1. Walking in New Zealand

Pedestrian Network Guidance

NZ Transport Agency Waka Kotahi

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V1.1

More information

NZ Transport Agency Waka Kotahi
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Contents

This document constitutes a chapter within the NZ Transport Agency Waka Kotahi Pedestrian Network Guidance (PNG). For access to the other chapters of the guidance, please visit nzta.govt.nz/png.

This version of the PNG, dated February 2025, is published in a hybrid format comprising both HTML (ie webpages) and PDF components, marking a departure from the previous version, which was available solely in HTML. The PDF documents, each addressing discrete sections or thematic areas, are designed to complement the overarching HTML structure, which presents the guidance in a cohesive and navigable format. Together, these formats are designed to function as an integrated whole, ensuring that users can access and engage with the content in a manner that is both flexible and coherent, while preserving the integrity and consistency of the guidance.

1. Walking in New Zealand

1.1. Context and definitions

1.1.1. Introduction

Walking is a basic human activity that it has often been overlooked when planning for transport and has been viewed as a second-class form of travel. However, the right to walk is a fundamental element of society, particularly in urban environments, and is embedded in numerous public policies. Although much of this guide focuses on walking for transport, people also walk for pleasure or exercise.

The use of walking for transport is declining. Even so, walking remains a key element of a balanced transportation system and is a focus of many towns and cities to prioritise. Overall, it is still the second most popular form of travel in New Zealand. Nearly one in five of all household trips is made on foot. For those households that have no car, or without car access for much of the day, and for those who cannot, or choose not to drive, walking is an especially vital mode of transport.

Walking is also included in most trips made by other modes. People walk for many reasons, from their cars to their workplace, from home to the bus stop or to a café for lunch. Whatever the main means of travel, walking is usually the first and last mode used, providing an important link between land use and motorised travel. It is also healthy, inexpensive and very environmentally friendly.

In many ways, walking is the glue that holds together the transport system, connecting all the different modes and places within it. The attractiveness and quality of our streets and public spaces is, therefore, key to getting more people to walk. The pedestrian network needs to cater for a vast range of activities

and possible destinations. Understanding pedestrian experiences, behaviour, needs and barriers to walking can help shape our urban environments to encourage more people to enjoy them as pedestrians[1].

With growing environmental and health issues, investing in changes to our built environment that reduce peoples' dependence on cars is becoming increasingly important.

The dual function of walking as a recreational activity, as well as a mode of transport, highlights the potential for walking to create healthier, safer, and more accessible communities.

1.1.2. Who is a pedestrian?

A 'pedestrian', as defined in section 1.6 of the Land Transport (Road User) Rule 2014, means '*a person on foot on a road, and includes a person in or on a contrivance equipped with wheels or revolving runners that is not a vehicle'*.

Pedestrians are road users with the same general responsibilities as other road users. A pedestrian can include a person walking or running, a person pushing a pram, a person in a wheelchair and a number of other users. Users of skateboards, skates and scooters are not pedestrians as defined by law but are permitted on the pedestrian network.

Figure 1: Pedestrians and other path users have a wide range of abilities and needs.

The various types of road users are grouped in legislation and where they can operate. Please refer to current legislation as this is subject to change.

1.1.3. What makes up the pedestrian network

The pedestrian network is made up of multiple components including footpaths, shared paths, road crossings and intersections, bridges, underpasses, tunnels, shared zones, laneways, unpaved walking tracks, stairs and ramps, elevators and escalators, etc. Those on transport devices may also use the road. Note that a road is broadly defined, including beaches and 'a place to which the public have access, whether as of right or not', which would include park pathways and trails.[2]

[1] NZ Transport Agency Waka Kotahi (2019), The Pedestrian Experience literature review

[2] Definition of a road as per Land Transport (Road User) Rule 2004.






Further information

- 25 years of New Zealand travel – Ministry of Transport
- Households with access to motor vehicles – Ministry of Transport

1.2. Pedestrians and the law

'Legislation' includes acts of Parliament, as well as rules and regulations made by people or organisations to whom Parliament has delegated this power (for example, the Minister of Transport for Land Transport Rules).

NZ Transport Agency Waka Kotahi guiding legislation

Table 1 summarises relevant legislation. There are also relevant rules on the use of land (under the Resource Management Act 1991) in regional and district plans.

Table 1: Legislation relevant to walking

Legislation	Relevance to walking
Land Transport Management Act 2003	The Land Transport Management Act 2003 (LTMA) has the purpose to 'contribute to an effective, efficient, and safe land transport system in the public interest' and therefore is relevant to all modes of transport including walking.
Local Government Act 2002	Although the Local Government Act was updated in 2002 parts of the Local Government Act 1974 still apply (ie they weren't repealed). This is the case for clause 331(2) that requires RCAs to develop a strategy for the provision of roads and footpaths as outlined below. "In forming or reforming any road or part thereof (not being a road in a rural area), the council shall ensure that reasonable and adequate provision is made for the kerb and channel of any footpath or part thereof to be formed or reformed so as to permit safe and easy passage from kerb to kerb of any mechanical conveyance normally and lawfully used by a disabled person." [s. 331(2)]
Land Transport Rule: Traffic Control Devices 2004	Sets out the specific requirements for signs, markings and signals, in particular pedestrian facilities such as pedestrian crossings, school crossings, footpaths, shared paths and pedestrian areas.
Land Transport (Road User) Rule 2004	Provides rules for passing and parking and use of pedestrian crossings; crossing roadways generally; use of shared zones, footpaths and roadways by pedestrians and other road users; and use of shared paths. Defines pedestrians, mobility devices, and wheeled recreational devices [s. 1.6]. Further information on the Road User Rule is provided below this table.
Resource Management Act 1991	Regarding land use applications, the Resource Management Act 1991 requires consideration of pedestrian access issues including managing potential conflicts with vehicles; access through carparks, etc
Railways Act 2005	Promotes the safety of rail operations, including for pedestrians accessing rail facilities, and those travelling across or along the rail corridor.
UN Convention on the Rights of Persons with Disabilities 2006	New Zealand is a signatory to the UN Convention on the Rights of Persons with Disabilities (CRPD) and therefore "shall take appropriate measures to ensure to persons with disabilities access…to transportation…and to other facilities and services open or provided to the public, both in urban and in rural areas…including the identification and elimination of obstacles and barriers to...Buildings, roads, transportation and other indoor and outdoor facilities, including schools, housing, medical facilities and workplaces." This includes ensuring that private entities that provide public access also meet accessibility requirements.

'Law' includes not only 'legislation', but also common law, which is understood and accepted by everyone and defined by law court judgments. Common law includes everyone's duty to care for their own safety and to avoid causing harm to others. Under common law, everyone has the right to travel unimpeded on all public roads, except where there are legal restrictions (such as those prohibiting pedestrians from motorways). Road controlling authorities (RCAs) are obliged to safeguard this right for all lawful road users, including pedestrians.

Local authorities and RCAs also have the power to enact bylaws for areas within their responsibility. Bylaws can be used for activities that may affect pedestrian safety or mobility, for example micro-mobility access rules, vehicle speed limits and parking.

1.2.1. Further detail on the Road User Rule 2004

The Road User Rule prohibits driving a motor vehicle along a footpath. Cycling on the footpath is prohibited unless delivering to mailboxes. Motor vehicles cannot stop, stand or park on a footpath or cycle path.

If a footpath is provided, pedestrians and mobility device users must, at all times when practicable remain on the footpath. If pedestrians need to be on the roadway they must remain as near as practicable to the edge of the roadway.

When crossing a roadway where no pedestrian crossing is available pedestrians need to endeavour to cross at right angles to the kerb. Drivers approaching pedestrian crossings must give way to pedestrians waiting to cross. Drivers must not stop, stand or park their vehicles on a pedestrian crossing or within 6m of the drivers approach to a pedestrian crossing.

Shared paths can be used by some or all of the following persons at the same time: pedestrians, riders of cycles, riders of mobility devices and riders of recreational devices. All persons using a shared path must act in a careful and considerate manner. Some signs or markings may give priority to certain road users and these must be followed.

1.3. Benefits of walking

Walking brings multiple benefits to the individual and to the society. There are eight main benefits, many of which overlap. They are:

Equity

Walking assists improving the accessibility to daily needs for non-drivers, which supports overall transport equity. This means that the benefits of investment in transport are distributed such that all people are able to participate in society.

Environment

Walking is a zero carbon emissions and clean mode. Walking is therefore key to assist reducing greenhouse gas emissions, air, noise and water pollution caused by motor vehicles.

Efficiency

Walking is the most space and energy efficient form of transport and makes the best use of our streets.

Health and wellbeing

It has been long acknowledged in health studies that walking is considered the keystone to promote healthier lifestyles a given that people are less sedentary when they walk more.

Community

Walking allows people to access employment, community services, and natural environments, building a sense of community. Walking also contributes to increase social interaction assisting in the reduction of social isolation's effects.

Economy

Walking is low cost making for more affordable access to opportunities and assisting in reduction of household transport related costs. Consequently these households have more disposable income and have more opportunities to spend locally. Walkable neighbourhoods are also associated with higher property values and increased retail sales.

Resilience and security

Walking is obviously an important mode in times of natural disaster or pandemic.

Supports public transport

Walking is the main mode for the first and last part of a journey undertaken by public transport.

For more detailed information on the above benefits, refer to Appendix A – Benefits of walking.

The following infographic can be used when engaging with the community, it communicates the key benefits of walking in plain language and uses New Zealand statistics and facts.

