following sections.

$$excess\ rate_{event} = \frac{events_{Māori}}{population_{Māori}} - \frac{events_{non-Māori}}{population_{non-Māori}} \quad (1)$$

$$excess\ events = excess\ rate_{event} \times population_{Māori} \quad (2)$$

$$primary\ attributable\ proportion = \frac{excess\ events_{primary\ avoidable}}{excess\ events_{total}} \quad (3)$$

$$excess\ PAHL = primary\ attributable\ proportion \times excess\ health\ loss \quad (4)$$

Where 'excess PAHL' is the excess primary health care attributable health loss.

4.4.1 Excess YLD from primary health care underfunding

The proportion of YLD inequity associated with primary health care underfunding is estimated using hospital discharge data. Total excess events are calculated from total discharges, while primary avoidable events are calculated from ambulatory sensitive hospitalisation discharges (ASH).^{16,17}

ASH events are defined as:

"mostly acute admissions that are considered potentially reducible through prophylactic or therapeutic interventions deliverable in a primary care setting."

¹⁶ We exclude discharges that have an ICD code starting with 'Z'. These are discharges relating to 'factors influencing health status and contact with health services'. The majority of these relate to birth, or readjustment and rehabilitation. While these may show important insight into inequities, it is likely that any inequities in health losses are captured in other discharge events.

¹⁷ The definition used for ASH conditions is as per the Ministry of Health (2018).

Therefore, our 'primary attributable proportion' for inequity in YLD is the proportion of that excess ASH events make up of excess discharges. If excess discharges roughly proxy excess morbidity, then it makes sense that excess ASH events is the equivalent for primary care associated morbidity. While excess discharge and excess ASH events may not perfectly proxy excess YLD and excess PAHL YLD respectively, it is the ratio that is important. This can be seen by combining equations (3) and (4), rearranging and substituting in our metrics, generating equation (5). Equation (5) shows that it is the ratios that are important. That is, the proportion of excess discharge events that are excess ASH events proxies the proportion of excess YLD that is potentially avoidable through equitable primary care.

$$primary\ attributable\ proportion_{YLD} = \frac{excess\ PAHL_{YLD}}{excess_{YLD}} = \frac{excess\ events_{ASH}}{excess\ events_{discharges}} \quad (5)$$

Taking the extremes, equation (5) can be explained intuitively through the two scenarios below.

- If there are no excess ASH events, there are no overall differences between primary care morbidity outcomes between Māori and non-Māori. Therefore, the primary care attributable proportion for YLD is zero, and it follows that the excess PAHL for YLD is also zero.
- Similarly, but opposite, if excess ASH events equal excess discharge events, all differences in morbidity are due to differences in primary care. That is, the only reason (at the aggregate level) there is a difference in discharge rates (a proxy for total health burden) is due to excess ASH events, which are potentially avoidable through adequate primary care.¹⁸

We note that not all ASH events are avoidable. However, much of the noise from unavoidable ASH events should be removed as we consider only the excess ASH events. That is, there will be unavoidable ASH events in the both Māori and non-Māori statistics, but the impact of these should be removed when we take the difference in rates. Similarly, the noise from differences in reporting/handling of ASH events and discharges should be reduced when taking the excess values.

We show the results of this approach for our 2018 proof of concept. As ASH events are only publicly available for children aged less than 5 and adults aged 45 to 64, we have only completed calculations for these age groups (Ministry of Health, 2018). ASH is still applicable for age groups (typically up to 74 years), and could be included to form a more complete view if this data were collected.

Table 8: Excess years lived with disability – year ending June 2018

Age	Excess PAM/SAM rate	Excess mortality rate	YLL primary attributable proportion	Excess YLL All cause	Excess YLL PHCS
<5	0.015	0.013	1.17	517	604
45 to 49	0.024	0.063	0.37	2,064	772

¹⁸ Note that it is possible for the primary attributable proportion to be greater than one. This indeed is the case for children less than five years old. This is discussed further with the results of our proof of concept.

