

“We’re trying to heal, you know?” A Mixed Methods Analysis of the Spatial Equity of General Practitioner Services in the Waikato District Health Board Region

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Abstract

Inequitable access to health services can cause and exacerbate inequities in health outcomes and should therefore be monitored regularly to ensure that service distributions match population needs. Health service accessibility includes several factors and can be monitored using both quantitative and qualitative methods. We present an exploratory analysis of the spatial equity of general practice services in the Waikato District Health Board region using a mixed methods approach. Geographic Information Systems are used to assess the spatial accessibility of GP services, and in-depth qualitative interviews provide a better understanding of not only where inequities exist, but *why* they occur.

Keywords: spatial equity, primary health care, geospatial, qualitative, mixed methods.

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Population health inequities are systematic, avoidable and unfair disparities caused by different levels of access and exposure to the social determinants of health such as poverty and education (World Health Organization, 2008). To achieve population health equity, disadvantage that is beyond the control of individuals must be eliminated (Marmot, 2005; Woodward & Kawachi, 1998). Health systems, which are known to cause and perpetuate inequities (Marmot & Commission on Social Determinants of Health, 2007), are one social determinant that individuals have little direct control over. Therefore, a critical step towards achieving health equity involves ensuring that health care services are equitable (Dalton et al., 2013). Spatial equity, often thought of as the fair distribution of resources and examined through measures of access, is in turn a key component of equitable health care (Markham & Doran, 2015; Neutens et al., 2010; Talen & Anselin, 1998). Since effective primary health care is associated with more equitable population health (Starfield et al., 2005), improved spatial equity of primary health care may advance health equity.

The New Zealand Primary Health Care Strategy (PHCS) (Ministry of Health, 2001) takes a population health perspective towards primary care services, while the refreshed New Zealand Health Strategy includes a shift from treatment to prevention, and a focus on overcoming the inequities in the health system (Ministry of Health, 2016). District health boards (DHBs) receive government funding according to the age, sex, ethnicity and socio-economic deprivation of each DHB region's population, to give areas with higher health needs appropriately higher funding (Ministry of Health, 2004). Primary health organisations (PHOs) are then funded by DHBs to deliver primary care to communities, usually through general practitioner (GP) services. However, New Zealand still has significant and persistent socio-economic and ethnic health inequities, especially between Māori and non-Māori (Reid & Robson, 2007).

The spatial equity of health services is dynamic and should be monitored regularly to ensure that current and future service distributions match population needs. Whitehead et al. (2018) have outlined a framework for examining the spatial equity and sustainability of GP services. However, health service access and equity is not limited to geography. Penchansky and Thomas (1981) outlined five domains of accessibility, which include non-spatial factors such as "accommodation", "affordability" and "acceptability". Levesque et al. (2013) have more recently expanded upon this and proposed

a framework of access that includes five elements (approachability, acceptability, availability and accommodation, affordability, and appropriateness) and also considers the ability of populations to achieve access. Furthermore, it is essential to incorporate qualitative methods into spatial equity analysis in order to better understand not only *where* inequities exist, but to gain insight into *why* they occur. Wakerman and Humphreys (2011) have argued that health services research should be multidisciplinary, and this exploratory paper combines spatial analysis with qualitative in-depth interviews to improve our understanding of GP service equity in the Waikato region.

Setting

The Waikato DHB region is home to around 405,000 people, with approximately 160,000 residing in Hamilton city and the remainder in small towns or rural areas (Stats NZ, 2019a). A greater proportion of the Waikato DHB population identify as Māori (23.9%) compared with the national average (16.2%), and nearly half of children aged under 15 in the Waikato DHB Region identify as Māori (36.9%) or Pacific (8.3%) (Stats NZ, 2019a). The New Zealand Health Survey has found that adults living in the Waikato region have higher levels of obesity, ischaemic heart disease, diabetes, high cholesterol and blood pressure, as well as higher levels of unmet need for primary care (Ministry of Health, 2018). Inequities in these indicators of poor health outcomes are experienced in the Waikato DHB region, particularly for Māori. For instance, half of Māori women in the Waikato DHB region experienced an unmet need for primary care – an odds ratio of 1.3 compared with non-Māori women (Ministry of Health, 2018). GP services in the Waikato DHB region are delivered through three PHOS – Hauraki Primary Health Organisation, the National Hauora Coalition, and the Pinnacle Midlands Health Network. Hauraki PHO and the National Hauora Coalition are kaupapa Māori PHOs that aim to empower wellness and mana in whānau through “mana whānau, whānau ora” (Hauraki Primary Health Organisation, n.d.; National Hauora Coalition, n.d.). Pinnacle is a network of 85 practices across the Waikato, Taranaki, Lakes, Bay of Plenty, and Tairāwhiti DHB regions (Pinnacle Incorporated, n.d.). Pinnacle leads the development of the Health Care Home – a new model of general practice care adopted by some practices (Pinnacle Incorporated, n.d.). Common elements of the Health Care Home model include capacity for same day

appointments, care planning for patients with high needs, the use of technology for phone or email consultations and web or smartphone-based patient portals, and the more effective use of physical space (Amey, 2018; Cumming et al., 2018; Hefford, 2017)

Methods

Quantitative approach

Geographic Information Systems (GIS) were used to quantitatively assess the spatial equity of GP services. The three steps to spatial equity analysis outlined by Whitehead et al. (2018) involve defining, estimating and quantifying spatial equity. Although spatial equity has a range of definitions that vary with context (Whitehead et al., 2019a), it has been referred to as a fair distribution of resources relative to need (Zenk et al., 2006). This recognises that in order to achieve equitable health outcomes, some populations with higher needs may require appropriately higher levels of services (Reid & Robson, 2007). Similarly, there are a range of measures and techniques used to estimate the spatial accessibility of health services (Guagliardo, 2004). The “Floating Catchment Area” (FCA) group of techniques estimate accessibility by considering service availability relative to population size and the distance between populations and services. FCAs calculate the ratio between the number of services and the size of populations within a defined catchment area and produce an accessibility score for each small area unit within a study area (McGrail & Humphreys, 2009). The main advancement of the Enhanced-2-step-floating-catchment-area method (E2SFCA) is that it incorporates a distance decay function, which recognises that spatial access to services decreases for populations living further from the centre of a GP catchment. The E2SFCA is now considered the default spatial accessibility measure (McGrail, 2012). This paper applied a modified version of the E2SFCA method in ArcGIS (ESRI, Redlands, CA, USA) to estimate accessibility within the Waikato DHB region. Once accessibility has been estimated, the Gini coefficient can be used to quantify equity. The Gini coefficient assesses the distribution of resources (such as income, or in this case, accessibility) across a population, and provides an equity score between 0 and 1, with 0 representing a perfectly equal distribution and 1 indicating a completely unequal distribution (Jang et al., 2017).

