

# Equity in access to zero-fees and low-cost Primary Health Care in Aotearoa New Zealand: results from repeated waves of the New Zealand Health Survey, 1996-2016

Equity in access Primary Health Care in Aotearoa New Zealand

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## Conflict of Interest

Declarations of interest: MT has since taken employment with The New Zealand Treasury. The Treasury is in no way affiliated with the research and the author declares no conflict of interest.

## Highlights

Access to low-cost primary health care has improved since the launch of the Primary Health Care Strategy

Access to low-cost care is particularly high for Pacific people

Current health policy does not ensure equity for Māori

# Abstract

Primary Health Care in Aotearoa New Zealand is mainly funded through capitation-based funding to general practices, supplemented by a user co-payment. Funding is designed in part to keep the costs of care low for key groups in the population who have higher health needs. We investigated changes in the socio-demographic determinants of no-cost and low-cost access to Primary Health Care using data from sequential waves of the New Zealand Health Survey (1996/97 to 2016/17). Fees paid were self-reported and inflated using CPI-adjustment to the value of the 2018NZD.

Over the 20-year study period, there was an increase in the population accessing low-cost care. Access to low-cost care was particularly high for Pacific people, but also higher for Māori and Asian people compared to Other/New Zealand European ethnicities. Area-level deprivation was a stronger predictor of access to low-cost care for non-Māori than for Māori. Although Māori were more likely than non-Māori to access low-cost care at all levels of deprivation, this was less evident in more deprived compared to more affluent areas. Given ongoing reported inequity for Māori being less able to afford primary health care, we suggest that future policies to improve access should be fully aligned with the articles of Te Tiriti o Waitangi and should focus on equity.

## Keywords

Primary Health Care; Fees, Medical; Health Equity; Health Expenditures; Out of Pocket payments; Co-payments

# Introduction

The health system in Aotearoa New Zealand is a mixed model; secondary care services are fully funded through 20 government-owned District Health Boards (DHBs), whereas general practitioners (GPs) work in a private capacity in general practices, funded mainly through a mixture of government capitation funding and user co-payments.

The 2001 Primary Health Care Strategy (PHCS) provided significant levels of new government funding. It aimed to: i) shift the focus of primary health care (PHC) towards preventative and population health, ii) improve access to care, and iii) reduce inequities in access to care, particularly for Māori (tāngata whenua, the indigenous people of Aotearoa New Zealand), Pacific peoples, and those on low incomes. [1, 2] One of the key changes introduced as part of the PHCS was the establishment of Primary Health Organisations (PHOs), which are contracted by DHBs to oversee the delivery of PHC services. Another major change was the introduction of weighted capitation payments to PHOs for patients registered with them, rather than the government directly paying GPs on a fee-for-service basis. The annual level of capitation varies by age, gender and eligibility for a High User Health Card.[3] An additional capitation fee is payable by the DHB to each PHO for users with a Community Services Card (a means-tested benefit), and for users in practices which have signed up to the Very Low-Cost Access (VLCA) scheme.[4] For practices within this scheme, the co-payments (as at 2018) were capped at \$18.50 for adults, \$12.50 for those aged 14 to 17 years and are free for under 14 year-olds.[4] Non-VLCA practices can opt in to receiving an additional capitation payment for under 14 year-olds, in return for offering zero fee visits. These practices set their own level of co-payments for all patients.

A number of evaluations of the PHCS have been conducted. Briefly, they show that in the early years of the PHCS (2001-05), the new funding led to lower co-payments, with a concomitant increase in the average number of GP visits per year.[5] A more recent analysis found that patients' reported co-payments did not reduce further from 2002/03-2006/07 [6]. In addition, several recent pieces of work, including claims to the Waitangi Tribunal, demonstrate that the PHCS is not compliant with the articles of Te Tiriti o Waitangi [7-9].

Te Tiriti o Waitangi, negotiated between Māori leaders and the British Crown in 1840, affirms the right to collective tino rangatiratanga (autonomy, self-determination, sovereignty, self-government), recognised in contemporary Māori health policy as including the right to provide health care [10, 11], and the right to equitable health outcomes [9, 12, 13]. As a consequence of past and current breaches of Te Tiriti, including a failure of the Crown in relation to PHC care to i) hold the ~~PHC primary health care~~ sector to account and reports on its performance in relation to Māori health, a failure of the Crown to ii) ensure that Māori have adequate decision-making authority and influence when it comes to the design and delivery of ~~primary health care~~ PHC services, and a failure of the Crown to iii) properly resource and support ~~Māori-controlled~~ PHOs and health providers to deliver quality health care to Māori communities, Māori experience the worst health outcomes of any population group in Aotearoa New Zealand.[9] Of particular concern in relation to PHC is that Māori experience nearly two--and--a--half times the rate of amenable mortality and over 60% higher rates of ambulatory-sensitive hospitalisations than non-Māori, suggesting lower access to PHC[14].

The estimated 4.9 million total population of Aotearoa New Zealand comprises 17% Māori, 8% Pacific peoples, 15% Asian and 70% “Other” ethnicities (note these add to more than 100%, as people can identify with more than one ethnicity).[15] The majority of the “Other” population are New Zealand European, i.e. of European (primarily British) descent. Key contributors to ethnic inequities in health include differential access to the determinants of health and health care, as well as differences in the quality of care received, [16] each of which is the case for Māori [17]. Māori are exposed to very different education [18], employment, income and housing opportunities compared with non-Māori [19], and this current and intergenerational inequity has resulted in over half of Māori now living in the most deprived areas of Aotearoa New Zealand. There is also extensive evidence of the impact on Māori of differential access to health care at all levels of service provision.[17] For example, 22% of Māori adults in the 2018/2019 New Zealand Health Survey (NZHS) reported not visiting their GP because of cost in the previous 12 months, compared to 13% of the Other/New Zealand European ethnicities. [20] However, it is unclear to what extent Māori have or have not benefited from policies introduced to improve access to PHC since the introduction of the PHCS.

