Indigenous Māori perspectives on urban transport patterns linked to health and wellbeing

K. Raerino (Ngāti Awa, Te Arawa) [a,*,1], Alex K. Macmillan [b], Rhys G. Jones (Ngāti Kahungunu) [a]

[a] Te Kupenga Hauora Māori, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand
[b] School of Population Health, The University of Auckland, Auckland, New Zealand

ABSTRACT

There is a growing body of research linking urban transport systems to inequities in health. However, there is a lack of research providing evidence of the effect of transport systems on indigenous family wellbeing. We examined the connections between urban transport and the health and wellbeing of Māori, the indigenous people of New Zealand. We provide an indigenous exploration of current urban transport systems, with a particular focus on the impacts of car dependence and the need for culturally relevant travel. We interviewed nineteen Māori participants utilising qualitative research techniques underpinned by an indigenous research methodology (Kaupapa Māori). The data highlighted the importance of accessing cultural activities and sites relevant to 'being Māori', and issues with affordability and safety of public transport. Understanding the relationship between indigenous wellbeing and transport systems that goes further than limited discourses of inequity is essential to improving transport for indigenous wellbeing. Providing an indigenous voice in transport decision-making will make it more likely that indigenous health and wellbeing is prioritised in transport planning.

© 2013 Published by Elsevier Ltd.

1. Introduction

Transport plays a vital role in human health and wellbeing. The accessibility and availability of transport options that contribute to the health and wellbeing of urban communities is largely dependent on transport policy and design. Integrative reviews have demonstrated complex links between transport provision, policy, and our ability to fully participate in society; economically, socially, culturally and politically (Hine, 2009; Delbosc and Currie, 2011; Currie et al., 2009; Dora, 1999). Further, it is marginalised groups in society, including indigenous populations, who face transport disadvantage in accessing health and wellbeing services, facilities and activities (Currie et al., 2009). Transport disadvantage is described as the mismatch between transport and the location of services that contribute to social exclusion by preventing people from participating in work or learning, or accessing healthcare, food shopping and local activities (Battellino, 2009; Currie and Delbosc, 2010; Loader and Stanley, 2009; NCOSS Transport Policy Advice Group, 2011). Transport-related social exclusion has also been described as a situation where people are not able to participate in society's basic activities because of a lack of access to transport options (Lucas, 2011, 2004; Lyons, 2004; Preston and Raje, 2007). Both transport

disadvantage and transport-related social exclusion are built on normative understandings of what constitutes advantage and social inclusion (Solomon, 2003). For example, the UK Social Exclusion Unit (Social Exclusion Unit, 2003) defines the problem of transport-related social exclusion as preventing people from participating in work or learning, and accessing healthcare, food and local activities. This rich body of literature has been important in understanding generalisable patterns of transport disadvantage mediated by income and gender. However, some recent research has called for a more nuanced understanding of differing aspirations for access, mobility and participation (Rose et al., 2009), including the specific aspirations of indigenous people, relating to cultural wellbeing and relationships with ancestral land (Helps et al., 2008).

There is also growing literature considering ethnically mediated transport disadvantage, yet indigenous transport issues remain relatively unstudied. While the evidence about social, health and environmental inequities for indigenous populations suggest that generic concepts of transport disadvantage or exclusion have relevance for indigenous wellbeing, such concepts may be inadequate for describing the relationship between transport and indigenous wellbeing. Disenfranchisement from traditional lands, language and culture through colonisation is likely to add a particular dimension to transport and wellbeing. This may include a specific set of destinations associated with efforts to reclaim and revitalise indigenous knowledge and culture, as well as specific links between place, transport and indigenous concepts of wellbeing. Two unpublished reports from Australia and New Zealand have begun to identify indigenous

* Corresponding author. Tel.: +64 9 373 7599x82715; fax: +64 9 303 5947.
E-mail address: k.raerino@auckland.ac.nz (K. Raerino (Ngāti Awa, Te Arawa).)
[1] Present/Permanent address: The University of Auckland, Te Kupenga Hauora Māori, 261 Morrin Road, Glenn Innes, Auckland, New Zealand.

transport issues. In Australia, transport services were found to inadequately meet the particular needs of Aboriginal communities, and appropriate community-based public transport either did not exist or was poorly funded, creating transport disadvantage (NCOSS Transport Policy Advice Group, 2011). The Australian report also described how travel undertaken in Aboriginal communities is frequently driven by cultural obligations and responsibilities which centre on family (Helps et al., 2008). This is likely to be similar for other indigenous peoples. For Māori, the indigenous peoples of New Zealand, a recent report stated that urban design and planning in areas of Auckland made it difficult for Māori to access services by active or public transport (Auckland Regional Council, 2009).

Auckland is a sprawling, car-dependent city of about 1.4 million people and is the largest urban centre in New Zealand. The very rapid and marked rural–urban migration of Māori over the past 60 years has led to 24.3% of Māori in New Zealand living in Auckland (Walker, 1990; Barcham, 2004; Statistics New Zealand, 2006) and many within this number originate from tribal areas outside the region. The combined characteristics of land use and transport in Auckland create significant social equity and environmental justice issues for Māori. These environmental determinants contribute to persistent differences in life expectancy, living and housing standards, educational attainment and access to health services (Glover et al., 2008; Counties Manukau District Health Board, 2007; Auckland Regional Council, 2009; Harris et al., 2006; Robson and Harris, 2007). Access to employment, the major mediator between income and health, is strongly determined by car ownership in New Zealand, and lack of access to a car is a significant barrier to employment for Māori job-seekers (Parker, 1997).

In addition to transport being a social determinant of Māori wellbeing there is well-established evidence for transport as an environmental justice issue. Administrative injury statistics (Ministry of Transport, 2011) indicate inequities for Māori, who comprised 15% of the population but over 30% of road traffic fatalities in 2010. Epidemiological studies focusing specifically on children have also found gradients by socioeconomic status and inequities between Māori and non-Māori children (Roberts et al., 1995; Shaw et al., 2005). Child pedestrian injury is the most important contributor to these inequities, with exposure to higher neighbourhood traffic volumes and speeds playing a significant role (Shaw et al., 2005). There is also emerging evidence for higher exposure and mortality rates from particulate air pollution among Māori (Pearce et al., 2006; Hales et al., 2010). These disparate pieces of evidence about inequity have not yet been considered in the context of the links between transport and Māori cultural wellbeing and advancement, including the influences on transport behaviour for Māori. Transport is likely to be an essential wellbeing support, enabling access to sites of importance to culture and identity, countering the indigenous-specific effects of colonisation and urbanisation (King et al., 2009) that have resulted in the loss of language, culture and connection to ancestral lands. However, this theory has not been explored previously in transportation research and the needs of indigenous communities are not currently accounted for in transport decision-making.