Data

All GP clinics were geocoded based on the physical addresses provided by the Waikato DHB website (Waikato District Health Board, 2019). Area unit (AU) boundaries were downloaded from Stats NZ (2019b) and 2013 Census data, including usually resident population, age group and ethnicity, were linked to represent the distribution of the Waikato DHB region's population. The NZDep2013 index of socio-economic deprivation (Atkinson et al., 2014) was also linked to the AUs. The New Zealand road network was downloaded from Land Information New Zealand (2019) to assist spatial analysis.

When analysis was carried out, 2018 Census data were unavailable. Although at the time of writing, Statistical Area 2 (SA2) level population data for the 2018 Census were available, the 2018 Census External Data Quality Panel (2019, p. 5) has highlighted “operational failures” that resulted in a high level of non-response for the 2018 Census. As a result, the External Data Quality Panel has rated the quality of ethnicity data in the 2018 Census as “moderate” and emphasised that at lower levels of geographic scale there is greater uncertainty around both population count and ethnicity data. Furthermore, delays to the release of 2018 Census data have meant that a 2018 version of the New Zealand Deprivation Index had not been developed by the time data analysis was performed. Due to these issues of data quality and availability, it was decided that 2013 Census data would be used for the purposes of this analysis.

Analytical methods

When estimating the spatial accessibility of GP services, we used a recently developed modification of the E2SFCA which incorporates dynamic catchment sizes defined by patient enrolment data: the VGP-E2SFCA (Whitehead et al., 2020). Dynamic catchment sizes were used to reflect the distance that patients in urban and rural areas were assumed to be willing to travel to access GP services. Researchers have argued for the incorporation of dynamic catchments to better model accessibility in mixed-urban-rural environments (Luo & Whippo, 2012; McGrail & Humphreys, 2014). Our decision to use 10-km, 20-km and 30-km catchments for clinics in major urban, small and medium urban, and rural areas, respectively, is based on a detailed analysis of patient enrolment records for the Waikato region, which is published elsewhere (Whitehead et al., 2020). The Butterworth distance decay function, as used by Langford et al. (2012), was

applied to take into account the reduced spatial accessibility of people living at the outer edge of a catchment compared with those living much closer. We accounted for differences in the level of services available at each clinic by weighting clinics in our model according to the number of GPs working there. While, the full-time equivalent (FTE) hours of each GP and nurse would give a more accurate measure of the availability of appointments for patients, this information was not available for all clinics. The distribution of accessibility scores across the Waikato DHB region was mapped, and differences in accessibility for age, ethnic and socio-economic groups were examined. To quantify the overall spatial equity of GP services, the Gini coefficient was calculated in R (R Core Team, 2017) using the ACID package (Sohn, 2016).

Qualitative approach

The qualitative component of this research was based on in-depth interviews. Key stakeholders were initially identified through purposive sampling and contact with appropriate organisations. A snowball method was then used to contact further participants. This method ensured representation of key groups.

Potential participants were contacted via email with an interview request, and informed written consent was obtained before the interview. The study received ethical approval from the Human Research Ethics Committee, Faculty of Arts and Social Sciences, University of Waikato (granted 18 May 2017; reference: Whitehead FS2017-18).

Participants included seven patient representatives ($n = 7$), general practitioners ($n = 5$), representatives from primary health organisations (PHOs) ($n = 4$) and the Waikato District Health Board (DHB) ($n = 1$). Face-to-face semi-structured interviews lasting approximately 60 minutes were conducted with the 17 participants between August and December 2018.

Participants were asked a range of questions within the broad theme of GP service equity, including questions around barriers to equity, causes and effects of inequity, and potential solutions. The semi-structured nature of interviews gave space for participants to raise their own areas of concern that were not directly addressed by the interview guide (displayed in Table 1 below). The interviews were carried out as part of a larger project that also examined the equity of GP services in the Waikato region, and therefore questions relating to the sustainability of services are included in the

interview schedule. The responses to these questions have been analysed and will be published separately. Audio from all interviews was digitally recorded, transcribed verbatim, de-identified, and imported into NVivo qualitative analysis software (QRS International, 2018). After conducting 17 interviews, saturation was reached with participants repeating common themes, and therefore no further participants were recruited. The interviews and analysis of qualitative data was carried out by Jesse Whitehead (JW), with planning assistance and guidance provided by the other contributing authors.

Table 1: Interview guide

Key topics relating to equity covered by the interview guide
How would you define equity?
Are services in the Waikato DHB region equitable?
What factors affect the equity of GP services?
Who is affected by inequitable services?
How could the equity of services be improved?
Which areas have the most or least accessible services?

Analysis and interpretation of data

Through this process of conducting and transcribing interviews, JW became familiar with the data corpus, which is phase one of a thematic analysis (Braun & Clarke, 2006). Then, in phase two, an inductive approach was used to generate initial codes from the recurring ideas in the interview transcripts. As suggested by Guest et al. (2012), a single codebook with thematic definitions was created iteratively. Codebooks include a list of codes, definitions and examples for each code, and details of when to use it (Guest et al., 2012). In phase three, potential themes were discerned by sorting and grouping codes. These initial themes were reviewed in phase four to ensure that the codes within them were coherent, and that there were clear distinctions between themes. Through this process, higher order themes were discerned, which led to phase five: the definition and naming of themes and an examination of links and connections between concepts. Finally, a more deductive approach has been used in phase six – the development of a narrative and the preparation of this paper – through alignment with key concepts and frameworks in the research literature. An exploratory approach to mapping participants' perceptions of equity and