50 to 54	0.034	0.072	0.48	2,164	1,033
55 to 59	0.042	0.095	0.45	2,408	1,077
60 to 64	0.055	0.124	0.45	2,225	993
Subtotal				9,378	4,478

The results show that, for the adult age bands, the primary attributable proportion for YLD is between 37 and 48 per cent, resulting in a total of almost 3,900 YLD lost. Interestingly the proportion is greater than one for those aged less than five. This means that there were more excess ASH events than excess discharge events. In other words, there may be some non-primary care associated burden of disease that afflicts non-Māori more in this age group (decreasing excess discharge events, but not impacting excess ASH events for non-Māori).

Alternatively, this could also mean that Māori children are experiencing differential access/reporting for hospital events. The greatest rate differences where non-Māori children experience more hospital discharges than Māori primarily relate to diagnosis codes under the “Certain conditions originating in the perinatal period” and “Congenital malformations, deformations and chromosomal abnormalities” groups. This may warrant further attention as the model is further refined from the proof of concept.

Excess YLL from primary health care underfunding

The proportion of YLL inequity associated with primary health care underfunding is estimated using mortality data. Total excess events are calculated from total mortality, while primary avoidable events are calculated from primary and secondary avoidable mortality codes, as defined by Tobias & Jackson (2001). The authors define primary and secondary avoidable mortality as the following:

Primary avoidable mortality (PAM) groups conditions that are preventable, whether through individual behaviour change (i.e. lifestyle modification) or population level intervention (i.e. healthy public policy). The condition is prevented before it develops by addressing its risk or protective factors: ‘primary prevention’.

Secondary avoidable mortality (SAM) groups conditions that respond to early detection and intervention, typically in a primary health care setting. As well as clinical preventive services such as cancer screening, it includes chronic disease management intended to delay the progression of diseases such as diabetes or the recurrence of events such as heart attacks or strokes (e.g. through the monitoring and management of high blood pressure). This approach constitutes ‘secondary prevention’.

The authors also define tertiary avoidable mortality (TAM) as:

Tertiary avoidable mortality (TAM) includes those conditions whose case fatality rate can be significantly reduced by existing medical or surgical treatments

(typically, but not necessarily, in a hospital setting), even when the disease process is fully developed. This constitutes ‘tertiary prevention’.

While TAM may include some treatments available in primary care, we exclude these as they are more likely to be related to in-hospital care. This could lead to understatement of primary care attributable inequities in mortality.

In addition, the categorisation and proportional assignment to PAM, SAM and TAM was generated many years ago, and medical knowledge, practice and technology has moved on considerably. As such, it is likely that the true assignment may have changed since then, typically increasing assignment toward primary and secondary prevention. This also works to understate the attribution to primary care. As such, it is likely that the results of our proof on concept are likely to be conservative.

Similar to the YLD equation, by using mortality and the combination of PAM and SAM, the YLL equation is shown in equation (6)

$$\text{primary attributable proportion}_{YLL} = \frac{\text{excess PAHL}_{YLL}}{\text{excess}_{YLL}} = \frac{\text{excess events}_{PAM,SAM}}{\text{excess events}_{mortality}} \quad (6)$$

Again, similar to the YLD estimates, it is the ratio of excess PAM and SAM to excess mortality that is important. In addition, not all PAM and SAM events are avoidable through, but again, much of this noise should be taken out when looking at the *excess*.

Data are only available publicly for calendar years, with the most recent final data available being for the year ended December 2017 (Ministry of Health, 2021). For simplicity we keep the same base population. As the period for the data is not largely different, we consider that the use of this data would approximate the same primary attribution proportion for YLL as data to June 2018. In future applications of this model, we suggest aligning all data to the same periods, where possible. While data are available for all age bands, we only provide results for the same age bands as ASH are available for consistency.

Table 9: Excess years of life lost – year ending June 2018

Age	Excess PAM/SAM rate	Excess mortality rate	YLL primary attributable proportion	Excess YLL All causes	Excess YLL PHCS
<5	0.0001	0.0004	0.41	7,488	3,104
45 to 49	0.0012	0.0021	0.57	5,185	2,940
50 to 54	0.0023	0.0039	0.58	6,927	4,008
55 to 59	0.0037	0.0057	0.65	7,924	5,177
60 to 64	0.0056	0.0089	0.63	10,554	6,605
Subtotal				38,078	21,834

Again, the primary attributable proportion is reasonably similar for the adult age bands, ranging from 57 to 65 per cent. These are higher than the equivalent YLD proportions. On the other hand, the proportion for those under five is much lower, both compared to adult YLL and child YLD proportions. Some of these differences for children may be due to relatively small numbers.