To investigate this, we: i) report on trends in fees paid to access PHC in Aotearoa New Zealand, spanning the time of the introduction of changes that occurred as a result of the PHCS, up until 2016/17; ii) report on socio-demographic determinants of access to zero-fees and low-cost PHC; iii) whether these determinants differ for Māori and non-Māori and iv) explore potential explanations of ~~inequity in~~ access to low-cost/-zero-fees PHC for Māori.

## Materials and Methods

Data on the cost of seeing a GP were obtained from the NZHS. This is a national survey that was conducted in 1996/97, again in 2002/03 and 2006/07, and which has been constantly in the field since 2011/12, with updates released annually. The NZHS has a complex design, which has changed over the years of the survey. Full details for each wave are available [21]. Briefly, interviews are conducted face-to-face in respondents' homes. For most questions, the interviewer enters responses directly into a laptop using Computer Assisted Personal Interviewing software. 'Show-cards' with predetermined response categories are used to assist respondents. Response rates ranged from 68% to 80% and were higher in more recent years. The number of respondents since in the 2002/03 survey ranged from 12,488 to 13,781; in 1996/97 there were 7,869 respondents. The surveys are repeated cross-sectional surveys, not a longitudinal survey of the same participants.

Statistics New Zealand provided access to the survey Confidentialised Unit Record Files (CURFs), i.e. individual level data that have been modified to protect confidentiality.[22] Over the various waves of the NZHS, there have been changes in how questions were asked and/or how the data were categorised at the time of collection. These are described in relation to relevant variables below. Analyses here are based on the adult (age 15 year and over) data.

Data on fees paid were self-reported, based on the most recent GP visit. The fees data were recorded in \$10 categories for the first two waves of data collection, in \$5 categories for 2006/7, and as an exact amount since then. The midpoint of the categories of fees, as collected in the first three survey waves, was used for the analyses. For the uppermost



category, the fee used was \$5 greater than the category limit for 1996/7 and 2002/3, and \$2.50 greater than the category limit for 2006/7. From 2011/12 onwards, the exact fee paid, up to \$199, was recorded. Costs were adjusted for inflation using the Consumer Price Index (CPI), by multiplying the fees paid by the ratio of the CPI of the 4<sup>th</sup> quarter of 2018 to the CPI of the 4<sup>th</sup> quarter of the relevant year. CPI data was obtained from the New Zealand Reserve Bank website.[23]

In the NZHS, participants can report multiple ethnicities. The prioritised system is commonly used in Aotearoa New Zealand for analyses of health data,[24] in which Māori who identify only as Māori, or as Māori and one or more ethnicities, are categorised as Māori; Pacific peoples who identify solely as Pacific, or Pacific and one or more ethnicities other than Māori, are analysed in the Pacific group; and likewise for Asian people. The remainder of the population are analysed as a non-Māori, non-Pacific, non-Asian group, hereafter termed the “Other” ethnicities group. A further analysis compared access to zero-fees and low-cost PHC for Māori to non-Māori.

Social determinants of health were measured using a measure of area-based deprivation, highest attained education and household income. Deprivation was measured using the New Zealand Deprivation Index (NZDep). This measure relies on census data to categorise small areas (Census Area Units, CAU) according to levels of deprivation. Different iterations of the NZDep measure were used in the NZHS, NZDep91 for 1996/97; NZDep96 for 2002/03; NZDep03 for 2006/07; NZDep06 for 2011/12 to 2013/14, and NZDep13 from 2014/15 onwards. Statistics New Zealand matched the place of residence of the participant to the

relevant CAU, and the data have been analysed in NZDep quintiles, based on the national distribution of the deprivation levels for the reporting year.

The question used in the NZHS identifying the highest level of education changed over time. To allow for comparisons, we categorised it as follows: none or no secondary level qualification; secondary school qualification; post-secondary, non-degree qualification; or university degree.

The categories used to record household income changed across waves of the survey. An indicator of low income was created, based on the category closest to 60% of the median household income for that year.[25, 26] The absolute cut-offs for low income were thus defined as under \$20,000 in 1996/97; under \$30,000 in 2002/03 and 2006/07; under \$40,000 for each year from 2011/12 to 2014/15; and under \$50,000 in 2015/16 and 2016/17. As 19.4% of the survey respondents did not answer the question on income, a dummy variable of non-response was included in all analyses involving the income variable. Sensitivity analyses was used to investigate whether this dummy variable approach was appropriate or not. Multiple imputation using chained equations was performed, based on all the variables used in the multivariable analysis, i.e. year of survey, age, sex, ethnicity, NZDep, education and the GP co-payment made. Some analyses were restricted to the 2011/12 data onwards, as the income data were recorded more consistently in later years. A further sensitivity analysis was conducted, using equivalised household income instead of total household income. This takes into account the household composition i.e. the number of people in the household and their ages. Due to lack of clarity around who in the household is dependent on the household income, and changes in how data on household composition were measured over time, this

was conducted as a sensitivity analysis rather than in the main analysis, and based on data from 2012/13 to 2016/17 only. Equivalised income was calculated using the modified Organisation for Economic Co-operation and Development (OECD) scale [27]. The midpoint of each income category was divided by the household composition value, which was based on a value of 1 for the adult respondent, an additional 0.5 for each extra adult and 0.3 for each child.

The NZHS was approved by the Multi-Centre Ethics Committee. The current analysis received an out-of-scope letter from the Health and Disability Ethics Committee (Ministry of Health, dated 17/5/19).

## Statistical Analyses

To investigate trends in fees paid to access PHC, the proportion of people who paid no fee to their GP, and the median (CPI-adjusted) fee paid, were calculated for each survey wave. These proportions and medians were plotted over time, by ethnicity and deprivation level.

To understand socio-demographic determinants of access to zero-fees and low-cost PHC for Māori and non-Māori, we defined low-cost access as a fee paid of greater than \$0 up to \$20 (in 2018 NZ\$). The \$20 cut-off was used to include the fees paid to VLCA practices, once inflated by the CPI. Logistic regression was used to estimate Odds Ratios (ORs) of the association between socio-demographic factors and access to zero-fees and low-cost PHC separately, and the association between access to PHC for Māori and non-Māori, by differing

levels of socio-economic measures. The analyses of zero-fees PHC access were restricted to those people who had seen a GP in the previous 12 months and compared those who reported paying \$0 to those who reported paying over \$0. The investigation of low-cost PHC access was limited to those people who had seen a GP in the previous 12 months and compared those who reported paying \$1 to \$20 to those who reported paying over \$20, i.e. did not include people who paid \$0.