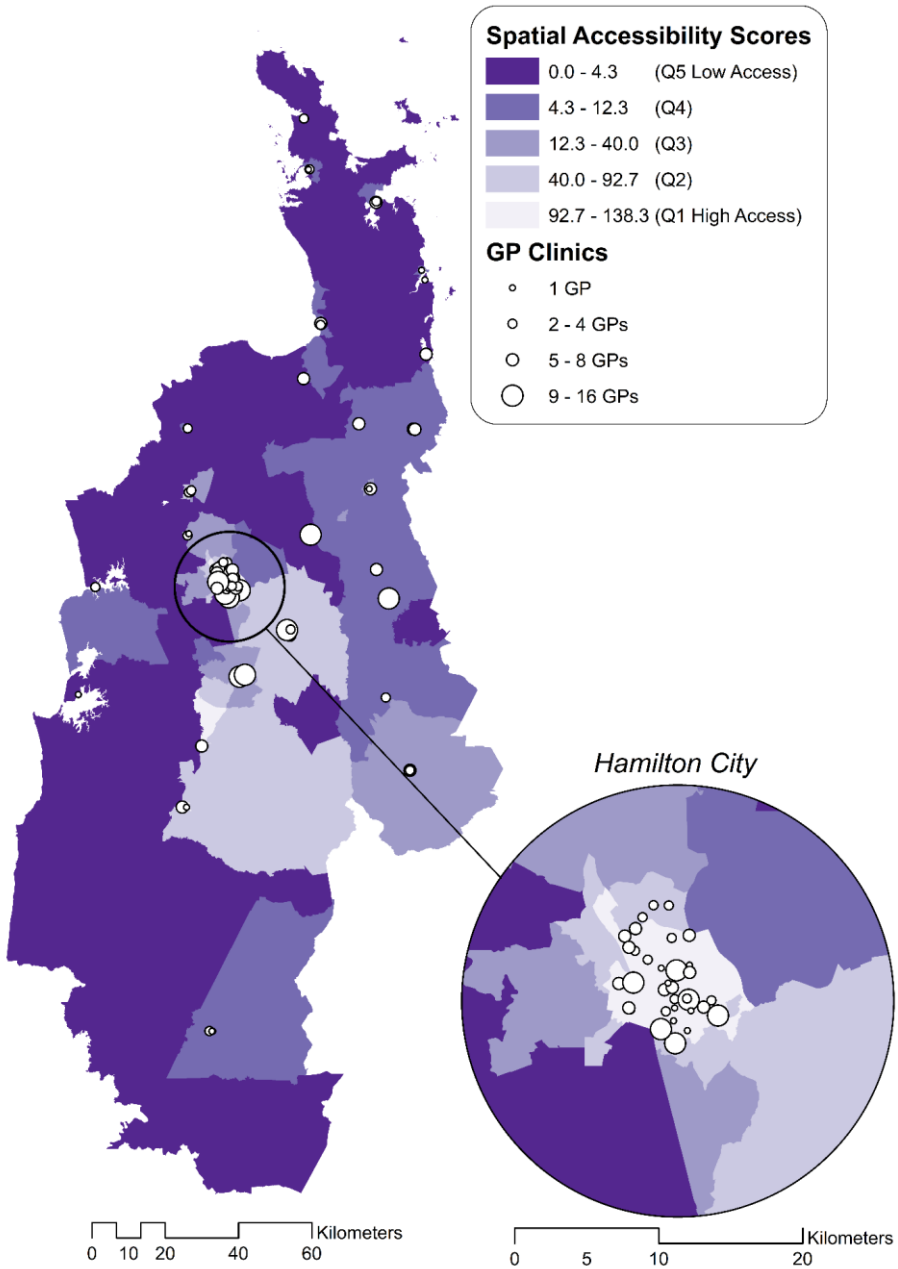
access across the Waikato DHB region was adopted. Participants were asked to highlight, on a map of the region, places that they believed had good or poor access to GP services. The information provided by all 17 participants was amalgamated and has been displayed visually.

Results

Spatial accessibility

The results of the VGP-E2SFCA analysis indicate that spatial accessibility to GP services varies within the Waikato DHB region. Figure 1 displays the accessibility scores of each AU. Scores were grouped into quintiles from quintile 5 (Q5 representing AUs with the lowest access scores) to quintile 1 (Q1 representing AUs with the highest access scores). Figure 1 indicates that Hamilton city tends to have better spatial accessibility to GP clinics than most rural areas. Sixty-five per cent of all AUs with Q1 or Q2 accessibility scores were in Hamilton, while no AUs in Hamilton had low accessibility scores (Q4 or Q5). Hamilton not only has the highest concentration of GP clinics in the region, but also many clinics that have several registered GPs. On the other hand, Figure 1 also reveals that the areas with the lowest spatial accessibility scores tend to be located around the periphery of the Waikato DHB region. For instance, most of the Coromandel region, the west coast, and the area surrounding Taumarunui in the southern part of the Waikato DHB region have spatial accessibility scores in Q5.

Figure 1: Distribution of spatial accessibility scores across the Waikato DHB region



Spatial equity

The Gini coefficient for the distribution of spatial accessibility scores across the Waikato DHB total population was 0.477, suggesting an unequal distribution of GP services. However, it also appears that this distribution is slightly “positive”, with a higher than expected proportion of the population (30.7 per cent) living in areas with high accessibility scores. Figure 2 shows that more than half of the Waikato DHB population reside in areas of high access (Q1 or Q2), while only 14 per cent live in areas of very low accessibility (Q5).

Figure 2: Distribution of accessibility scores across the population

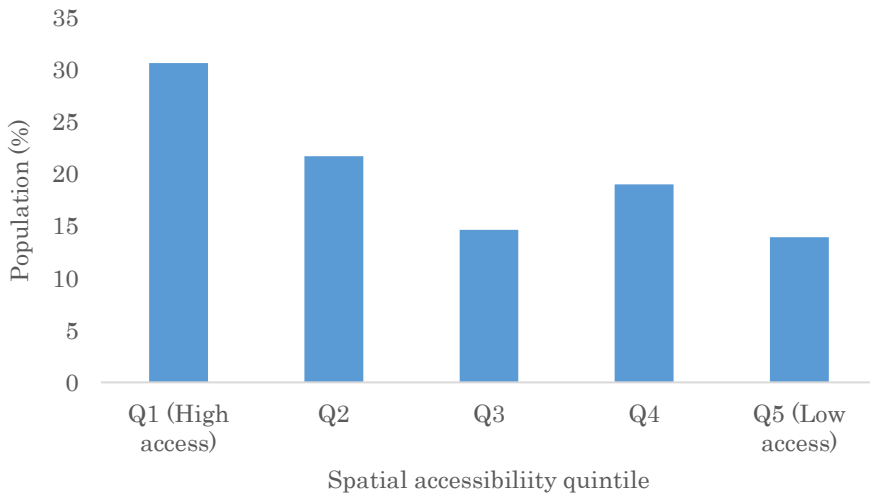


Figure 3 shows a similar pattern and indicates that all age groups are over-represented in areas of high accessibility, while only the “over 65 years” group has a higher than expected population living in areas of lower accessibility (Q4). Figure 4 shows the distribution of accessibility scores by ethnicity. There are high proportions of all ethnic groups living in areas of high accessibility (Q1 and Q2). A particularly high proportion (80 per cent) of Asian residents live in areas of high access, with 52 per cent living in Q1 and 28 per cent living in Q2. While many Europeans live in high-access areas, there is also a relatively high proportion living in areas of lower accessibility (Q4). More than half of Māori and Pacific in the Waikato DHB region live in areas of high accessibility (Q1 or Q2), while a low proportion

(11 per cent and 7 per cent, respectively) live in areas of very low accessibility (Q5). A high proportion of residents of other ethnicities also lived in areas with high spatial accessibility. These results suggest that the ethnic distribution of accessibility scores in the Waikato DHB region follows the same overall trend as the overall Waikato DHB population (as outlined in Figure 1), and most residents live in areas of high spatial accessibility.