This research therefore begins to explore these research gaps, as well as responding to a community-identified need. It investigates the influences on, and health impacts of, transportation mode choices (car, public and active transport) for Māori living in Auckland. Initiated by the Māori steering group members of a Health Research Council of New Zealand funded project *The Health Effects of Intervening in the Trip to Work*, the members requested further research that specifically addressed the issues for Māori and the potential wellbeing impacts of transport policy on *whānau ora*[2]

---

[2] Throughout the remainder of this paper, Māori terms are presented in italics and translations can be found in the glossary.

(family health and wellbeing for Māori). Although the research was specific to urban Māori in Auckland, recommendations are likely to be highly relevant to other urbanised indigenous people.

2. Methods

We used qualitative research techniques underpinned by an indigenous research methodology (Kaupapa Māori). Kaupapa Māori research is developed and designed for Māori by Māori, with underlying principles or aspects which are based on a Māori worldview (Smith, 1992, 1996; Irwin, 1994; Bevan-Brown, 1998). Key methodological principles include; the legitimacy and validity of being Māori, the importance of ensuring the survival and revival of Māori language and culture and the centrality of self-determination of Māori cultural wellbeing (Smith, 1997). We based the research on principles of Kaupapa Māori research (Smith, 1996, 1997) by answering a question posed by Māori stakeholders, involving them in the design of our research and connecting the research with a Māori model of health promotion. Our stakeholders (steering group members) were invited to participate in all stages of the research study. *Hui* (meeting) were held to discuss, review, analyse and code data – and then identify key issues requiring policy-level recommendations. The lead interviewer was Māori and participants were provided an option to have their interviews conducted in *te reo* (Māori language). While none of the participants chose to be interviewed entirely in *te reo* Māori, many participants drew on Māori concepts and utilised Māori words in their narratives. Selection of the participants was determined by purposive sampling using the a priori sampling frame shown below (Table 1):

The participant group comprised twelve women and seven men varying in ages between 18 and 75+ years. Fifteen of the participants were members of a Māori steering group for a Health Research Council funded transport study, the remaining four participants were recommended by steering group members. Having an interest in transport systems and providing a Māori viewpoint were the only criteria for participation in the study. Interviews were conducted between January and April 2010. In-depth, semi-structured, face to face interviews were undertaken by a Māori interviewer. Each participant was asked to discuss their views of the links between transport patterns (or transport options) and the wellbeing of their families and communities. After the initial response to this question and as new issues arose the participants were then prompted to explore the influences and impacts of each identified transport behaviour or theme.

Two methods of data collection were used. As well as recording and transcription of interviews, cognitive mapping was used to include both the research interviewer and participant in visually recording the interviews in a way that promoted analysis, questioning and understanding of the data (Eden and Ackerman, 1992). The cognitive maps provided a valuable tool to capture the main themes and discussion points identified by each participant, and act as a prompt to revisit and review themes and sub-themes. By employing this method of data capture, a visual display was created in real time with the participants that highlighted the development of relationships between themes and variables. The individual cognitive maps were then combined into a single set of shared cognitive maps relating to the principle themes that emerged. At the completion of the interview, each participant was sent a copy of his or her transcript to review. Interview transcripts were analysed using a general inductive approach (Thomas, 2006). The data was coded by the lead Māori researcher and presented to the research team and the stakeholders for discussion and review. Three consecutive *hui* were held to obtain agreement on data coding, the analysis

Table 1
Participant group.

Participant group	
Criteria	– Self-identify as Māori – Currently live in urban Auckland area – Interest in transport systems of Auckland
Representing	*Iwi, hapū, marae,* local council, Auckland Transport, Māori community wardens, Health and disabilities organisations, students, Māori University Lecturers, Māori community groups, Urban design

framework and identification of important themes. A final report was presented to the Māori steering group at the end of the study.

3. Results

From the *hui* with the stakeholders four main themes emerged as important factors for family wellbeing: the lived experience of being Māori (including identity, culture and access to the Māori world); the relationship between transport behaviour and the built and natural environment; the link between transport and healthy daily lives; and the ability to participate fully in society economically and in the wider family. These emerging themes closely correlated to the goals for Māori wellbeing identified by Durie (1999) in his model of health promotion, Te Pae Mahutonga. Te Pae Mahutonga (named after the constellation also known as the Southern Cross) identifies four goals for wellbeing: Mauriora (access to Māori cultural, economic and social resources); Waiora (environmental protection and access to the natural environment), Toiora (physical, mental and emotional wellbeing) and Te Oranga (participation in society). Durie also identifies two important process requisites for meeting these goals: Ngā Manukura (leadership) and Te Mana Whakahaere (autonomy and empowerment).

Alignment between the emergent themes and the foundations of health outlined in Te Pae Mahutonga led to the arrangement of themes utilising Te Pae Mahutonga as a framework. This approach was found to provide a reasonably accurate and comprehensive representation of the research data. However, the relationships between transport, the physical environment and Māori wellbeing described by participants were more complex than those described by Durie under the theme of Waiora. We have therefore labelled this section "Relationships with the physical environment". Aspects of Waiora are included under this heading. In their interviews, participants discussed transport patterns in their communities as a series of dichotomies to explain the influences on, and outcomes of, those patterns with a comparison of all other modes against car use as the norm (e.g. car use versus public transport, car use versus active modes). Research data highlighted 55 influences and impacts, inclusive of 29 sub-themes that were specifically related to being Māori. The general themes involved transport cost and reliability issues, whereas Māori-specific themes related to Māori perspectives, values and beliefs regarding language, culture, health and environmental concerns.

The following section includes a selection of maps created from the participant interviews and data analysis. The maps are arranged with transport patterns or actions in the centre of the picture, the perceived variables that influence those actions at the bottom and the outcomes for wellbeing at the top. Arrows denote causal direction—the variable at the base of the arrow influences the variable at the head. A plus sign means that increasing the variable at the tail leads to an increase in the variable at the head of the arrow. A minus sign means that increasing the variable at the tail leads to a decrease in the variable at the tail. Where

participants discuss variables by contrasting two opposing ideas or poles (e.g. travelling by car as opposed to travelling by bus) then an ellipsis (…) is used to denote "as opposed to" or "rather than".