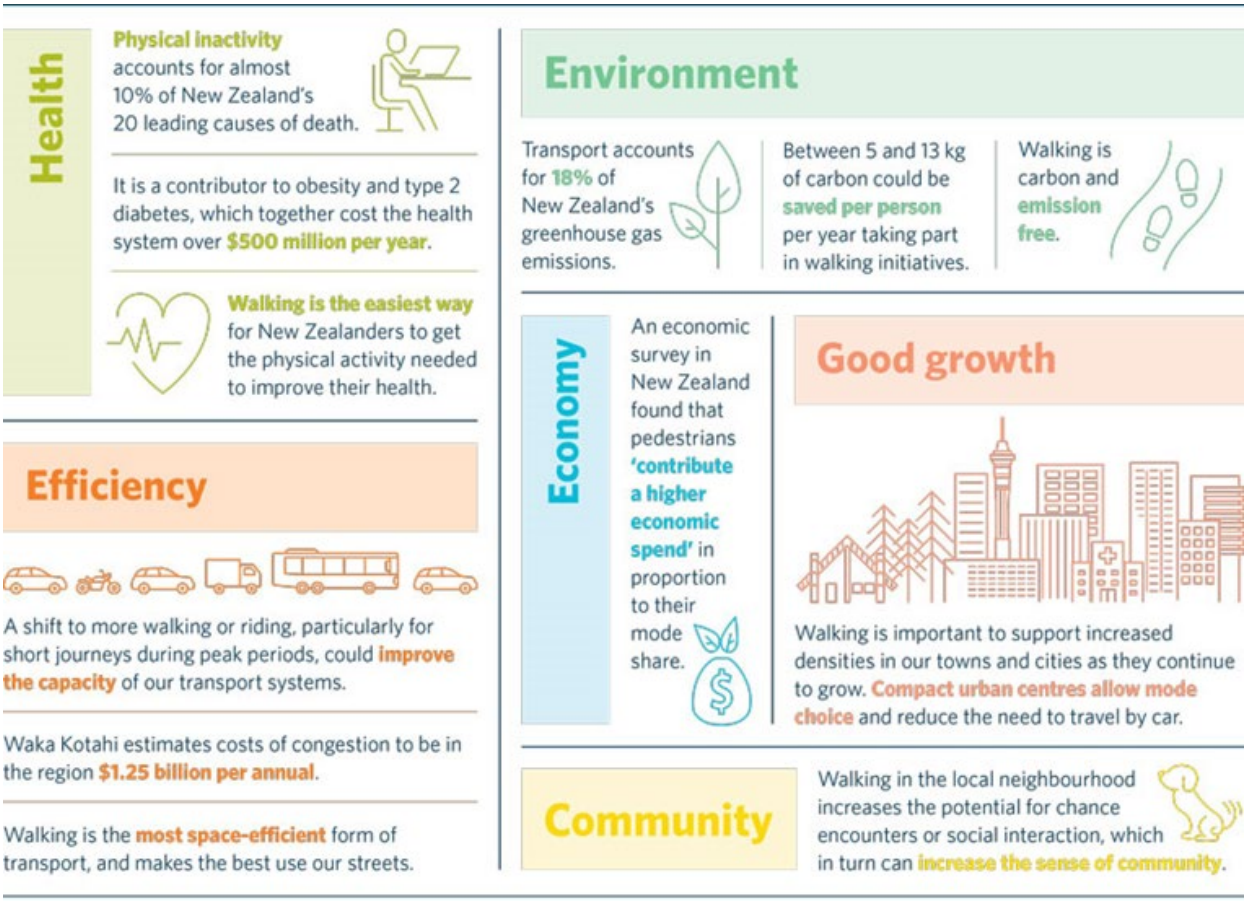

Figure 2: Key benefits of walking. Download key benefits of walking infographic.

1.3.1. Summary: the benefits of walking

The design of our urban environment influences our mode choice:

- When land use density is higher, the distance between destinations is more walkable and public transport is easier to serve.
- When the quality of the public realm is high, people feel safer walking and are therefore more likely to walk.
- When people don't need to drive everywhere, they can live with fewer or no cars – which saves money that is available to be spent, for example, locally.
- When people drive less, there are fewer greenhouse gas emissions, noise, air and water pollution and injuries/fatalities from vehicle crashes.
- When people walk more, they build physical activity into their daily lives – improving their health and mental wellbeing.

1.4. Walking activity and trends in New Zealand

1.4.1. How much walking happens in NZ?

The New Zealand Household Travel Survey (HHTS) shows that of the estimated 6000 million plus trips made by New Zealand households annually, nearly one in five (17 percent) was made by walking[3]. New Zealanders spend 205 million hours annually as pedestrians in the road environment and walk an estimated 807 million kilometres per year.

[3] Ministry of Transport (2015). Walking: New Zealand Household Travel Survey 2011–2014

Research into household travel undertaken for the New Zealand travel survey identifies every leg of a journey as a 'trip'. For example, a trip to the bus stop, followed by a bus ride, followed by a walk at the other end would count as two walking trips and a public transport trip. Similarly, a motor vehicle trip to work, with a stop on the way at a dairy, would count as two motor vehicle trips to two separate destinations. By focusing on 'trips', we can better see the multi-modal nature of many of our journeys, enabling us to plan better for all the modes of transport involved. A walking trip is defined as being at least 100 m in length or crossing a road.

Around 84% of walking trips involve getting from A to B solely by walking. Around 16% were undertaken in association with other modes of transport (eg walking to and from a parked car or walking to and from public transport).

A recent study into understanding attitudes and perceptions of cycling and walking[4] found that:

- 73% of urban New Zealanders view walking as a great way to get around town easily and efficiently.
- For walking there are fewer perceived barriers than for cycling but there are more basic preconceptions to overcome; such as people don't have enough time to walk or they live too far from destinations for walking to be practical.
- Overall, perceptions of safety are strong with 86% viewing walking as safe in their region. However, safety perceptions drop when walking at night (52%) and around people cycling on shared paths (56%).
- 70% of New Zealanders are walking for commuter trips including to/from work or study or to get around town. 21% are committed commuters and are walking for these trips most days.
- The level of walking differs at a regional level; Auckland and Hamilton have the lowest levels of walking, while Wellington has the highest.

1.4.2. Types of walking

1.4.2a Walking for transport

Walking for transport includes walking for any non-recreational purpose, such as to or from schools, shops, work, visiting friends or family, or to public transport stops/stations. Although walking for transport is a broad definition it can be helpful particularly when planning and designing for walking to replace or support other modes of transport and therefore can have a greater impact on mode shift.

The HHTS 2015–2017 found that on the average day, 81% of New Zealand adults reported no walking for transport.[5]

Between the late 1980s and 2014, the average daily time spent walking dropped from 10 minutes to 8 minutes while the length of time spent driving has increased slightly (see image below).[6] Over the same time period, car-dominated urban sprawl[7] and resulting increasing trip distances (estimated at 1% increase per year)[8] has made walking a less practical mode for many people.

[4] NZ Transport Agency Waka Kotahi (2021). Understanding attitudes and perceptions of cycling and walking

[5] Ministry of Transport (2017). New Zealand Household Travel Survey 2015–2017

[6] Ministry of Transport (2015). Household Travel Survey, 25 years of New Zealand Household Travel 1989–2014

[7] Chaston, D. (2018). Visualisations showing how seven of our cities have grown over time

[8] Sullivan, C. & O'Fallon, C. (2010). Kilometres travelled and vehicle occupancy in urban areas: improving evaluation and monitoring. NZ Transport Agency Waka Kotahi Research Report 399

Figure 3: Change in time spent driving and walking since the late 1980s (Source: Ministry of Transport, 2014).

1.4.2b Walking for leisure

Although there has been a decline in walking for transport, New Zealanders' love walking for leisure. Walking is New Zealanders' preferred recreation activity with 64% of adults walking regularly.[9] This suggests that improving the attractiveness of the walking environment could increase the amount that people walk for transport.

1.4.3. Most walking trips are short

As shown below 90% of walking trips are less than 2 km long[10]. For trips of 2 km or less, the walk mode share is 30%. Only 4% of trips longer than 2 km are walking trips. The implication is that towns and cities designed to have shorter trip distances will have more walking.

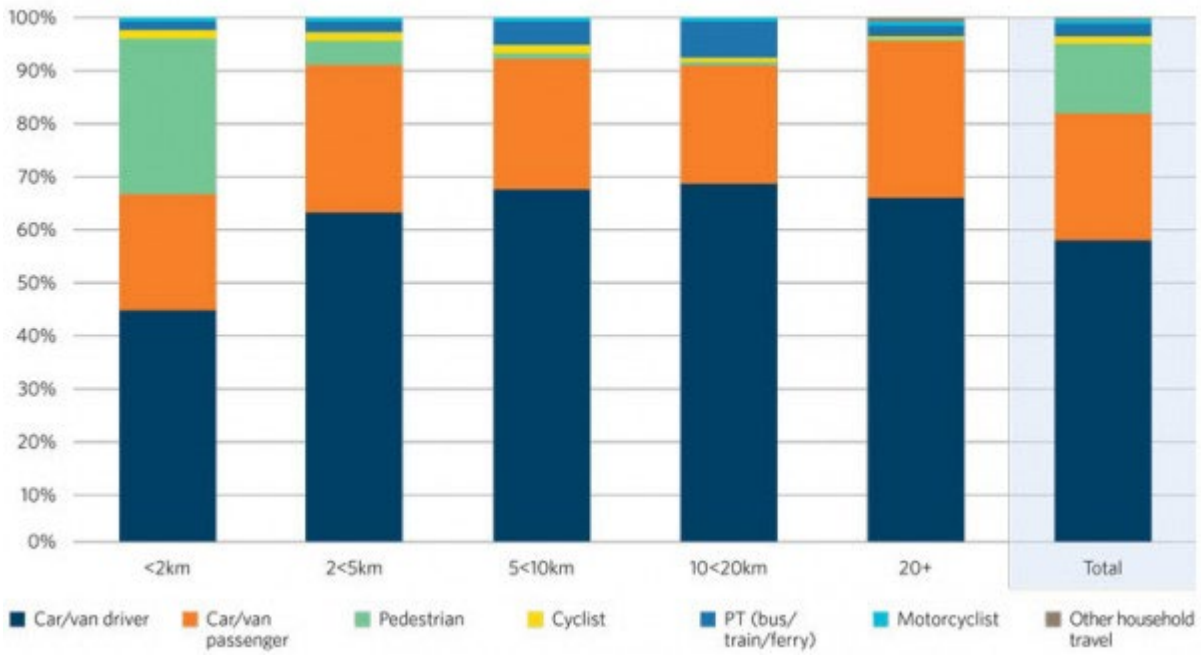

Figure 4: Mode distribution of trip legs by distance of trip leg, main urban areas (Source: HHTS 2015-2017 data).

Twelve percent of all car trips in New Zealand are under 1 km; if all these short car journeys were made on foot instead (scenario 'a' in graph below), it is estimated that would lead to a 3% mode shift overall.