Figure 3: Distribution of accessibility scores, by age

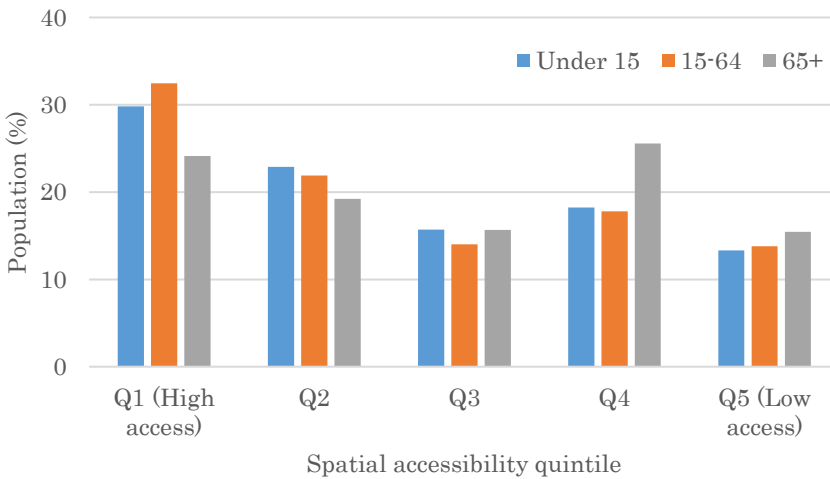


Figure 4: Distribution of accessibility scores, by ethnicity

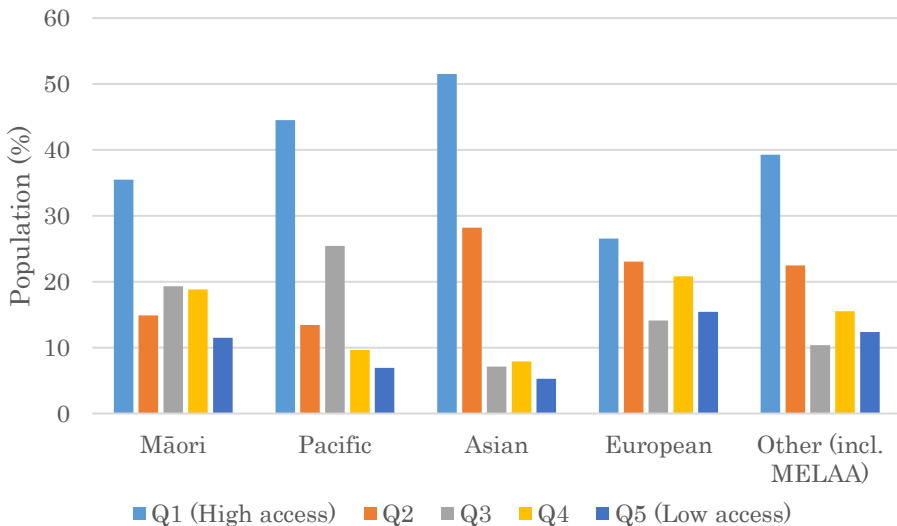


Table 2 indicates the distribution of accessibility scores for the Waikato DHB population living in areas of high deprivation (NZDep2013 deciles 7–10). Figure 5 indicates that a high proportion of the Waikato DHB population live in areas of high socio-economic deprivation, and that Māori and Pacific populations in particular are over-represented in these areas. Table 2 shows that only a very small proportion (0.26 per cent) of the population face the double burden of living in areas that are both very highly deprived (NZDep 10) and have very low accessibility (Q5). Furthermore, almost half (49 per cent) of people living in areas of high socio-economic deprivation (NZDep 7–10) also live in areas of high spatial accessibility (Q1 and Q2). While this may suggest that spatial accessibility is distributed equitably, almost one-third (31.9 per cent) of people living in areas of high socio-economic deprivation have poor spatial access (Q4 and Q5) to GP services. Furthermore, a large proportion of the total DHB population (17.9 per cent) are affected by both high deprivation and low spatial access to GP services. This is higher than would be expected in an equal distribution and represents more than 64,000 residents.

Figure 5: Waikato DHB deprivation profile, by ethnicity

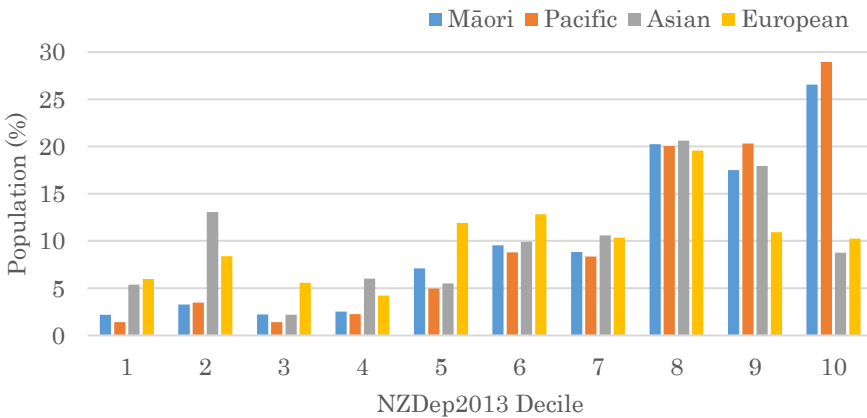


Table 2: Area-level deprivation by accessibility

NZ Dep 2013	Accessibility	DHB Population (%)	Expected Population (%)
Decile 7	Q1	4.96	2.00
	Q2	0.58	2.00
	Q3	0.04	2.00
	Q4	2.43	2.00
	Q5	1.98	2.00
	Total	10.00	10.00
Decile 8	Q1	7.43	2.00
	Q2	0.72	2.00
	Q3	4.99	2.00
	Q4	4.84	2.00
	Q5	1.64	2.00
	Total	19.62	10.00
Decile 9	Q1	7.23	2.00
	Q2	0.00	2.00
	Q3	2.36	2.00
	Q4	2.41	2.00
	Q5	0.73	2.00
	Total	12.73	10.00
Decile 10	Q1	5.56	2.00
	Q2	0.79	2.00
	Q3	3.42	2.00
	Q4	3.58	2.00
	Q5	0.26	2.00
	Total	13.60	10.00