3.1. Mauriora

You know, so the realisation for us is that not only do we have difficulty accessing services or accessing even the transport to get to the services, we have difficulty accessing Māori knowledge (Participant 14).

The majority of participants spoke about Mauriora in terms of accessing sites linked to their Māori cultural identity. Access to *te Ao* Māori (the Māori world), *te reo* and *marae* (traditional Māori meeting place) activities were seen as both influences on transport patterns and as wellbeing outcomes. Seven participants reflected that Māori identity and culture includes obligations and responsibilities to attend activities and sites connected not only to their tribe, but also their family identity. Limited access to transport was identified as a barrier to meeting these obligations and as having possible long-term effects on Māori cultural identity. The role of *kaitiaki* (caretakers of the land) was considered by four of the participants to be central to their Māori identity, influencing their requirements for travel. Utilising transport to access cultural activities was of vital importance to all of the participants. The majority of the participants identified that car use was the only option in accessing sites important to their identity and that public transport did not cater for these journeys.

Fig. 1 shows that a number of influences, primarily related to cultural needs, obligations and norms, encourage car use as opposed to other modes of transport. These factors may also influence people's choice of living situation, for example choosing to live on *papakainga* rather than in more conventional suburban environments, which in turn also leads to increased car use due to peri-urban location. The net result is a predominance of car travel relative to other modes, which in turn enables largely positive outcomes in terms of cultural literacy, connection and fulfilment of cultural obligations. The only exception noted was the link between excessive car travel and fatigue leading to detrimental effects on waiora and *hauora*(health).

3.2. Relationships with the physical environment

"… the more people are encouraged to use cars and, sort of private vehicles, um, the more, the emissions we have and pollution and that's obviously got an impact on, on air quality … I think it's, particularly an issue for, you know, for whānau ora because who are the people that are most likely to be living beside the motorway…." (Participant 1)

There were three interconnected threads discussed in relation to this theme: responsibilities as *kaitiaki* for natural resources and the environment influencing how participants travelled; aspects of the built environment which also influence how participants travel; and outcomes for the environment of vehicle use (Waiora).

Eight participants spoke of being aware of their role as *kaitiaki* of natural resources, at local and broader levels. This was noted to encourage long distance travel by car to fulfil this role in participants' own tribal land. Fulfilling different *kaitiaki* roles was seen as creating a tension with the effects on *Papatuanuku* (mother earth) of current transport patterns, but these concerns were not widely identified as influencing how participants travelled.

A number of aspects of the built environment emerged as making participants more likely to use cars for transport than other modes. The current road layout was identified to encourage car use, which in turn increased the need for road building and widening. The need for personal safety and security within their
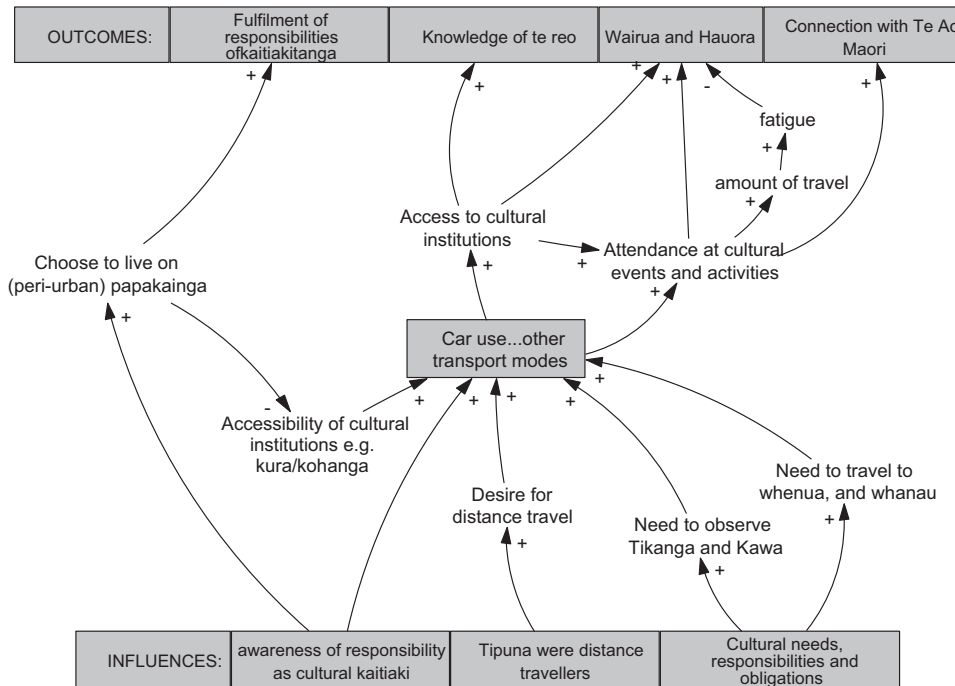
Fig. 1. Mauriora and car use.

living environment was addressed by fourteen of the participants as a strong influence on decisions about public transport use. Two participants commented that bus and train stations were not well-lit or safe enough to utilise. Lack of personal safety was also identified as a barrier to active transport, and participants drew attention to the importance of other aspects of the built environment including facilities that make it safe and convenient to walk and cycle.

Six participants reflected on the impacts on Waiora of increased car use and subsequent air pollution, identifying adverse effects on *whenua* (land) and particularly on *whānau ora* as a result of inequalities in exposure. The relationship between public transport and air pollution was also considered to be problematic because of the poor quality and efficiency of buses, combined with low patronage.

3.3. Toiora

"… the health consequences of probably not exercising and poorer diets [mean] we do need to access healthcare more often than perhaps non Māori, certainly more than tauiwi anyway. And, and that, that puts another stress on an A&E situation…" (Participant 4).

Participants described two specific links between transport patterns and healthy lifestyles: First, as a desire to be healthier through more exercise and losing weight; and second the ability to access primary, secondary and emergency healthcare. For many, opportunities to exercise through walking for recreation and walking for transport were inseparable and were influenced by the need to increase physical activity and decrease car (and public transport) use. Lack of physical activity within family was discussed by several participants as a major contributing factor to overweight and unhealthy family members. The needs of mobility impaired *whānau* (family) members were identified by one participant as contributing to increased car use. Issues faced by deaf and blind Māori in accessing public transport included poor communication skills and lack of disability awareness by public

transport operators, which created a reliance on *whānau* members to provide transport.