[9] https://sportnz.org.nz/about/news-and-media/news-updates/latest-active-nz-survey-results-and-data-tools/

[10] Ministry of Transport. (2018). New Zealand Household Travel Survey 2015–2018

That translates to 23,900 quality adjusted life years (QALYs) and nearly half a billion dollars in healthcare costs saved over the lifespan of the current adult population.[11]

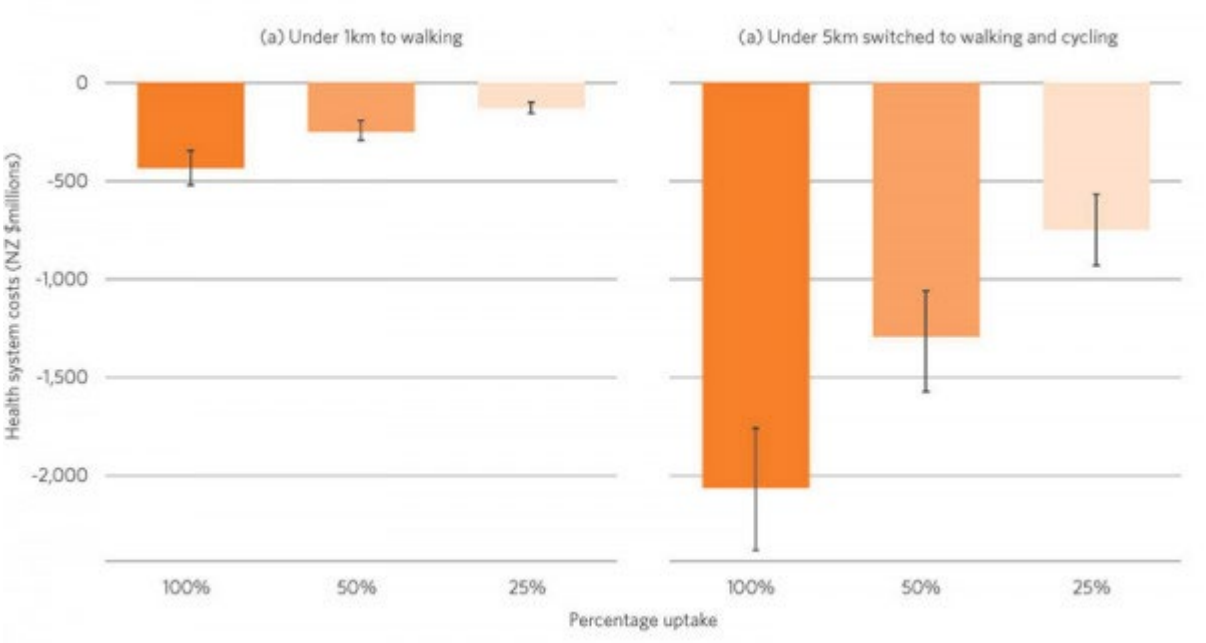

Figure 5: New Zealand healthcare savings from mode shift (Source: Mizdrak et al 2019).

1.4.4. Walking journey times

People tend not to walk for trips that take more than 30 minutes, and walk more when trip durations are short. In New Zealand's main urban areas, 99% of walking for transport trips are less than 5 km, and 90-91% are less than 2 km.[12]

1.4.5. School travel trends

Walking to school is also declining:

- An estimated 54% of primary school students and 33% of secondary students who live less than two kilometres from school do not walk the full journey[13].
- The rate of walking to school dropped from 42% to 29% between 1990 and 2014[14].

Some of the key barriers to active school travel include personal security ('stranger danger') and traffic safety concerns[15,16].

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[11] Mizdrak. A, Blakely. T, Cleghorn, C.L. & Cobiac, L.J. (2019) Potential of active transport to improve health, reduce healthcare costs, and reduce greenhouse gas emissions: A modelling study PLoS ONE 14(7): e0219316

[12] NZ Transport Agency Waka Kotahi (2022). Sustainable urban mobility benchmarking

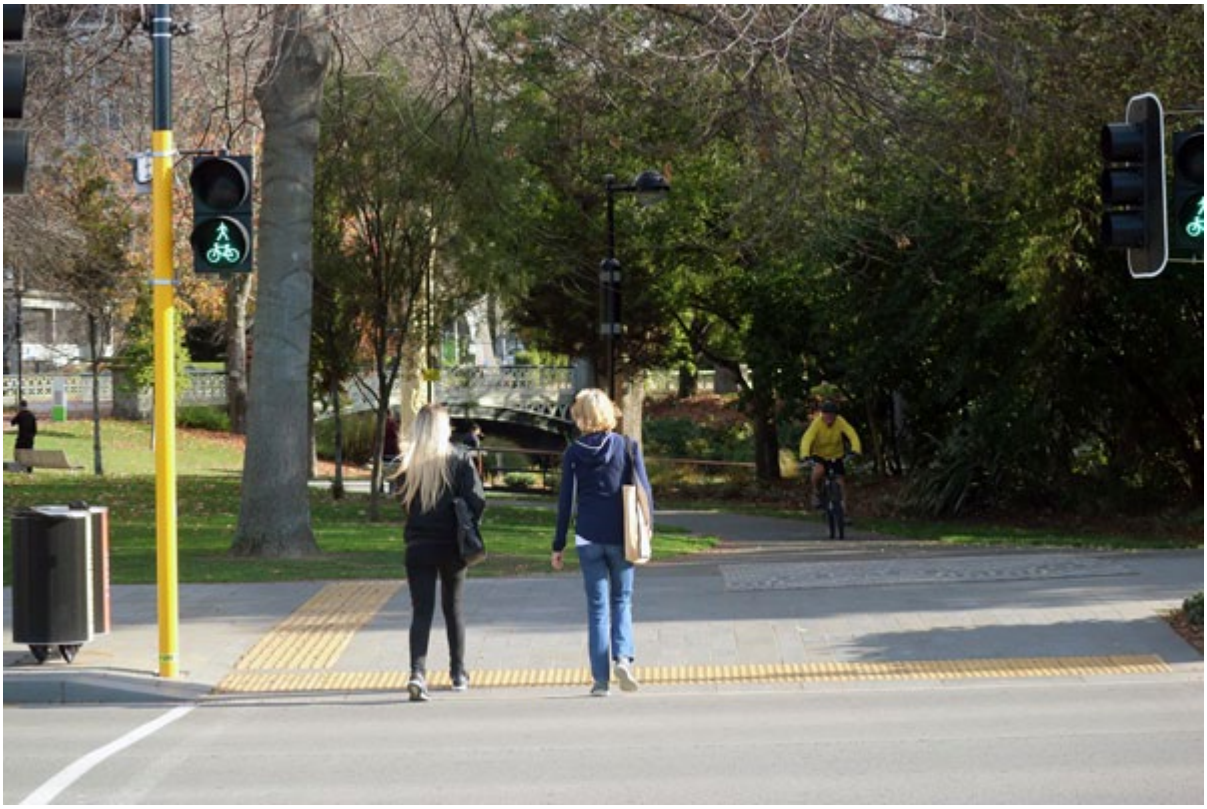
[13] Ministry of Transport (2015). Walking: New Zealand Household Travel Survey 2011–2014

[14] Ministry of Transport 25 years of New Zealand Household Travel 1989–2014

[15] Cheyne, C., Imran, M. (2017). Barriers to Active Transport in Palmerston North: Experiences and Perspectives of Secondary School Students

[16] Boshier, P. (2017). Ombudsman investigation into the Ministry of Education's engagement processes for school closures and mergers

1.5. A Safe System for walking



1.5.1. Safe System approach

Safe system is about providing a transport network that eliminates deaths and serious injuries on our transport system and acknowledges that even one death or serious injury of all road users (including pedestrians) is unacceptable.

For planners and designers taking a safe system approach, planning and designing for pedestrians means implementing and maintaining safe system infrastructure and speed measures wherever possible.

This is a change, as traditionally we've taken an incremental, risk-based approach in determining the most appropriate type of intervention. Those interventions were not always safe system aligned and generally led to limited, or even poor, safety outcomes (ie high-volume roads without median barriers, high volume high speed signalised intersections, non-separated pedestrian crossings).

In a Safe System approach:

- We promote good choices but plan for mistakes.
- We design for human vulnerability.
- We strengthen all parts of the road transport system.
- We have a shared responsibility.

More information on safe system approaches for pedestrians can be found in the Safe System Assessment Framework[17], research on the safe system context behind pedestrian road trauma in Auckland[18] and in section 3.1.1. Safe System design in PNG: Pedestrian design principles.

[17] Austroads (2016). Safe System Assessment Framework

[18] Thorne, R., Hirsch, L., Blewden, J., & Mackie, H. (2019). Understanding the Safe System context behind pedestrian road trauma in Auckland. Auckland, New Zealand, Prepared by Mackie Research for Auckland Transport

1.5.2. Pedestrian – vehicle crashes

1.5.2a How big is the problem?

In the last 10 years pedestrians were involved in about 22% of serious casualty crashes on urban roads, and around 11% nationally[19]. In the 10 years to 2019, 326 pedestrians were killed and 2,383 were seriously injured in road crashes (excluding wheeled pedestrians). 77 wheelchair and mobility scooter users were killed or seriously injured in that time. It is important to recognise that pedestrian crashes are under reported and under recorded in the crash analysis system (CAS) giving unrepresentative results.

On its own, walking is a very safe activity – as it would be expected, the instance of two pedestrians colliding resulting in a fatality is extremely rare. The graphic below shows what road user types are involved in fatalities in the 2018 and 2019 years.

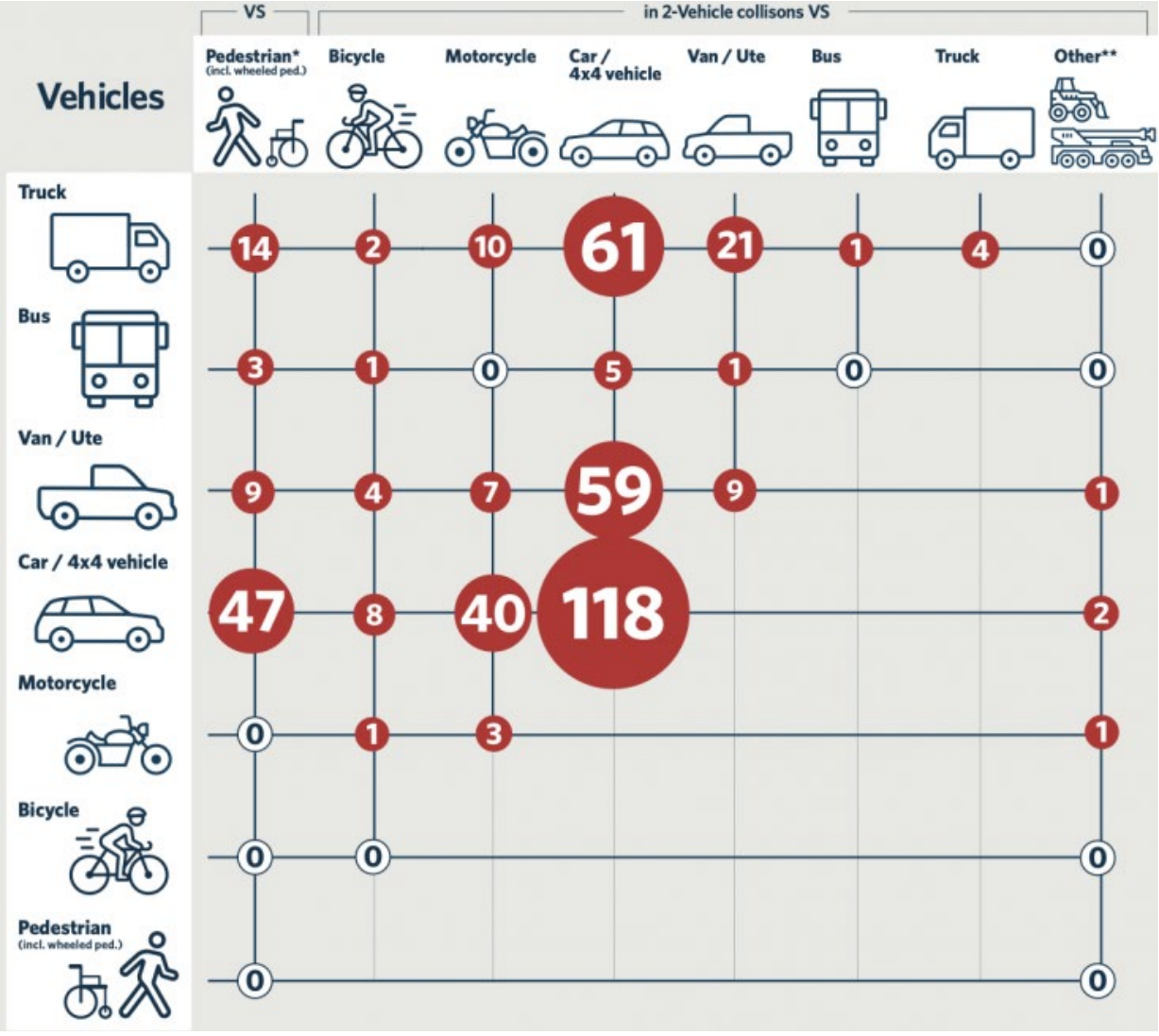


Figure 6: 2018–2019 fatalities from crashes between two or more road users (Source: NZ Transport Agency Waka Kotahi).

