

Is the Island Bay-City Cycleway a valid approach to Climate Change Mitigation?

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Public Health Project

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<http://www.bizjournals.com/austin/news/2012/06/01/austin-getting-more-protected-bike-lanes.html>

Abstract

Climate change is going to negatively impact every person on the planet. There are several international agreements which aim to mitigate climate change; the most significant of these is the Kyoto Protocol, under which NZ appears in line with suggested emissions reduction targets. However, some believe these targets are too conservative and that climate change will continue to escalate unless drastic measures are taken. NZ was discovered to be a significant contributor to global greenhouse gas emissions, and a major portion of those emissions arose from the transport sector. Emissions from the transport sector have been shown to be highly amenable to modification, and therefore a key target for policy. There are specific health benefits associated with reducing climate change via active transport policies such as implementing cycleways, but while Wellington Regional and City councils show a strong support for mode shift, there is a relative lack of action.

The proposed Island Bay to City Cycleway in Wellington has been contentious, especially with regards to the second stage which passes through Newtown; many Newtown business owners signed a petition against it. We performed a case study on the perceptions of the Newtown business owners towards the Southern Suburbs to CBD Cycleway. We interviewed business owners until saturation, and performed qualitative analysis to elicit key themes. Cyclists' safety, the negative impact on business, and uncertainty of uptake were major themes. Literature suggests that a cycleway is in fact likely to increase safety, either improve or have no negative effect on businesses, and dramatically increase cycling uptake in the area. Another more general theme was information disparity. It became evident that the underlying cause of the opposition by business owners was inadequate communication between policy makers and stakeholders. Improving communication is key to progress in implementing such climate change-mitigating policies.

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Chapter 1: Climate Change

Climate change is arguably the most significant health threat to face the world in the 21st century (1). Climate change already accounts for a significant proportion of disease; in 2005 the World Health Organization (WHO) estimated that the changes in climate over the previous 30 years had directly accounted for more than 150,000 deaths. Most of these deaths have occurred in developing countries (2). People in the poorest countries, who incidentally have contributed the least to greenhouse gas production, will experience the worst effects (3).

Current international models used by the WHO estimate that climate change-associated mortality and morbidity will double by 2030 (2). Negative health effects are expected as a result of changes in temperature, precipitation, soil moisture and sea level (4). Direct effects on health include those as a result of increased extreme climatic events, such as droughts and flooding. There are also many indirect effects that implicate global health, through changes to food and water availability, land availability, population displacement/migration, national stability and geography of disease distribution. Many vector-borne diseases, including malaria and dengue fever, have been shown to have alterations in their area of viability due to temperature changes (5,6).

Despite the significance of this issue, it appears that the global community has been slow to respond. The United Nations Environment Programme and the World Meteorological Organisation set up the Intergovernmental Panel on Climate Change (IPCC) in 1988 (7,8). The aim of the IPCC was to provide an objective assessment of current scientific data on climate change, with the intent of developing pragmatic response strategies (8). The first assessment report of the IPCC confirmed that the build-up of carbon dioxide, methane, chlorofluorocarbons and nitrous oxide in the atmosphere had resulted in a global greenhouse effect, and had been substantially increased by human activity. The report also predicted that the levels of carbon dioxide in the atmosphere would double by 2025-2050, and that there would be an associated increase in the average global temperature of 1.5°C - 4.5°C (9).

This information was instrumental in the formation of the first international agreement on greenhouse gas emissions: the 1992 United Nations Framework Convention on Climate Change (UNFCCC) (10,11). This agreement recognised the human contribution to climate change, and aimed to restrict greenhouse gas emissions to a level that would prevent further

anthropogenic¹ climate interference (12). This seemed like a lofty goal, and the second IPCC assessment report of 1995 suggested that international emissions-reduction targets were inadequate under the UNFCCC. The report also showed a continued increase in greenhouse gas levels in the atmosphere. It predicted that carbon dioxide emissions would need to drop to 1990 levels within 40 years, were carbon levels to remain anywhere close to the levels prior to industrialisation (4). As a response to this, the United Nations introduced the Kyoto Protocol in 1997, a contract whose purpose was to fortify the UNFCCC (13).

1.1 The Kyoto Protocol

The Kyoto Protocol is a binding international agreement, linked to the UNFCCC, which obligates its parties to follow set emission-reduction targets (13,14). The quota of 55 ratified nations was reached when Russia signed in late 2004, and the protocol entered into force in early 2005. The protocol places more stringent reductions on developed nations, recognising their disproportionate contribution to global emissions (14). Two commitment periods were outlined in the protocol: the first from 2008 to 2012, and the second from 2013 to 2020. During the first commitment period, 37 industrialised nations and various European countries agreed to a 5% reduction in greenhouse gas emissions against 1990 levels. During the second commitment period a reduction of 18% against 1990 levels was agreed to, however the composition of nations in this period was different to the first (13). These targets were designed to be met primarily through national reductions.

Alternate pathways to meet targets are also included in the protocol, in the form of three market-based mechanisms. The first mechanism, “joint implementation”, allows a participating nation to earn emissions-reduction units via investment in an emissions-reduction scheme in another participating nation. The second mechanism, “clean development”, allows a participating nation to earn emissions-reduction units through instituting an emission-reduction project in a developing nation. The third mechanism, “emissions trading”, allows those nations in emissions-deficit to trade their assigned amount of units, or carbon credits, to nations in emissions-surplus (13).

New Zealand (NZ) ratified the Kyoto protocol in 2002, and agreed to an unconditional target of a 5% reduction in emissions against 1990 levels, by 2020. During the first commitment period,

¹ Anthropogenic = created by people or caused by human activity

NZ's target was to limit emissions to an average of 1990 levels each year (15). NZ's position under the Kyoto Protocol is provisional, awaiting international review by the UNFCCC in late 2014; however, the Ministry for the Environment anticipates NZ will meet its targets for the first commitment period, when carbon removal from land-use reforms and forestry are taken into account (16). A surplus of 90.8 million carbon credits is predicted, with a value of approximately \$27 million dollars (17).

1.2 The New Zealand Context

Although in a carbon credit surplus in 2012, NZ was the fifth highest greenhouse gas emitter per capita in the developed world (16). NZ's greenhouse gas emissions have increased by 25% between 1990 and 2012; this also represents one of the largest increases in gross emissions among developed nations (1,16).

NZ emissions were confined to four main areas: agriculture, energy, industrial processes, and waste. The proportional contribution from each area fluctuates from year to year, however in 2012 the contributions were 46%, 42%, 7%, and 5% respectively (see Figure 1 below) (16). Since 1990, agriculture has, on average, been the most significant source of emissions, although its proportional contribution has declined since 1990 (18). This reflects the significant increases that have occurred in the energy sector. Energy sector emissions have increased by over a third during the 1990 to 2012 period, and levels surpassed those from the agriculture sector in 2008 (16). Subsequent to 2008, the energy sector fell behind the agriculture sector due to the global recession, favourable milk prices, and investment in renewable energy (18). However, the relatively large average increase in emissions from the energy sector suggests that it could be a key target for emissions-mitigation schemes.

The two main sources of emissions in the energy sector are road transport, and public electricity/heat-production. Road transport is the largest contributor at 38.7%, compared to 19.6% from public electricity. Although public electricity/heat-production has a significant emissions contribution, NZ's high reliance on renewable energy renders this contribution minimal by international standards (18). In contrast to this, NZ has one of the highest rates of car ownership among OECD countries, with more than 5 cars per 10 people, 25-30 cars per \$1000GDP per capita, and one parking space for every two jobs (18,19).

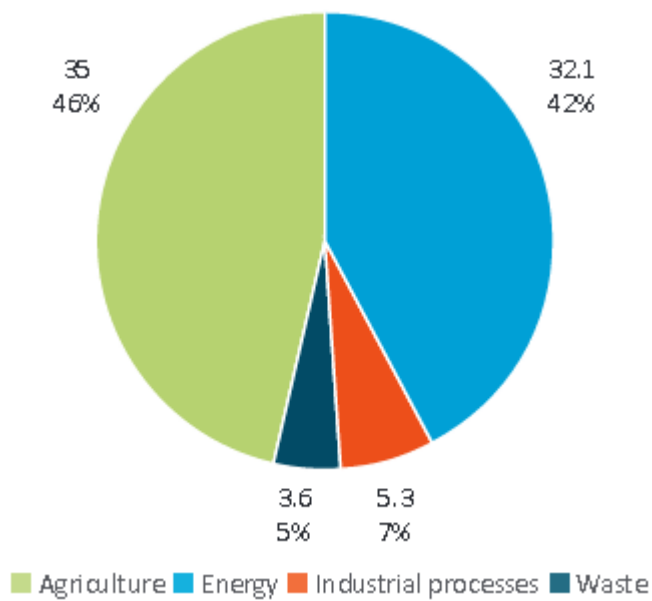


Figure 1: New Zealand's greenhouse gas emissions in 2012 (by sector, in million tonnes of CO2 equivalent) (16)

Furthermore, road transport emissions have increased by 68% between 1990 and 2012, representing one of the top four contributors to NZ's increasing total emissions (18). In view of this, the road transport sector is arguably the sector in greatest need of greenhouse gas mitigation policy in NZ.

Chapter 2: Health Co-benefits of Mitigating Climate Change

Despite clear evidence of the need to address climate change for long-term international health, barriers such as short-term cost and political viability limit the global response to this issue. Climate change policy within the transport sector can be made more beneficial and cost effective, by including a focus on promotion of active transport. Such policies lead to direct short-term improvements in population health, which in turn lead to improved wellbeing, workplace productivity, and decreased healthcare costs for the community involved (20). Transport policy is made more 'palatable' when there are predicted co-benefits for climate change and health (21). This offers a strong incentive for the development and application of dual-oriented policy. Policies that promote modes of active transport, such as cycling, have many direct and indirect effects on health; particularly important are resultant increases in physical activity, and decreases in air pollution (22). Diseases influenced by these factors are highly prevalent in the NZ population therefore policy changes of this nature may be highly beneficial to our national health status.

2.1 Anthropogenic Air Pollution

Anthropogenic air pollution is a broad term, which encompasses primary and secondary gaseous pollutants as well as small particles. Primary gaseous pollutants are those emitted directly from combustion sources, key examples are sulfur dioxide (SO₂), nitrogen oxides (NO and NO₂) and carbon monoxide (CO). Secondary gaseous pollutants are formed in the atmosphere from directly emitted pollutants; the most important of which is ozone (O₃). There are also many particles in the atmosphere, which are small enough to be inhaled into the lung. Particulate matter (PM) is a term used worldwide in estimations of the concentration and effects of these small pollutant particles. Particulate matter has been studied extensively and has been consistently linked to serious health effects. It is considered to be a useful indicator of total air pollution. The main particle sizes implicated in human disease are PM₁₀ (<10µm diameter), and PM_{2.5} (<2.5µm). Both are associated with a significant increase in mortality, though PM_{2.5} is associated with the highest mortality rate overall. Anthropogenic air pollution in NZ comes from many different sectors, but domestic sources, fires for example, are the largest contributor. Motor vehicles also have a significant effect, accounting for 22% of the total health and social effects of air pollution (23).

Anthropogenic air pollution is a significant cause of morbidity and mortality; the majority of which results from increased respiratory and cardiovascular disease (24). In NZ it is estimated that anthropogenic air pollution is annually responsible for: 1,175 premature deaths, 607 extra hospital admissions and 1.49 million days of restricted activity due to respiratory and cardiac illness (23). Because of the nature of air pollution, this effect is generally described as a concentration-response relationship (24). Exposure is in relation to a defined area rather than to an individual person. There is a great deal of evidence to support the specific effects of particulate matter, particularly PM₁₀. Areas with medium or high exposure to PM₁₀ have a 15% and 18% respective increase in mortality due to respiratory disease (25). This association between air pollution and cardiopulmonary disease is supported by many international studies. For example, a cohort study of six US cities found that people living in the most polluted city had an adjusted mortality-rate ratio of 1.36 compared to people living in the least polluted city (26).

Children are a group of the population significantly affected by air pollution; it is estimated that for every 10µg/m³ increase in the concentration of PM₁₀, there is a 1% increase in daily mortality of 0-4 year old children due to acute respiratory infection (24). Air pollution also has an impact on adult health; an American Cancer Society study shows that for every 10µg/m³ increase in the concentration of PM_{2.5}, there is a 6% increased risk of cardiopulmonary mortality and an 8% increased risk in lung cancer mortality (27). Ethnic disparities must also be considered, as Maori, in particular, are disproportionately represented in the adult premature mortality figures. 18.3% of air pollution related mortality is in the Maori population; a significant over-representation given that Maori are only 8.7% of the total adult population. This is consistent with the increased exposure to air pollution, the PM₁₀-mortality exposure-response function for Māori is nearly three times that of the whole adult population (28). However, the confidence intervals for the Māori adult and all adult response functions overlap so this finding may not be statistically significant. Regardless, it is of concern as this subgroup already experiences poorer health outcomes (23).