Four participants identified a link between driving *tamariki* to school, and a tension between concern for safety, and a lack of exercise leading to overweight *tamariki* (see Fig. 2). These relationships connect together as a reinforcing loop, whereby time spent in cars as *tamariki* and adults leads to poorer health of both *tamariki* and adults, increased need for health care, and decreased ability to walk and cycle, therefore increasing the time spent in cars – creating a vicious cycle. Two participants also identified that encouraging active transport for *tamariki* could flip this vicious cycle into a virtuous one over time. This feedback loop is denoted in the map below by the symbol:

3.4. Te Oranga

Participants talked about participation in society (Te Oranga) in three main ways: the economic circumstances of *whānau;* maintaining relationships with family; and the impacts of illegal driving and imprisonment on participation in society for Māori men in particular. Aspects of participation in employment and *whānau* responsibilities are very closely interconnected with having the financial and practical ability to improve access to Māori resources and activities (as discussed in the first theme). Employment provides the financial means to access Māori cultural places and events directly linked to Mauriora.

3.4.1. Participation in the economy

"How many people can't get to work regularly? Not 'cause they can't work, because they can't get to work. If they were spending fifty bucks on transport just getting to work, because they're generally low paid it ain't worth working" (Participant 9).

Almost all participants connected access to employment and financial security with *whānau ora*. The place of car ownership and use for accessing employment was seen as a double-edged sword, as shown in Fig. 3. For many, access to employment was dependent on car use, as alternatives such as public transport or cycling were perceived as being too unreliable, slow or dangerous. On the other hand, many described the increasing cost of petrol and car ownership as having a negative impact on access to employment. This resulted in reduced financial security and increased stress as *whānau* attempted to manage their car reliance on a limited budget. However the cost of public transport was also considered challenging. In assessing the relative costs of different options for getting to work many participants concluded using the car seemed more cost effective.

The other major factor identified in Fig. 3 was the need to combine work commitments with *whānau* and community commitments, reflecting the complexity of transport needs. This was seen as leaving no real alternative to using a car. Seven participants acknowledged that juggling public transport timetables to go to work, visit family and attend *marae* meetings was often very difficult—which made car use seem more practical.
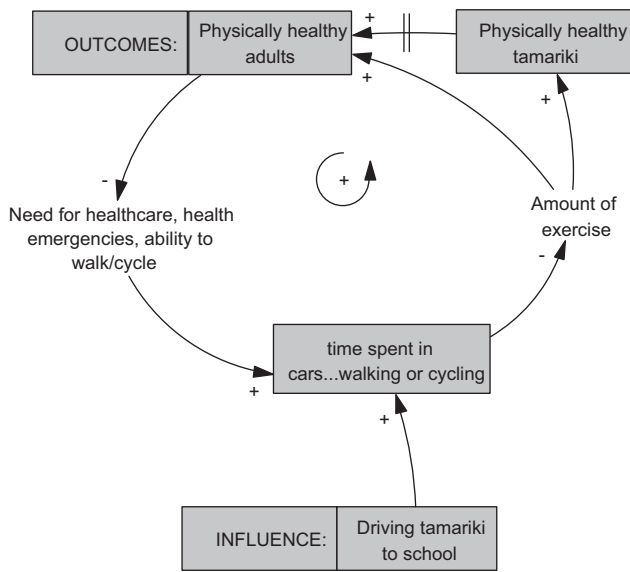

Fig. 2. Active transport and *tamariki* health.

3.4.2. Participation in whānau

"… so if I hadn't been able to go and pick him up, you know, for whatever reason then we don't have our kaumātua to perform this ceremony for us and that's a major role that, that he still can, can play. So that's, that'd be sad for him to, to not be able to discharge his, his duty and his role and it certainly deprives us of his expertise" (Participant 13).

The connection between car ownership and use, and aspects of mana whakahaere and *tino rangatiratanga* (independence) were emphasised by nine of the participants. As shown in Fig. 4, a number of factors were identified as encouraging car use in favour of other modes of transport. Having a sense of control over the management of a range of activities, and the ability to travel quickly and reliably to facilitate this, was seen as important and related to a sense of sovereignty. Four participants spoke of the importance of *whakawhanaungatanga*, or family and friends making social connections, which car journeys helped to facilitate. The size and composition of *whānau*, whether living in the same household, or connected by *whakapapa* (genealogy), had major implications in relation to transport and the need to have accessible transport to respond to emergencies. Two participants felt that Māori *whānau* were likely to have more dramas than other families. Particular aspects of *whānau* composition related to having a large number of *tamariki* (children), and having close relationships and responsibilities for *kuia* (elder woman) and *kaumātua* (elder male). In addition to the direct individual needs of *kaumātua* and *kuia* who were not able to drive themselves, and may otherwise have been housebound, participants emphasised the importance for the whole family of *kaumātua* and *kuia* being present at *hui*. All these factors contributed to participants being more likely to travel by car.

In turn, the impacts of car use were reported to be overwhelmingly positive in relation to *whānau* participation (Fig. 4). Travel by car provided a means of responding to *whānau* emergencies and necessities, was often consistent with historical cultural travel patterns, and importantly allowed *whānau* access to wisdom and cultural knowledge. The presence of elders at hui and other events was highlighted as particularly critical; without their expertise, there was a risk of adverse impacts on the wellbeing of the whole family, including the loss of *tikanga* (procedures) and *kawa* (ceremonial etiquette) knowledge.
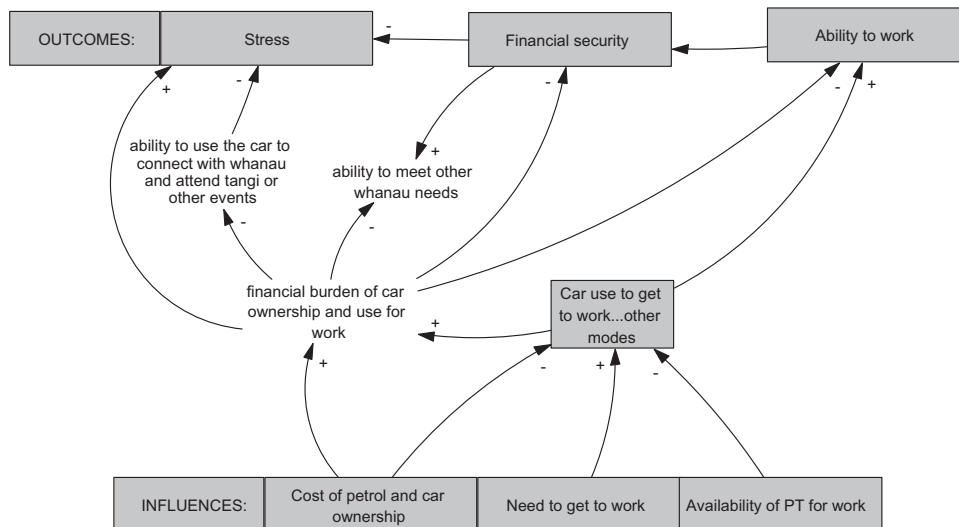