To investigate potential explanations of ~~inequity in~~ access to PHC for Māori, logistic regression was used to estimate ~~OR of the~~ Māori/non-Māori OR ~~inequity~~, adjusting sequentially for potential explanatory socio-demographic factors. To address whether either Māori or non-Māori who are exposed to more than one measure of socio-economic deprivation experienced a greater or lesser chance of accessing low-cost care, models with multiplicative statistical interaction between the two socio-economic variables were run, separately for Māori and non-Māori. To simplify the interpretation of these models, the socio-economic variables were dichotomised: high deprivation was defined as NZDep quintile 4 or 5; low education was defined as no post-secondary qualifications. As recommended by VanderWeele [28], results of the tests of interaction were reported with a common reference category, e.g. low deprivation and high education level.

All analyses were conducted using the integrated survey weights, accounting for clustering by primary sampling unit and strata, as appropriate for each survey wave. The results presented are, therefore, broadly representative of the Aotearoa New Zealand population. Analyses were conducted in Stata v14, using the survey ("svy") suite of commands.

## Results

The analyses are based on 111,657 individuals from nine waves of the NZHS, aged 15 years and over. These included 25,171 (22.5%) Māori, 6,850 (6.1%) Pacific peoples, 9,312 (8.3%) Asian people and 70,324 (63.0%) Other/New Zealand European ethnicities. The median age was 46 years (inter-quartile range 32 to 62 years). A total of 22,727 individuals (20%) reported that they had not seen a GP in the previous 12 months, so were excluded from the analysis. Of the remaining 88,930 participants, 4,276 (5%) had missing data on the fee that they paid, and a further 355 people were excluded, as they reported having paid the equivalent of over \$150 (CPI-adjusted) at their last visit; this is likely due to having an extended or specialised consultation. The resulting dataset (84,299 people) included 7,546 who had had a zero-fees consultation at their last visit, and 17,930 people who had paid between \$1 and \$20.

### Trends in fees paid to access PHC, 1996/7 to 2016/17

The median fee paid, inflated using CPI to the 2018 NZ\$ value, rose from \$24 in 1996/97 to \$35 in 2002/03, was then static to 2006/07, and rose from 2006/07 to reach \$37.98 in 2011/12. For the following four years there were small decreases (<\$1) in the median fee, followed by a rise since 2014/15, culminating in a median cost of \$39.34 in the most recent survey wave (2016/17). The median fee paid varied by ethnic group (see Supplementary Figure 1). In recent years (2011/12 to 2016/17) there have been small reductions in fees paid by Māori, small increases for Pacific peoples, large increases for Asian people and small increases for “Other/New Zealand European” ethnicities.

The median fee paid decreases incrementally across deprivation categories, from \$43.48 in the most affluent areas in 2016/17 to \$19.6720 in the most deprived areas (see Supplementary Figure 2). Over time, the people in the most deprived areas have continued to pay lower fees. It is of note that people in NZDep4 are the only group to pay higher median fees in recent years compared to 2002/03. Additionally, in recent years, people living in all but the most deprived areas have experienced an increase in fees.

Who is most likely to access zero-fees and low-cost PHC?

Overall, 26% of people accessed zero-fees or low-cost PHC, including 45% of Māori, 60% of Pacific peoples, 40% of Asian peoples and 19% of the Other/New Zealand European ethnicities group. For the remainder of the analyses, results were separated into zero-fees and low-cost PHC, as the policies relating to each differ currently in New Zealand. The

association between socio-demographic factors and each of these outcomes is shown in Table 1. Access to zero-fees PHC was higher in the earlier years of the study, and continued to reduce in recent years. Concomitantly, access to low-cost care increased dramatically between 2002/03 and 2011/12. Younger people are most likely to access zero-fees PHC, but there is little difference in the accessing of low-cost care across age groups. The data suggest that women are less likely to access low-cost PHC than men. Among ethnic groups compared to the Other/New Zealand European ethnicities group, Māori were over twice as likely to access zero-fees care, and Pacific peoples over eight times as likely to access low-cost care, although this was substantially attenuated following adjustment for area-based deprivation. Māori and Asian peoples were over twice as likely as “Other/New Zealand European” ethnicities to access low-cost care.

People living in the more deprived areas, and in households with lower incomes, were more likely to access both zero-fees and low-cost care than those in more affluent areas or with higher incomes. Those who did not report their income were also more likely to access low-cost care. People who had received less formal education appeared more likely to receive free care, but this was explained by adjusting for age and ethnicity, and actually reversed when income and deprivation were taken into account, so that in the multi-variable model, those with degree-level education were the most likely to access free care, but least likely to access low-cost care.

The results based on the imputed dataset were only minimally different from the analysis of socio-demographic factors and access to free or low-cost care presented in Table 1. For example, the fully adjusted OR of accessing low-cost care among people on a low compared to higher income was 1.38 (95%CI: 1.28 to 1.49), whereas the equivalent OR based on the complete case analysis was 1.36 (95%CI: 1.27 to 1.45). Similarly, comparable results were found for all other variables. The sensitivity analysis to investigate the use of equivalised household income instead of crude household income indicated that the former is more strongly associated with accessing low cost PHC. Restricting the data to those from 2012/13 onwards (the period for which reliable equivalised income data were available) found the association between low crude income and higher income was 1.33 (95%CI: 1.22 to 1.44), whereas the association between low equivalised income and higher income was 1.54 (95%CI: 1.40 to 1.68).

*Insert Table 1 about here*

Do socio-economic predictors of access to PHC differ for Māori and non-Māori?