The main issue for pedestrian-involved crashes is that injuries are more severe. For instance, fatalities are a low proportion of cycling injuries but high for walking. This is because most pedestrian injuries involve higher impact speeds as they are crossing a road operating at higher speeds, but people cycling are hit by slower speed vehicles turning across a cycling route.

[19] NZ Transport Agency Crash Analysis System (CAS) data (2010-2019)

When I am crossing the road at an intersection, I can't hear traffic approaching so it can be scary. I avoid intersections where the traffic feels really fast because it's just too stressful.

Aisha[20]

From 2015 to 2019, pedestrians accounted for about one in 10 (10.37%) of all road deaths in New Zealand. In the main urban centres, on roads subject to urban speed limits, about one in four road deaths (24.08%) were pedestrians.

Annually, an average of 34 pedestrians are killed and 905 are reported injured on New Zealand roads. While the number of pedestrians killed is trending downwards, reported pedestrian injuries have been unchanged for the last 15 years, despite the decline in walking by children who are the largest group at risk[21].

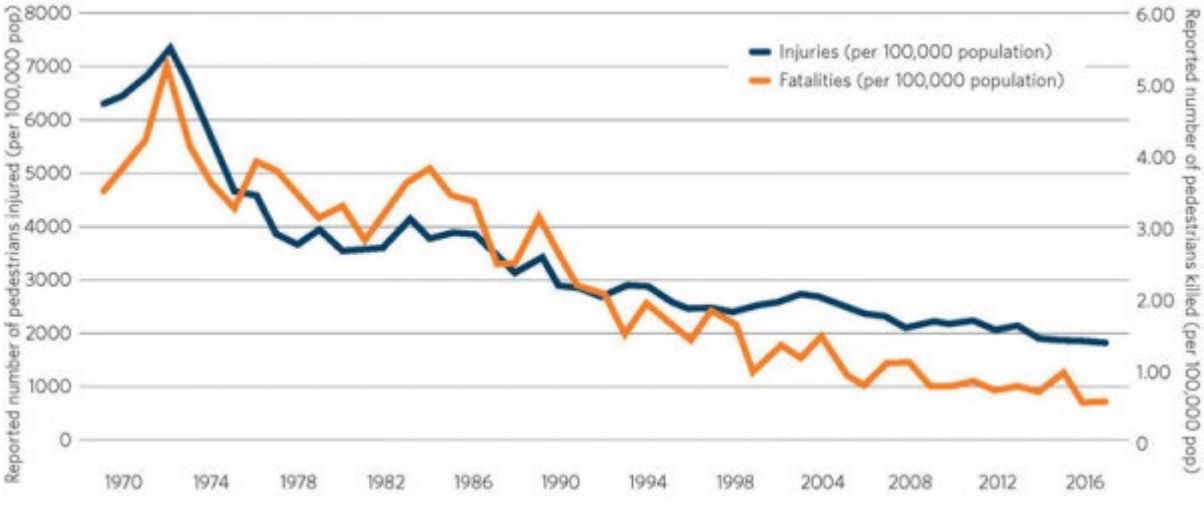


Figure 7: Reported number of pedestrians killed and injured per 100,000 population[22]

Note the different y-axis scales. In the mid-1980s, there were approximately 4 fatalities and 40 injuries per 100,000 population (a ratio of 1 fatality for every 10 injuries). After 2000, the trend lines swap to less than 1 fatality and about 20 injuries per 100,000 population (a ratio of 1 fatality for every 20 injuries). The ratio of fatalities to injuries has roughly halved. During this same period, traffic speeds have dropped about 5 km/h.[23]

It is also likely that the number of deaths and injuries directly attributable to road safety issues per capita is declining because the HHTS indicates there is less walking activity per capita; this is an area for further research as local authorities begin to collect finer grained data on walking along streets.

[20] For more information about the personas, see section 2.1.1c in PNG: Planning.

[21] Ministry of Transport (2017). Pedestrian Crash Facts 2017

[22] Ministry of Transport. (2005). Motor Vehicle Crashes in New Zealand (for data from 1970-1979). NZ Transport Agency Crash Analysis System (1980-2018). Data accessed 20 January 2020. Population data from Statistics NZ

[23] Ministry of Transport (2013). Speed survey results – car speeds

1.5.2b Perceptions of safety

As well as objective risk as estimated by reported crashes, pedestrians' perceptions of safety, and the accessibility of paths and crossings, affects their decision whether to walk or not in the first place[24]. Planning for pedestrian safety therefore requires consideration of how safe walking environments feel, and how accessible they are. Many people report that they will not walk when they do not feel safe. The alternative is that they will travel using another mode (such as public transport or car), or the trip will be foregone – with social and economic consequences related to inequity of participation.

Pedestrians feel safe from harm in pedestrian friendly environments. Sufficiently wide footpaths which are separated from faster moving traffic is vital for pedestrian safety. Footpaths should have non-slip surfaces and no hazards which may cause slips, trips or falls. Good lighting and public surveillance are also important to make pedestrians feel seen and safe.

For more information, refer to section 3.1.2a Principles of Safe, Obvious and Step-free in PNG: Pedestrian design principles.

1.5.2c Who is involved?

Both older and young pedestrians are at particular risk as they tend to have lower cognitive, sensory, and physical abilities. The bar graphic below shows the annual average number of deaths and serious injuries (DSIs) by age group (2014–2018 CAS data), divided by the total annual hours in millions for each age group as estimated by the Household Travel Survey.

The greatest risk is for people 65 and older, although younger people also have an elevated risk compared to those in the 35-64 age groups.[25]

- Those aged over 75 are involved in 24% of pedestrian fatalities, although they represent only 6% of the population.
- Those aged under 19 represent 33% of injuries, yet make up only 26% of the population.[26] However, teenagers tend to walk further than other age groups, so their risk (by hours of exposure) is not substantially higher than older groups. That said, just over one-third of death or serious injury crashes involving male pedestrians aged 13–20 was identified as involving 'antisocial behaviours such as street racing, playing chicken with the traffic, and being involved in fights on the street'.[27]
- Although the number of child pedestrians under four years of age who are killed or seriously injured is relatively low (12 per year compared to the overall average of 17 per year for all age groups), their DSI rate is high perhaps due to driveway crashes and relative frailty.

[24] Burdett, B. (2017). Understanding Pedestrian Safety in New Zealand, IPENZ Transportation Group Conference, Hamilton 29

[25] Ministry of Transport. (2017). Pedestrian Crash Facts 2017

[26] Population distribution is the usually resident values from the 2018 Census (source: Statistics NZ)

[27] Hirsch, L., Mackie, H., Scott, R. & Thorne, R. (2018). Understanding the Safe System context behind pedestrian road trauma in New Zealand. Auckland, New Zealand. Prepared by Mackie Research for Waka Kotahi NZ Transport Agency.

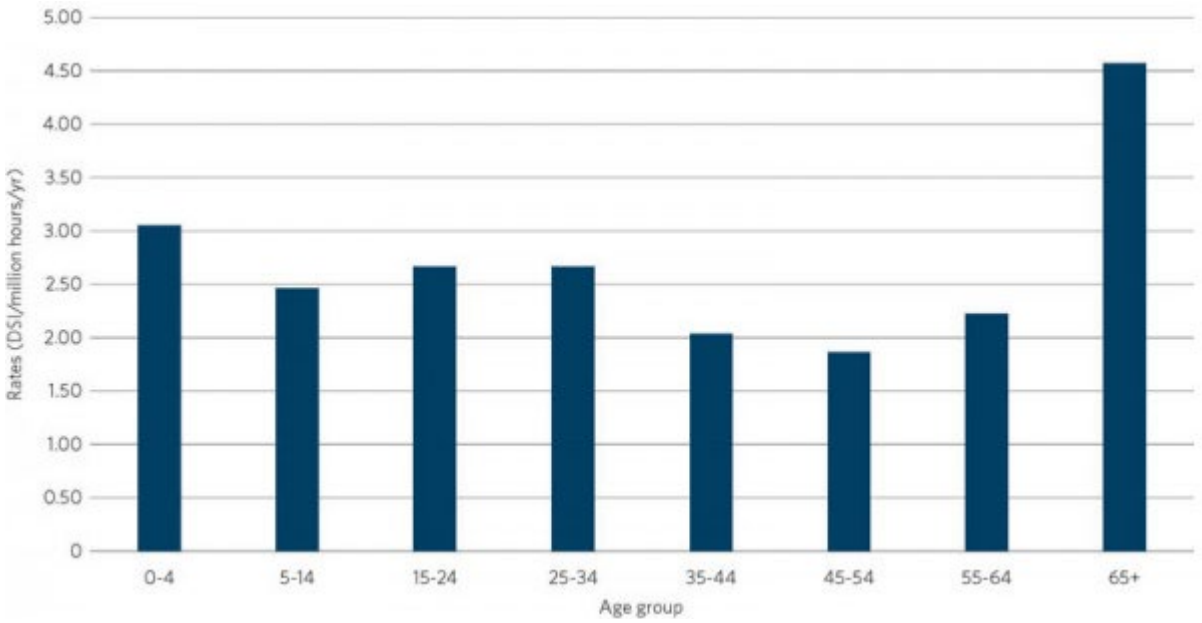


Figure 8: Rate of pedestrian deaths and serious injuries in motor vehicle crashes by age group.

1.5.2d Where are crashes occurring?

At a national level, crashes involving pedestrians occur mainly[28]:

- while pedestrians are crossing roads (around 70%)
- in built-up areas (61% of pedestrian deaths and 94% of injuries)
- near residential land use (half), commercial land use (one third), and within two kilometres of the pedestrian's home (57%)[29]
- on relatively main roads rather than minor roads (43% on roads classified by TLAs as 'arterial urban', 32% on 'major or medium urban', and only 12% on 'minor or access urban' roads)
- away from formal pedestrian crossings (92%)
- when pedestrians are most likely to be out and about (eg during daytime, in fine weather, before and after the school day).