A reduction in anthropogenic air pollution has the potential to have significant health benefits for the NZ population. One strategy to achieve this, which has been successfully demonstrated internationally, is to target transport policy: particularly with the aim of reducing motor vehicle usage (6,29). A NZ based study has shown that shifting 5% of vehicle kilometres to cycling would reduce vehicle travel by approximately 223 million kilometres each year. This is

predicted to annually save about 22 million litres of fuel and reduce transport-related greenhouse emissions by 0.4%. Of note, the health effects of this reduction would include approximately six fewer deaths per year, attributed directly to a reduction in local air pollution (6).

The benefit of shifting towards active transport modalities is supported internationally. Modelling studies of the large London and Delhi populations assessed the effects of air pollution with the current emissions projection and compared this with interventions to reduce emissions. Switching to low emission cars was shown to directly reduce air pollution and lead to a saving in disability-adjusted life years (DALYs),² in both cities. Switching motor vehicle transport to active travel, including cycling, was shown to have a far greater benefit in terms of air pollution and the DALYs it accounted for. With the assumption of “a doubling of the total distance walked, and an 8 fold increase in cycling from the very low baseline levels,” the London modelling assessment estimated an annual saving of 7332 DALYs and 530 premature deaths per million population (29).

2.2 Physical Activity and Non-Communicable Diseases

Rates of non-communicable diseases currently faced by the NZ population can be significantly improved by regular physical activity; these include obesity, diabetes, cardiovascular disease, many types of cancer, and depression (29,30). Physical inactivity is an increasing problem in developed countries, and is now estimated to be the “fourth leading cause of death worldwide” (31). Rates of physical activity in NZ are low, with only 52% of the population meeting the baseline recommendations of 30 minutes 5 times per week. Physical activity levels are even lower in the Māori population, with just 47% of people meeting the baseline requirements (32).

Physical inactivity, or low physical activity, was shown to account for 2.8% of DALYs in 2010, and about 3.2 million deaths (30). Inactivity directly accounts for 10% of breast and colon cancers, 7% of diabetes, and 6% of chronic heart disease (33). These diseases all account for a significant proportion of poor health in NZ.

² Disability Adjusted Life Years (DALYS) are a way of objectively quantifying disease burden, in terms of mortality and morbidity. One DALY can be considered as the loss of one healthy year of life. This is a useful economic tool, which allows comparison between different disease states. (109)

The Ministry of Health Annual survey found that 31% of NZ adults are obese, and a further 34% are overweight. Furthermore, there is a substantial inequality within the distribution of this disease; 48% of Māori and 68% of Pacific adults are obese.³ Diabetes rates are high in NZ, affecting 5.8% of all NZ adults; disease rates are also higher in the non-European population, with a prevalence of 7.8% in Māori, and 12.5% in Pacific Islanders. Rates of Ischaemic Heart Disease (IHD) are also high; 5% of NZ adults are currently diagnosed with this condition. Again, the distribution of disease shows marked inequalities; men are 1.7 times as likely as women, and Māori 1.8 times as likely as non-Māori to develop IHD (32).

The low rates of physical activity in NZ, and the potential health benefits of increasing them, show a need for the development of physical activity-oriented policy. Worldwide interventions to improve physical activity show that such initiatives are more effective when partnered with other agencies, including the transport sector. Policy targeting urban design and infrastructure is an efficient way to increase the physical activity of a community (34).

An important determinant of the success of such interventions is their role in addressing the obesogenic environment. In the context of physical activity, this refers to the availability of safe and enjoyable environments, including parks, sports grounds, and also activity centres such as gyms and swimming pools. Individuals from safe, connected neighbourhoods were found to do more physical activity, and were less likely to be obese, than individuals from more deprived neighbourhoods (35). Therefore, to ensure that development of infrastructure has a positive effect on equity, the deprivation and availability of resources in different areas needs to be considered. These suggested methods to improve the rates of physical activity in NZ align well with the international Ottawa Charter for health promotion. Objectives of this document include building healthy public policy, creating supportive environments, strengthening community actions, and developing personal skills (36).

Cycling has been shown to be an effective way to improve physical activity, and can be promoted by transport policy changes targeting climate change mitigation. Rates of cycling in NZ are particularly low, accounting for less than 1% of total trips under 7km. This is a decline from the 1990's, where cycling was estimated to be the mode of transport for 3.6% of short total trips. An Auckland based study estimated the national health effects of shifting 5% of short trips currently taken by cars to bicycles (6). This transition was shown to save 116.5

³ High Body Mass Index (BMI) itself accounts for 3.8% of global DALYs (32)

deaths, and annual health costs of \$200 million dollars. International evidence from a recent American study showed that a cycleway costs around \$235 (USD) per user annually, but has medical savings of \$622 per person due to the increased engagement in physical activity. This shows it is both an energy and financially-efficient way to travel (37).

2.3 Safety

An increase in cycling also has potential health risks, the main risk being the potential increase in traffic accidents. Multiple international and national studies have demonstrated that the substantial health improvements far outweigh the effect of an increase in traffic accidents (6,38,39). Despite this, fear of injury or death from cycling in a 'car-dominant' city, has been shown to be a strong psychological barrier to cycling uptake (40).

Shifting 5% of short trips taken by vehicles to cycling is predicted to increase the total number of annual hospital discharges in NZ from 77 to 109, with fatalities increasing from 3.5 to 5 per year. However, there is a 'safety-in-numbers' effect, whereby the risk-benefit ratio improves with a greater level of cycling. As the level of cycling increases, the proportion of people getting injured will decline. "It's estimated that a doubling in the prevalence of cycling is associated with approximately a 34% reduction in death rate per km cycled" (6). Interventions that increase the safety of cycling, including implementation of infrastructure such as cycleways, can decrease the risk of injury, and also reduce the psychological barrier to cycling. Part of the 'safety-in-numbers' effect is attributable to the increased infrastructure that supports large cycling populations. Motor vehicles are implicated in most serious cycling injuries in NZ, and as described by Macmillan et al., "those involving a light vehicle are amenable to changes in commuting patterns." A considerable increase in cycling can directly reduce vehicle numbers on the road, therefore leading to a reduction in motor vehicle accidents (40). It is likely that this would also improve the perception of cycling and cycle safety.

2.4 Equity

Māori and Pacific populations often carry a higher burden of disease. If implemented appropriately, transport policy could help reduce this extra burden on Māori and Pacific peoples. Cycling is an economical form of transport, costing less than private car or public

transport. International data suggests cycling is a particularly equitable form of transport, with similar rates across all income groups, in countries with high levels of cycling, such as Germany or the Netherlands, and in countries with low rates comparable to those of NZ, including the U.S. and U.K. (41). Māori and Pacific people are over-represented in the more deprived areas of NZ, where it is known that the environment is generally less supportive of physical activity (35). This means that the location of infrastructure is an important consideration when developing transport policy.⁴

⁴ Equity is discussed further on pg. 33, particularly in the context of Wellington, and in the discussion on pg. 51.

Chapter 3: Transport Policies to Mitigate Climate Change

Modifying current and future transport policy is vital for the mitigation of greenhouse gas emissions. According to the IPCC, growth in the transport sector has the potential to outweigh all mitigation measures unless transport emissions can be decoupled from economic growth (42). However, in the realm of personal transport activity, there is continuing and ever-expanding growth and impact. The matter is further complicated by the reality that transport has become enveloped in a complex matrix of economic, political, social, spatial and technological influences (43).

So, how then can governing bodies best tackle this problem? Banister et al suggest a sustainable mobility paradigm. This involves an approach to policy focused on:

- the reduction in the need for transport
- promotion of modal shift
- land use and planning
- increasing the efficiency of vehicles through the advancement of technologies (44)

3.1 International Transport Policy

The notion of modal shift, in particular, claims much support internationally. It calls for transport policy measures that will result in a reduction in car use through the promotion of public transport, walking and cycleways, effectively creating a new transport hierarchy (44).

However, while passenger transport is acknowledged as a significant sector in terms of greenhouse gas production, it is not, in any way, an easy topic to address. As has been mentioned, there is a complex web of influences at play. For modal shift, individual behaviour and attitudes remain a considerable barrier to successful implementation of policy. Rajan considers solutions for this matter falling into two broad categories: structural and motivational (43). Structural policies attempt to alter the environmental context in which decisions about transport are made. They can be further subdivided into 'push' or 'pull' measures which change peoples' transport behaviours:

- 'Push' measures attempt to promote modal shift by increasing the cost or decreasing the availability of personal vehicle usage. Examples of such policy measures include

increased fuel and vehicle taxes, road tolls, priced parking, vehicle-free zones and car-free days.

- ‘Pull’ measures attempt to promote modal shift by providing financial incentives for reduced vehicle use and offering attractive alternatives. Examples of such policy include the development of well-designed and efficient public transit options, reduced fares for public transit, improved walking and cycling infrastructure, road space reallocation or promoting car sharing. (43)

Meanwhile, motivational approaches rely on information provision, social modelling, conformity pressures and the shifting of norms to encourage individual and societal behaviour change. Measures include advertising and educational campaigns, role model endorsement along with positive promotion of alternative transit options, employee or community programmes encouraging cycling uptake and so forth (43).

Overall, it is clear that the transport sector, in particular personal transport, has an important role to play in the mitigation of climate change. As Banister et al have demonstrated, there are many ways in which policy can be used to facilitate this role. In particular, policy aimed at encouraging modal shift has gained much international support. There are countless examples of international, national and local governing bodies developing and utilizing such policies to promote modal shift; we shall outline a few examples here.

3.1.1 Environmentally Sustainable and Healthy Urban Transport (ESHUT) (45):

ESHUT is a WHO co-sponsored initiative in Asia and the Western Pacific. It demonstrates how international bodies have become involved in policy promotion and development. It aims to address greenhouse gas emissions, air and noise pollution, road traffic injuries and second-hand smoke; as well as increasing opportunities for physical activity and encouraging health and social equity by ensuring safe and equal access to urban public transport. ESHUT promotes the sustainable mobility paradigm and thus has been involved in a number of activities promoting modal share. Examples of such activities include a focus on making bicycle friendly cities via the provision of cycle lanes, cycle rental services and bicycle parking facilities.

3.1.2 Arequipa, Peru (45):

The city of Arequipa has reorganised its transport system with the major goals of reducing greenhouse gas emissions from transport sources and addressing key public health issues (such as traffic-generated air pollution, injuries and barriers to healthy physical activity). Policy has been multifaceted and incorporates a modified public transport system with a modernised low emission fleet, as well as the development of new cycling and walking infrastructure.

3.1.3 'Bicing' Barcelona, Spain (39):

Bicing is a bicycle-sharing program initiated in Barcelona, Spain in March 2007 in an attempt to encourage modal shift through promoting and improving access to cycling as an alternative form of transport. The program has proven to be incredibly successful and a study by Rojas-Rueda et al has shown that low cost public bicycle sharing systems aimed at encouraging commuters to cycle are worth implementing in other cities, not only for the health benefits but also for potential co-benefits such as a reduction in air pollution and greenhouse gases.

3.1.4 Aguascalientes, Mexico (45):

The city of Aguascalientes, Mexico has taken to urban design policy to tackle transport issues resulting from increasing sprawl, high personal transport use and inefficient public transport networks. City policy makers and developers have planned a new development for 40,000 residents that will address structural factors via the completion of higher density, wider sidewalks, 9 km of bike lanes and better parking distribution, as well as redesigned intersections and traffic calming on main streets. Planners project that the development will lead to a substantial increase in the proportion of local trips made on foot or bicycle, and trips to destinations outside the community that are made by public transport will increase.

3.1.5 European Union (41):

An analysis by Pucher and Buehler has demonstrated the successes of the Netherlands, Denmark and Germany in implementing policy that has led to significant modal shift within their populations. They have outlined how a multifaceted approach to transport policy is

required for such success. Elements of structural (both push and pull measures) and motivational measures are clearly utilised. These included:

- provision of separate cycle facilities in the form of cycleways
- traffic calming measures
- cycle rights of way in road rules
- promotional events to boost enthusiasm for cycling
- public education and training
- taxes and restrictions on car ownership and use
- land-use policies, ensuring more bikeable trips are made possible

They found that the most important approach to making cycling safe and convenient in Dutch, Danish and German cities is the provision of separate cycling facilities.