Socio-economic predictors of access to zero-fees and low-cost care are shown in Table 2. Area-level deprivation was strongly related to access to zero-fees and low-cost care in Māori and non-Māori. However, there were differences: for zero-fees care, the magnitude of the effect appeared stronger in Māori, whereas the opposite was true for low-cost PHC; in this case, the magnitude of the effect appeared stronger in non-Māori. The associations between very low levels of education and zero-fees or low-cost access were greater in Māori than non-Māori. This was partially explained by area-level deprivation; education is a stronger predictor of living in a more deprived area in Māori than in non-Māori. Restricting the analyses to the more recent years (2011/12 onwards), when the VLCA scheme was fully established, made little material difference to the results, although the association between deprivation and access to low-cost care was marginally strengthened for both Māori and non-Māori.

*Insert Table 2 about here*

Potential explanations of zero-fees/-low-cost inequity in access to PHC for Māori.

Estimates of access to zero-fees and low-cost care for Māori compared to non-Māori are shown in Table 3. Māori are twice as likely to access zero-fees care compared to non-Māori, but half of this excess was explained by socio-demographic variables; in multi-variable models, Māori were 55% more likely to access zero-fees care. Similarly, for low-cost care, over half the excess probability of Māori accessing this type of care was explained by socio-demographic variables, and Māori remain at 77% higher chance of accessing low-cost care in multi-variable models.



*Insert Table 3 about here*

When the data were stratified by deprivation level, it was evident that Māori were more likely to access zero-fees and low-cost care at all levels of deprivation. We considered *a priori* that Māori living in the most deprived areas might be the most likely to access low-cost care, given where VLCA practices are located. However, we found that Māori in the most affluent areas were over twice as likely as non-Māori to access low-cost PHC. Restricting the analyses to the more recent years (2011/12 onwards), when the VLCA scheme was fully established, made little material difference to the results, although the association between Māori/non-Māori ethnicity and access to low-cost care was marginally strengthened in all deprivation strata.

To address whether there is a mutually beneficial or detrimental effect of experiencing more than one measure of deprivation in relation to accessing zero-fees or low-cost care, models were re-rerun, separately for Māori and non-Māori, with two-way interactions between the measures of socio-economic deprivation. Results are presented in the Supplementary Table. For most models, no interaction was found, suggesting that exposure to multiple measures of deprivation does not increase or decrease the chance of accessing zero-fees or low-cost care. However, there were a few instances in which interactions were found. For access to zero-fees care, a positive interaction between education and deprivation among non-Māori was found. This suggests that non-Māori with low levels of education who also live in more deprived areas are more likely to access zero-fees primary care than would be expected, given the independent effects of deprivation and education. This interaction was not seen for Māori. Regarding access to low-cost care, three negative interactions were found: between

income and deprivation for non-Māori, and between income and education for Māori and non-Māori. This suggests that people that are exposed to two sources of deprivation were less likely to access low-cost care than expected given the independent effects of each measure when acting singly. Although the magnitude of the association between income and education variables were partially explained by deprivation, the interactions persisted following adjustment for quintiles of deprivation.

## Discussion

The PHCS and later PHC policies included funding changes that were designed to increase access to low-cost PHC, via the introduction of a weighted capitation formula, new funding to enable reductions in co-payments, and a VLCA scheme which pays providers more if they keep co-payments below a certain amount. We have found that that this has resulted in an increase in the population accessing low-cost care over time. Access to low-cost PHC is particularly high for Pacific people, but also higher for Māori and Asian people compared to Other/New Zealand European ethnicities. On more detailed examination, however, the policy appears not to have benefitted all people equally. Area-level deprivation is a stronger predictor of access to low-cost care for non-Māori than for Māori. Although Māori were more likely than non-Māori to access low-cost care at all levels of deprivation, this was less evident in more deprived areas compared to more affluent areas. We also found that people with both low income and low education levels, and non-Māori with low levels of income living in deprived areas, are not benefiting from low-cost access to PHC as much as we would expect.

The strengths of the current study are that it is a national survey, weighted to account for population differences in Aotearoa New Zealand. The results are, therefore, likely to be generalisable to the population as a whole. This is one of the first analyses to investigate changes in the fees paid to GPs, and determinants of access to zero-fees and low-cost PHC. We also analysed fees paid using medians not means, and although the latter are commonly reported on, they are not an appropriate measure for a variable that has a bimodal and/or skewed distribution.

We are limited in our analyses by the choice of questions and the degree of missing data in the surveys since the question related to fees was only answered by those people who had seen a GP in the previous 12 months. Some of these people would not have accessed further care due to lack of need; these people are likely to be younger and materially better off than those who have accessed care due to a medical problem. On the other hand, this group would also include those who have had a need to see a GP, but have not been able to, because of cost or another reason. A recent investigation of this was conducted using Heckman selection modelling, in which having seen a hospital specialist (which is free in Aotearoa New Zealand) was used as an excludable instrument to control for selection effects. The results from this analysis made no difference to the ethnic differences in the average fees paid, compared to ordinary least squares regression methods. However, controlling for selection reduced the difference in fees reported by high and low income earners.[6] We were also limited to analysing crude rather than equivalised household income, due to limitations in the collection of household composition over time. As the sensitivity analysis showed that equivalised

household income is more strongly associated with access to PHC, it is likely that the use of crude household income has resulted in some misclassification, and thus attenuation of results. The household income findings should therefore be interpreted with caution.

Full interpretation of the results is also somewhat limited by the reliance on self-reporting of the fee paid. This is unlikely to have differentially biased the results across different socio-demographic groups, given the broad categorisations used in the analysis. Having to use the midpoint of categories, particularly the upper category of fees paid, means that the reliability of the data for the first three waves is lower than for the more recent waves of the survey. However, the results are consistent with those reported from administrative data, both published[5] and more recent analyses in progress (Irurzun Lopez, 2020, personal communication).

A further limitation of the analysis, through relying on prioritised ethnicity,[24] means that the results for Pacific peoples should be interpreted with some caution. A significant proportion of the population identify as having both Māori and Pacific mixed ethnicity (16% of the total Pacific population in 2017/18) and were analysed as Māori. More detailed work on people with more than one self-reported ethnicity, as well as considering groups of Māori based on iwi and hapū, is warranted.