Qualitative results

Most participants defined equity in terms of a ‘vertical’ needs-based distribution of resources where individuals or populations with higher levels of need received higher levels of resources. This is closely related to a

definition of equity that focuses on outcomes. Several participants took an outcome-focused definition of equity, arguing that a social justice approach should be used to ensure that people can achieve the same outcomes of good health and well-being regardless of their background. Specifically, participants referred to equity of access and outcomes irrespective of the social position, ethnicity, location or physical impairment of individuals. These needs-based and outcomes-focused definitions of equity align with spatial equity definitions outlined in the research literature (Whitehead et al., 2019a). Some participants expanded upon the outcomes-focused definition to consider equity in terms of the ability of individuals and populations to achieve their full potential in a wider sense, such as the potential for "...good health, good career, good family life, good housing". Finally, interviewees also recognised that equity was intertwined with the rights of individuals and populations, and the importance of service quality in achieving equity. All participants viewed GP services in the Waikato region as inequitable. The reasons participants gave were organised into two broad groups: barriers to equitable access, and structural or systemic causes.

Equity of access

Responses that were coded as access-related were grouped into key themes that aligned with the Levesque et al.'s (2013) model of access. Levesque et al. (2013) incorporate five dimensions of service accessibility; *approachability*, *acceptability*, *availability* and *accommodation*, *affordability*, and *appropriateness*. The model includes five corresponding abilities of people to interact with services in order to achieve access. These are the ability to *perceive the need for care*, *seek care*, *reach care*, *pay for care*, and *engage with health care*. Participant discussions of these interrelated domains and their relationship to the equity of GP services are outlined below.

Approachability of services

Participants reported that GP services are often not approachable as the health system is difficult to navigate and understand, particularly for patients with complex health needs or multi-morbidities. This is then exacerbated by difficulties around the *ability to perceive the need* for health care among some individuals and groups. Different levels of health literacy among some patients meant that they often did not perceive the need for care until conditions had progressed and become serious. On the other hand,

participants also discussed a group which they called “the worried well”, who over-utilised health services, often for relatively trivial matters, adding to clinic workloads and taking up appointments that could have been used by those with more serious health issues.

Acceptability of services

The acceptability of services was a key issue. Participants highlighted that mainstream services are aligned with a European view of health, rather than a more holistic Māori approach. Most services lack cultural safety, which presents a significant barrier to access.

We've built [the health service] on the needs of the provider, it's a European model and it isn't responsive to the needs of the population. (D, Waikato DHB)

We have tried, or been made to conform to a mainstream model, and our people continue to be unwell and our people to continue to not thrive as they should. (A, patient)

Participants talked about how discrimination results in patients avoiding health services at all costs.

The only time that our people will engage is in ED, when it's literally life or death, and then they get discriminated there...the only way our people will engage is if we make it safe. (P, patient)

Participants also expressed a sense frustration with the limitations of ‘traditional’ GP models of care, and talked about wanting more holistic health care that integrates a wider range of health and social services in order to address the root causes of poor well-being, rather than just treating the symptoms. These discussions also included a patient’s *ability to seek care*, which was highlighted as another point where inequities in access develop. A lack of services that are seen as culturally safe, exacerbated by a lack of trust in the health system in general, means that many patients delay seeking care. Participants explained that many patients have complex or chaotic lives which often means that accessing health care is not their most immediate priority. Furthermore, the view that the most marginalised members of society are excluded from mainstream services was expressed by several participants.

Availability and accommodation of services

The availability and accommodation of services was also emphasised as a key issue affecting equitable access. Participants highlighted the impacts of

workforce shortages (among both GPs and other health professionals) which result in difficulty getting timely appointments. Patients talked about having to wait weeks for an appointment at understaffed practices and highlighted that inflexible opening hours and a lack of after-hours care exacerbates these issues, particularly in isolated areas and with clinics without “drop-in” or urgent care services. This is also related to a patient’s *ability to reach care*. Participants highlighted a lack of available transportation, or high costs associated with transport, as a key barrier to equitable access, particularly in rural areas with very limited public transport. This particularly affects patients with low incomes, as well as the young and elderly who are often reliant on others for transportation. Furthermore, participants emphasised a lack of services designed for people living with disabilities. This lack of accommodation means that some basic aspects of facilities – such as outward opening doors – can act as a fundamental barrier to physically entering a health service.

Affordability of services

The affordability of GP services was highlighted as a fundamental barrier to equitable access. Participants argued that the cost of appointments was far too high, and that this was often exacerbated when the cost of prescriptions and accessing after-hours care was considered.

[People] don’t want to spend the money. When [my partner] is in the height of his pain and I say go to the doctors he says ‘No, I don’t have enough money to go to the doctors’. (H, patient)

This is directly related to a patient’s *ability to pay for care*. Participants highlighted how the lack of affordable GP services, in a context of widespread poverty in many communities, means that many patients are unable to pay for health care.

Appropriateness of services

According to Levesque et al. (2013), the appropriateness of services concerns their quality in terms of timeliness, the care put into diagnosis and treatment, and fit between services and patient need. Participants discussed how services could be inappropriate if they were unable to address patients’ wider social, spiritual, environmental or cultural needs, which are all important components of well-being. Patients also highlighted that the quality of care they received from different clinics or different GPs varied greatly. Some patients were willing to travel significant distances to a

preferred GP that they knew would be able to meet their particular needs and support access to additional equipment or services that would help them to achieve equitable outcomes. Other patients expressed distress at losing the relationship, continuity and trust that they had developed with a particular doctor, sometimes over generations.

I struggled when my doctor left. He was my doctor from birth. My mum's doctor, my nan's doctor. He just knew me. I didn't even have to say it, I'd just walk in and he'll know. So, when he retired, I cried because I had a hard time picking a doctor for [my daughter]. A really hard time. (S, patient)

The appropriateness of services aligns with a patient's *ability to engage*. Participants highlighted that this is dependent on patients having a level of empowerment, support and health literacy, and that this should be developed at the whānau level.