3.2 National Transport Policy

The New Zealand Transport Strategy aimed to have an affordable, integrated, safe and sustainable transport system by 2010. This included an integrated mix of transport modes to ensure environmental stability. The latest NZ Transport agency (NZTA) strategy, has 2 key features which are consistent with these aims: increase choice of transport modes and reduce the adverse environmental effects due to land transport (46). This strategy supports the installation of cycleways, as they encourage both intermodal transport and a reduction in carbon emissions from private vehicles, thereby helping to create a healthier environment.

In 2006, a Ministry of Transport report, *Getting there - on foot, by cycling*, was released. This report discussed potential ways of encouraging cycling and walking in communities around NZ. It produced three main goals: encourage community environments and transport systems that support walking and cycling, get more people choosing to walk and cycle, and improve safety for pedestrians and cyclists. It is important to note that this initiative was subject to business case approval (47).

3.2.1 Policies regarding transport modeshare in NZ

The majority of road usage is by car drivers, with people aged between 35-64 spending two thirds of their total travel time driving (48). Vehicles transporting goods for national and international trade also account for a large proportion of road usage. Public transport has

moderate uptake in NZ, with 37% of New Zealanders have using this mode of transport in the past year (49). By contrast, biking accounts for only 2% of total time travelled, demonstrating its minor role in NZ transportation (50).

NZ infrastructure and city planning, as governed by local and national authorities, has been largely targeted at car users (51). This emphasis reflects the current use of transport modes in the NZ population. Although international evidence supports the multiple benefits of modal share, it is not an option that has had much traction in NZ. Rather, reports have focussed on reducing congestion and incidence of motor vehicle accidents (52).

The NZ energy efficiency strategy of 2011-2016 also alludes to the importance of promoting and funding alternative means of transport in NZ. Largely, however, the focus of this report is on the efficiency of motor vehicles and a more integrated use of rail, sea and airports for transporting goods to national and international markets (53).

3.2.2 Broader national policy relevant to cycling

The Urban Design Protocol of 2005, written by the Ministry for the Environment, identifies seven key qualities labelled the seven C's, which combine to form high quality urban design. The first aspect is Context, under which the most relevant idea is the consideration of the health impacts on the population living and working there. Choice is another design concept that discusses the ability to choose a variety of lifestyle options including mode of transport. Connections places a high priority on alternative means of transport such as walking and cycling, and their integration with other transport means, in order to reduce travel time and reduce environmental impact. Finally, Custodianship places emphasis on the protection of the environment, with development to help mitigate the effects of man-made hazards (54). These concepts demonstrate the applicability of cycleways when striving for high quality urban design.

3.3 New Zealand Political Party Policies on Climate Change

In NZ, the four major political parties are: National, Labour, Green and the Maori Party.

These parties have a common overall goal of reducing NZ's contribution to climate change, and all consider the climate in their policy formation. Each party has a different approach and degree of focus on this global issue.

3.3.1 National Party:

National policies are largely focused on reducing the government's financial deficit, building a competitive economy, developing improved public services and rebuilding Christchurch (55). In regards to natural resources, National plans to explore natural gas and oil deposits, whilst maintaining environmental standards. This aligns with National's economic goals. National does want to increase environmental reporting so that national and regional authorities are achieving their environmental targets. Infrastructure targets for National involve improving highways and vehicle access. There are also plans to introduce electric trains in Auckland for the first time (56).

3.3.2 Labour Party:

Labour plans to build local communities and invest in growth and jobs at a regional level. There is no specific mention of the projects involved. However, a \$200 million investment, over four years, will go into regional development for projects that create jobs and growth (57). In addition, Labour has specific policy plans for protecting the environment. These involve introducing a national policy statement on the protection of water quality in NZ and increasing marine protection, including reserves. Furthermore, Labour does not want to invest in lignite development (58).

3.3.3 Green Party:

The green party has many policies regarding climate change and environmental protection in NZ. These include reducing greenhouse gas emissions to a scientifically credible level for in prevention of climate change, and aims to benefit current and future generations. The Green Party believe that climate change mitigation will help to reduce Maori health disparities. The Green Party also aim to introduce policy that makes 'polluters' accountable for pollution production, through appropriate pricing schemes. Finally, the Green Party believes there is a need for more investment into research regarding climate change and prevention (59).

3.3.4 Maori Party:

This party supports a NZ free from nuclear power and genetic engineering. Improvement of public transport, developing sustainable buildings and use of emission free vehicles are all part of Maori Party policy. The Maori Party plans to introduce cross party conversation regarding oil exploration in NZ. They also want a moratorium (temporary prohibition) on 1080 poison drops. Another priority of the Maori Party is mitigating the impact of emissions pricing on low and medium income consumers through development of affordable and sustainable energy services for household users (60).

Each governmental party has a different central focus, and range of accompanying policies. The National Party places greater emphasis on economically oriented policy whereas, the Green Party is the most environmentally active. Each party approaches climate change and environment protection with differing levels of emphasis and with different mitigation strategies.

3.4 Summary

NZ road transport and its policy centres around cars, which make up the majority of transport modeshare. Efficient road infrastructure is important to support local community, and provide a competitive environment for businesses. Many policies surrounding future transport support the need for more fuel efficient vehicles and increased use of public transport. These methods align with governmental aims to lower petrol consumption in NZ, in order to lower NZ exposure to the volatile oil market. The government has also stated that protecting the environment, promoting physical activity and promoting modal shift in the transport sector will be beneficial to the nation for multiple reasons. Current policy and planning for future road transport development includes a focus on infrastructure to promote modeshift to active transport options.

Chapter 4: The Wellington Context

New Zealand is a country globally recognized by its 'clean and green' image, though there has been some controversy about the accuracy of this reputation (61,62). Wellington City, as the capital of NZ, identifies its unique position to take a leadership role in climate change mitigation, and, in the words of the City Council, "[Serve] as a centre of excellence for urban planning, resilience and ecological sustainability". The Wellington City Council highlights the importance of cities leading the charge in climate change mitigation, rather than relying on national policy (63).

Plans and Policies: What are they for and what do they mean?

Greater Wellington Regional Council

Regional Land Transport Strategy 2010-2040 (RLTS)

This is the overarching transport document for the Greater Wellington Region. It is prepared under the Land Transport Act 1998 and is the strategic transport document that guides the development of the Wellington Region's transport system including public transport, roads, walking, cycling and freight for the next ten years and beyond.

Regional Cycling Plan 2008

This is a series of implementation plans and corridor plans that have been developed to translate the RLTS vision, objectives, outcomes and policies on cycling into specific projects.

Wellington City Council

Wellington Towards 2040: Smart Capital

This outlines the Council's strategic plan for Wellington City over the next 30 years, including a vision and goals.

Wellington Transport Strategy 2006

This is the Council's plan for the future development of Wellington City's transport system. It includes plans, budgets, and implementation information.

Wellington City Cycle Policy 2008

This outlines the cycling-specific planning as set out in the Wellington Transport Strategy 2006. It includes detail on cycling in Wellington, the context set by other policies and strategies, and a framework for the development of infrastructure.

Long-Term Plan 2012-22

This is prepared in accordance with the Local Government Act and covers 10 years until the 30th of June, 2022. It describes the city's activities and community outcomes; provides for integrated decision-making and a coordinated use of resources; and gives a long-term focus for decisions.

District Plan 2010

This contains rules that affect the development of land or land-use and promotes the sustainable management of natural and physical resources.

Climate Change Action Plan 2013

This outlines the strategies for Wellington City regarding carbon constraints, the reduction of greenhouse gas emissions, climate impacts, extreme weather events and sea-level rise.

4.1 Wellington City Emissions

Compared to national averages, Wellington is already seen as a leader in many facets of climate change mitigation. Wellington has a lower carbon footprint than the rest of NZ on average. For example, the city generates 6.2 tonnes of greenhouse gas emissions per person, compared to the national average of 18 tonnes per person (63). However, the city recognizes the need to reduce emissions even further, and thus outlined ambitious targets in a 2010 report on climate change. The city is aiming for 30% reduction in emissions from 2001 levels

by 2020, with the Council itself aiming for a 40% reduction from their own 2003 levels. By 2050, both the city and the council have aimed for a reduction of 80% (64).

4.2 Climate Change Mitigation in Wellington

In order to meet these ambitious targets, many changes will need to be made to regional and national policies. The New Zealand Energy Strategy outlines that by 2040, it will be possible to reduce the country's transport emissions to 1990 levels, however this is partly reliant on the development of new fuels (53). These new fuels, however, are only expected to be available by 2020, and there is no guarantee that they will be available at all. As such, Wellington is somewhat dependent on national and international developments. Even with the development of new technologies and support from national bodies, an aggressive implementation of climate change mitigation strategies will need to occur. Wellington City's population is forecast to increase by over 20 percent in the next 20 years (63) and, in the Wellington Region, with this increase in the population, as well as economic growth "road demand and CO₂ emissions are forecast to increase 13.9% and 13.6% respectively" (65). As such, the coordination of many different sectors within Wellington, alongside clearly defined and measurable goals, is required.

Climate change mitigation needs to be treated as a priority, and the city needs to know which avenues of climate change mitigation will be most effective. Wellington City Council recognises the implications of climate change and "the need to put climate change, sustainability of resources and the environment at the forefront of planning for the future" (63).

The meeting of ambitious emissions goals not only requires national, regional and municipal direction, individuals also need to take meaningful and responsible action. The Long-Term Plan for Wellington City includes educating residents and business on the importance and means of reducing emissions (66). The Wellington Regional Land Transport Strategy (RLTS) 2010-2040 says, "People's travel choices will recognise the risk and impact of climate change and diminishing non-renewable resources" (65). Research has shown that Wellingtonians already have more concern for the environment than the average New Zealander. In the 2010 Nielsen Quality of Life survey 82 percent of Wellingtonians agreed or strongly agreed that they would change their lifestyle to help prevent global warming if they knew it would make a

difference. This compares to 76 percent for the total NZ wide survey group (67). However, when surveyed on perceived efforts of local governments or businesses in The 2013 Wellington Residents Monitoring Survey, only 43% of Wellingtonians agreed or strongly agreed that Wellington is working to reduce its greenhouse gas emissions (64). This indicates a clear desire for change from the status quo.

4.2.1 Climate Change Mitigation through the Transport Sector

As highlighted earlier in this report, changes within the transport sector can be particularly effective as a means for climate change mitigation. In Wellington in 2010, four hundred and twelve thousand tonnes of CO₂, and 35% of the city's emissions, were due to land transport. This was second only to emissions from buildings and energy at 42% (68).

In line with this, the vision of the RLTS is: "To deliver an integrated land transport network that supports the region's people and prosperity in a way that is economically, environmentally and socially sustainable" (65). Wellington Towards 2040: Smart Capital, indicates that the need to respond to climate change is a big challenge in Wellington's near future. The strategy outlines four major goals: two of which, "connected city" and "eco-friendly city", directly address transport as a major avenue for change (63).

As such, there are a number of regional and city initiatives to shift towards a more environmentally sustainable future. The regional website promotes carpooling as a good means of reducing car numbers and congestion, linking to the website letscarpool.govt.nz to allow people to find means of carpooling all across the region, and beyond (69). Carpooling is also mentioned in the city's Climate Change Action Plan 2013, however, with less information about how the city is encouraging this (64).

Both the Regional and City Councils also aim for more vehicles that will run on renewable, non-polluting and sustainable fuel sources. The RLTS states that the Regional Council will "advocate for improved fuel efficiency and for alternative fuels", and, "build infrastructure that supports electric vehicles" (65). In 2012, the City Council undertook a pilot project with eight Mitsubishi i-MiEV electric cars, and ran an exhibit outside Te Papa as part of a shift for alternate fuel sources. The City Council also aims to optimise its own vehicle fleet as a priority for 2013-2015 (64).

Telecommuting is also promoted as a viable alternative to driving, with use of new technologies such as Skype and other forms of online communication. Recent research in 15 international countries showed that in areas of high Internet access, young people were less likely to have drivers' licenses (70). Two recent developments within the central Government, the ultra-fast broadband initiative and the rural broadband initiative, will provide even better Internet access throughout the Wellington Region (63).

4.3 Mode Shift towards Cycling

The focus of this report is on modal shift away from private car use, and towards active transport, in particular, cycling. The RLTS, The Long-Term Plan, The District Plan and The Wellington Transport Strategy all place importance on this goal (65,66,71,72). The RLTS, as the overarching transport document for the region, outlines the importance of walking and cycling for short trips, and providing viable means to do this through safe, convenient and pleasant networks (65). This is mirrored in the city's Long-Term Plan, which states, "People want Wellington to be a more pedestrian and cycling friendly city". The Wellington City Cycle Policy states, "“Every opportunity should be taken to ensure cycling is a viable option for short trips to and from suburban centres”...”educational centres”... ”recreational centres and facilities” (66).