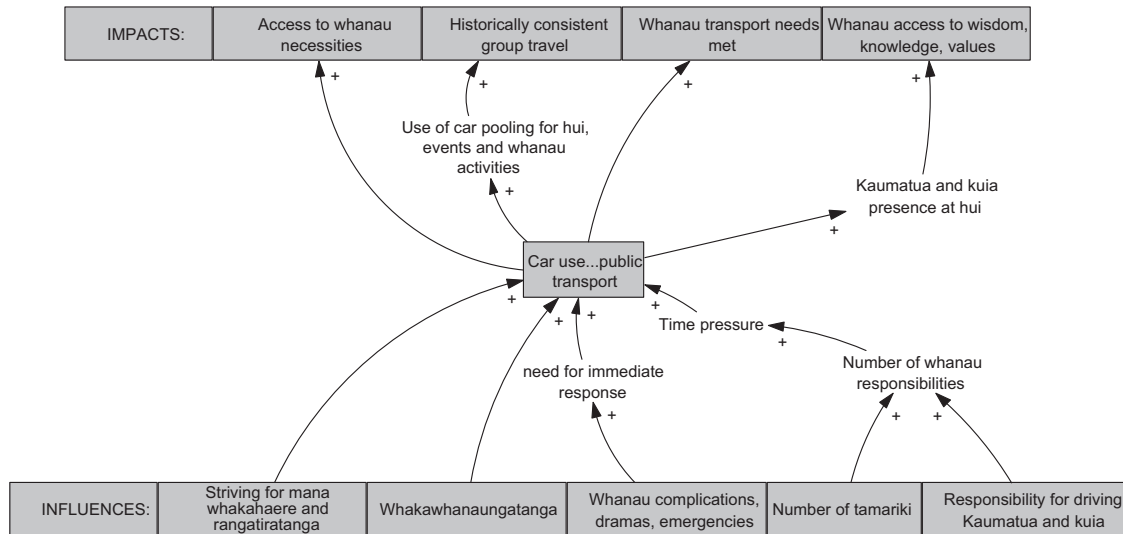**Fig. 3.** Participation in the economy (PT—public transport).

Fig. 4. Participation in *whānau*.

3.4.3. Illegal driving

"… getting your licence involves, having literacy for a start, so it involves a level of success in the racist education system. It involves engaging with an agency on several occasions and going through a rather drawn out process and, and then, and quite, ah, significant expenses and, to get your licence… and driving without a licence is quite an important reason why Māori men are imprisoned" (Participant 6).

One participant spoke at length about the prevalence of illegal driving, particularly among Māori men. This issue was determined by the research group to be of great concern, and needed to be highlighted. Fig. 5 demonstrates the relationship between illegal driving and issues of participation in society described by participants. Two vicious cycles were described. The first relates to the cost of attaining a driver's licence. Meeting this cost is often achieved through income from employment. However, employment is overwhelmingly dependent on having a driver's licence. The second cycle relates to not being able to afford to maintain a warranted, registered vehicle, leading to illegal driving, and increasing the risk of having a criminal record. This in turn reduces the ability of Māori men to gain employment and obtain the income required to maintain a registered vehicle. The pressure to respond to *whānau* needs by driving was also considered an important contributor to these cycles.
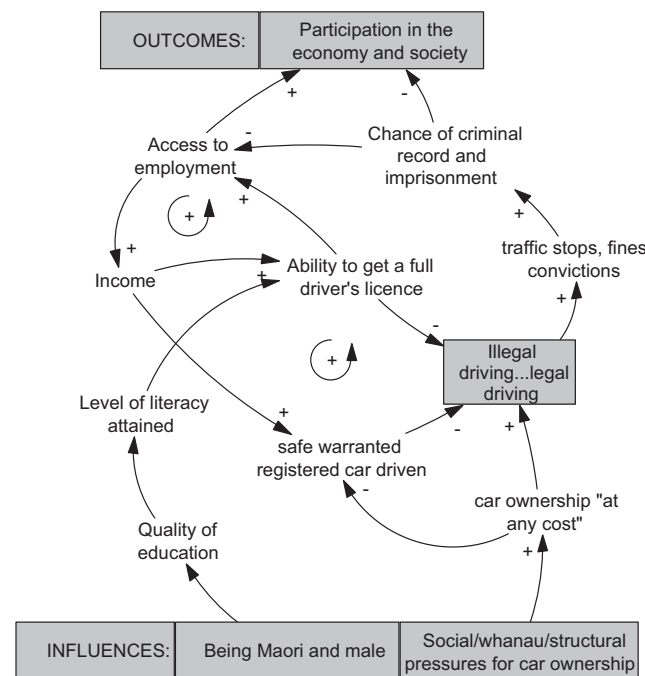
3.5. Mana Whakahaere and Ngā Manukura

"… if the wairua and the mana and the sense of injustice and wellbeing of people, if people do not think those issues are being addressed for them then the price is extraordinarily high in terms of their day to day interactions. Their ability to do submissions for a Regional Land Transport strategy thing becomes a nonsense when they're dealing with a hundred and fifty years of what hasn't happened for them, you know, in the region" (Participant 15).