4.5 Valuation of the burden

Valuing health and life is very contentious. As such, there is very little consensus on the way to attribute a monetary value to DALYs. We are currently unaware of any studies that consider assigning a monetary value to DALYs that also adjusts for any societal value for *inequity* (i.e. the value of inequitable DALYs).

Again, monetising the impact of lost health is a very Western concept. The commonly used conversions have not been generated from a Māori perspective. However, we take this approach to enable relative comparison, consistency, and comprehension of the scale of the impact.

The two most common methods that are used in the literature to monetise DALYs fall into two categories.

- Willingness-to-pay (WTP) methodologies. These methodologies typically estimate the value of health or life through either revealed preference or stated preference approaches. The monetised value is the result of the question “how much are you willing-to-pay for...?”. In this case, it would be how much are you willing to pay to reduce a specified loss in health.
- Cost-effectiveness threshold methodologies. These methodologies are typically used in health economics to help determine if a health intervention would be considered cost-effective, or ‘value for money’. For instance, the United Kingdom’s National Institute for Health and Care Excellence typically considers an intervention cost-effective if it would cost between £20-30,000 per quality-adjusted life year (QALY), or of course, less.¹⁹ Similarly, the World Health Organisation has often used the concept that a health intervention is cost-effective if it would cost between one and three times the annual GDP per capita per QALY.

In many ways these are similar approaches. The cost-effectiveness threshold methodologies are assumed to implicitly have answered the willingness-to-pay value for a DALY averted/QALY gained. That is, a society is willing to pay up to the threshold for a DALY averted/QALY gained.

Where the approaches differ is what is considered within the “value” of a QALY gained versus the value of a DALY averted. Cost-effectiveness thresholds are typically used where the only societal benefit is the health benefit itself, the QALYs gained, and typically only to the individual treated. The

¹⁹ A quality-adjusted life year (QALY) is similar in concept to a DALY. It also accounts for quality and length of life, although does so on the opposite scale, that is one QALY is equal to one year lived in perfect health, whereas one DALY is one year of perfect health lost. Due to the nature of the measures, QALYs are typically used for health technology assessments which ask the question “how much health can we gain (and for what cost)?”. DALYs on the other hand are typically used in burden of disease studies, which ask the question “how much health are we losing?”

willingness-to-pay methodologies are more likely to include wider societal factors into the value of a DALY averted.²⁰ These could include the value of lost productivity and impacts on whānau.

On balance, we undertake a willingness-to-pay approach. This approach is more likely to reflect the wider societal values relating to health loss. In addition, willingness-to-pay approaches are widely used outside of health, and therefore this may give a better comparison to non-health valuations. We are also unaware of any cost-effectiveness thresholds publicly available and used in New Zealand.

The most common willingness-to-pay figure in New Zealand is the value of value of statistical life (VOSL), maintained by the Ministry of Transport. This value represents the willingness-to-pay to avoid a fatality from a road crash. It was originally estimated in 1991, and updated by indexing to average hourly earnings. The most recent value, for 2019, is \$4.53 million per fatality (Ministry of Transport, 2020).

While generated for the specific purpose outlined above, we use this as our base as it is the most widely used and available figure in New Zealand that considers the value of a life.

The total \$4.53 million is used to represent the 'social cost' of a road fatality. We therefore need to adjust this to reflect the social cost of a DALY. We calculate the value of a statistical life year (VSLY) to be \$192,350 using the information in Table 10 to convert from the VOSL. We equate the VSLY to the value of a DALY incurred.

Table 10: Conversion of Value of Statistical Life to Value of Statistical Life Year

	Value	Source
VOSL	\$4.53 million	Ministry of Transport (2020)
New Zealand median age	37.6	Statistics New Zealand (2021)
Remaining life expectancy (for median age)		
Male	44.7	Statistics New Zealand (2021)
Female	47.7	Statistics New Zealand (2021)
Average (simple 50:50 weighting)	46.2	
Discount rate	3.5%	Discussed below
Discounted remaining life expectancy	23.5	
VSLY	\$192,350	

²⁰ Alternatively, the willingness-to-pay to avert a DALY could be considered the compensation value for incurring a DALY.