A shift to active transport, in particular, cycling, is supported by those in the health sector, due to the dual benefits of climate change mitigation and health promotion (21). This has been discussed in detail earlier in the report. Wellington leads the country in the percentage of people who take public transport, walk, run or cycle to work. In the central city, this proportion is as high as 65% of residents (63). Over the previous ten years, car use has dropped by almost 10 percent, likely the result of increased residential living in the inner city (63). However, there is much room for improvement.

The RLTS has a 2020 Strategic Target of increasing "active mode share up to 30% of all trips in urban areas". This is the same target as set by the NZ Transport Strategy, though the national target is set at 2040. In the Wellington Region in 2005-2009, this was at 26% (65).

Mode of transport chosen for a trip to work is a good parameter for mode share, as it is measured in the New Zealand Census, among other surveys. In the Wellington Region in 2006,

13% of people travelled to work by active transport. The RLTS aims for this to be 16% by 2020 (65). Data for Wellington City, however, shows a slightly better picture. Figures from the 2013 Census show that 21% of people commuted to work by walking, running or cycling; this is compared to 42% of people commuting via private vehicle. Of this, only 3.5% of people cycled to work (73). Over the last 20 years in Wellington City, the number of people choosing to cycle to work has steadily increased. This goes against the regional trend (74).

When looking at all trips within the Wellington Region, however, the percentage that are made by bicycle is very small, though vary between sources. The State of Cycling report puts the mode share of all trips by cycle in the region at only 1%. This rises to 1.5% when looking at trips less than 5km. For the Wellington Region between 2008-2012, the Household Travel Survey data puts this number slightly higher at 4% (75). Whichever source you look at, they all tell us the same thing. Currently, within Wellington, and in NZ generally, cycling mode share is very small.

The percentage of trips made by cycle, however, particularly into the CBD is expected to rise, with an increased population in Wellington, increased fuel prices, and a shift towards more eco-friendly, sustainable, modes of transport (43,64).

Aside from the multitude of climate change and health benefits outlined earlier in this report, cycle lanes, and cycling as a mode of transport, have been shown to have a number of additional benefits. Cycling can positively affect quality of life, economic development and resilience. It is cheap, quiet, has a minimal effect on the built environment, and can facilitate social inclusion (43,76). With improved cycling infrastructure, a city also becomes less reliant on oil supply (43). Wellbeing can further be enhanced with cycle lanes by facilitating social networks providing additional means for people to access places of work and other facilities within their communities. Without access to appropriate infrastructure (such as cycleways) people may not choose active transport for shorter trips, instead relying on private vehicles (65). In 2012, when residents of the Wellington Region were asked about their motivations to cycle, they were commonly stated to be for “Exercise/fitness” (51%), “Cost/to save money” (47%), “Convenience/quicker” (29%) (75). Cycle lanes can also provide another means of transport for those without the access or ability to drive a car, such as children and those without a driver’s license.

Clearly there are a lot of benefits for a mode shift towards cycling, so what are the Regional and City Councils of Wellington doing?

4.3.1 Region's Plans for Cycling

The Regional Land Transport Strategy 2010-2040 (RLTS) outlines the vision that:

“People will generally walk or cycle for short and medium length trips. Pedestrian and cycling networks will be convenient, safe and pleasant to use”

Aligned with this vision, the RLTS expressed goals for:

- Increased mode share for pedestrians and cyclists
- Improved level of service for pedestrians and cyclists
- Increased safety for pedestrians and cyclists (65).

While the RLTS outlines the overarching goals and visions for cycling, The Regional Cycling Plan is the document outlining goals and organisations to achieve this (77). The Regional Cycling Network map was developed under this plan to show routes that link the region's centres. An analysis of the report was carried out in 2004 to detect areas of inadequacy and suggest improvements. The State of Cycling Report outlines 44 areas in the region that have had cycle infrastructure improvements over the last decade, however, the Regional Council gives no indication of where and when future improvements might be made, aside from a small diagram of the whole region (75). (RLTS) From the Cycling Network map in 2012, the Wellington Region was estimated to have approximately 44km of on-road cycle lanes and 68km of sealed shared paths. This is for a region spanning 2132 km² in size, and encompassing the capital city of NZ (78). Clearly there is much room for improvement.

The Regional Cycling Plan does outline that in order for the cycling network to be improved, a network that identifies important local routes and connections needs to be determined, and in order for this to happen, a review of the current cycling network needs to be conducted. Within this review, “Road space allocation” and “Segregated cycle facilities on high speed/high volume routes” were to be considered as part of this plan, with the deadline of December 2010 (65).

One of the points on the Regional Cycling Plan states, “Implement improvements to address any deficiencies identified through the above cycling network reviews.” However, under timeline only states, “ongoing” and cost, “To be determined” (77). The Plan was released in 2008.

One positive initiative of the Regional Council, in partnership with city councils, is the development of the Journey Planner website and mobile app, to allow people to plan desirable routes anywhere in the Wellington Region (79).

4.3.2 City’s Plans for Cycling

Wellington Council’s Transport Strategy 2006 focuses primarily on encouraging public transport and walking as modes of transport, but “recognises some people prefer to cycle”. The policy aims to support these people through the promotion of a safe and convenient network but also aims to ensure “conflict between different groups is managed appropriately” (65).

Wellington Towards 2040 also outlines the goal of being a connected city of cycle networks. As the Wellington City Council states, it “endorses an interlinked network of on-road lanes and off-road paths” and “emphasises that quality, well-located facilities is key to making cycling safer, more convenient and fun in Wellington” (74).

Currently, within Wellington City, there are a number of bus lanes that are shared between bikes and buses. The Wellington City Council Cycling Policy, “Proposes to place significant emphasis on an expanded bus priority network as a means of delivering a cycle network.” It outlines the aim of creating a network of cycle routes that are suited to novice and inexperienced cyclists (74).

In addition, the council outlines a number of opportunities to provide dedicated parallel routes to the existing cycle lanes or proposed bus/cycle lanes, such as Tory Street, Hanson-King Streets, Dover to Rintoul Streets and the Tawa Porirua stream trail. The feasibility of these routes needs to be investigated. However, given the strong environmental focus of transport reports within the city, currently, Wellington has only an “estimated 11.1m of bike lanes per square km”, and only 26km of cycleways, despite 684km of urban and rural roads

(66,80).As Jean Beetham notes in her thesis, “There is clearly a gap between policy and practice in regards to the provision of cycleways in Wellington” (43).

Another indicator of a nation, region or a city’s level of action is the amount of funding that is allocated for particular goals. Disappointingly, in the 2010/2011 financial year, while the region spent \$400,000 on cycling facilities in the area, the New Zealand Transport Authority decreased the amount it spent compared to the previous three years, giving the total spent in the region as \$865,000. This \$865,000 was only 0.2% of the National Land Transport Fund expenditure in 2010/11 (75). If we take cycling mode share at the lowest estimate that we have, at 1%, it could be expected that the percentage of transport funding allocated to cycling would match this. Additionally, if the Council has a goal to increase cycling mode share and promote sustainable transport options, it could be realistic to expect an even higher percentage of funding. While the Regional and City councils do rely partly on central government for funding, the RLTS outlines advocating for adequate government funding as a key action for the implementation of safe and effective cycling facilities.

In 2008, Wellington City spent only \$70,000 on cycling facilities, though in recent years, this amount has increased to \$1.8M in 2013 and now \$4.3M for the 2014/15 budget, an increase of 230percent (According to the City Council, this dramatic increase in funding will be used for implementing safe cycle routes citywide, and will helpfully assist Wellington with its climate change mitigation goals (81,82).

4.4 Island Bay Cycleway

One particularly important development currently underway in Wellington City is the Island Bay Cycleway, a cycle lane that will cover the 6km from Shorland Park in Island Bay to Waitangi Park in the Wellington CBD. The council states that this is “to make cycling from the southern suburbs safer and easier” (83). The route has been split into four sections, and while the exact route has not yet been determined, it will run through the suburbs of Island Bay, Berhampore and Newtown before reaching the CBD.

As discussed earlier in the report, there are high level of nitrogen dioxide in many of our cities, particularly around motorways and other car-dense areas. For example, the air quality monitoring station in Newtown, on the corner of Riddiford and Hall Streets, recorded an

average of $36.8 \mu\text{g}/\text{m}^3$ over the 2010-2012, placing it very close to the WHO's unsafe level of $40 \mu\text{g}/\text{m}^3$ (84,85). As such, anything that will decrease car use in the Newtown area, reducing emissions, could be very beneficial.

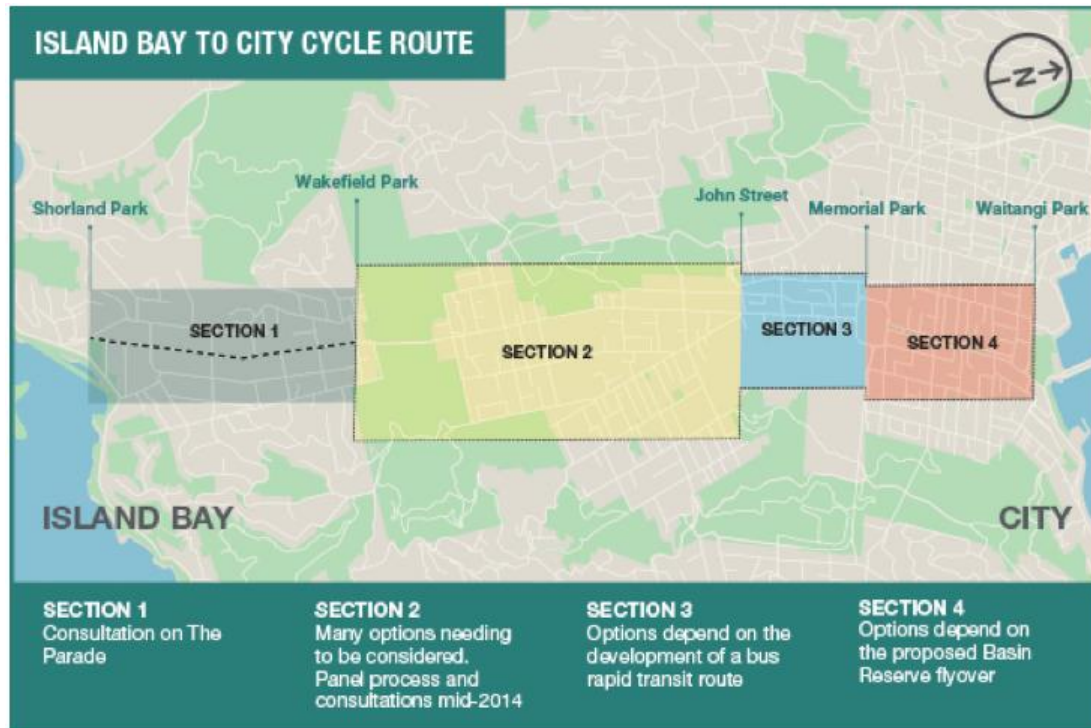


Figure 2: The four sections of the Island Bay to city Cycle Route [adapted from (83)]

The route has been selected for a number of reasons, including Island Bay's population, the likely future growth of this population, and its geography(83). We speculate that, on top of this, the route has been chosen as the southern suburbs have the highest cycling rates in the city (86) (however, this has not been explicitly stated by the Council). As such, the Council recognises this as a good area to start with.

According to the Council website, "Combined with other future improvements, the Island Bay to city cycleway will:

- "encourage more people in the southern suburbs to cycle around their neighbourhoods, and between the suburbs and the city"
- "help reduce congestion, make Wellington a more liveable city, and bring a range of environmental, health and social benefits for Wellingtonians" (83)

Indeed, success in the implementation of this route is of utmost importance, as it is the first of 19 proposed cycle routes from various suburbs into the central city. The central city is an important location within Wellington, as it provides 68% of all Wellington employment, and 52% of the region's GDP (63).

While the only references we could find for these 19 strategic routes were a quote from mayor Celia Wade-Brown on the Wellington City Council webpage (87) and some newspaper articles (88) correspondence with Council members as indicated that they have recently commissioned a review of proposed routes, along with suggestions for improvement (personal correspondence), however this information has not yet been publicly released. If then, the Island Bay Cycleway is seen as a case-study for the implementation of future cycleways, it's important that barriers are properly addressed. Major problems with the implementation of this cycleway could delay plans for future cycleways.

The proposed route for the Island Bay cycleway has been a very contentious issue. Section 2, from Wakefield Park to John Street, is currently under discussion. Encompassing the medical school and Wellington Hospital, this is of great local relevance to us as medical students, local residents and future health professionals. A citizens' advisory panel has narrowed down the options to two routes, and recommend that both be built (89):

- Adelaide Road (from Dee Street), Luxford Street, Rintoul Street, Waripori Street, Russell Terrace and Riddiford Street to the John Street intersection
- Adelaide Road (from Dee Street), Stoke Street and Hanson Street to the John Street intersection.