Participation in planning was considered to have a significant influence on whether transport and urban planning met Māori needs and contributed positively to *whānau ora*. Involvement in decision-making and the ability to demonstrate leadership in design were both regarded as important. This included decisions about public transport and community level urban planning. Eleven participants described barriers to participation in planning

Fig. 5. Illegal driving and Māori men's participation in society.

and active exclusion of Māori from decision making; for example, actions of the local council were identified as symptomatic of ongoing colonisation and oppression. A lack of voice in decision making was specifically described in relation to public transport design and provision. Improved participation would increase the appropriateness of public transport services for Māori, and therefore Māori patronage of those services. The design of small-scale community-owned public transport services was considered particularly important for improving safety, security and accessibility.

4. Discussion

This study has examined transport patterns and Māori health and wellbeing, emphasising both the determinants on, and effects of, these patterns. Existing literature about transport disadvantage

makes normative assumptions about the transport and social aspirations and needs of non-dominant groups. For the first time we have extended the dominant discourse about transport as merely a cause of ethnic inequity to provide an indigenous-centred view of transport and wellbeing. The links between transport and urban Māori health are complex and multidimensional. Understanding these relationships requires a conceptualisation of health and wellbeing that incorporates physical, social, cultural and environmental domains. Although many of the links identified by participants share similarities with the existing literature about transport and social exclusion, one of the most significant findings was that transport systems are extremely important for enabling access to activities and sites relevant to the lived experience of being Māori. Conversely, barriers imposed by poorly designed transport systems were identified as having significant adverse effects on cultural wellbeing and therefore whānau ora. In Auckland, where transport systems have been dominated by heavy investment in road infrastructure, the implication is that restricting access to travel by car, without providing alternative means of transport, is likely to impact negatively on Māori wellbeing.

Participants identified an important tension between the need to fulfil cultural and community obligations and the exercise of kaitiakitanga. Many participants felt compelled to rely on their car to attend family, marae and cultural activities, while acknowledging that their car use created conflict with kaitiaki obligations to protect and care for ecosystems. Over 84 percent (Statistics New Zealand, 2006) of Māori are urbanised and most live outside their tribal area, resulting in a need to travel long distances to their tūrangawaewae (home ground) to participate in tribal activities and events. Tūrangawaewae are essential to Māori identity and wellbeing as they are places where cultural practices and processes are supported, secure and safe from the dominant colonial culture (Walker, 1992). Much of the imperative to travel long distances identified by participants is a direct result of the urbanisation of Māori. Public transport systems have not been designed to meet the specific needs of urban Māori, which means that such long distance travel requires private transport. The tension faced by Māori in this context is inconsistent with conceptions of indigenous rights, which, as a subset of human rights, are interdependent and indivisible (United Nations, 1993). Access to cultural resources and the ability to fulfil kaitiaki obligations both represent indigenous rights, and it is important that Māori are not forced to make a choice between the two. A key principle here is that indigenous peoples ought to be free to determine how these rights are balanced, or how best to enhance both sets of rights in question (Stavenhagen, 2009).

The desire for better health expressed by participants in this study highlights the unmet demand for active transport among Māori whānau, particularly for children. Participants identified both risk of injury and threats to personal security as significant barriers to active transport in their neighbourhoods. This is consistent with evidence that environmental barriers can override behavioural influences on walking and cycling (Owen et al., 2004) and that infrastructure which makes walking and cycling safer is likely to be the most effective intervention for encouraging active transport (Pucher and Dijkstra, 2003). Our findings also emphasise failures in the education system that create inequitable education outcomes and result in considerable barriers to participating fully in society, particularly for Māori men. A significant end point of these inequities is the incarceration of Māori men for traffic offences and illegal driving (Hook, 2009; Blows et al., 2005; McDowell et al., 2009). A vicious cycle involving low income, poor quality vehicles, car dependent employment opportunities and illegal driving stems from these educational inequities, but is exacerbated by failures in urban planning.

This study adds new information to transport disadvantage (Hine, 2009; Delbosc and Currie, 2011; Currie et al., 2009) and indigenous wellbeing research (NCOSS Transport Policy Advice Group, 2011). While there is a growing body of literature exploring transport and ethnic inequity, very few articles provide insights into the complex relationships between transport systems and indigenous health, from an indigenous perspective. A comparable study in Australia reviewed the Aboriginal experience of transport systems and identified several contributing factors to their transport disadvantage. It drew attention to high transport costs and poor availability of public transport services, which disable access to health care and create isolation for specific groups (NCOSS Transport Policy Advice Group, 2011). The authors also identified that the travel patterns of Aboriginal people were very different from those of the non-Aboriginal majority for whom transport systems had been developed (Helps et al., 2008). Much of the transport-related literature relevant to indigenous wellbeing focuses on the accessibility of transport; this study adds another important dimension by including indigenous concepts that influence transport choices and the outcomes of the resulting transport patterns.

The strength of indigenous research is that it gives voice to indigenous communities. In this research participants have voiced what Māori deem as important in the transport systems in their living environment and the impacts of transport on the wellbeing of their families. However, the small sample size means this is by no means a comprehensive indigenous view. The study can be seen as exploratory, given the paucity of existing research examining the relationships between urban environments, transport and health from a Māori perspective. It has helped to identify broad themes and concepts that require development, refinement and validation through more comprehensive research. Qualitative research inevitably provides rich data, which relies on decisions of priority during the analysis. The potential for researcher bias was reduced by using an iterative process of checking emerging themes against the data, and was further mitigated by the active involvement of the participants in data analysis.

This research has implications for future transport policy and further research which are likely to be generalisable to other urban indigenous populations, particularly where there is a history of colonisation. While the implications for other colonised indigenous populations may be similar in relation to high-level transport decision-making, the specific solutions will differ according to local contexts. Future research is required to examine the issues in greater depth with a larger sample of indigenous participants, and to enable analysis by different demographic characteristics.

We make three recommendations for transport policy. First, greater representation of indigenous peoples is required at multiple levels in both the development of regional transport strategies and local implementation of those strategies. Many of the issues identified in this study reflect fundamentally different drivers of transport patterns for Māori, based around particular cultural norms and imperatives, that urban transport systems in Aotearoa/New Zealand have not been designed to accommodate. The privileging of non-indigenous transport needs is not surprising in light of current political structures that provide only very limited Māori representation or influence into policy decisions that affect Māori. In 2007 less than 5% of successful local body government members were Māori (Taonui, 2012). "Cultural representation" on regional transport committees is currently required by the legislation governing transport legislation in New Zealand (Land Transport Management Act 2003, 2003). This representation does not currently need to be indigenous, and the legislation is currently being reviewed to potentially weaken this requirement further. This research suggests that the transport needs and aspirations of indigenous peoples are likely to be different from

other minority groups. To balance the under-representation in democratically elected positions of power, indigenous representation needs to be legislated for, not just in transport but other urban policy forums. Increasing meaningful indigenous participation in policy decisions will provide an informed understanding of the relationship between indigenous wellbeing and transport systems, enabling more effective urban design and policy to improve indigenous wellbeing in urban settings.