Children are more likely to be injured in a road traffic incident in the area between 0.5 km and 1.5 km from school, and not at the school gate.[30]

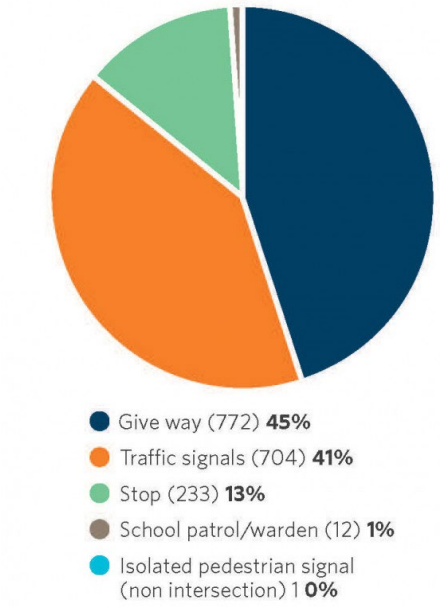
More than nine in every 10 reported pedestrian casualties occurred on urban roads (those with a speed limit of 70 km/h or less). However, only 2% of urban crashes are fatal while 36% of rural crashes are fatal.

For pedestrian-involved crashes in the five-year period from 2014 to 2018, 704 (41%) of controlled intersection crashes were at traffic signals (left image below) and 148 (6%) of junction crashes were at a roundabout (right image).

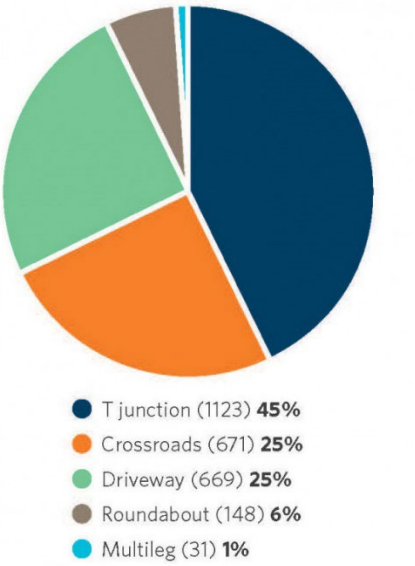
[28] Crash Analysis System (CAS) data accessed November 2019 unless otherwise noted; data is for the 2014–2018 five-year period

[29] Kokotailo, R. (2000). New Zealand pedestrian profile

[30] Pour, A.T., Moridpour, S., Tay, R., & Rajabifard, A. (2017, November). Using crash severity to identify safe walking distance in vicinity of schools. *Australasian Transport Research Forum* (ATRF), 39th, 2017, Auckland, New Zealand.



Reported pedestrian-involved crashes by control type, excluding 1279 uncontrolled intersection crashes, 2014–2018.



Reported pedestrian-involved crashes by junction type, excluding 3047 non-junction crashes, 2014–2018.

Considering the junction crashes, nearly half are at T-junctions and a quarter each are at driveways and crossroads. This points to a probable deficiency in the design of minor street/road intersections and potential issues with driveway inter-visibility as well as road user behaviours.

1.5.2e Caveats about the use of crash statistics

Police reported crash data is of little use when attempting to understand issues of safe travel for pedestrians other than vehicle-pedestrian crashes[31]. While road crash statistics are invaluable in identifying the sites and pedestrian groups with particular road safety issues, they do not provide any qualitative information, such as:

- how safe people feel using the pedestrian network, whether through personal security, accessibility or road danger concerns
- whether they deem the street or location to be pedestrian friendly with safe and convenient crossings
- which routes are perceived to be so dangerous that pedestrians either completely avoid them or take extra care in them
- where schools have high existing or latent demand – refer to accessibility mapping research.

Moreover, pedestrian crashes and injuries that do not involve a motor vehicle or involve another road user, or that happen away from the roadway (eg falls due to poorly maintained footpaths) are not included in CAS, and often go unreported in other channels.[32]

[31] Oxley, J., et al. (May 2018). Falling while walking: A hidden contributor to pedestrian injury. Accident Analysis & Prevention 114, 77–82.

[32] Lennon, A., Williamson, A. et al. (2016). Distraction and Attitudes Towards Safe Pedestrian Behaviour. Austroads Research Report AP-R510-16

1.5.3. Relationship to speed and speed environment

Speed is a major factor in the severity of injury and likelihood of death in pedestrians, side impact and head on crashes[33]. A Safe System speed is typically defined as the impact speed[34] where the chance of death is less than 10% or the point on fatality risk curves on the graph below where this changes from shallow to steep.

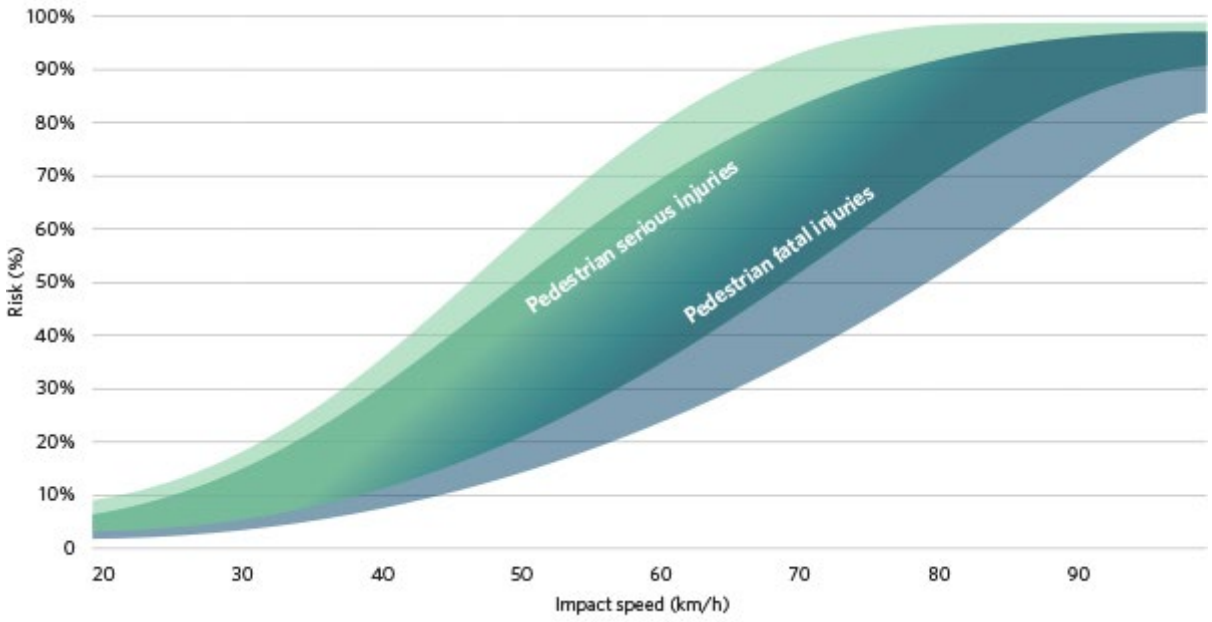


Figure 9: The influence of collision impact speed on the risk of pedestrian death and severe injury (Adapted from AAAFTS, 2011).

Corben (2020) states that:

> It is increasingly accepted by road safety practitioners that, to be aligned with the Safe System Approach for pedestrians (and people cycling), 30 km/h impact speeds define the upper limit of an 'acceptable' collision. This 'Safe System boundary condition' coincides with an approximate 10% chance of the struck pedestrian being killed by the collision. Put another way, this corresponds to a 90% chance of survival. For the corresponding situation with serious injury (ie, a collision with a pedestrian producing a 10% chance of serious injury), a much lower impact speed applies[35].

Corben also cites ITF's conclusions on the topic:

> Whilst there is, and will continue to be, considerable debate on safe impact speeds and the shape of various fatality risk curves, precise definitions are not possible or meaningful in reality. They represent some form of population average over a sizeable number of cases but there is considerable variability in outcomes, and hence risk, among individuals due to uncontrollable factors such as the type and size of the vehicle, the age and health status of the road user, the point of impact, etc. There is a certain randomness about these factors that is often beyond the control of the system designer or operator. Because of this variability in the incidence and circumstances of real world crashes, a conservative position should be adopted concerning risk so as to account for a broad range of population, vehicles

[33] Scott, R. & Mackie, H. (2018). Speed/injury Risk Curves: Analysis of evidence and considerations for updated curves

[34] In one study, about half of all fatally injured pedestrians were struck at the initial travel speed, ie the driver had not braked before impact; therefore it is appropriate to use the posted speed when interpreting Figure 15. Refer to Anderson R.W.G., McLean A.J., Farmer M.J.B., Lee B.H. & Brooks, C.G. (1997). Vehicle travel speeds and the incidence of fatal pedestrian crashes. *Accident Analysis and Prevention* 29, 667–674.

[35] Corben, B. (2020). Integrating Safe System with Movement and Place for Vulnerable Road Users. Austroads Research Report AP-R611-20

and conditions. We must also be cognisant that the use of fatality risk curves, and the tenth percentile value to determine safe impact speeds, is by definition permitting the incidence of some deaths and serious injuries, notwithstanding the commitment to eradicating deaths and serious injuries from road crashes.[36]

Lower speeds can be achieved by designing 'self-explaining' streets (through road space allocation, traffic calming, etc). Setting the appropriate speed limit can be an additional low-cost approach, but is unlikely to achieve lower speeds as a sole treatment. Evidence by Koorey (2020) also suggests agencies may reduce speed limits (and travel speeds) to safe levels without seriously increasing travel time.[37]

There's a busy road on my way to school and Mum and Dad say that there is too much traffic for me to walk, so they drive me.

Tom[38]

1.6. Falls – slips, trips and stumbles

Falls are a leading cause of injury for people of all ages, but especially the elderly. While a large percentage of falls occur on stairs and inside buildings or homes, pedestrians walking or jogging on footpaths, stepping off kerbs and crossing roadways also fall. Because falls are largely unreported, there

[36] International Transport Forum (2016). Zero Road Deaths and Serious Injuries: Leading a Paradigm Shift to a Safe System. OECD Publishing, Paris.

[37] Koorey, G. (2020). Does speed greatly affect travel time? Transportation Group NZ Conference 2020, Christchurch. 10–13 March.

[38] For more information about the personas, see section 2.1.1c in PNG: Planning.

is little data on the magnitude and consequences of pedestrian falls. Falls in public spaces are a prevalent public health problem with significant human and economic consequences.

Because I have tripped so often on uneven surfaces, I don't trust paved paths. I will avoid them because I cannot be sure they are well maintained enough to keep me from tripping

Layla[39]

New Zealand has a safe system approach to road safety, under which RCAs have a responsibility to minimise injury on their road networks, irrespective of whether the injury involves motor vehicles or not. In New Zealand, around 700 pedestrians are admitted to hospital each year as a result of slips, trips and stumbles in the road environment (including the footpath), and so the problem is not insignificant.[40]

The highest proportion of trips and falls (34%) was sustained while stepping over a kerb. A further 18% were caused by irregularities in the path or road surface.