Figure 3: Proposed cycle routes for section 2 of the Island Bay to City cycleway [adapted from (90)]

Routes have been selected based on a list of criteria, including convenience, cost, and safety, along with keeping parking loss to a minimum. Topography, use of the route by buses and directness were also major considerations (89). These routes will now be considered by the Wellington City Council at a meeting on 21st August before any final decisions are made.

There are a number of considerations and barriers that need to be addressed, however, for the successful implementation of the cycleway.

4.5 General Barriers to Cycling in Wellington

The Greater Wellington Regional Council outlines some barriers to cycling. These include weather conditions, general inconvenience, having too much to carry and hilly terrain (65). Indeed, as stated in the report, Wellington Towards 2040, “Wellington is one of the windiest cities in the world, and it rains about a third of the time” (63). However, despite Wellington’s reputation as “the windy city”, only 7% of people surveyed described weather as a barrier to cycling (91).

To address the barrier of inconvenience, the City Council has a number of objectives and policies, including Policy 3.3 “Those who choose to cycle will have provision for securing their cycle near their destination in the central area” and advocating, “for accessible public transport options for cyclists e.g. carriage of bikes on buses” (74).

In terms of the hilly terrain, this is one reason that selecting appropriate streets for a cycle lane is very important. However, a study commissioned by the Council and undertaken by Copenhagen Architect Jan Gehl described Wellington as having great potential for cycling in the central city due to reasonably flat topography. Additionally, Gehl suggests that, “public transport could offer the possibility of carrying bikes back up-hill” in areas that have steeper topography (92).

4.5.1 Cycling Demand and Uptake

Of course, a major challenge for modal shift and cycle lane implementation is perception of cycling. Is cycling seen as an acceptable means of transport, and are people likely to cycle if a cycle lane is implemented? We know that the Regional and City Councils support cycling as a

mode of transport, and that 82% of Wellingtonians would change their lifestyle in order to combat climate change (67), however, if a cycling lane is built, how many people will actually cycle? Two recent studies have investigated demand for cycling within Wellington City. Both, also looked at demand for a cycleway between Wellington City's southern suburbs and the city centre, a route covered by the Island Bay cycleway (43,93).

A study conducted in 2013 by environmental scientist Jean Beetham interviewed Wellington residents via online survey and street intercept, and classified all participants into 'stages of change' as outlined by Prochaska and DiClemente (94). According to their responses, each group was given a score out of seven for perception of cycling, and willingness to cycle. All groups stated a very favourable opinion of cycling, with the lowest mean score belonging to the 'precontemplation' group (6.62). Willingness to cycle ranged between 4.29-6.77, though even the lowest group 'precontemplation', scored on average higher than the neutral score of 4. As Beetham stated, "Potential cyclists indicated that they would be likely to cycle for transport more often if a cycle path connecting Wellington's southern suburbs and city centre was constructed" (43).

A study by Tom Pettit carried out between March and June 2014 found similar results. Pettit assessed local demand for and likelihood of cycling uptake given appropriate infrastructure. Throughout the city, 79% of those surveyed supported or strongly supported cycleways to increase cycling, and over 85% of respondents supported cycleways to decrease crashes. Specific to Island Bay, the percentage of people supporting cycle lanes was also very high, at 75% and over 90% respectively. Pettit found that 76% of the population over age 18 would consider cycling if improved infrastructure, such as separated cycle lanes, was provided. Finally, while 31% of respondents said that their preferred mode of travel was by bike, only 9% were currently travelling by bike, indicating that while the desire to bike exists, external barriers were preventing them from doing so (93).

Beetham and Pettit identified safety, both real and perceived, as a major barrier to cycling in Wellington City, with Pettit stating, "The Wellington research verifies international research that shows the most important issue to non-cyclists, when making the decision to cycle or not, is safety". Beetham states, "By far the predominant comment, by people in all stage-of-change groups, was that they would cycle, or cycle more frequently, if it was safer. (91respondents)" (43).

4.5.2 Cycling Safety

Safety concerns have doubled over the period between 2003-2008 (65), a Ministry of Transport document states, “Residents’ perceptions of how safe it is to cycle in Wellington have become more negative in recent years” (43). In the Transport Perceptions Survey in 2012, only 22% of respondents rated cycling as “safe” or “very safe”, and this number has decreased since previous surveys. Forty-nine percent of respondents thought cycling was, “unsafe” or “very unsafe” (91). In light of this, the Island Bay cycleway could be a good means of increasing cycling and will likely improve perceptions of cycle safety, as research has shown this association (95).

Indeed, it is important to note that safety barriers includes both real and perceived safety. Indeed, Jean Beetham, states, “Transport cycling is suppressed primarily because of a perceived lack of safety” (43).

Unfortunately, perceptions about the lack of cycling safety are informed by negative cycling statistics. Cycling is second only to motorcycling as the riskiest transport mode in NZ, both by time spent travelling and distance travelled. Wellington is also the most dangerous city in NZ in which to cycle. 2007 was the worst year in a decade for cycle safety, with 149 cyclist casualties in the Wellington Region (75). Information from the Crash Analysis System (CAS), relating to on-road cycle crashes, shows that in the 2007-2011 period, cyclists were involved in 12% of all injury crashes and 14% of fatal and serious injury crashes, this is much higher than the percentage of trips being taken by cycle, reported in The State of Cycling document as roughly 2.6% (75).

At both the Regional and City Council levels, cycle safety is stated to be of great concern (65,72,75) though stated to be of only medium concern nationally (96). The RLTS outlines a goal of, “Increased safety for pedestrians and cyclists” (65) and the first policy of Wellington City Cycle Policy Report, Policy 1.1 states “Every opportunity to make the city as safe as possible for cyclists must be explored” (74).

Actions outlined within the policy report that will allow the city to achieve this outcome, include adopting best-practice guidelines for cycle network planning, lowering speed limits, safety and awareness campaigns - targeting both motorists and cyclists, and undertaking studies to identify dangerous routes and intersections (74).

The next policy states, “Cycle-friendly traffic-calming measures will be implemented as required to moderate motorists’ speeds”. Then, perhaps ambitiously, “Every opportunity must be taken to make improvements to the cycle network, to make the routes safer and more convenient”. Finally, in line with the desire for separated cycleways “On main corridors, cyclists will have an option of riding free of general traffic by using dedicated cycle facilities where practical or by using dedicated bus lanes” (74).

As Beetham found, “Road safety improvements were identified as the key change required to encourage the uptake of transport cycling” (43). A Land Transport NZ commissioned study backs this up, identifying “lack of cycle lanes” as a particularly large barrier to cycling (97). This reinforces the information discovered by Pettit and Beetham in their recent cycling-demand research, based in Wellington.

It is imperative that steps are taken to improve cycle safety, as safety issues are likely to be compounded in the future due to more vehicle traffic (74).

4.5.2.1 Initiatives for Increasing Cycle Safety

The Greater Wellington Regional Council supports a number of initiatives that aim to improve cycle safety by addressing both real and perceived issues. The cycle skills ‘Pedal Ready’ programme is funded by Sport Wellington and available free to schools within the Wellington Region. It works at improving bike handling skills as well as providing bike and helmet safety checks for children.

Adults can learn cycling skills through the “Active a2b” programme. This involves a three-hour workshop and has been running for the previous two years, though capacity is limited to 20 spaces per year.

Of greater capacity is the “bike buddies” scheme started in 2010. In this initiative, new cyclists are matched with experienced riders in order to learn the best routes for commuting, cycle skills and tips. In 2012, 134 bike buddies and 120 bike mentors were part of the programme.

With the aim of addressing the relationship between bus drivers and cyclists, bus/bike workshops have been set up in the region running three times per year. These workshops involve up to 20 bus drivers and cyclists at a time and allow drivers and cyclists to switch places in order to experience the road from other's perspective. In addition, both groups learn skills for co-existing safely on our roads (75).

4.5.3 Equity

On a broader scale, any infrastructural change, and particularly one that could have a substantial effect on health and wellbeing, equity and access are important considerations. What will the changes do to those who are already the most disadvantaged? Will the changes help to reduce or widen inequalities? Equity is a major consideration as addressed in the Ottawa Charter (36), and, perhaps more relevant to the NZ context, the Treaty of Waitangi (98). The Wellington City Council states, "Everyone, regardless of age, culture, or ability must have access to city life and be able to participate in civic activities and healthy communities" (63).

4.5.3.1 Access to a bike

A barrier to cycling, as highlighted by Pettit, was lack of access to a bicycle. Pettit found that those who were classified as "dedicated cyclists" said that lack of access to a working vehicle was their main barrier to cycling (93). This is also reflected in a report from the Greater Wellington Regional Council that states that not having a bicycle is a major barrier to cycling in the region (75). The NZ Household Travel Survey showed that in 2007-2011, only 47% of surveyed households in Wellington had access to a working bicycle (75). In her study, Jean Beetham found that for those in the 'contemplation' group regarding likelihood of cycling, lack of gear was mentioned as a barrier in just over 20% of responses (43). However, Regional Council research suggests that lack of bike ownership may not actually be a big barrier to cycling, rather, symptomatic of a lack of interest or willingness to cycle. As Beetham states, "It is more likely to follow from a lack of safe cycling facilities rather than being a major distinct barrier in itself" (43). Nevertheless, access to a bike is an important consideration with mode shift towards cycling.

4.5.3.2 Cost of Cycling

Due to the relatively low cost of cycling, promoting cycling and cycle lanes could be seen as a good way to address inequalities. Car ownership involves many costs, including initial purchase, registration, warrant of fitness, and maintenance. A bicycle is typically much cheaper to purchase and maintain.

With data from the 2013 Census, suburbs within Wellington have been given a social deprivation score, taking into account income, employment, qualifications, home ownership, support, living space and transport. A score of 1000 is the mean, and anything greater than this is considered more deprived. The Island Bay cycleway will connect a number of suburbs, including Island Bay-Ohwiro (score= 927) Mt Cook (1039), Newtown (1024), Berhampore (1024), and Wellington Central (995). For reference, the most deprived area in Wellington City is identified as Kilbirnie with a score of 1044, and the least deprived is Seatoun-Karaka Bays-Breaker Bay with a score of 888 (73).

Although studies on cycling demand and likelihood of uptake in Wellington did not classify respondents according to income or socioeconomic status, it could be hypothesized that residents of more deprived areas may cycle more and benefit more from the addition of a cycleway due to the lower cost. Research from the Regional Council however, makes this hypothesis more tenuous. In both NZ, and the Wellington Region, cycling for transport is most commonly associated with those with higher incomes (75,97,99). Additionally, international research suggests that wealthier people tend to use cycling infrastructure more than poorer people (100).

4.5.3.3 Access to other services within the city

The Wellington Regional Transport Strategy highlights, “The ability of people to access health services is another important relationship between the transport system and public health. The region’s transport network needs to connect people with health services (ranging from local GP clinics to the regional hospital in Newtown) by providing a range of transport options. It is important that those without access to a private vehicle are not disadvantaged in terms of access to health care. The affordability of public transport services plays a role in this.” An objective of the RLTS is “Improve access, mobility and reliability”, ensuring that access within the region is improved for all groups (65). With this in mind, cycling and cycle lanes can

provide another means of access to health services for those without access to a private vehicle, provided people have the equipment and physical ability to do so.

4.5.3.4 Cycleways and disability

The RLTS describes the importance of having a transport network with, “ease for social participation and interaction for all” (65). With any changes to transport infrastructure and mode shift, we need to consider those who may be unwilling or unable to use a particular type of transport. As Wellington-based Dr Esther Woodbury discusses in her PhD the car can be a tool of independence for those who have physical disabilities and that, “cars play a vital role in improving social participation and inclusion for people with mobility impairments” (101). While a mode shift towards cycling may actually advantage those who rely on cars for transport, for example, by decreasing congestion and competition for remaining car parks, the impact of loss of and location of remaining car parks for this group of people needs to be considered. In addition to this, we need to consider the effect that an aging population may have on the demand for different modalities. Poor eyesight and impaired mobility may prevent elderly people, in particular, from cycling. It is important to note that physical fitness promoted through the use cycle lanes may improve a person’s mobility and decrease their likelihood of physical disability. This issue cannot be explored with great detail in the context of this review, however is important to be aware of.

4.5.3.5 Māori

Article three of the Treaty of Waitangi details equity or *oritetanga*. However, in NZ, people who identify as Māori are overrepresented in many statistics of poor health and low socio-economic status. Therefore, achieving equitable outcomes for Māori is of great importance. In Wellington City, 7.6% of the population identify as Māori(73). In addition, Māori make up a greater percentage of the population in the suburbs that the Island Bay cycleway connects, including Island Bay-Owhiro Bay (9.1%), Berhampore (10.5%), Newtown (10.2%), and Mount Cook 11.1%) (73).