4.5.1 Discount rate

It is unknown what discount rate was intrinsically attached to the original VOSL estimate.

In economics, discounting is common-place and widely accepted. It is based on the concept that people would generally prefer to receive a benefit now, rather than the same benefit in the future, or alternatively incur a cost in the future rather than the same cost now. It allows comparison of different valuations where the time horizon is different.

Where there is less consensus is around the 'correct' discount rate. High discount rates would often penalise long-term prevention strategies which are required for a sustainable health sector. As such Due to the relatively long-term outcomes often seen in health, health economists typically argue for relatively low discount rates. For instance, PHARMAC uses a 3.5 per cent per annum discount rate in their cost-effectiveness analyses (Pharmaceutical Management Agency, 2015), while the default Treasury rate is current five per cent per annum for "most social sector projects".²¹

Given the VOSL measures the societal cost of a fatality, which includes lost years of life far into the future, we opt to use the lower PHARMAC rate. This is used to discount the remaining life expectancy.

4.6 Final estimates

The final estimates set out the total monetised value of inequity arising from poor access to appropriate primary care for Māori. The overall estimate is slightly in excess of **\$5 billion**.

Table 11: Monetised value of health burden from underfunding of primary care

Age	Excess YLD	Excess YLL	Excess DALY	Monetised YLD (\$millions)	Monetised YLL (\$millions)	Monetised DALY (\$millions)
<5	604	3,104	3,708	116	597	713
45 to 49	772	2,940	3,712	148	566	714
50 to 54	1,033	4,008	5,040	199	771	970
55 to 59	1,077	5,177	6,253	207	996	1,203
60 to 64	993	6,605	7,599	191	1,270	1,462
Subtotal	4,478	21,834	26,313	861	4,200	5,061

²¹ <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates>

4.7 What does this mean for investment in Māori primary health care?

The cost of underfunding and under-provision of primary health care for Māori is borne by Māori. For just 30 per cent of the 2018 Māori population, we estimate the health loss in 2018 due to inadequate primary care is valued at **\$5 billion**.²² This does not include the cost to the health system of subsequent treatment. We have not valued this. However Ministry of Health (2009) found that, for long-term conditions, most studies estimate that indirect costs are similar to the direct health care costs.

On the other hand, investment in improving health outcomes typically costs considerably less. For instance, PHARMAC's average cost per quality-adjusted life year for new investments has ranged from \$4,200-\$32,300 (PHARMAC, 2016-2020). If current direct health care costs are indeed similar to our estimated indirect costs, this could mean that appropriate investment in primary health care would be cost-saving in the longer term.

4.8 Limitations, improvements and other matters

In this section, we have developed a methodology for estimating the social value of health losses for Māori that are attributable to under provision of primary health care. We have modelled the use of this using publicly available data for the under five and 45-64 year-old Māori population for the year ending June 2018. If this methodology were to be used to estimate all health losses attributable to lack of fulfilment of the PHCS we make the following suggestions.

4.8.1 Time horizon for assessment: 2011-onwards

We suggest that the timeframe for assessment should start from 2011. This timeframe would have enabled time for changes from the PHCS to come into effect for many health outcomes. There may have been impacts would have occurred earlier, however, there are also likely to be longer-term impacts that occur post 2011, but are due to events prior to the PHCS.

4.8.2 Collection of ASH data for all age-bands

Data for ASH admissions are only publicly available for the under 5 and 45-64 year olds. However, there are definitions for ASH admissions for ages up to 74 years of age (inclusive). ASH is typically not defined for 75+ ages. This is because it is more difficult to ascertain underlying cause of hospitalisation (and attribution to primary care) due to the complexity of comorbidities and other areas of health status.

It may be appropriate to extend the age group for the ASH definition under our methodology. This is because we use relative excess events/rates between Māori and non-Māori. That is, under an equitable health system, the complexity factor should be similar between Māori and non-Māori, and

²² Due to differences in relative health outcomes by age group, we do not extrapolate this value out for the entire Māori population.

therefore the 'error' rate of attribution to primary care should be similar. This is removed when taking the difference between the rates in our methodology.