The University of Otago and University of Canterbury's Geofall project team reviewed St. John data, conducted an online survey exploring elderly persons' experiences, and reviewed currently available products for reporting and detecting falls.[41] Data was sourced from the Life and Living in Advanced Age study, interrail, hospitals, ACC, and St. John:

- In 2017/18 there were 47,000 claims for falls in a road or street, costing $105 million (ACC).
- Falls account for about 10% of all callouts (St. John), with about 6% of these occurring on street.
- Falls occur more frequently in areas of socio-economic deprivation.
- More adults age 65+ fall closer to home (within 1.3 km) than those under 65 (within 3.8 km).
- In a survey of 173 older Christchurch residents, 30% had fallen at least once in the last year with 31% of those falls occurring in the street. Most of these were attributed to the footpath condition. 44% of those surveyed feared falling.

Based on an analysis of Ministry of Health data, falls are the leading cause of injury resulting in death amongst people aged 65+. Falls are also the leading cause of hospitalisation amongst nearly all age groups.[42]

The next sections describe three types of falls: slips, trips and stumbles.

- Slips are due to a loss of friction between the foot or wheel (for those using small wheels) and the travelled surface.
- Trips are when the foot is caught on a lip or other upward protrusion of the surface.
- Stumbles are due to an unexpected height change or uneven surface.

[39] For more information about the personas, see section 2.1.1c in PNG: Planning.

[40] Thomas, J. & Frith, W. (2010) The mechanisms and types of non-motor vehicle injuries to pedestrians in the transport system and indicated infrastructure implications NZ Transport Agency Waka Kotahi Research Report 431

[41] Curl, Fitt & Tomintz. (2020). Experiences of the Built Environment, Falls and Fear of Falling Outdoors among Older Adults: An Exploratory Study and Future Directions

[42] Injury Prevention Research Unit. (June 2019). Causes of Injury by Age factsheet

All can cause a fall.[43] Commonly reported environmental factors involved in falls in public places include pavement cracks and misalignments, gutters, steps, construction works, uneven ground and slippery surfaces.[44]

1.6.1. Slips

Slips are caused by inadequate friction between the foot and the pavement. This can be due to the material and construction of the sole of the shoe, the nature of the pavement surface, the presence of lubricants such as water, any surface treatments such as sealers, and the maintenance of the surface. Polished hard surfaces can become slippery due to the presence of fine dust or grit as well as by water or ice.

A pedestrian's gait also affects the friction required for stability. Running requires more friction than walking. When people know a surface is slippery they can compensate by taking shorter steps and avoiding sudden movements.

Because of the complex nature of friction measurement and performance, international requirements are not uniform. The New Zealand Building Code DS1/AS1 requires a co-efficient of friction of 0.4 on level surfaces increasing by 0.125 for every percent of gradient. Table 2 of the code provides guidance on the suitability of a variety of materials. Joint Australian/New Zealand standards specify how to measure the friction of new and existing surface materials. For footpath surfaces, the sliding skid resistance of a wet surface is the critical test. This is measured by a pendulum tester using a rubber slider to simulate the sole of a shoe.[45,46]

Because the amount of friction required depends on the context, the joint Australian/ New Zealand standards have moved away from a single value of required friction. Official guidance for applying these standards is provided in *An introductory guide to the slip resistance of pedestrian surface materials* HB197:1999 and *Slip resistance of pedestrian surfaces – guide to the reduction of slip hazards*.[47,48]

The only matter under the control of those providing the infrastructure is the specification of the surface material and its treatment and maintenance. It is advisable to provide a safety factor by exceeding the requirements of the standards, thereby catering for activities such as running that require more friction.

1.6.2. Trips and stumbles

A pedestrian trips when the surface being walked upon has an abrupt increase in height that is large enough to snag the toe of a shoe and cause the pedestrian to lose balance[49]. A study of people walking shows that the toe is generally the lowest part of the swinging foot (ibid). However, just before 'initial contact' the foot pivots so that the heel touches first. The toe is the last part of the foot to lift off at the start of the swing and the heel is first to make contact at the end of the swing. Hence it is most often the toe that makes contact with the obstacle.

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[43] Zecevic, Aleksandra A., Salmoni, Alan W., et al. (June 2006), Defining a Fall and Reasons for Falling: Comparisons Among the Views of Seniors, Health Care Providers, and the Research Literature, *The Gerontologist*, Volume 46, Issue 3, 367–376

[44] Lord, S., Sherrington, C., Menz, H., & Close, J. (2007). Falls in Older People: Risk Factors and Strategies for Prevention Cambridge, UK: Cambridge University Press; Google Scholar.

[45] Standards New Zealand. (2004). Slip resistance classification of new pedestrian surface materials AS/NZS 4586:2004

[46] Standards New Zealand. (2004). Slip resistance measurement of existing pedestrian surfaces AS/NZS 4663:2004

[47] Standards Australia and CSIRO. (1999). An introductory guide to the slip resistance of pedestrian surface materials HB 197:1999

[48] Standards New Zealand. (1994). Slip resistance of pedestrian surfaces – guide to the reduction of slip hazards AS/NZS 3661.2:1994

[49] Brown, A. & Brown, A. (2007). Information sheets – Trip hazards, human gait and misstep hazards

The clearance between toe and ground during the 'swing phase' is small. This relates to persons walking on an even surface, where the expectation is to place each foot on a surface of the same level as the previous step, as on paved footpaths and roadways. A study by Murray[50] found toe to ground clearance in the range of 1–38 mm with a mean of 14 mm. Based on this data, a rise in height of 14 mm would represent a trip hazard to 50% of the people tested. It is estimated that 10% of those tested would trip if the rise was 6 mm. Unfortunately, older pedestrians who are most at risk lift their feet the least and are least likely to recover if they catch their toe on an obstacle.

The relative probability of catching the toe is shown below.

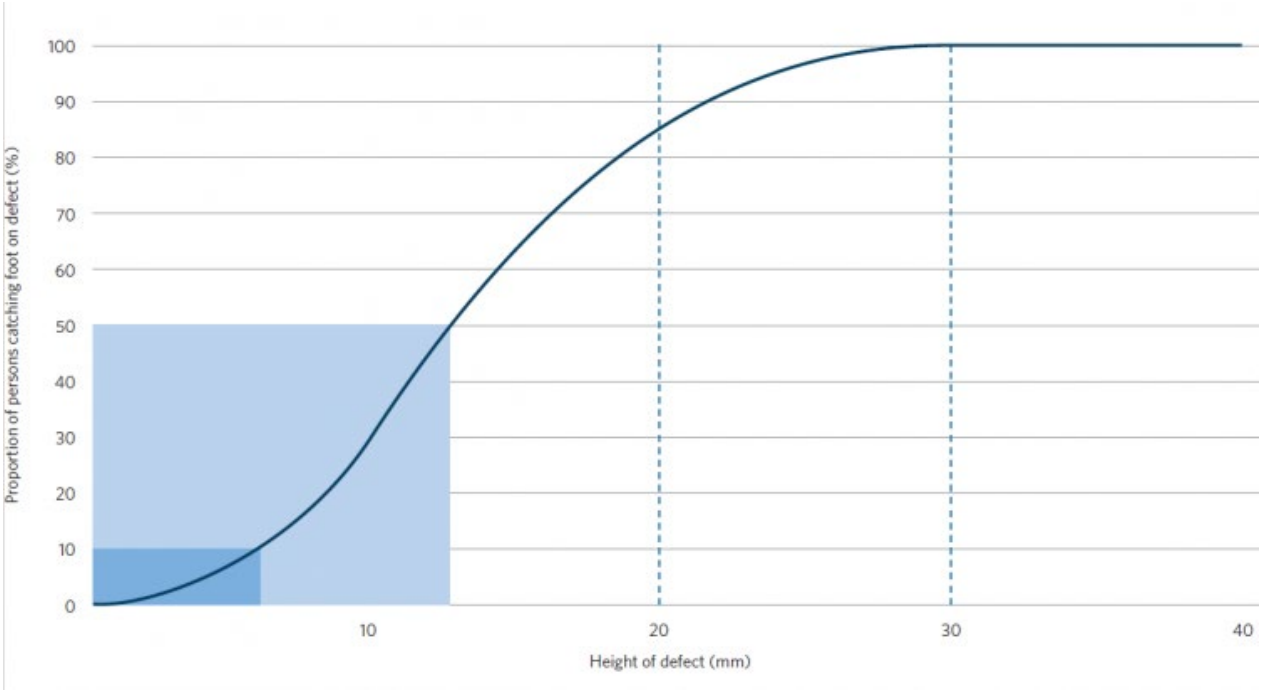

Figure 10: Probability of catching foot on abrupt height change (Murray, 1967).

Based on this analysis, 6 mm is the maximum intervention standard for sudden changes in footpath level.

Trips can also occur when a stair riser is taller than expected, or not noticed. This is particularly likely where there is a single step.

Bird, Sowerby and Atkinson[51] analysed the number of third party insurance claims for accidents on footways with respect to the height of footway defect. The exposure of pedestrians to defects of differing heights was also considered. It was found that the probability of an accident occurring increases logarithmically until a defect height of about 40 mm, after which the probability remains constant. At higher step heights the defect is more likely to be noticed so the risk does not increase further. This is illustrated in Figure 11 for varying levels of pedestrian flow.

[50] Murray, M.P. (1967). Gait as a total pattern of movement. *American Journal of Physical Medicine* 46: 290–333.

[51] Bird, S., Sowerby, C.R. & Aitkinson, V.M. (2007). Development of a Risk Analysis Model for Footways and Cycletracks. England. TRL Limited. Report No PPR171.