Unfortunately, the studies investigating demand for cycling lanes and likelihood of cycling uptake in Wellington communities did not characterise responses via ethnicity. Therefore, information on ethnicity specific likelihood of cycling uptake is uncertain. It should also be

noted that, on average, Māori people tend to have a larger whanau structure than Pakeha, thus perhaps making it more difficult to travel by bicycle especially if a whanau has young children. While not specific to Māori, 6% of people surveyed in the Transport Perceptions survey identified “children factors” (6%) as a significant barrier to cycling (91). This may be an important barrier to cycling for Māori and therefore should be considered.

Chapter 5: The Case Study

5.1 Introduction

Previous studies have shown that business owners on the path of a cycleway often have several concerns. These include, fear of loss of car parks, fear that shoppers will have problems accessing their shops, space concerns, and loss of business (43).

With particular reference to Section 2 of the Island Bay cycleway, business owners in the Newtown region are key stakeholders and indeed have some concerns. Jimi Meanger, a Newtown business owner, created a petition opposing the cycleway and collected 65 signatures from business owners on Riddiford Street. Major concerns were that the Newtown section of the cycleway would replace customer car parks in the shopping centre, therefore reducing the accessibility of businesses to customers. These concerns were also sparked by the controversy and opposition to Section 1 of the cycleway, in Island Bay (102).

In the media, concerns of business owners were quoted; “People won’t be able to do their shopping on bikes”. Many business owners were also concerned about parking “...we need more parking, not less” and others were concerned about traffic flow “Traffic congestion caused by cars, buses, emergency services and deliveries to retailers is already problematic on Riddiford St” (103).

Many of the barriers outlined within this report have been addressed, or in the very least, identified by the Council and some goals for improvement have been made. However the ideas and concerns of these business owners are yet to be systematically characterized. Relevant questions are: Are there other concerns that haven’t been mentioned? How common are the concerns that have been raised? Are these concerns widespread, or just the voice of a vocal few?

Considering these questions, we decided to conduct interviews with business owners on Riddiford Street in Newtown, and used qualitative analysis to look at key themes. Our major goal was to explore their concerns to see if these could be addressed. It is clear that cycleways can provide a good strategy for climate change mitigation, along with many health co-

benefits. However, to avoid continued resistance to cycleways in Wellington, we must address the concerns of local stakeholders.

5.1.1 Aims

To assess the opinions of Riddiford Street Business owners surrounding the proposed cycleway from Island Bay to the Central Business District (CBD).

5.2 Methods

5.2.1 Data Collection

Information was gathered from responses to open-ended questions asked in face-to-face interviews with individual business owners. The interviews were conducted by groups of two medical students and took place in the businesses on Riddiford Street. During the participant selection process, we allocated pairs to different sections along Riddiford Street in order to create a sample that represented a wide range of businesses as well as allowing good geographic representation of the street. Businesses were selected at random within the sections as the pairs came across them. Interviews continued until saturation of information occurred, that is we were able to predict the type of comments we would hear and no new ideas were brought up during the interviews. This occurred at 19 interviews.

The questionnaire was formulated to provide information on the Newtown business owners' perceptions of the proposed cycleway, its effects on their business and their ideas surrounding cycling in general. A copy of the questionnaire can be seen in Figure 4. The interviews were recorded on to Dictaphones, and notes were taken at the time of the interview. The two interviewers then independently transcribed the recordings.

1. What do you think about the proposed cycle way through Newtown?
Prompts: a) what do you know about it?
b) what do you see as the advantages?
c) what do you see as the disadvantages?
2. What are your views on cycling as a means of transport?
3. What do you think the point of the proposed cycle way is?
Prompts: a) Why do you believe the WCC are proposing this?
4. Is there anything else you would like to add?

Figure 4: Newtown Business Owners' Questionnaire

5.2.2 Data Analysis

Analysis was conducted in three stages, in order to enhance rigor. Individually, the transcriptions were coded into key ideas. The two interviewers then grouped the key ideas together into themes, alongside explanations and direct quotes. This was done as per the template in Appendix A. In the third stage, the information from all interviews was analysed as a group and the themes were refined to more accurately convey the findings. This was done visually in hard copy format, using a 'cut and paste' technique whilst noting which interview the information had been sourced from. The group then discussed each of the ideas from individual interviews until appropriate themes were agreed upon. Subcategories were also created to allow for greater distinction within themes. Ideas from the business owners that were applicable to multiple categories were copied and displayed under all relevant key themes or subcategories.

In order to assess the relative importance of the themes identified, the number of times a theme was mentioned across all interviews was noted as well as the emphasis each business owner had placed on a particular theme. Emphasis was gauged by ranking the themes from each interview, with the most emphasised idea being allocated two points and the second allocated one point. We also identified themes that did not fit in the most emphasised or frequently mentioned categories from an interview but were deemed important or unique.

5.3 Findings

5.3.1 Frequency

The most frequently mentioned theme was 'safety'. This encompassed both cyclist and motorist safety, as well as cyclist education.⁵ The second most frequently mentioned theme was the 'road user attitudes', or attitudes of both cyclists and motorists on the road. Concern regarding the potential impact of the cycleway on retail business was the third most frequently mentioned theme, featuring in 11 of the 19 interviews. This was followed by the health benefits of cycling. Traffic and practicality of implementation were equally mentioned by 9 businesses as important factors in the cycleway. Cycling uptake, cost savings and losses, environmental benefits, development and lack of information were the least mentioned themes. The frequency findings are displayed below in Figure 5.

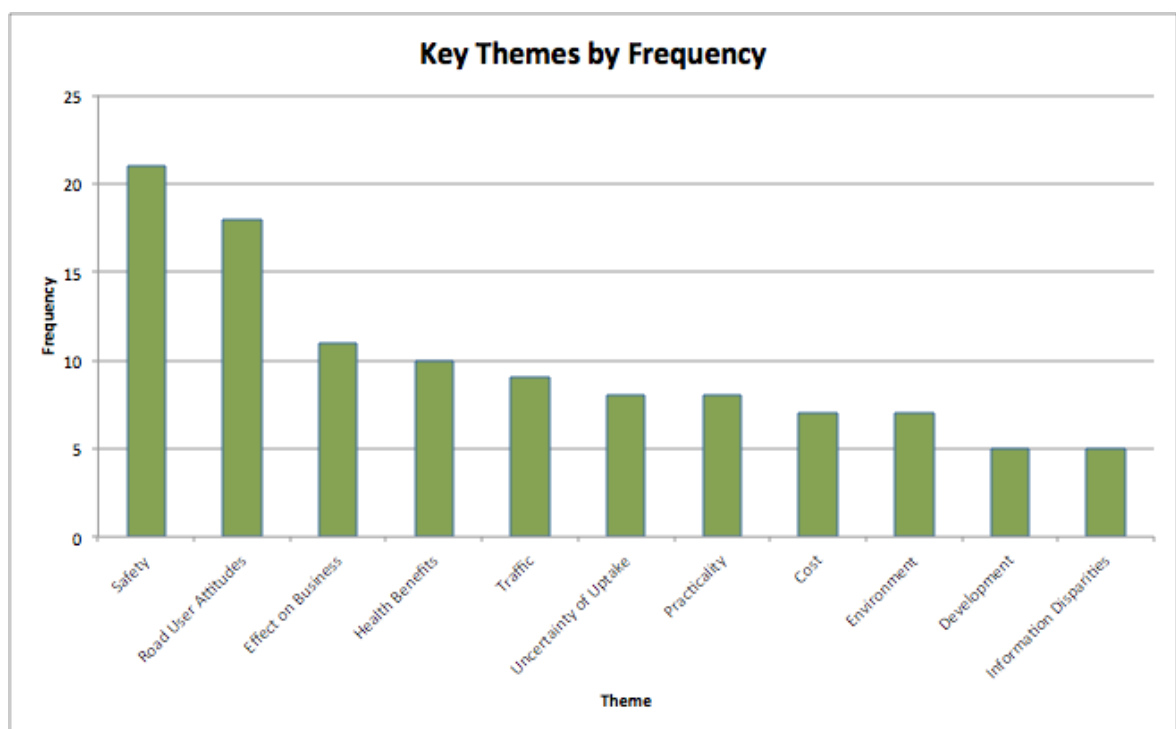


Figure 5: The frequency of themes mentioned across all interviews

5.3.2 Emphasis

The theme emphasised the most across interviews was the potential impact of the cycleway on business. Overwhelmingly, this was perceived as a negative impact. The second most

⁵ Safety as a theme had a total frequency of 21, greater than the 19 interviews. This is because safety as a theme incorporated both positive and negative views, as well as ideas surrounding cyclist safety education. For example, if a business owner mentioned both negative views and cyclist education, we counted this as two separate mentions of safety.

emphasised theme was cyclist safety, with both positive and negative perspectives. The practicality of implementing the cycleway was the third most emphasised theme. Respect between cyclists and drivers, and uncertainty surrounding uptake of the cycleway were fourth and fifth respectively.

Other themes emphasised by business owners were misinformation, lower costs of cycling to the individual, the great cost of a cycleway to the government, the environmental benefits of cycling and the role of cycling as a form of transport in NZ compared with its role in other countries. The emphasis findings are displayed below in Figure 6.

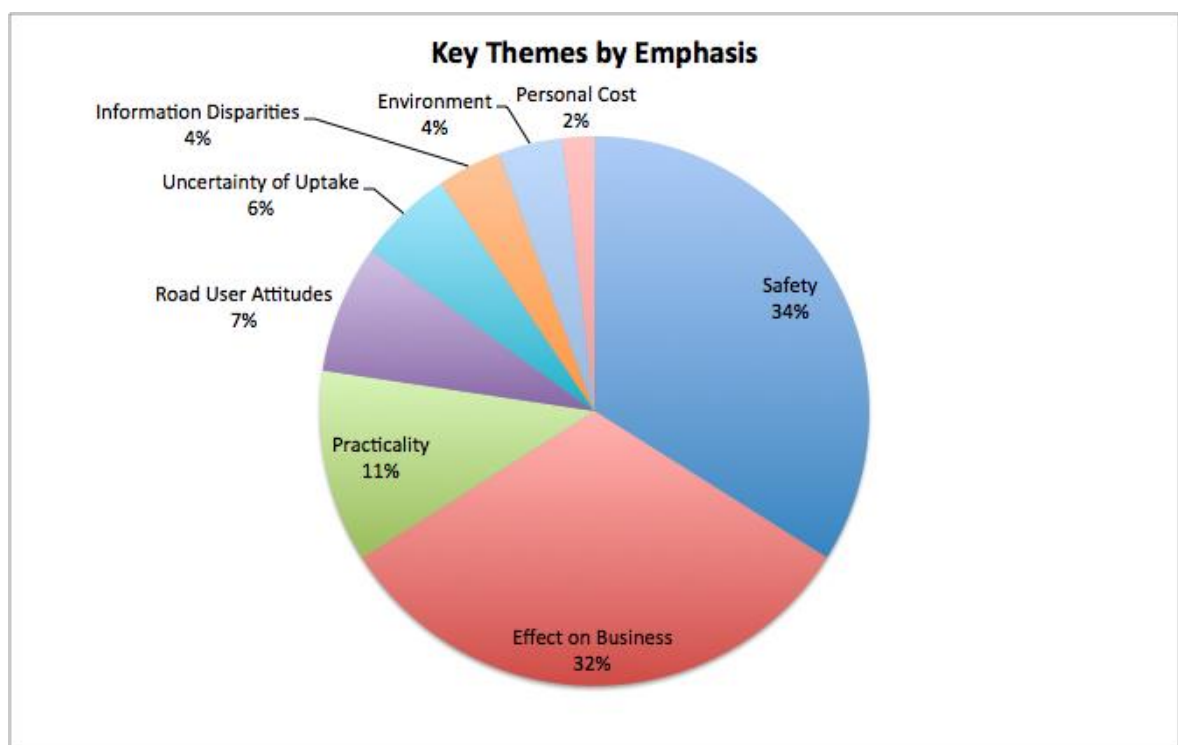


Figure 6: Emphasis placed by Newtown business owners on the key themes

5.3.3 Key Themes

5.3.3.1 Safety

Cycle safety was the most emphasised theme. Business owners were concerned about safety and were interested in improving it, although the perception of how to achieve this differed between individuals. The need for education of cyclists also featured when discussing cycle safety.