The results regarding the interactions between education and income level are intriguing, with both Māori and non-Māori with low levels of education and income being less likely than expected to access low-cost PHC. This interaction was not explained by deprivation, although the individual effects of education and income were. Further investigation of this finding

found no difference in cost being a barrier to care among those with low levels of attained education and low-income levels, over and above the individual effects of each (results not shown). It is possible that the results we found reflect lower levels of health literacy in people with low levels of attained education and low-income levels. There appear to be few studies which have addressed the relationship between health literacy and health care utilisation. A systematic review of dental care utilisation found that people with poor health literacy were under half as likely to access dental services than those with better health literacy, based on four studies from Australia, Brazil (2) and Canada.[29] There are a number of plausible reasons for these findings. For example, low income and low education combined may reduce a person's capacity to investigate the possibility of accessing low-cost care or may impact an individual's personal sense of agency (mana) to engage with health care professionals. Furthermore, individual distrust of the health sector can become internalised and compounded due to intergenerational experiences of racism in the health sector, resulting in lower PHC utilisation. This finding warrants further investigation.

In contrast to the inverse care law - "the availability of good medical care tends to vary inversely with the need of the population served"-,[30] the PHCS appears to have succeeded somewhat, with Pacific peoples, and those living in the most deprived areas paying less to access PHC than at any point in the last 20 years. This benefit has also occurred, though to a lesser extent, for Māori. These benefits are likely to be due, at least in part, to the VLCA scheme, which by design offers lower fees to practices with higher proportions of Māori, Pacific people, and those from more deprived areas. The benefit for Pacific people may be due to most Pacific people living in the most deprived areas. However this highlights the

problem with the VLCA policy, since on average the health of Māori is the lowest of all ethnic groups [9] and Māori should therefore have highest access to services. This is highlighted in data from the NZHS, which show that in 2017/18, 15% of adults report that there was a time in the past 12 months that they had a medical problem but did not go to a GP because of cost. Māori are twice as likely to report this, when adjusted for age,[20] as well as when adjusted for socio-demographic factors and measures of health.[31]

The proportion of adults who can now access zero-fees PHC is lower than 20 years ago. Reported financial non-viability [32] has led to a reduction in the small number of practices which offer this, due to capitation funding not covering running costs, and practices which offer zero-cost access relying on volunteer staff.[33] Targeted fee-for-service subsidies, which were replaced with the introduction of capitation funding, may have made it easier to provide free visits to those using services, whereas the current capitation formula likely under-compensates practices offering services to high-needs communities (see Page 100, ref [9]). We have found that people living in NZDep4 are facing higher costs than 15 years ago. People living in these areas are likely to be struggling to afford PHC; in this study, 26% of households in the NZDep4 areas were classified as being low-income households.

The policy of VLCA practices appears to have benefitted Pacific peoples and those living in the most deprived areas but there remains a significant proportion of the population for whom the cost of seeing a GP is a barrier. Basing the VLCA policy on area-level deprivation and proportions of Māori or Pacific people limits its benefits. For example, people of low income,

defined here as a household income of under \$50,000 in 2016/17, are only 36% more likely to access low-cost care compared to those on a higher income, whereas those living in the most deprived quintile are over three times as likely to access low-cost care compared to those in the least deprived quintile. This suggests that either, being on a low income is not a determinant of a need to access low-cost care (which is unlikely), or that the policy which is directed at practices based on location and ethnicity is not sufficiently comprehensive to cover those who require it. In some regions of Aotearoa New Zealand, Māori choose to live in their traditional iwi and hapū rohe (region), regardless of levels of personal wealth or area deprivation. A pan-European study specifically identifies co-payments as one attribute of health systems which have gaps in health coverage, and which undermine equity and health system efficiency.[34] The problem with using a practice-based approach for capitation funding has been demonstrated by Love and Blick[35] who note that in 2012/13, 44% of high-needs patients (defined as Māori, Pacific, or living in the most deprived quintile) were registered with a non-VLCA practice, and thus were not benefitting from the reduced co-payments. This has clear implications for inequity in accessing affordable PHC.

One of the arguments for user co-payments is that services that have no fee attached are not always used appropriately. A systematic review found that co-payments were associated with a lower rate of consultations,[36] although this is not consistently found in studies examining high income populations with relatively low co-payments[37]. There is a balance between appropriate use of limited resources and ensuring that patients who need health care can access it. However, the RAND study, a randomised controlled trial of differing levels of co-payments, found that people on lower incomes have reduced access to preventive care,

including the ability to afford medications for managing chronic disease, when there are co-payments. [38]

A study comparing Northern Ireland (where PHC is free at the point of access) to the Republic of Ireland (where about 70% of the population pay to see a GP) found that among people who made co-payments, 26.3% in the Republic of Ireland did not see a GP when they needed to because of cost, compared to 1.8% in Northern Ireland.[39] In Aotearoa New Zealand, 15% of people did not see a GP when they needed to, based on 2017/18 data[20]; this is on a national level, and the data cannot be split according to whether these people would have been eligible for zero-fees or low-cost care, or not. A study in Norway, utilising a policy change in 2010 in the co-payments payable by young people from age 12 to age 16, found that the co-payment deters people with mental health and chronic conditions to a much greater extent than those with acute illness.[40] A modelling of various scenarios of introducing GP co-payments in Australia concluded that such fees would disproportionately effect those with the greatest need and lowest ability to pay. [41] These studies suggest that while co-payments may reduce unnecessary utilisation, they also differentially impact more vulnerable populations and therefore potentially increase health inequity. In Aotearoa New Zealand, PHC policy does not preferentially benefit users with high health needs, when it comes to paying for health care. Although GPs can apply for a high-user health card on behalf of a patient, this does not necessarily result in lower fees for the patient to see their regular GP.