Second, we recommend that policy-makers empower the development of small community-owned and operated public transport systems that reflect the specific needs of indigenous communities, including systems such as *marae*-based transport. This research indicates that such services provide a valuable alternative to travel by car, which can help to mitigate some of the adverse effects of reliance on private cars for transport. Developing these services would ensure that urban transport systems improve accessibility to services and sites of cultural wellbeing. Although more general improvements in public transport that prioritise low income communities would also likely benefit Māori wellbeing, the issues raised by participants in this study highlight the need for more specific, Māori-centred strategies in order to achieve transport equity.

Third, it is essential that transport strategies and policies are introduced specifically to address access for indigenous youth to education and employment, through a combination of improved public transport services and programmes to support full driver licensing and safe vehicle ownership. This is required in order to address the determinants of illegal driving, particularly for Māori men, identified in this research.

Future qualitative and quantitative research is needed to improve our understanding of the barriers to and enablers of sustainable transport behaviour for urban indigenous people. This includes research that connects urban design and transport policy, for example the effect on active transport patterns of creating urban 'cultural landscapes' which enable indigenous groups to maintain a cultural and spiritual connection to the urban physical environment (Hoskins, 2008). This research highlights that while universal policies may go some way towards improving indigenous wellbeing, their effects will be limited in comparison to an indigenous-centred approach. Indigenous populations have very different needs, imperatives and contexts, and mainstream policies and strategies are clearly not meeting these needs effectively. Intervention studies are also needed to assess the effectiveness of small community-designed and owned public transport for improving access to a range of cultural sites, goods and services with a view to enhancing the wellbeing of indigenous people. Intervention studies that assess the effectiveness of improved public transport services for reducing the harmful outcomes of car dependence and illegal driving for young indigenous men are also needed.

In conclusion, the process of colonisation has led to the design of transport systems that privilege the dominant group and marginalise the needs of indigenous populations. Current discourses of transport disadvantage fail to identify the specific effects of transport policies and systems on indigenous wellbeing, including the impacts of historical and contemporary colonisation. Indigenous health needs to be considered in the design of transport policy in order for transport's contribution to indigenous health and equity to be maximised, and for harms to be minimised (Dora, 1999). A strategy that involves changes to transport systems and policies combined with participation of indigenous peoples in decision making processes is required to bring about substantial and sustained changes in transport patterns that are conducive to indigenous health and wellbeing.

References

Auckland Regional Council 2009. Auckland Regional Land Transport Strategy 2010: volume IV—Working Reports.

Barcham, M., 2004. The politics of Māori mobility. In: Taylor, J., Bell, B. (Eds.), Population Mobility and Indigenous Peoples in Australasia and North America. Routledge, London.

Battellino, H., 2009. Transport for the transport disadvantaged: a review of service delivery models in New South Wales. Transport Policy 16, 123–129.

Bevan-Brown, J, 1998. By Māori, for Māori, about Māori—is that enough?. In: Te Pūmanawa Hauora (Ed.), Te Oru Rangahau Māori Research Conference. Palmerston North: School of Māori Studies. Massey University.

Blows, S., Ivers, R.Q., Connor, J., Ameratunga, S., Woodward, M., Norton, R., 2005. Unlicensed drivers and car crash injury. Traffic Injury Prevention 6, 230–234.

Counties Manukau District Health Board 2007. Maa Taatou, Moo Taatou. Information to support Maaori Health Planning in Counties Manukau. Auckland: Counties Manukau District Health Board.

Currie, G., Delbosc, A., 2010. Modelling the social and psychological impacts of transport disadvantage. Transportation 37, 953–966.

Currie, G., Richardson, T., Smyth, P., Vella-Brodrick, D., Hine, J., Lucas, K., Stanley, J., Morris, J., Kinnear, R., Stanley, J., 2009. Investigating links between transport disadvantage, social exclusion and well-being in Melbourne—preliminary results. Transport Policy 16, 97–105.

Delbosc, A., Currie, G., 2011. Exploring the relative influences of transport disadvantage and social exclusion on well-being. Transport Policy 18, 555–562.

Dora, C., 1999. A different route to health: implications of transport policies. British Medical Journal 318, 1686–1689.

Durie, M., 1999. Te Pae Mahutonga: a model for Maori health promotion. Health Promotion Forum of New Zealand Newsletter 49, 2–5.

Eden, C., Ackerman, F., 1992. The analysis of cause maps. Journal of Management Studies 29.

Glover, J.D., Hetzel, D.M.S., Tennant, S.K., 2008. Australia and New Zealand, health systems of. In: Kris, H. (Ed.), International Encyclopedia of Public Health. Academic Press, Oxford.

Hales, S., Blakely, T., Woodward, A., 2010. Air pollution and mortality in New Zealand: cohort study. Journal of Epidemiology and Community Health.

Harris, R., Tobias, M., Jeffreys, M., Waldegrave, K., Karlsen, S., Nazroo, J., 2006. Racism and health: the relationship between experience of racial discrimination and health in New Zealand. Social Science & Medicine 63, 1428–1441.

Helps, Y., Moller, J., Kowanko, I., Harrison, J.E., O'Donnell, K., de Crespigny, C., 2008. Aboriginal peole traveling well: issues of safety, transport and health. Road Safety Grant Report 2008-01. Flinders University, Adelaide.

Hine, J., 2009. Transport and social exclusion. In: Rob, K., Nigel, T. (Eds.), International Encyclopedia of Human Geography. Elsevier, Oxford.

Hook, G. 2009. The Potential Influence of Legislation on the Criminality of Māori and Pacific Islanders in New Zealand. MAI Review, 3 (Target Article 1).

Hoskins, R., 2008. 'Our Faces in our Places': cultural landscapes—Māori and the urban environment. In: Public Health Advisory Committee (Ed.), Re-thinking Urban Environments and Health. PHAC, Wellington.