“They can cycle without fear of being scraped by a car or bus”

“[Cycleways will cause] more congestion, more aggressive driving because there will be traffic jams and probably more bikers getting hurt because of that”

"I love the idea of having a safer route because I actually don't bike to the mountain bike trails because I'm scared of the cars"

5.3.3.2 Negative Impact on Business

The second most emphasised theme identified in the interviews was the potential negative impacts of a cycleway on the income of small businesses. It was the second most emphasised theme across the interviews and the second most frequently mentioned idea.

The main issue for business owners is the perception that introduction of a cycleway will remove parking currently available for potential customers.

“Immediate parking for customers who just want to stop, grab a quick takeaway coffee. That's not going to happen anymore. If it goes ahead...I could lose quite a bit of business”

"It will hinder the business by taking away the car parking spaces”

5.3.3.3 Practicality of Implementation

A common outlook shared by business owners was that the roads of Newtown are too narrow to safely accommodate a cycleway without interfering with the flow of traffic.

“I have seen a car stop for another car coming down. You’re going to put cycleways there, where are the buses going to go? That’s crazy.”

“Fire engines, cop cars and ambulances already have a hard path to go through.”

Another perception amongst Newtown business owners was that NZ roads, particularly those in Wellington, have not historically been designed or constructed to incorporate cyclists.

“In Holland and Europe, roads were built with bikes in mind.”

The business owners also believed that it would be a difficult task to alter the Newtown infrastructure and implement a cycleway whilst addressing the issues of safety, parking and maintaining the flow of traffic.

5.3.3.4 Road User Attitudes

Another theme commonly highlighted by business owners was the attitudes of both cyclists and drivers, and the idea of mutual respect between the two groups. This was divided into three subcategories: attitude of cyclists, attitude of motorists and mutual respect.

Many business owners viewed cyclists’ attitudes negatively.

“You get cyclists who think they own the road”

“Some cyclists are a bit crazy so it’s dangerous for everybody”

However, most business owners acknowledged that changes in attitude needed to occur within both groups in order for the cycleway to be effective.

“One of the main issues is safety and compatibility between the cyclists and the motorists”

“There needs to be more education about it. They [cyclists] need to show courtesy as well as to drivers. It should go both ways”

5.3.3.5 Uncertainty of Uptake

Uncertainty of uptake was another idea strongly emphasised by business owners in Newtown. We subdivided this theme into three categories: usage of the cycleway itself, cyclists disregarding the cycleway and weather barriers.

The greatest concern expressed was that merely constructing a cycleway would not be sufficient to promote and encourage cycling amongst the population.

“My main concern is that it [the cycleway] is going to get watered down or... not utilised, that would be my biggest fear... the whole theory is, build it and people ‘will come’, but... you really need to encourage them to make use of it”

One of the desired outcomes of implementing a cycleway is increased physical activity, leading to an improvement in health. However, one business owner believed that a cycleway alone would not provide encouragement for people to take up cycling

“They not gonna get healthy because you put the bike road, you know. It can be empty as well”

In contrast, another interviewee believed that having a cycleway would motivate more people to cycle.

“People will use a cycleway if there is one coming through”

With both the wind and the rain, Wellington weather is known to be somewhat temperamental. Business owners saw this as another potential barrier to cycling uptake.

“Who wants to ride their bike when it’s pissing down with rain?”

Finally, an interesting point raised was that cyclists would not stay within the cycleways. There were opposing views on cyclists being able to use both the cycleway and the car lanes.

“Cyclists are happy that there isn’t a cycle lane here because they can just whizz around and go around the traffic”

“There’s people that will want to ride on the road, let them, cause they’re experienced riders.”

5.3.3.6 Information Disparities

A key issue observed throughout the interview process was the level of knowledge surrounding the cycleway. Whilst lack of information was not specifically mentioned, it was clear when analysing the interviews that information regarding the cycleway differed greatly between business owners and was not always consistent with information released by the council.

“The first we’d heard of it...they would come and put it outside here along the road [Riddiford Street] and there would be no parks”

“They raise way of [the cycleway] going through Adelaide road...”

“I think it’s all resolved now?”

5.3.3.7 Other themes

Two themes frequently mentioned but not strongly emphasised were the potential health benefits that could be obtained from a cycleway and the positive and negative effects on traffic. These topics were cited but not further explored by the interviewees.

“Because the more people bike, and exercise, the healthier people are going to be”

“Traffic will get less usage of the road...it will cause more congestion...traffic jams”

“The main advantages are better traffic flow and safety for all participants”

“They make there be less congestion on the roads”

Other minor themes that were mentioned in the interviews were the lower costs of cycling to the individual, the great cost of a cycleway to the government, the environmental benefits of cycling and the role of cycling as a form of transport in NZ compared with its role in other countries.

5.4 Discussion

5.4.1 Key Themes

5.4.1.1 *Safety: Positive and Negative*

Newtown business owners identified safety as an important factor when considering cycling and the implementation of the cycleway. The majority of business owners thought that cyclist safety would be increased by use of the cycleway. This is in keeping with research which has shown there is a “safety in numbers” effect, whereby implementation of interventions, such as a cycleway, decrease the risk of injury and reduce the psychological barrier of fear. It’s estimated that doubling the prevalence of cycling is associated with a reduction of approximately one third in the death rate per km cycled (6). Another study from Portland, Oregon interviewed cyclists about their experience of cycling on a cycle way that had been constructed two years previously. They found that 71% of respondents agreed with the statement “The cycle track has made this section of SW Broadway SAFER for me as a cyclist” (104).

Whilst the majority of business owners thought the cycleway would increase safety, a few thought safety would be negatively affected. A study by Lindsay et al. states that the fatalities from cyclist injuries may increase from 3.5 to 5.0 annually, with a shift in short urban car trips (<7km) to cycling of 1% to 5%. However, the rate of cyclist fatalities per 100,000,000 km cycled will actually decrease from 2.19 to 1.32 (6). In other words, whilst the study shows that an increase in cycling will increase the absolute number of injuries, but the proportion of cyclists injured will actually remain the same or decrease. Overall, the study concludes that the health benefits from increasing cycling rates will heavily outweigh the cost of injury from road crashes. These health benefits include effects from increased physical activity, reduced air pollution and the safety in numbers effect on injuries. The study calculated a benefit-cost ratio of 3:1 for just a 1% substitution of short car trips to cycling, and over 40:1 when 30% of

trips were substituted (6). In keeping with the business owners' perception, overall, research suggests that the cycleway will have a positive effect on cycle safety.

We have previously identified a few initiatives run regionally and locally for increasing cycle safety in this report. We were unable to find any evidence reviewing the effectiveness of many of these programs. An example by the Regional Council, is the development of the Journey Planner website and mobile app, to allow people to plan desirable routes anywhere in the Wellington region. We recommend that more research needs to be undertaken to ascertain which interventions are most effective in improving safety and increase the capacity for these initiatives.

5.4.1.2 Impact on Business

The majority of business owners interviewed, emphasised that implementing a cycleway would have a negative impact on their business. A major concern was that if a cycleway was implemented, it would result in a reduction of the available on-road carparks. This implies that business owners believe a large proportion of their customers travel by car to their businesses. In order to address this concern, it is important to understand the current behaviours of customers. A study conducted by Fleming et al looked at the economic impacts of transport and road space reallocation in shopping areas located in New Zealand cities. This showed that whilst sustainable transport users (walking, cycling and public transport) spent on average \$12 less per trip than car users, they visited more frequently and spent more time in the area. As a consequence, sustainable users spend the same or more than car users, in a month (51). This is consistent with other research, internationally and in Wellington (43,105). Fleming et al. also found that whilst sustainable users made up 37% of the participants surveyed, they contributed 40% of total spend. This shows that the sustainable users made a higher economic contribution than their mode share. These findings suggest that the benefit to businesses of encouraging more sustainable transport journeys to shopping areas, outweighs the cost of re-allocating car parks.

The business owners were also concerned that the loss of car parks would affect 'passing trade'. Fleming et al found that the majority of people, shopping in arterial areas, such as Newtown, intended to visit the area already and passing trade accounted for less than a third of purchases. This implies that if well sign-posted alternative parking is available, the removal

of on-street parking directly outside shops, will not necessarily affect passing or local trade (51).

International evidence also supports the idea that a cycleway will have a neutral or positive effect on local business. A study in Seattle surveyed businesses before and after a bike lane was constructed in two different locations. Overall, the findings were that the changes to these areas did not have a negative economic impact on businesses (105). The Valencia Street Bike Lane Merchant Survey in San Francisco also looked at the impact of bike lanes on businesses four and half years following their construction. This area has similar demographics to Newtown as it is primarily a low income, working class, immigrant neighbourhood. When business owners were asked in general what the impact on business and/or sales had been after installation, 65.4% responded that the bike lane had a positive effect, while another 30% did not think that the bike lane had any effect. Only one individual said that the bike lanes had a “slightly negative effect” (106). Furthermore, research has also been conducted that quantifies an increase in retail sales after the implementation of bike lanes (107).

Although the causality of the increase in sales is arguable, it is important to note that many of these studies found that business owners did not observe a negative impact on their business and/or sales. This provides an illustration of the potential effects following implementation of a cycleway in Newtown.

5.4.1.3 Practicality of Implementation

The practicality of implementing a cycleway in Newtown was another theme strongly emphasised by business owners. There is a perception that the planning for New Zealand transport infrastructure has previously been focused on incorporating the needs of cars and other motorised vehicles, rather than bicycles. This idea is supported by a survey conducted in 2009 which found that the majority of local authorities and decision makers within NZ government were largely focused on problems faced by car drivers in regards to transport issues in NZ (51). Both the historic decisions surrounding infrastructure and the prioritisation of other road users, means that it can be very difficult to implement cycleways. These results correspond with the aforementioned concerns from Newtown business owners. Business owners felt that implementing a cycleway would make it difficult to maintain the existing functionality of Newtown - including concerns for safety, parking and the flow of traffic. Issues

mentioned were narrow roads and busy intersections in the Newtown shopping area. Business owners felt that they would be directly affected by this reduction in functionality, as it is perceived that the majority of customers travel to their businesses by car, rather than by bike.

5.4.1.4 Road User Attitudes

Our findings identified the attitudes between cyclists and other road users as a key issue surrounding the proposed cycleway. There are numerous examples in the literature and media regarding these attitudes. An Australian study surveyed 1830 cyclists in Queensland, finding that 76% of men and 72% of women reported being harassed by motorists in the previous 12 months (108). Whilst there is research acknowledging the existence of the negative attitudes between cyclists and other road users, we found little evidence on how to effectively reduce this or what effect a cycleway would have on these attitudes. As many of the business owners recognised, this is an important area to address and it needs more research in order for cyclists and motorists to share the road in a safe and respectful manner.

5.4.1.5 Uncertainty of Uptake

The implementation of the Island Bay to City cycleway aims to improve cycling infrastructure in Wellington. The present barriers affecting cycling are shown in a recent survey and these include poor road infrastructure, poor road maintenance, cycle safety, unsafe drivers, weather, and difficulty in carrying heavy items (93). Putting this cycleway into effect is likely to remove some of the barriers preventing people from cycling or making it difficult for cyclists currently.

Selecting an optimal route - that is ideally flat, with direction and safety elements included, has been shown to be important in implementing a successful cycleway (93). These factors can promote a greater uptake of cycling and increase the use of the cycleway. This research is relevant to the findings of our study, as business owners were uncertain whether a cycleway would increase the uptake of cycling or not. It is important to note that some barriers such as weather and the inconvenience of cycling are unavoidable, so will still apply, even with the implementation of the proposed cycleway.

A Wellington study conducted earlier this year, found that 76 percent of respondents over 18 would consider cycling in some circumstances, given that safe, separated infrastructure was provided – whether for recreation, errands or commuting (93).

The importance of education and appropriate promotion of the cycleway should be noted, as this is crucial to ensure maximum utilisation of this intervention.

5.4.2 Communication

Wellington Towards 2040: Smart Capital is a document that was developed by the Wellington City Council (WCC) in 2011 which explicitly states a desire for community participation and engagement in city planning, through improving transparency and accountability of those making decisions. Objectives of becoming more proactive in engaging the community in the development and delivery of services and facilities has also been described. This involves making engagement more accessible to those who will be affected by proposed changes (63).

While the Council has stated their desire to engage stakeholders, some business owners believed that this had not occurred to a satisfactory standard with regards to the Island Bay to City cycleway. Communication was emphasised by a small number of business owners in the interviews, however, there was a strong feeling among interviewees, that businesses had not received adequate information or consultation on the proposed plans. This apparent lack of communication contributed to the uproar among some of the business owners.

As a result of our interviews, we have identified a lack of communication between the council and the business owners as an important theme. The city council has previously been criticised for ‘over-consultation’ leading to a perceived ‘consultation fatigue’. However, we would recommend a higher level of effective consultation with the relevant communities, thus ensuring that major stakeholders in the project are adequately informed throughout the planning process. Members of the community are interested in being consulted and involved in the development of the project. Moreover, it would be advantageous for those managing the project to consider looking into both NZ and international research on the implementation of cycling infrastructure, in order to help predict and avoid complications.