The future of PHC includes a move away from the traditional face-to-face GP consultations, and towards new models of care, including, for example, an increased role for nurse



practitioners [42] and more frequent monitoring of those with chronic illnesses.[32] These measures should be associated with lower fees to increase the accessibility of PHC for those who are currently facing financial barriers to such care. It is important to remember that there are also non-financial barriers to PHC, some of which are being addressed through service delivery re-organisation on a local level.[32] However, for a PHC system to be compliant with Te Tiriti o Waitangi,[8] system-wide changes far beyond this are required, as well as efforts to redress historical and contemporary underlying causes of inequities and poor health outcomes among Māori.[7, 9, 43]

In summary, we have demonstrated that the PHCS resulted in an initial decrease in co-payments for individuals in accessing PHC, with the lowest co-payments being made by Pacific peoples and those living in the most deprived areas. Although Māori were more likely than non-Māori to access low-cost care at all levels of deprivation, this was less evident in more deprived compared to more affluent areas. We suggest that future policies should work towards making PHC more affordable. In particular for Māori, health policy should be fully aligned with Te Tiriti o Waitangi[8], as we have previously described [17] and retain a focus on equity.

## Acknowledgements

The authors are grateful to the participants in the New Zealand Health Survey. Access to the data used in this study was provided by Statistics New Zealand under conditions designed to

keep individual information secure in accordance with the requirements of the Statistics Act 1975. The opinions presented are those of the authors and do not necessarily represent an official view of Statistics New Zealand.

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## Tables and Figures

Table 1: Association between socio-demographic factors and access to free or low-cost PHC

	Zero-fees PHC					Low-cost (<\$20) PHC				
		Simple model <sup>#</sup>		Multivariable Analysis			Simple model <sup>#</sup>		Multivariable Analysis	
Exposure	%	aOR	95%CI	aOR	95%CI	%	aOR	95%CI	aOR	95%CI
Year of survey										
1996/97	11%	1.40	1.19 to 1.65	1.40	1.18 to 1.66	15%	0.60	0.51 to 0.70	0.65	0.55 to 0.77
2002/03	9%	1.15	0.98 to 1.35	1.24	1.05 to 1.47	6%	0.20	0.16 to 0.24	0.20	0.17 to 0.24
2006/07	9%	1.16	1.00 to 1.36	1.23	1.05 to 1.44	7%	0.27	0.23 to 0.32	0.27	0.23 to 0.31
2011/12	8%	1*		1*		23%	1*		1*	
2012/13	8%	1.02	0.86 to 1.20	1.03	0.87 to 1.22	23%	1.00	0.85 to 1.18	1.02	0.88 to 1.19
2013/14	7%	0.85	0.72 to 1.00	0.89	0.75 to 1.05	22%	0.98	0.83 to 1.16	1.03	0.88 to 1.20
2014/15	8%	0.92	0.79 to 1.09	0.96	0.81 to 1.12	24%	1.05	0.89 to 1.25	1.12	0.95 to 1.31
2015/16	8%	0.95	0.81 to 1.11	0.99	0.84 to 1.16	24%	1.06	0.90 to 1.23	1.10	0.95 to 1.27

2016/17	7%	0.83	0.70 to 0.98	0.87	0.73 to 1.03	24%	1.05	0.89 to 1.23	1.10	0.95 to 1.28
Age Group										
15-24	20%	4.84	4.36 to 5.38	4.28	3.84 to 4.77	23%	1.37	1.26 to 1.50	0.95	0.86 to 1.04
25-34	8%	1.82	1.66 to 1.99	1.74	1.59 to 1.92	20%	1.11	1.05 to 1.18	0.93	0.87 to 0.99
45-64	5%	1*		1*		19%	1*		1*	
65+	5%	1.07	0.97 to 1.19	1.03	0.92 to 1.15	18%	0.94	0.88 to 1.01	0.97	0.90 to 1.04
Sex										
Female	8%	1.08	1.01 to 1.15	1.01	0.94 to 1.09	19%	1.01	0.97 to 1.06	0.95	0.91 to 1.00
Male	8%	1*		1*		19%	1*		1*	
Ethnicity										
Māori	14%	2.27	2.10 to 2.46	1.60	1.46 to 1.75	36%	3.76	3.52 to 4.01	2.57	2.41 to 2.74
Pacific	13%	2.04	1.81 to 2.30	1.32	1.16 to 1.50	54%	8.34	7.55 to 9.21	5.11	4.63 to 5.64

Asian	8%	1.25	1.10 to 1.42	0.95	0.83 to 1.09	34%	3.25	2.97 to 3.55	3.17	2.88 to 3.49
Other	7%	1*		1*		13%	1*		1*	
NZDep quintile										
Q1 (Least deprived)	6%	1*		1*		9%	1*		1*	
Q2	6%	1.08	0.94 to 1.25	1.09	0.94 to 1.26	13%	1.52	1.29 to 1.80	1.39	1.18 to 1.65
Q3	8%	1.33	1.16 to 1.53	1.25	1.08 to 1.43	16%	1.99	1.70 to 2.33	1.72	1.46 to 2.02
Q4	9%	1.59	1.39 to 1.81	1.36	1.19 to 1.56	25%	3.70	3.18 to 4.32	2.84	2.43 to 3.32
Q5 (Most deprived)	12%	2.22	1.96 to 2.52	1.66	1.45 to 1.90	38%	6.99	6.03 to 8.10	4.13	3.55 to 4.79
Income										
Higher income	7%	1*		1*		15%	1*		1*	
Low income	8%	1.22	1.12 to 1.32	1.29	1.17 to 1.41	24%	1.72	1.62 to 1.82	1.36	1.27 to 1.45
Missing	12%	1.93	1.76 to 2.11	1.34	1.22 to 1.48	29%	2.06	1.93 to 2.21	1.48	1.37 to 1.59
Education										



No secondary qual	9%	1.14	1.02 to 1.27	0.89	0.79 to 1.01	24%	2.04	1.88 to 2.22	1.35	1.24 to 1.48
Secondary qual	10%	1.34	1.20 to 1.48	0.86	0.77 to 0.96	22%	1.73	1.61 to 1.87	1.33	1.23 to 1.44
Post-secondary qual	7%	0.84	0.76 to 0.94	0.81	0.73 to 0.91	18%	1.28	1.19 to 1.38	1.16	1.08 to 1.26
Degree	8%	1*		1*		14%	1*		1*	