Along with this, accuracy could also be improved if the lowest age band currently used, under five, was split into under one and one to four. This is because the health status is very different for these two groups, with under ones requiring significantly more health care provision.

4.8.3 Updated burden of disease estimates

Our current methodology relies on the burden of disease study that uses data from 2006, with the burden calculated in 2013. More recent (up to 2019) health burden estimates for New Zealand are available. However, currently there has not been an update that assesses the burden for Māori and non-Māori separately. We understand that this work is currently being undertaken. We suggest that if this data becomes available, it should be used. Ideally, the data would also enable a comparison between Māori and non-Māori, non-Pacific people. This would give a more accurate measurement of the inequity gap, as Pacific people also suffer from health inequities. Comparing Māori with non-Māori is likely to underestimate the full impact of inequities.

The general methodology outlined in this report would remain appropriate with the updated data.

4.8.4 Updated avoidable mortality mapping

The avoidable mortality conditions and weights used in this our proof of concept were from a 2001 study. These were generated by expert opinion. As knowledge of health conditions and interventions change over time, it is likely that the conditions and weights are no longer the same. We suggest an update to this work would improve the accuracy of our methodology. Overall, it is likely that avoidable mortality is higher than this mapping suggests. This is because health knowledge and interventions improve over time, increasing what might be considered avoidable, and typically shift treatment from tertiary toward primary care.

Depending on the relative mix of changes in avoidable mortality and relative rates of mortality due to certain conditions between Māori and non-Māori, this could shift the primary attributable proportion for YLL either way. However, given general trends, and the point below, we believe that our estimate is more likely to underestimate than overestimate the cost.

In addition to updating the mappings, accuracy could be further improved if definitions were slightly altered from the original paper to look at primary interventions and treatments. Some interventions and treatments that occur in a primary care setting may be included in the tertiary preventable mortality. This is likely to underestimate the attribution to primary care.

4.8.5 Updated monetisation estimate

The VOSL value used here was originally estimated in 1991 and has since been indexed to current terms based on average hourly earnings. We understand that work is underway by the Ministry of Transport to update the VOSL estimate (Ministry of Transport, 2020). If this update becomes available, it would be worth investigating to see if this can be used as a better estimate of the social value of life (and a proxy for health).

Alternatively, conducting research on the social value of health and life for New Zealander's (ideally for different social, cultural and economic groups) may provide further accuracy and insights. This could help start to bridge the gap between the Western practice of monetisation and the Māori philosophy of hauora.

5. A methodology for estimating the underfunding of Māori primary care services

5.1 Key components of the methodology

In summary, we have proposed three components to a methodology for estimating the underfunding of Māori primary health care services. Those three components are:

- estimates of direct underfunding compared to need, arising from the base funding formula for primary health care services provided through PHOs
- estimates of the cost of delivering a comprehensive primary health care service to a Māori population, consistent with the vision of the Primary Health Care Strategy
- estimates of the consequential impact of not providing access to comprehensive primary health care for Māori in Aotearoa.

We have set out these approaches, and we have conducted proof of concept analysis to establish that they are feasible.

5.2 Methodological strengths and weaknesses

We note a number of methodological strengths and weaknesses in the approaches that have been developed. In our view there are several points to consider:

1. We have generally tried to use information that is available in the public domain, so that the methodologies are reliant upon information that is transparent and open to replication by other parties.
2. The estimates of direct underfunding are based upon publicly available weights for funding general practice services. The values of the weights and actual distribution of need in Māori populations are generally matters of accepted fact, and the lack of weighting for ethnicity and socioeconomic deprivation in the first contact services PHO funding formula is a matter of public record. There is little ambiguity about this element of the estimates.
3. Our estimates of the counterfactual cost of providing a comprehensive primary health care service for a Māori population are based upon a series of assumptions. These are all open to debate by other parties, but we have based most of our assumptions upon publicly available information that can be verified by other parties, and we have estimated costs on the basis of public sector employment agreements. The key issue with this element of the methodology is agreement on the FTE of roles needed to deliver the service. While some aspects of this could be debated, and some may dispute the range of roles that we have included in this model, we have considered the major cost components of the model, and we have found relatively low sensitivity to the overall cost on the basis of those FTE estimates.
4. In the circumstance that stakeholders may question assumptions about the roles and FTEs included in our depiction of a comprehensive primary health care service, there is an implied responsibility to propose a constructive alternative. If not the assumptions proposed here, then what alternative assumptions about a comprehensive range of services should be made?