5.4.3 Responsibility

Another barrier to implementing the cycleway is determining which organisation is primarily responsible for managing the proposed cycleway. While the Regional Cycling Plan identifies which agencies have authority (in this case, Territorial Authorities and Road Controlling Authorities), it does not clearly outline who these groups actually are. The plan states that whilst it is the responsibility of each agency to pro-actively progress to action, commitment from many agencies will be needed to deliver an effective solution. It is therefore important that the multiple agencies involved are effectively communicating with each other and working towards a common goal. This will enhance the quality of the project and improve the efficiency of the process.

As mentioned earlier, the amount of funding in the transport sector dedicated to cycling facilities nationally has previously not been representative of the proportion of cyclists using the roads. However, figures from the recent 2014/15 budget report show that Wellington has increased its spending by 230 percent. In order to achieve substantial mode shift from cars to sustainable transport modes, we support the continuation of increased funding regionally and nationally on cycling facilities.

5.4.4 Accessibility and Equity

Accessibility is important to consider in regards to implementation of a cycleway. It relates to equity and can be discussed in terms of current access to cycling, access to the proposed cycleway and the indirect consequences of a cycleway. For example, reduced accessibility to shopping facilities due to a loss of on-street carparks. It is also essential to consider the effects on the most disadvantaged groups within our society using the principles stated in the Ottawa Charter and the Treaty of Waitangi. The Wellington City Council has attempted to address these ideas, stating: “Everyone, regardless of age, culture, or ability must have access to city life and be able to participate in civic activities and healthy communities” (63).

Implementation and use of the cycleway is also dependent on access to bicycles. Research has shown that 46% of households in NZ own a bicycle (49). Pettit has also highlighted that lack of access to a working bicycle was a barrier across all groups. In addition, almost 30% of Pettit’s study population said they would cycle more if they owned a working bicycle (93). Therefore, strategies to improve access to bicycles have the potential to increase access to cycling for all

individuals, for example, a policy to introduce bicycle and helmet subsidies in order to make biking more accessible to those of low socioeconomic status.

As the proposed cycleway covers a range of suburbs with differing levels of deprivation, the Island Bay to City cycleway improves the accessibility to city life and the ability to participate in the community.

It is paramount to consider the indirect effects of the cycleway on accessibility. The removal of car parks in Newtown may lead to reduced accessibility for specific groups within the community, especially the elderly and disabled. This issue has been identified in other studies and is applicable to the proposed Island Bay to City cycleway. A study reviewing the installation of the cycleways in Portland identified reduced accessibility for handicapped individuals due to an inability to park and/or drop-off on the curb of streets (104). These indirect consequences need to be taken into account when implementing the Island Bay to City cycleway, in order to minimise their negative impacts on our society.

A specific focus on achieving equitable outcomes for Māori is required in the implementation of the cycleway. As mentioned earlier, Māori have poorer health outcomes than non-Māori and are overrepresented in low socioeconomic groups. We considered strategies following the Ottawa Charter Framework and the Treaty Understanding of Hauora in Aotearoa-New Zealand (TUHA-NZ). At a community level, we propose marae based cycle education sessions and culturally appropriate cycle awareness campaigns. Biking events such as Iron Māori encourage community engagement and participation. Additionally, local iwi should be consulted for their thoughts and suggestions on the project. Taranaki Whānui ki te Upoko o Te Ika (Taranaki Whānui) represent iwi originating in the Wellington region, including Te Ātiawa, Ngāti Tama, Ngāti Ruanui and Taranaki. Ngāti Toa should also be included among those consulted, as the Waitangi Tribunal have acknowledged their mana whenua interests in the region (63).

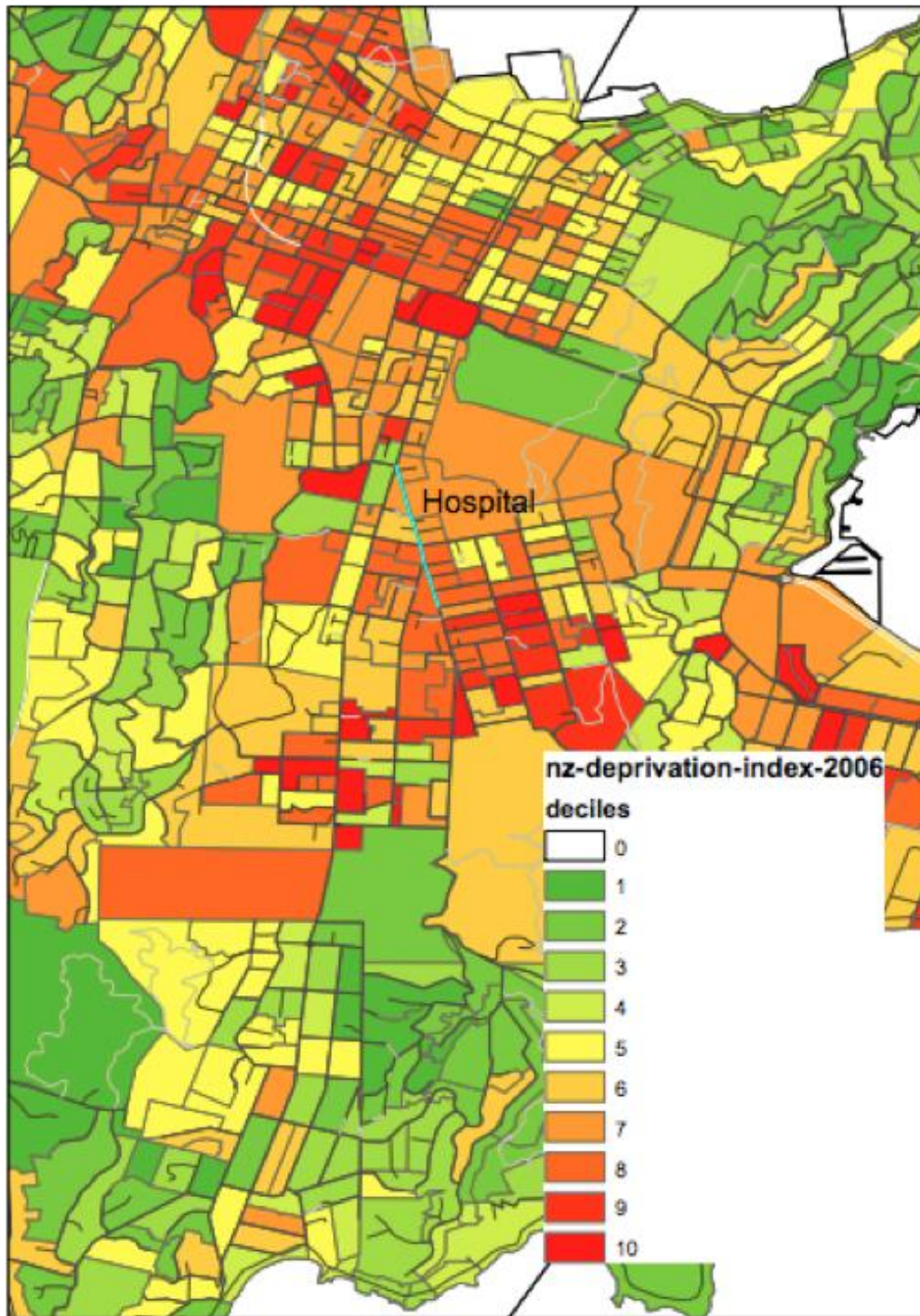


Figure 7: Deprivation Index for Wellington (New Zealand Deprivation Index 2006)

5.4.5 Strengths and Limitations

An expected limitation of the study was that medical students carried out the interviews. As medical students, we have been taught about the potential health benefits of increased physical activity through cycling. This may have resulted in the introduction of interviewer

bias. To minimise the effects of this, open-ended and impartial set questions were used to allow business owners to voice their opinions with minimal influence from the interviewers. The use of set questions also strengthened the study design as they improved consistency between interviews. Prompts were provided as an option for interviewers to ensure that sufficient data was collected from each business owner.

Multiple interviewers posed another limitation when it came to analysing the data. It was difficult to compare the emphasis placed on each theme by business owners as different interviewers were involved. To overcome this, interviews were recorded and transcribed. This ensured other members of the group could read the word-for-word transcriptions of each interview. We also developed a systematic ranking process, as discussed in methods, allowing us to standardise findings.

A strength of the study was using multiple levels of analysis. This was achieved by having the data analysed first by individuals, followed by in pairs, and finally, amongst the wider group. This improved rigor of the study. In order to not lose context of the comments, we continually referred back to the original narratives. Another strength of the study was that we collected data until saturation was achieved. This helped to ensure that adequate and quality data was collected.

5.4.6 Ethical Considerations

Our project attempted to address the topic of barriers to climate change mitigation policy. As we have discussed, climate change is a pressing issue for global health. In order to tackle this issue we must undertake a globally collaborative effort to reduce the anthropogenic causes of climate change. However, several ethical issues exist and must be considered, especially when it comes to policy aimed at mitigating the effects of climate change. Such issues exist at all levels; from the question of whether or not to address climate change in the first place, to the local level policy implementation disputes. At the global level, issues exist with the distribution of benefits and harms of climate change. It is commonly seen that people in the poorest countries, who incidentally have contributed the least to greenhouse gas production and reap minimal benefits, will experience the worst effects. In addition, the issue of positive rights, such as access to a safe, clean environment and healthy lifestyles must be considered as climate change may negatively impact these rights. Ethical issues may also be observed more

locally when it comes to the implementation of climate change mitigation policy. Some policies have the potential to infringe on individual rights and freedoms and may be considered paternalistic by some. As a result, opposition may arise and thereby act as barriers to the policy implementation. Fair and transparent processes for the implementation of such policy must therefore be undertaken to ensure such issues are minimized.

Several ethical concepts and approaches are relevant to addressing these issues. At the broader global and national levels, ideas of utilitarianism, communitarianism, and an anthropocentric approach play a significant role in the debate of whether or not to address these issues. With regard to utilitarian theory, addressing climate change and promoting healthy co-benefits through policy implementation leads to a significant amount of good for the whole global population. Communitarianism is another concept applicable at the broader level. It describes the ideas of common good, shared values, ideals and goals of a community. It emphasizes that many goods are held and enjoyed in common, in this case being a healthy and clean environment. An anthropocentric approach may also be taken to address these issues, with particular emphasis on the instrumental value of the environment to mankind at present and for future generations. Perhaps of more relevance to our case study though are the ethical issues at the local policy level. Such issues arise both in the development and implementation of these policies and include: equity, cost-benefit, Treaty of Waitangi considerations (e.g. Māori input and values), fair process and distributive justice. In our project we have had a significant focus on fair democratic process, equity and Treaty of Waitangi considerations, which ultimately shine through in our conclusions and recommendations.

5.5 Conclusion

Climate change is an undeniable and pressing issue that affects us all. Even if New Zealand manages to meet international guidelines to reduce carbon emissions, these efforts may still not be sufficient to mitigate all threats posed by climate change. The transport sector is a large and increasing contributor to these emissions, however, it is also very amenable to change and thus a key target for climate change policy. Cycleways are an example of a cost-effective approach to encourage modal shift and reduce carbon emissions. They also have the advantage of providing many health co-benefits, such as the direct effects from increased physical activity and the indirect effects from decreased air pollution.

There are many barriers to implementing climate change mitigation policies, despite research supporting their effectiveness and necessity. This can be seen in the case of the Island Bay to City Cycleway in Wellington. Our case study identified five key issues surrounding the cycleway from the perspective of Newtown business owners: safety, effect on business, practicality of implementation, attitudes of road users, and uncertainty of uptake. These barriers are consistent with findings in the literature. However, further research indicates that many of the identified concerns are unlikely to have a significant impact in practice. Evidence suggests that the cycleway is in fact likely to increase safety, improve or have no negative effect on businesses and dramatically increase cycling uptake in the area. We therefore postulate that the root cause of the opposition by business owners in Newtown is a lack of adequate communication between policy makers and stakeholders. If the communication between these parties was improved and all contributors worked towards a common goal, we believe some of the barriers to implementation of climate change policy will be reduced.

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Appendix A Interview Analysis Template

Positives:

Statement	Explanation	Quote
<i>example</i> Improve Health	People will be doing more exercise if they ride bikes more often as opposed to driving their car.	"If we had more cycleways around more people will be cycling. They will reduce pollution at the same time as increasing their own exercise".

Negatives:

Statement	Explanation	Quote

Narrative:

To provide context for the analysis please provide 1-2 illustrative narratives that arose during your interview.