\* Reference Category; # This model was adjusted for wave of data collection; Qual: qualification; aOR: adjusted Odds Ratio; CI: Confidence Interval

Note that 2011-12 was selected as the reference year, as it was the first year of the Health Survey in its current annual form

Table 2: Access to zero-fees and low-cost PHC across socio-economic categories for Māori and non-Māori

	Zero-fees PHC				Low-cost PHC			
	Māori		Non-Māori		Māori		Non-Māori	
Exposure	aOR	95%CI	aOR	95%CI	aOR	95%CI	aOR	95%CI
NZDep quintile								
Least deprived	1*		1*		1*		1*	
Q2	1.11	0.76 to 1.63	1.09	0.94 to 1.27	1.15	0.83 to 1.60	1.55	1.30 to 1.85
Q3	1.06	0.75 to 1.48	1.31	1.13 to 1.52	1.50	1.12 to 2.02	1.97	1.67 to 2.34
Q4	1.45	1.05 to 2.00	1.43	1.24 to 1.65	2.92	2.21 to 3.87	3.54	3.01 to 4.16
Most deprived	1.99	1.46 to 2.71	1.75	1.52 to 2.02	4.95	3.78 to 6.48	6.30	5.38 to 7.38

Income								
Higher income	1*		1*		1*		1*	
Low income	1.49	1.29 to 1.72	1.39	1.25 to 1.55	1.81	1.61 to 2.03	1.91	1.78 to 2.05
Education								
No secondary qual	1.48	1.19 to 1.84	1.02	0.89 to 1.17	2.25	1.88 to 2.71	1.89	1.71 to 2.08
Secondary qual	1.14	0.92 to 1.42	0.98	0.87 to 1.11	1.53	1.28 to 1.83	1.67	1.53 to 1.82
Post-secondary qual	1.08	0.87 to 1.35	0.88	0.78 to 0.99	1.51	1.26 to 1.82	1.24	1.14 to 1.35
Degree	1*		1*		1*		1*	

aOR: adjusted odds ratio

Note: all models are adjusted for year of survey, age group and sex

\* Reference Category



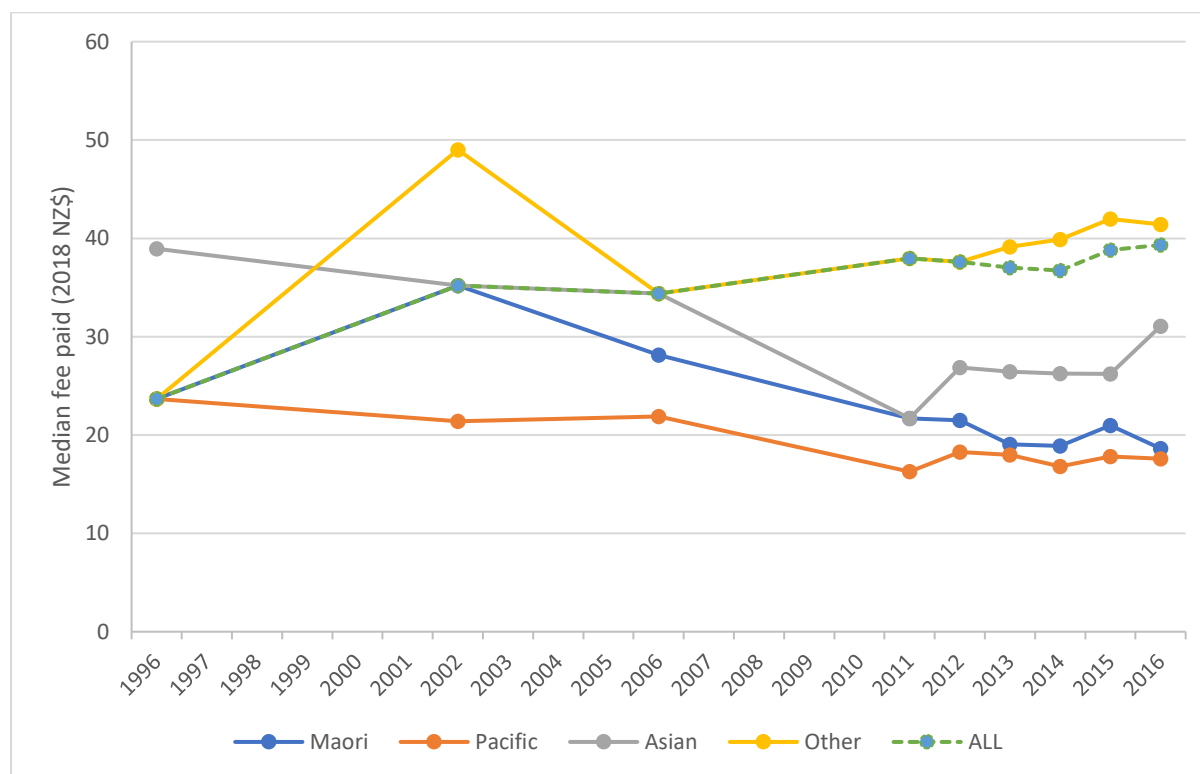
Table 3: Access to zero-fees and low-cost PHC for Māori compared to non-Māori

	Zero-fees PHC		Low-cost (<\$20) PHC	
	OR	95%CI	OR	95%CI
Adjusted for:				
Nothing	2.08	1.93 to 2.25	2.71	2.56 to 2.88
Survey wave, age group and sex	1.80	1.65 to 1.95	2.66	2.50 to 2.83
+ NZDep quintile	1.57	1.44 to 1.70	1.87	1.76 to 1.99
+ Income	1.53	1.41 to 1.67	1.81	1.70 to 1.92
+ Education	1.55	1.42 to 1.68	1.77	1.66 to 1.88
Stratified by deprivation level: *				
Q1 (Least deprived)	1.53	1.10 to 2.11	2.24	1.71 to 2.95
Q2	1.58	1.21 to 2.05	1.65	1.34 to 2.03