- We have estimated the monetized value of the consequential harm of not providing access to effective primary health care for Māori in Aotearoa. A key methodological debate here is the applicability of the proportion of ASH rates in hospitalisation as a method for apportioning the component of overall disease burden that is attributable to primary health care. We believe that this is the most straightforward approach on the basis of widely available information. This component of the methodology provides an approximation, rather than a precise estimates, but we suggest that the value of the finding arises as an indication of the order of magnitude of the result (which is very large), rather than as a detailed estimate.

Our estimate of the monetised equivalent of the health inequity for Māori is, to our knowledge, the first attempt to do so. We note that there are several directions that such analysis could be taken in the future. In particular, updated burden of disease estimates are due to be released in the near future, and our estimates should be updated to reflect these once they become available. More broadly, we think that this approach could be further developed by trying to establish or identify a more holistic, but still quantitative, measure of health than burden of disease estimates that would better reflect Māori concepts of Hauora. This would make estimates with the methodology more representative of the true inequity in health outcome that exists for Māori.

The methodological approaches proposed in this report rely upon available data and a degree of judgement. However, our view is that the broad results that emerge are consistent, demonstrate widespread underfunding of Māori primary health care from multiple perspectives, and are unlikely to change substantially under realistically alternative assumptions.

5.3 Applying the methodology

We have applied the approaches we have developed, in order to demonstrate as a proof of concept that the methodologies outlined here are feasible with readily available information. We summarise the overall results as:

Results of direct underfunding methodology

As a demonstration of the magnitude of the estimates that our approach generates, we present a series of results for a group of organisations with a total population of 332,051, covering the enrolled populations of Ngā Mataapuna Oranga PHO, Hauraki PHO, Ngāti Porou Hauora, Ora Toa PHO and the National Hauora Coalition. We refer to this as the test population. The test population encompasses all of the Māori PHOs in the country and many, but not all, Māori practices in the country. The aggregate annual result is extrapolated back to 2003 and adjusted by the cost of capital to reflect the opportunity cost of the underfunding.

Result	Amount (\$ millions)
Total accumulated over time (since 2003)	\$283m
Total accumulated inflated by cost of capital (5%)	\$456m
High scenario (cost of capital = 6.5%)	\$531m
Low scenario (cost of capital = 3.5%)	\$394m

Results of the promise of the Primary Health Care Strategy

We present the results of modelling a comprehensive primary health care service for a) the populations of the test organisations; b) the populations of the test organisations if they had grown by 50 per cent; c) the cost of providing the service to 50 per cent of Māori in Aotearoa; and d) the cost of providing the service to all Māori in Aotearoa. These are annual costs in 2020 dollars.

	Cost for test population (\$000)	Cost for test population +50% (\$000)	Cost for 50% Māori population in Aotearoa (\$000)	Cost all Māori population in Aotearoa (\$000)
Upper estimate	\$412,452	\$618,679	\$530,695	\$1,061,390
Lower estimate	\$346,445	\$519,667	\$445,764	\$891,527

Results of valuing inequity in health outcome for Māori

The cost of underfunding and under-provision of primary health care for Māori is borne by Māori. For the 2018 Māori population aged under five, and between 45 to 64 (for whom ASH rates are prepared by the Ministry of Health), we estimate that the annual health loss in 2018 due to inadequate primary care is valued at \$5 billion.