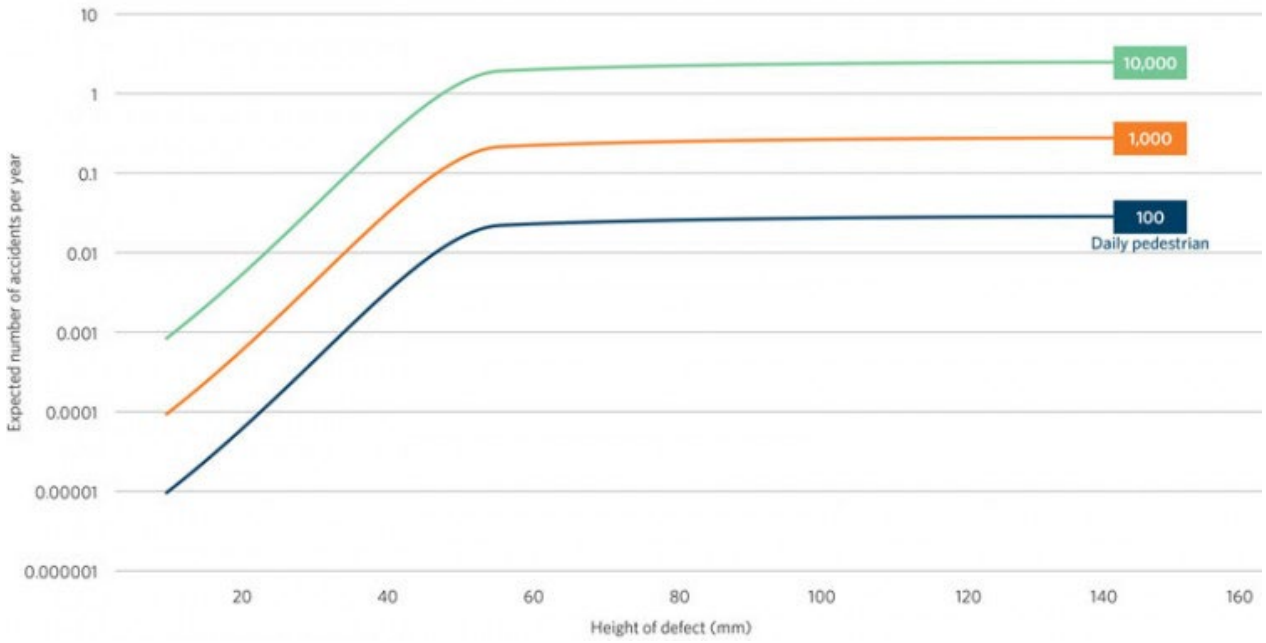

Figure 11: Accident occurrence with respect to defect height for different daily pedestrian volumes.

Stumbles happen when the surface is higher or lower than expected. Stumbles become more likely as undulations in the surface rise above 12 mm.[52]

[52] Lord, S., Sherrington, C., Menz, H., & Close, J. (2007). *Falls in Older People: Risk Factors and Strategies for Prevention*. Cambridge, UK: Cambridge University Press.

Appendix A – Benefits of walking

Walking brings multiple benefits to the individual and to the society. There are eight main benefits, many of which overlap. They are:

- equity
- environment
- efficiency
- health and wellbeing
- community
- economy
- resilience and security
- supports public transport.

Equity

Equity means that the benefits of investment in transport are distributed such that all people are able to participate in society[53].

Providing for pedestrians is crucial for disabled people who do not have access to other travel modes, or those who rely on walking to access other travel modes such as public transport:

- 7% of people aged 15+ said they have a long-term condition or health problem that gives them some difficulty in using transport; 25% of these people are aged 75+ years old.[54]
- In 2013, 24% of the New Zealand population were identified as disabled, and many of these have physical or vision impairments that would preclude driving or cycling.[55]

Equity also means proactively ensuring that people who have historically had fewer transport choices (women caring for children in single car households, children and elderly people who cannot drive, and people who cannot afford other modes) can still get where they need to go on foot. As an example, equitable provision of a walking facility may require consideration of personal security as this may impact a woman's travel choice.

The Better Later Life Strategy emphasises that making it easier to walk and cycle to everyday destinations supports the physical and mental wellbeing of older people.[56]

See section 2.1. Pedestrian planning principles in PNG: Planning for more information on people who depend on walking for mobility. See section 3.1.2. Universal design principles in PNG: Pedestrian design principles for more information on universal design.

The images below illustrate a poor outcome for walking that could have been avoided through better design, and a good outcome for pedestrians by providing a well-designed bus stop with an accessible kerb height.

[53] Victoria Transport Policy Institute (2019). Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning. Accessed 20 January 2020

[54] Ministry of Transport (2018) Household Travel Survey 2015-2018. Accessed 20 January 2020

[55] Statistics New Zealand (2013). Disability Survey. Accessed 20 January 2020

[56] Ministry of Social Development (2019). Better Later Life He Oranga Kaumātua 2019 to 2034 (DRAFT)

A kerb upstand caused a tourist trip injury.

A well-designed bus stop with accessible kerb height.

Environment

Transport accounts for 17.5% of New Zealand's greenhouse gas emissions and has been the fastest growing source of emissions since 1990. Between 1990 and 2022, road transport emissions increased by 82% compared with 14% for total gross emissions across the economy. Within transport, road emissions grew by 68.5%. 90.9% of New Zealand's transport emissions come from road transport.[57]

This reflects several factors, with the key ones being:

- the transport fuels we use are almost entirely fossil fuels
- public transport accounts for only 3% of all trips
- transport and urban planning have contributed to a high level of private car dependency by incentivising urban sprawl, prioritising the movement of motor vehicles, and requiring urban land for car parking.

Supporting a move to cleaner, healthier and more active transport modes like walking and public transport can help address climate change. A small reduction in short vehicle trips potentially generates significant reduction in carbon emissions, because engine pollution controls are not fully effective during cold running.[58]

The Queensland Department of Transport and Main Roads found that the combined environmental benefits of reducing noise and greenhouse gas emissions, and improving air quality, equates to around 5.9 cents per kilometre walked or cycled.[59]

The NZ Transport Agency Waka Kotahi Monetised costs and benefits manual also puts a value on emissions, but these are site-specific rather than a combined value per kilometre not travelled by motor

[57] Ministry for the Environment (2021). New Zealand's Greenhouse Gas Inventory 1990–2022

[58] Climate Change Commission (2021). Supporting Evidence accompanying Ināia tonu nei: a low emissions future for Aotearoa

[59] Queensland Department of Transport and Main Roads (2011). Benefits of inclusion of active transport in infrastructure projects, prepared by SKM and PWC, Table EX.1: Benefits summary

vehicle. In congested areas, mode shift may not lead to a reduction in vehicle kilometres travelled if new residents fill the 'freed' capacity or increased trip-making occurs (induced demand).

One review of soft measures to promote active travel modes (eg personalised travel planning, active travel to school) has found that between 5 and 13 kg of carbon could be saved per person per year taking part in walking initiatives, 17 and 57 kg could be saved through walking to work and active travel to school respectively, and 183 kg through personalised travel plans resulting in reduced car travel.[60]

Incorporating appropriate trees and landscaping into urban spaces improve the level of service (comfort, amenity) for pedestrians and also has many co-benefits for the environment. Tree canopies help clean the air and reduce the urban heat island affect, while sheltering pedestrians' skin from the hot summer sun[61] and landscaping areas allow for interest, diversity and variety in the pedestrian experience. Landscaping can also be incorporated in rain gardens within the streetscape that assist with stormwater management.

Refer to PNG: Streets and public realm for more information.

As streets are re-designed to re-allocate space for different modes, the opportunities to improve the overall environment through prioritisation of active modes and providing space for green enhancements will increase the overall amount of high quality and active public space and walkable communities.

Efficiency

Walking is the most space-efficient form of transport and makes the best use our streets. The figure below shows the space used by each mode of transport.

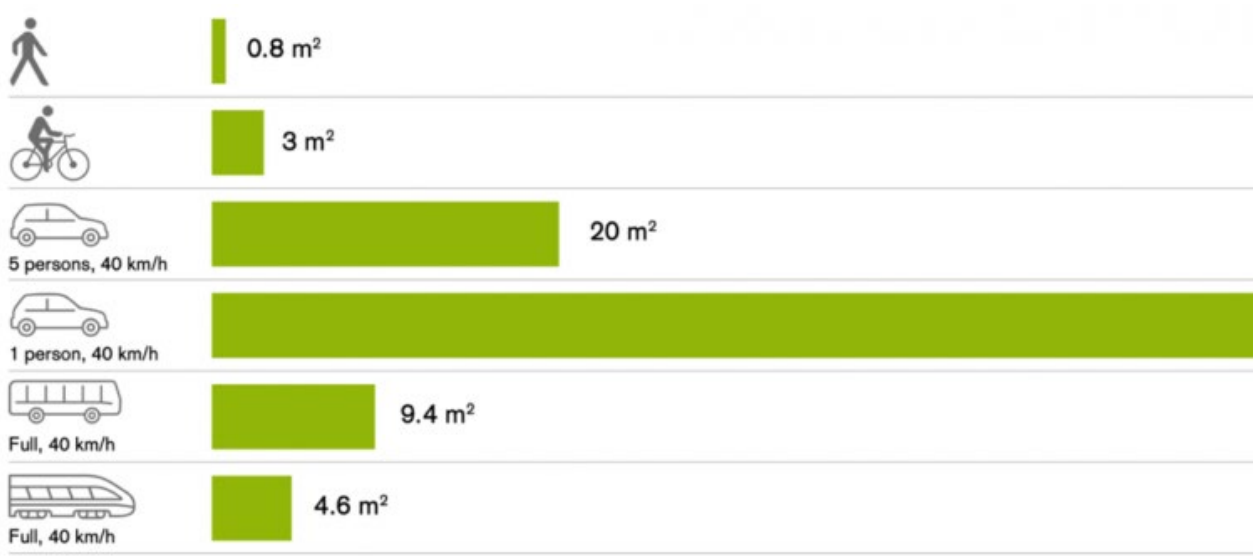

Figure 12: Space used per person according to mode of transport (Source: Urban Mobility Plan Vienna)[62]

Repurposing street space for more efficient travel modes increases the total street capacity; refer to the Global Street Design Guide for a useful comparison between different modes per hour.[63]

Traffic in urban areas, and the consequent economic cost, is a central consideration for assessing various modes of transport. A study commissioned by NZ Transport Agency Waka Kotahi estimates costs of congestion to be in the region $1.25 billion per annum.[64]

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[60] SchoolTravelHealthCheck.co.uk (2011). Soft measures – hard facts

[61] City of New York (2013). Active Design: Shaping the Sidewalk Experience

[62] Stadt Wien (2015). STEP 2025 - Thematic Concept - Urban mobility plan Vienna – Short report

[63] NACTO (2015). Global street design guide

[64] Ian Wallis Associates Ltd, Wellington (2013). The costs of congestion reappraised NZ Transport Agency Waka Kotahi Research Report 489.

A shift to more walking, particularly for short journeys during peak periods, could improve the capacity of our transport systems:

- Litman (2017) compiled various congestion reduction strategies and concludes that 'Compact, multimodal cities … tend to have more intense congestion (greater peak-period speed reductions), but lower congestion costs (fewer annual hours of delay per capita) due to lower auto mode shares and shorter trip lengths, which reduces congestion exposure (the amount residents must drive during peak periods). More dispersed, automobile-oriented cities … tend to have less intense congestion but greater congestion costs.'[65]
- Bento et al. (2005) studied a sample of households in 114 US cities and predicted that the 'effect of moving … sample households from a city with measures of urban form and public transport supply the same as (car-centric) Atlanta to a city with measures the same as those of (compact and transit-oriented) Boston is to reduce annual VMTs (vehicle-miles travelled) by 25%.'[66]
- About 40% of peak traffic in Auckland is related to education; more students would walk if the routes to school were safer and more convenient.[67]

Health and wellbeing

Walking is estimated to provide health benefits of $2.60 per kilometre.[68]

Many trips start and end with walking. This has been long acknowledged in health studies, where walking is considered the keystone to promote healthier lifestyles based on physical activities.