Q3	1.19	0.96 to 1.47	1.68	1.43 to 1.97
Q4	1.51	1.29 to 1.78	1.83	1.63 to 2.05
Q5 (Most deprived)	1.69	1.48 to 1.93	1.74	1.59 to 1.92

OR: odds ratio\* Adjusted for all other variables in the model above

Supplementary Figure 1: Trends in the median co-payment made by patients to their GP, by ethnicity, 1996-2016

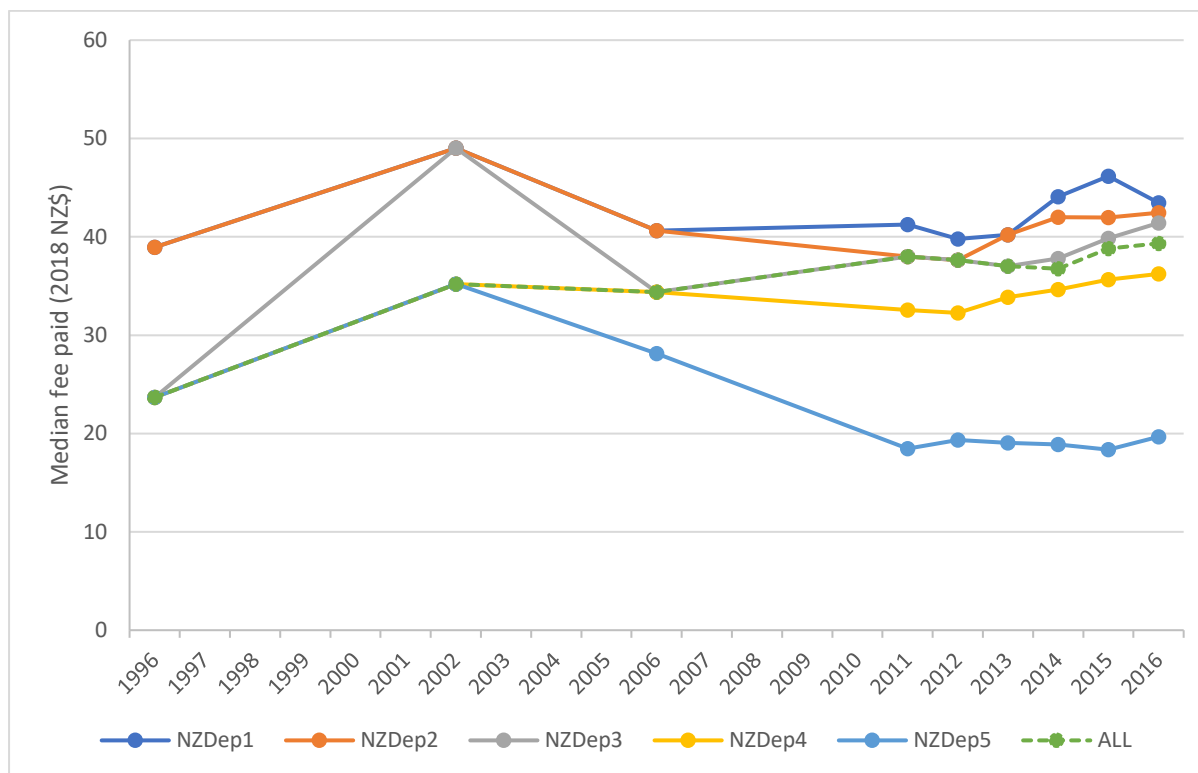


Data source: New Zealand Health Survey, 1996/97 to 2016/17, aged 15+





Supplementary Figure 2: Trends in the median co-payment made by patients to their GP, by NZDep quintile, 1996-2016



Data source: New Zealand Health Survey, 1996/97 to 2016/17, aged 15+

Supplementary Table: Interactions between pairwise combinations of socio-economic measures and access to zero-fees or low-cost PHC for Māori and non-Māori

		Zero-fees PHC				Low-cost PHC			
		Māori		Non-Māori		Māori		Non-Māori	
		Deprivation Level		Deprivation Level		Deprivation Level		Deprivation Level	
		High	Low	High	Low	High	Low	High	Low
Income	Low	2.17 (1.73 to 2.60)	1.39 (1.00 to 1.93)	1.73 (1.51 to 1.95)	1.22 (1.04 to 1.43)	4.42 (3.65 to 5.19)	1.46 (1.15 to 1.86)	4.23 (3.77 to 4.69)	1.70 (1.53 to 1.89)
	High	1.60 (1.30 to 1.96)	1*	1.22 (1.09 to 1.37)	1*	3.03 (2.55 to 3.60)	1*	3.02 (2.72 to 3.36)	1*
P value for interaction		0.91		0.15		0.98		0.005	
Education	Low	1.91 (1.53 to 2.29)	1.13 (0.89 to 1.45)	1.45 (1.29 to 1.61)	0.91 (0.81 to 1.03)	3.69 (3.07 to 4.31)	1.15 (0.94 to 1.41)	4.11 (3.70 to 4.53)	1.29 (1.19 to 1.41)
	High	1.62 (1.31 to 2.01)	1*	1.20 (1.06 to 1.35)	1*	3.07 (2.57 to 3.66)	1*	2.91 (2.63 to 3.22)	1*
P value for interaction		0.80		<0.001		0.71		0.12	
		Income		Income		Income		Income	
		Low	High	Low	High	Low	High	Low	High
Education	Low	1.59 (1.30 to 1.88)	0.98 (0.81 to 1.18)	1.31 (1.14 to 1.48)	0.94 (0.83 to 1.06)	2.26 (1.91 to 2.60)	1.54 (1.33 to 1.79)	2.40 (2.19 to 2.62)	1.46 (1.34 to 1.58)

	High	1.24 (0.99 to 1.56)	1*	1.42 (1.23 to 1.65)	1*	2.26 (1.90 to 2.68)	1*	2.02 (1.84 to 2.22)	1*
P value for interaction		0.072		0.85		<0.001		<0.001	

Results are presented as OR with 95%CI. All models are adjusted for year of survey, age group and sex

\* Reference category