5.4 Implications

In directing that this work be conducted, the Tribunal noted that there is an element of supporting compensation discussions that will draw upon these methodologies. The Tribunal also noted that, since a number of Māori PHOs no longer exist, there is also a role for a future focused discussion on supporting the development of additional Māori primary health organisations and providers. The methodologies proposed here can contribute to both compensation and to forward focused discussion of Māori primary health care services in the following ways:

- We have estimated the direct underfunding of Māori primary health services in light of the core primary health care funding formula that is widely used for PHOs with high need populations. This may contribute to the kōrero on compensation, noting also a number of additional elements on establishment funding and PHO management costs.
- We have estimated the cost of providing a comprehensive primary health care service to a Māori population. This may contribute both to an historical discussion on compensation (in light of the gap between actual funding and the funding needed to deliver upon the vision of the Primary Health Care Strategy), and to a more future focused discussion on supporting Māori provider development and the future shape of services that should be funded within a comprehensive primary health care service for Māori.
- We have estimated the monetised equivalent of the inequity caused by lack of access to effective primary health care services for Māori. This finding is relevant both for understanding the degree of consequential harm that has been caused, and for discussion about compensation, but also for a future focused discussion about investment. The

magnitude of harm (or the monetised equivalent) that is experienced by Māori in Aotearoa given the failings of primary health care presents a context in which to consider what the magnitude of future investment in primary care for Māori should be.

Overall, we have considered the problem of developing a methodology for estimating the underfunding of Māori primary health care in several ways. We hope that these methodologies will support a constructive discussion both about the history and future of Māori primary health care in Aotearoa.

References

- Carroll, M., Jepson, H., Molyneux, P., & Brenton-Rule, A. (2020, December). The New Zealand podiatry profession-a workforce in crisis? *Journal of Foot and Ankle Research*, 13(1), 1-7.
- Health and Disability System Review. (2020). *Health and Disability System Review - Final Report - Pūrongo Whakamutunga*. Wellington: HDSR.
- Ministry of Health. (2009). *Report on New Zealand Cost-of-Illness Studies on Long-Term Conditions*. Wellington: Ministry of Health.
- Ministry of Health. (2013). *Health Loss in New Zealand: A report from the New Zealand Burden of Diseases, Injuries and Risk Factors Study, 2006–2016*.
- Ministry of Health. (2018). SI1/SLM data by DHB of Domicile to June 2018. Retrieved from https://nsfl.health.govt.nz/system/files/documents/pages/si_1_-_report_-_data_to_2018q2_wiesnz14_-_v1.04.xlsm
- Ministry of Health. (2019, October 1). *Achieving equity*. Retrieved from Ministry of Health: <https://www.health.govt.nz/about-ministry/what-we-do/work-programme-2019-20/achieving-equity>
- Ministry of Health. (2019). *Māori Health Disability Statistical Report*. Wellington.
- Ministry of Health. (2021, January 18). *Equity*. Retrieved from Ministry of Health.
- Ministry of Health. (2021, April). *Mortality web tool*. Retrieved 06 11, 2021, from https://minhealthnz.shinyapps.io/mortality_webtool/
- Ministry of Transport. (2020). *Social cost of road crashes and injuries - June 2019 update*.
- Ministry of Transport. (2020). *Transport Evidence Base Strategy - Progress Report December 2020*.
- Pharmaceutical Management Agency. (2015). *Prescription fo Pharmacoeconomic Analysis: Methods for cost-utility analysis*.
- Ryan, D., Grey, C., & Mischewski, B. (2019). *Tofa Saili: A review of evidence about health equity for Pacific Peoples in New Zealand*. Wellington: Pacific Perspectives Ltd.
- Smith C, Tinirau R, Rattray-Mana H et al (2021) Whakatika: A survey of Māori experiences of racism. Te Atawhai o Te Ao Charitable Trust
- Statistics New Zealand. (2021, April 20). *Naitonal and substational period life tables: 2017-2019*. Retrieved from Stats NZ: <https://www.stats.govt.nz/information-releases/national-and-subnational-period-life-tables-2017-2019>
- Statistics New Zealand. (2021, February 18). *Population*. Retrieved from Stats NZ: <https://www.stats.govt.nz/topics/population>
- The Treasury. (2020, September 18). *Discount Rates*. Retrieved from <https://www.treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates>

Tobias, M., & Jackson, G. (2001). Avoidable mortality in New Zealand, 1981-97. *Australian and New Zealand Journal of Public Health*, 25(1), 12-20.

Walsh, M., & Grey, C. (2019). The contribution of avoidable mortality to the life expectancy gap in Māori and Pacific populations in New Zealand—a decomposition analysis. *NZ Med J*, 132(1492), 46-60.

Woodhams, N. (2016). *The sustainability of very high-needs primary care practices in a capitated environment*. National Hauora Coalition.

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