...the first point of contact for people to be well and maintain their well-being is whānau, and so whānau capability is a huge thing for me ... If I hadn't become savvy about systems, the outcomes for my daughter would be different ... so that whole kind of literacy space is really important but also building whānau leadership... (L, patient)

Qualitative mapping

Participants had different views on sub-regional equity, and at times there were contrasting opinions about which places had good or poor access to services. This is likely to reflect the in-depth knowledge and insight that each individual participant has about their local area. However, in general there was agreement that accessibility was much better in Hamilton and the immediately surrounding area, while peripheral rural areas of the region such as Taumarunui, Putaruru and Tokoroa had poor access to GP services. Participants recognised that access to GP services varies across the Waikato DHB region, and that “place” shapes the opportunities that individuals and communities have to use health services. The number of participants who commented that a place had good or poor access to GP services was counted for each town in the region and has been represented in Figure 6. This gives a visual depiction of where interview participants perceived spatial inequities in access to GP services to be located. Figure 6 highlights an understanding among participants that equitable access is variable and dependent on place, as some places have much better access than others. There appears to be significant overlap between the qualitative depiction of accessibility in Figure 6 and the results of the quantitative spatial

accessibility model in Figure 1. Of the AUs that interviewees rated as having “good” access, 70 per cent were also considered to have high spatial accessibility (Q1 and Q2) according to the VGP-E2SFCA results. The same was true for 68 per cent of AUs that were rated as having “poor” access by interviewees.

Structural factors

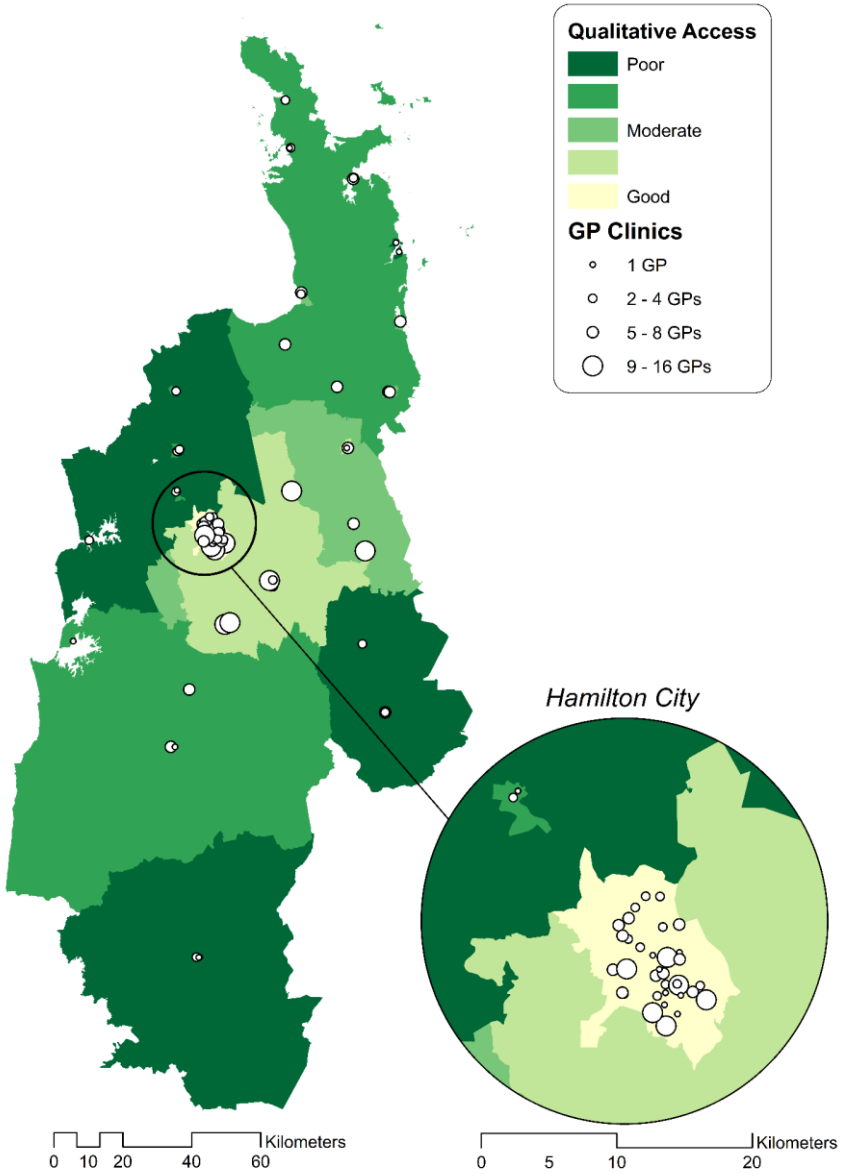
Participants also highlighted how these barriers to equitable access are influenced by structural factors. These aligned with the three main “system structures” that Kringos et al. (2010) highlight in their systematic review of primary health care: governance, economic conditions and workforce development. Participants emphasised the importance of good governance of health services at all levels, including the Ministry of Health, DHBs, PHOs and at individual practices, as a key factor influencing the accessibility of services. The lack of appropriate planning and the design of services in a provider-centric fashion, rather than a design to meet the needs of patients, were highlighted as key barriers to equitable access. Furthermore, patients called out a lack of community engagement from governance structures around the design and delivery of services. These act as barriers to the development of service approachability and acceptability. Patients also expressed a strong desire for the better integration of services, with a stronger holistic focus that incorporates the prevention of illness and maintenance of well-being. Integration was seen as a particularly pertinent issue in rural areas, where most secondary, tertiary and specialist services can only be accessed by traveling to Waikato Hospital. A lack of planning and service integration can act as a barrier to the approachability and appropriateness of services.

Participants outlined funding arrangements and business models as key economic factors that affect equity by directly affecting the affordability of GP services. Participants explained the current GP system as a public–private partnership, with practices receiving a base-level of public funding based on their enrolled patient population, which is topped up through co-payments from patients. This arrangement affects service equity. Participants stated that this can result in some practices enrolling high numbers of patients to get higher levels of funding, meaning that patients are more likely to experience longer waiting lists, shorter appointments and lower quality care.

We're incentivised to take as many patients as we can. It's all mixed up.
(P, GP)

Furthermore, if practices are not registered as Very Low Cost Access clinics, they can set their own co-payment costs, meaning that the cost of an appointment varies greatly throughout the Waikato region. The type of business model that clinics operate can also affect business decisions and impact on patients. For instance, some doctors noted that under GP-owned models, they had more control over how much to charge patients and, in some cases, would not charge anything when they knew that patients couldn't afford to pay. On the other hand, participants expressed concern about the increasing corporatisation of health care, suggesting that businesses run purely in the name of profit were unlikely to have patients' best interests at the core of their model, leading to the potential for increased inequities.