Irwin, K., 1994. Maori research methods and processes: an exploration. Sites Journal 28, 25–43.

King, M., Smith, A., Gracey, M., 2009. Indigenous health part 2: the underlying causes of the health gap. The Lancet 374, 76–85.

Land Transport Management Act. 2003. Public Act 2003 No 118. New Zealand.

Loader, C., Stanley, J., 2009. Growing bus patronage and addressing transport disadvantage—the Melbourne experience. Transport Policy 16, 106–114.

Lucas, K., 2004. Locating transport as a social policy problem. In: Lucas, K. (Ed.), Running on Empty. Transport, Social Exclusion and Environmental Justice. The Policy Press, Bristol.

Lucas, K., 2011. Driving to the Breadline. In: Lucas, K., Blumenberg, E., Weinberger, R. (Eds.), Auto Motives: Understanding Car Use Behaviours. Emerald Group, Bingley, UK.

Lyons, G., 2004. Transport and society. Transport Reviews 24, 485–509.

McDowell, A., Begg, D., Connor, J., Broughton, J., 2009. Unlicensed driving among urban and rural Maori drivers: New Zealand drivers study. Traffic Injury Prevention 10, 538–545.

Ministry of Transport, 2011. Motor Vehicle Crashes in New Zealand 2010. In: Research And Statistics (Ed.), New Zealand Government, Wellington.

Ncoss Transport Policy Advice Group 2011. An Effective and Equitable Transport System—Election Kit. New South Wales.

Owen, N., Humpel, N., Leslie, E., Bauman, A., Sallis, J.F., 2004. Understanding environmental influences on walking: review and research agenda. American Journal of Preventive Medicine 27, 67–76.

Parker, B., 1997. Very long-term job seekers barriers to employment: a nationwide survey. Labour Market Bulletin 1, 63–79.

Pearce, J., Kingham, S., Zawar-Reza, P., 2006. Every breath you take? Environmental justice and air pollution in Christchurch, New Zealand. Environment & Planning A 38, 919–938.

Preston, J., Raje, F., 2007. Accessibility, mobility and transport-related social exclusion. Journal of Transport Geography 15, 151–160.

Pucher, J., Dijkstra, L., 2003. Promoting safe walking and cycling to improve public health: lessons from The Netherlands and Germany. American Journal of Public Health 93, 1509–1516.

Roberts, I., Norton, R., Jackson, R., Dunn, R., Hassall, I., 1995. Effect of environmental factors on risk of injury of child pedestrians by motor vehicles: a case-control study. British Medical Journal 310, 91–94.

Robson, B., Harris, R. (Eds.), 2007. Hauora: Maori Standards of Health IV. A Study of the Years 2000–2005. Te Ropu Rangahau Hauora a Eru Pomare, Wellington.

Rose, E., Witten, K., Mccreanor, T., 2009. Transport related social exclusion in New Zealand: evidence and challenges. Kōtuitui: New Zealand Journal of Social Sciences Online 4, 191–203.

Shaw, C., Blakely, T., Crampton, P., Atkinson, J., 2005. The contribution of causes of death to socioeconomic inequalities in child mortality: New Zealand 1981–1999. New Zealand Medical Journal 118.

Smith, G., 1992. Tane-nui-a-rangi's Legacy. Propping up the Sky: Kaupapa Māori as Resistance and Intervention. New Zealand Australia Association for Research in Education. Deakin University.

Smith, G., 1997. The Development of Kaupapa Maori: Theory and Praxis. Doctoral, University of Auckland.

Smith, L., 1996. Kaupapa Maori Health Research. Hui Whakapiripiri: A Hui to Discuss Strategic Directions for Maori Health Research. Te Ropu Rangahau Hauora a Eru Pomare, Wellington.

Social Exclusion Unit 2003. Making the Connections: Final Report on Transport and Social Exclusion. London.

Solomon, J., 2003. What is transport social exclusion?. In: ROOT, A. (Ed.), Delivering Sustainable Research: a Social Science Perspective. Pergamon, Amsterdam.

Statistics New Zealand. 2006. QuickStats About Maori [Online]. Available: ⟨www.stats.govt.nz⟩ [accessed 3 May 2010].

Stavenhagen, R., 2009. Making the declaration work. In: Charters, C., Stavenhagen, R. (Eds.), Making the Declaration Work: The United Nations Declaration on the Rights of Indigenous Peoples. IWGIA, Copenhagen.

Taonui, R. 2012. Ngā māngai—local body representation. Te Ara—The Encyclopedia of New Zealand. New Zealand.

Thomas, D.R., 2006. A general inductive approach for analyzing qualitative evaluation data. American Journal of Evaluation 27, 237–246.

United Nations, 1993. Vienna Declaration and Programme of Action. UN General Assembly, Vienna.

Walker, R., 1990. Ka Whawhai Tonu Matou Struggle without End. Penguin Books, Auckland.

Walker, R., 1992. Marae: a place to stand. In: King, M. (Ed.), Te Ao Hurihuri - Aspects of Māoritanga. Reed Books, Auckland.

Glossary

hui: Meeting;
kaitiaki: Caretaker of the land;
kaitiakitanga: Guardianship, Stewardship;
kaumatua: Elder male;
kawa: Ceremonial etiquette;
kohanga reo: Nursery;
kura: School;
kuia: Elder woman;
marae: Traditional Māori tribal meeting place;
Mauriora (TPM): Access to Māori cultural, economic and social resources;
Ngā Manukura (TPM): Leadership;
Papakainga: Māori settlement, an area or local vicinity that holds close kinship ties;
Papatuanuku: Mother earth;
tamariki: Children;
tauiwi: Foreigner;
Te Ao Māori: The Māori world;
Te Mana Whakahaere (TPM): Autonomy and empowerment;
Te Oranga (TPM): Participation in society;
Te Pae Mahutonga: Māori health promotion framework;
te reo: Māori language;
tikanga: Procedure, protocol;
tino rangatiratanga: Independence;
Toiora (TPM): Physical, mental and emotional wellbeing;
Turangawaewae: Home ground, place where one has rights of residence and belonging through kinship;
Waiora (TPM): Environmental protection and access;
wairua: Spirit;
whakapapa: Genealogy;
whakawhanaungatanga: Relationships, connections;
whanau: Family;
whanau haua: Family member with disabilities;
whanau ora: Family wellbeing;
whenua: Land.