Figure 6: Participants perceptions of areas of 'good' and 'poor' access to GP services in the Waikato DHB region



Participants also highlighted the link between workforce development and the availability and accommodation of services. Issues around the current GP workforce were discussed. In many areas, clinics rely on locums or international medical graduates, which affects GP continuity for patients. Difficulties recruiting and retaining doctors long-term means that the level of services available can fluctuate. Participants also highlighted the need to better integrate the non-GP health workforce, including pharmacists, nurses and physician assistants into a health care team. For example, not all appointments need to be with a GP, and therefore other health professionals could meet some of the demand for GP services. Participants also highlighted a lack of professional development opportunities, and that the current medical training system tends to discourage medical students from a career in general practice, contributing to workforce shortages that impact on service availability.

Finally, participants outlined the fundamental drivers of health inequity as New Zealand's history of colonisation, and continuing discrimination at systemic, institutional and interpersonal levels. Participants directly tied the historical injustices of colonisation to current poor health among Māori. Significant land confiscation, violence and oppression resulted in the loss of an economic base and, through the social determinants of health such as poverty, education and incarceration, has led to present-day health inequities.

The violence that happened across the whole of the Waikato is deeply entrenched in people's history and impacts biochemically on them as well as in terms of what happens with their illness. (F, GP)

Participants argued that colonisation has resulted in Māori being disempowered by the government over many generations. This intentional disempowerment has a significant impact on each of the five 'abilities' of individuals to access care.

Our people are traumatised. There's intergenerational trauma. We're trying to heal, you know? (P, patient)

Participants also emphasised that the negative impact of colonisation is reinforced through present-day racism and discrimination which, in the context of health services, directly affects access to appropriate services and treatment.

As a young Māori woman ... the service you may receive, as soon as they see you, is not the same as somebody who is similar age, same gender, but could be a different race. (J, patient)

Participants have described how the historical and ongoing trauma of colonisation and repeated breaches of the Treaty of Waitangi have a direct impact on health, despite Māori being guaranteed rights to protection under Article 3 of the Treaty, including access to the same quality of health and standard of living as Pākehā citizens (Wepa, 2015). Ryks et al. (2019) have demonstrated that the ongoing impact of colonisation has produced inequities between Māori and non-Māori that exist across key social determinants of health, such as housing, transport, socio-economic deprivation, racism, and access to and quality of health care. Furthermore, the *Wai 2575 Health Services and Outcomes Kaupapa Inquiry* (Waitangi Tribunal, 2019) found that the primary care system does not adequately address the severe inequities experienced by Māori. Although there has been an increase in Māori service providers, and the Waikato DHB region has four Māori service providers across eight locations (Ministry of Health, 2012), the *Wai 2575* inquiry argues that the Crown has not done enough to support Māori to design and deliver primary care services for Māori. Furthermore, the key legislative framework of the primary care system in New Zealand – the New Zealand Public Health and Disability Act (2000) – is not considered to be Treaty-compliant as it does not give full effect to the Treaty of Waitangi or its principles.

The direct links that participants drew between colonisation and health inequity supports the research literature outlined above and highlights the importance of recognising colonisation and self-determination as key determinants of health for indigenous people. In Canada, Greenwood and de Leeuw (2012) have outlined a 'Web of Being' model of the social determinants of indigenous people's health. The inner layer of children, families and communities are impacted by proximal determinants of health such as income, education and healthy environments. These are surrounded by the intermediate determinants such as health systems, location, cultural ways and justice, while the outer layer consists of distal determinants of health such as self-determination, language, racism, land resources and poverty. Greenwood and de Leeuw's model recognises the historical and ongoing determinants of health that directly affect indigenous people in Canada, suggesting that improvements to health systems and health

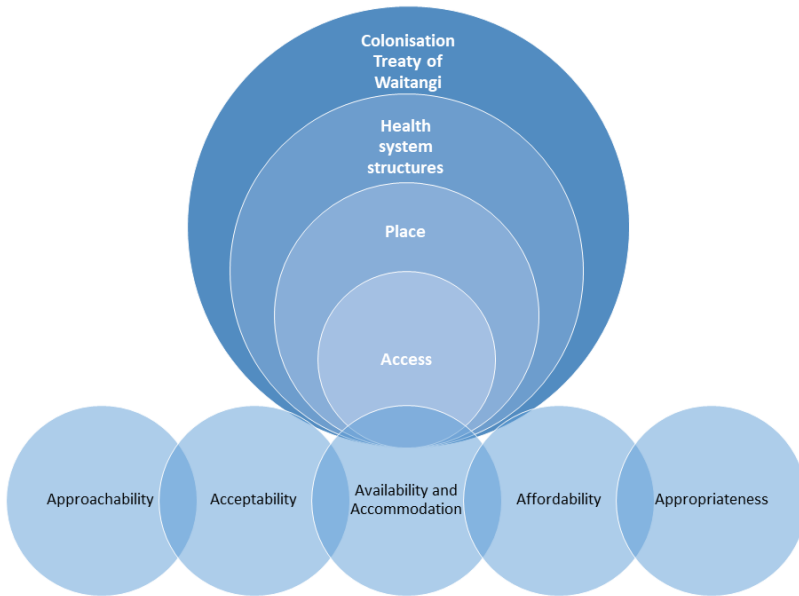
outcomes are intrinsically related to indigenous self-determination and empowerment. The *Wai 2575* inquiry (Waitangi Tribunal, 2019) has given an interim recommendation that the Crown should explore the concept of a stand-alone Māori primary health authority.

Colonisation in Aotearoa New Zealand is also closely linked to capitalism. The systematic dispossession of Māori from their land – and the rights and freedoms associated with it – established the preconditions for capitalism in Aotearoa New Zealand and laid the foundations for persistent inequities between Māori and Pākehā (Wynyard, 2017). In more recent years, neoliberal economic restructuring in Aotearoa New Zealand has led to increasing poverty (Kearns & Barnett, 1992) which marginalises and excludes individuals who are unable to purchase health care (McGregor, 2001). At the same time, market approaches appear to have increased geographic differences in GP availability, resulting in acute shortages in rural areas (Barnett & Barnett, 2004). Kearns and Barnett (1992) note that the health system in Aotearoa New Zealand has been gradually privatised since the 1950s, leading to the emergence of corporate models of primary care service provision. Capitalism and neoliberalism became influential ideologies in the New Zealand health system in the 1990s (Prince et al., 2006) and despite the intentions of the PHCS (Ministry of Health, 2001), primary care in Aotearoa New Zealand is largely based on a privatised business model driven by neoliberal market forces.

Colonisation and capitalism have produced inequitable societal conditions, both in terms of the ‘abilities’ that individuals and populations have to access services, and the impact on the availability and affordability of user pays primary health care services. The research findings discussed above have been synthesised into a model of equitable access to primary health care in the Aotearoa New Zealand context, as displayed in Figure 7. The model shows that the components of access outlined by Levesque et al. (2013) – approachability, acceptability, availability and accommodation, affordability, and appropriateness – are also key themes in ensuring equitable access to GP services in Aotearoa New Zealand.

However, as our participants have highlighted, it is also important to consider the roles that place and health system structures play in shaping inequitable access to health care.

Figure 7: A model of equitable access to GP services in Aotearoa New Zealand



Discussion

Overall, the quantitative findings point to an inequitable distribution of GP services in the Waikato DHB region. The Gini coefficient of 0.477 suggests that access is not shared equally among the population. Although it appears that most residents have good spatial access to services, and there do not appear to be any major differences by age or ethnicity, it is important to recognise that this is likely to be influenced by the geographic distribution of the population. Hamilton city accounts for a large proportion of the overall Waikato DHB population, and good access to GP services in the Hamilton area may be masking poor access in rural peripheral areas that have smaller populations. Furthermore, a high proportion of residents of socio-economically deprived areas reside in Hamilton and therefore also have good spatial access to GP services. However, this is also likely to be masking smaller populations living in small towns and rural areas with high socio-economic deprivation and poor access to GP services. Importantly, a substantial proportion of people are affected by the double burden of living

in areas with poor spatial access to GP services and high socio-economic deprivation.

The results of the qualitative component of this research provide important additional insight, and highlight key factors that participants identify as influencing the equity of GP services. The qualitative mapping approach triangulates our quantitative findings and there appears to be significant overlap between the results of a quantitative GIS model of access – based on population size, supply and the geospatial distribution of services – and the more nuanced qualitative understandings of access among the interviewees.

In-depth interviews reinforced the idea that spatial accessibility is only one component of access, supporting the findings of previous research in this area (Panaretto et al., 2017; Whitehead et al., 2019b). Participants emphasised non-spatial factors that act as barriers to equitable access, particularly the availability, acceptability and affordability of GP services. Many considered the cost of services to be prohibitive, and the focus on European health models unacceptable, and expressed frustration at the difficulty of receiving an appointment with their GP. Several accessibility factors that our participants identified align with the international literature, such as the Levesque et al. (2013) model of patient-centred access.

While the Health Care Home (HCH) model is one response to increase patient-centred care, Cumming et al. (2018) argue that it has potential shortcomings and it is too soon to judge whether it could be a successful model of care in the New Zealand context. For example, Cumming et al. (2018) argue that the HCH model does not directly tackle major equity concerns, especially around the health of Māori and Pacific populations. Furthermore, they suggest that the HCH model is mainly focused on business efficiency, and it is assumed that giving GPs more time will result in better care for patients and populations with complex needs. Our interviewees also identified factors that influence GP service equity and are unique to the Aotearoa New Zealand context such as the historical and ongoing impact of colonisation and Treaty of Waitangi breaches. Our proposed model of equitable access to GP services therefore highlights the importance of historical and structural factors, as well as the role of place, in shaping individual and community level access to GP services. Landscapes of health and place are dynamically and reciprocally developed through the activities of health care provision which affects health services,

the health of population groups, and the vitality of places (Kearns, 1993; Kearns & Joseph, 1997). Kearns (1993) argues that health services are a key institutional component of places. However, the restructuring and re-orienting of health services towards free-market principles since the 1980s have often limited the provision of rural services to very basic levels (Joseph & Chalmers, 1996). Furthermore, Pomeroy (2019) has outlined how the inequitable development of rural New Zealand has systematically disadvantaged Māori populations, while Came et al. (2019) argue that a fundamental barrier to achieving health equity is colonial health policy designed for 'all' New Zealanders. The colonial health infrastructure and policies which replaced indigenous systems of health have been ineffective at addressing the systemic inequities produced through colonisation (Came et al., 2019; Waitangi Tribunal, 2019). Therefore, in order to achieve equity, health policy and health services need to effectively engage with te Tiriti o Waitangi obligations (Came et al., 2019).

This paper has taken an exploratory approach to investigating health care equity using mixed methods. It has highlighted areas of weakness in a purely quantitative approach, and areas for future improvement. For instance, the VGP-E2SFCA model used in this paper did not consider the availability of appointments at each clinic, the type of service being provided, or the cost of an appointment, despite availability, acceptability and affordability being emphasised by participants as key components of equitable access. The ability of populations to access services was also assumed to be equal across the region. Although practice-level databases exist that include the availability and type of appointments and PHOs have data on staff FTE hours for each clinic, this data were not made available for this research project. Future research could aim to better incorporate these aspects of accessibility into a GIS model. Furthermore, the use of GP numbers as a proxy measure of GP and nurse FTE hours represents a potential underestimate of service availability in our GIS model. Many primary care nurses are highly qualified, hold their own appointments, and manage the population health components of general practice such as screening, leading to increased capacity.

The qualitative component of this research is not without its limitations either. While our original sample was designed to include a diverse range of interviewees, the snowball approach to identify additional participants may have limited the final sample. Interviewees may have

recommended contacts with similar world views, meaning that thematic saturation might have been reached earlier than if another methodology had been used – such as randomly selecting service providers and cold-calling them to request interviews. However, overall, incorporating the perspectives of patients, GPs and health service providers into this research has led to the development of a much more intricate and nuanced understanding of GP service delivery in the Waikato region.

To our knowledge, this type of mixed-methods analysis of health service accessibility is unique. Previous research in the New Zealand context has tended to take approaches that are either quantitative (see Pearce et al. (2006) for their examination of access to health-related resources) or qualitative (see Lawton et al. (2016) for their examination of barriers to accessing contraception among Māori teenage mothers). This has meant that quantitative studies of access to health services have tended to overlook the social and historical contexts within which the use of services takes place, and the underlying structural factors that shape opportunities to access health care are concealed.

Conclusion

This exploratory research has provided new insights into the equity of GP services in the Waikato DHB region and has highlighted particular areas that have poor spatial accessibility. Although it is unclear whether these results can be generalised to other parts of Aotearoa New Zealand, the research approach could be replicated and applied to other study regions. There is clear potential for the results to inform the Ministry of Health and DHBs in their decision making around delivering more equitable primary health services. Our proposed model of equitable access expands upon previous theoretical frameworks of accessibility, is tailored to the Aotearoa New Zealand context, and incorporates key drivers of health service equity. This paper has shown how a mixed methods approach can be used to gain a deeper understanding of health care equity at a regional level and can answer questions of not only *where* inequities occur, but also *why* they have been and continue to be produced.

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