Reducing physical inactivity by walking is one of the World Health Organization's priorities and considered one of the best investments to achieve health and sustainable development for all, with a goal to attain a 15% reduction of sedentary activities by 2030.[69]

Creating active environments that support walking is part of 'systems-based' approach to addressing the effects of inactivity.[70]

[65] Litman, T. (2017). Congestion Reduction Strategies. Victoria Transport Policy Institute. Accessed 1 April 2020.

[66] Bento, Antonio M., Cropper, Maureen L. et al. (2005). The effects of urban spatial structure on travel demand in the United States. *The Review of Economics and Statistics* 87(3): 466-478

[67] NZ Transport Agency Waka Kotahi (2014). BCA Strategic Options Toolkit Second edition.

[68] NZ Transport Agency Waka Kotahi (2020). Monetised benefits and costs manual

[69] Appolloni, L., Corazza, M, & D'Alessandro, D. (2019). The Pleasure of Walking: An Innovative Methodology to Assess Appropriate Walkable Performance in Urban Areas to Support Transport Planning. Sustainability 11(12)

[70] World Health Organisation (2018). Global Action Plan on Physical Activity

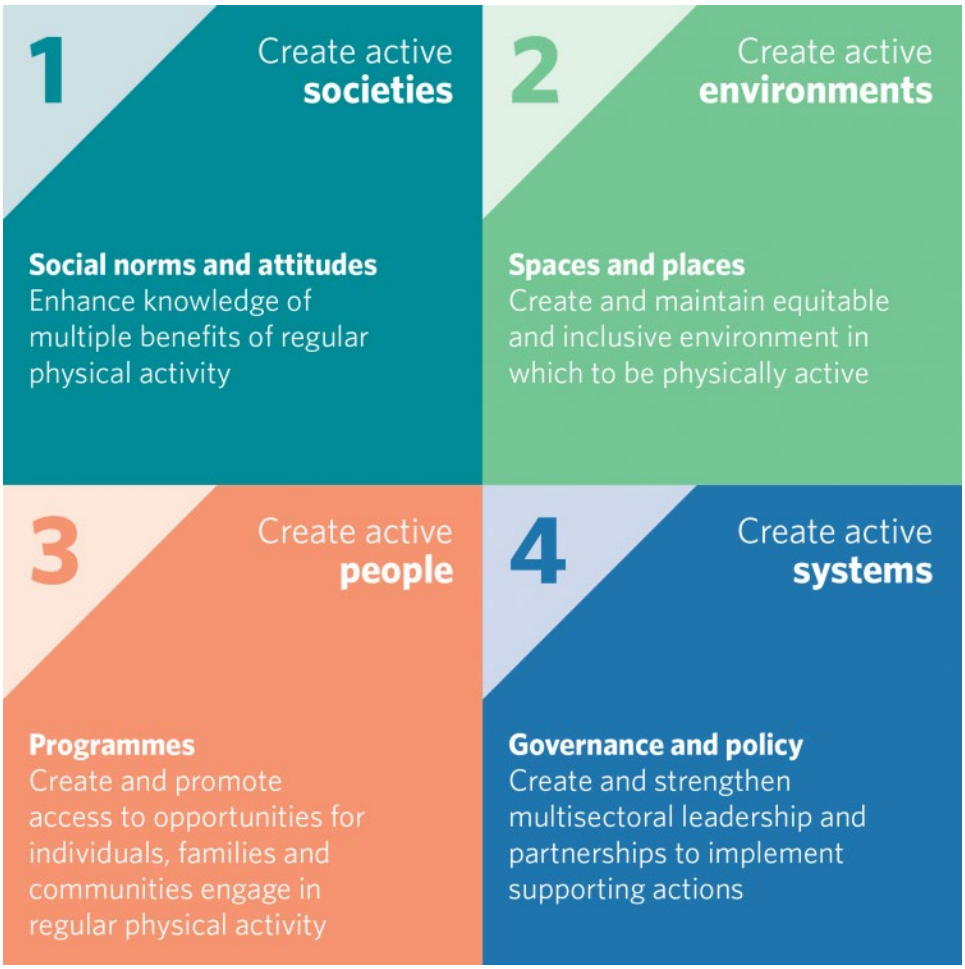

Figure 13`: A systems-based approach (based on WHO Global Action Plan on Physical Activity)

In New Zealand, physical inactivity contributes to around 9% of all deaths. By some measures, half of the population is insufficiently physically active[71] and 9 out of 10 New Zealand adolescents do not meet WHO recommended activity levels[72].

The health benefits of walking include:

- Communities with higher numbers of people walking, especially for transport purposes, have better health profiles than those in less active neighbourhoods.[73]
- People who regularly walk to work (including to access public transport) experience sufficient exercise to reduce all-cause mortality by 30%.[74]
- People who participate in regular physical activity have less chance of developing heart disease, stroke, type II diabetes, high blood pressure and high cholesterol, and are less likely to be obese.[75]

[71] Wellington Regional Strategy, Waikato Regional Council and Auckland Council (2013). The Costs of Physical Inactivity: Toward a regional full cost accounting perspective

[72] Guthold, R. (2019). Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants. The Lancet Child & Adolescent Health

[73] Genter, J.A., Donovan, S. & Petrenas, B. (2008). Valuing the health benefits of active transport modes, NZ Transport Agency Waka Kotahi Research Report 359. Accessed 6 April 2020.

[74] World Health Organization. Health Equity Assessment Toolkit (HEAT). Accessed 6 April 2020.

[75] https://www.c3health.org/walking-gateway-physical-activity/

- In neighbourhoods with higher walkability, active transport is associated with a lower prevalence of diabetes and obesity.[76,77,78]
- In a meta-analysis of five New Zealand-based studies, it was found that increased street connectivity (a measure of walkability) around schools was related to active travel to school.[79]

As a low income person who cannot drive, walking is a really important form of exercise for me. If I can trust my walking route I will use it a lot, to get places and just for exercise.

Layla[80]

Walking can also improve mental health and well-being, by having a positive impact on self-esteem, physical self-worth, stress, mood and mindset. An Australian study found that those who walked for recreation for more than 8.6 minutes per day were 72% more likely to report better physical health and 33% more likely to report better mental health than those who walked less.[81]

When I walk to school, I like the fresh air and I get to chat to my friends on the way, and if I take my scooter it's fun.

Tom[82]

Active travel to school not only incorporates physical activity into students' daily lives (with resulting health benefits) but also helps children concentrate at school – a Danish study found that children who cycle or walk to school have greater concentration than those who are driven.[83] A meta-analysis of the research shows strong evidence that active travel to school is positively related to academic performance.[84]

Community

Walking can equitably allow people to access employment, community services, and natural environments, building a sense of community.

Experiences from New Zealand, and internationally, that support this are outlined below:

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[76] Creatore M.I., Glazier R.H., Moineddin R., et al. (2016). Association of Neighborhood Walkability with Change in Overweight, Obesity, and Diabetes. *JAMA*. 315(20):2211-2220

[77] Booth, G.L., Creatore, M.I., Luo, J., et al. (2019). Neighbourhood walkability and the incidence of diabetes: an inverse probability of treatment weighting analysis. *J Epidemiology Community Health*.73:287-294

[78] Frank, L.D., Andresen, M.A., & Schmid, T.L. (2004). Obesity relationships with community design, physical activity, and time spent in cars. *American Journal of Preventive Medicine.* 27(2):87-96

[79] Ikeda, Erika, et al. (2018). Built environment associates of active school travel in New Zealand children and youth: A systematic meta-analysis using individual participant data. *Journal of Transport and Health*. 9:117-131 DOI.

[80] For more information about the personas, see section 2.1.1c in PNG: Planning.

[81] Row, J., & Aspinall, P. (2011). The restorative benefits of walking in urban and rural settings in adults with good and poor mental health(external link). Health Place, 17(1)

[82] For more information about the personas, see section 2.1.1c in PNG: Planning.

[83] Science Nordic (2012). Children who walk to school concentrate better.

[84] Singh, A., et al. (2012). Physical activity and performance at school: a systematic review of the literature including a methodological quality assessment(external link) *Arch Pediatr Adolesc Med.* 166(1):49–55

- Enabling children to walk safely around their neighbourhood and to school can help reduce congestion, encourage children to be physically active and gain independence. One of the most significant impediments to walking to school is “stranger danger”[85]. If lighting is good, vegetation is not overgrown, and fences are low then “eyes on the street” (natural, passive surveillance) from residents and other passers-by help alleviate this concern[86].

- Walking to school not only incorporates physical activity into students' daily lives but also contributes to environmental and social benefits for communities[87].
- An Irish survey of 750 households showed that residents of pedestrian-oriented, mixed-use neighbourhoods have higher levels of social capital (how well neighbours know and trust each other, political participation, and social engagement) than residents of automobile-oriented neighbourhoods[88].
- Pedestrian-friendly streets create opportunities for people to meet and interact, helping to create community networks. Research conducted in Christchurch confirmed the seminal work of Appleyard in showing that residents of lower vehicle volume streets are more likely to know their neighbours and show more concern over their local environment than residents of streets with higher vehicle volumes and speeds[89].
- Surveys of residents in different neighbourhoods in Perth found the “sense of community was positively associated with walking for transport”[90].
- Hobsonville Point, Auckland is New Zealand’s largest master-planned residential development and was designed from the outset to achieve a vibrant community with an environmentally responsible focus[91]. Surveys show over 80% of residents feel safe and are able to walk. Although the surveyors did not attempt to assess correlation, they found a strong sense of community and appreciation for the walkable urban design.

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[85] Cheyne, Christine, Imran, M., Ahmed, W., Potroz, C. (2017). Barriers to Active Transport in Palmerston North: Experiences and Perspectives of Secondary School Students

[86] Jacobs, J. (1961). *The Death and Life of Great American Cities*

[87] Mason, C. (2000). Transport and health: en route to a healthier Australia? *The Medical Journal of Australia* 172, 230-232.

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Economy

New Zealand has one of the highest rates of car ownership in the world. Improving walkability and therefore reducing the need to use a car for travel has numerous economic benefits.

At 0.77 vehicles per capita (double the car ownership rate of some European countries), with most of the South Island having a car ownership above 0.9 vehicles per capita[92]. This is in part due to urban patterns that favour or require access to a car and limits transport accessibility for the one in eight households with no access to a motor vehicle[93].

Improving walkability and therefore reducing the need to use a car for travel has numerous economic benefits:

- For individuals and households, transport costs are the third-largest part (15%) of household budgets (after housing and food). The majority of these costs are for vehicle ownership ($70 per week) and fuel ($42 a week)[94]. The burden is particularly acute for lower income households, for whom car-related transport costs take up a higher proportion of overall household spending. Families with multiple cars per household may use one car infrequently, but still pay a lot to own this asset. Walking helps keep money in the pocket and available to be spent locally. It also insulates people from the budgeting uncertainty of fluctuating fuel prices[95].
- Local businesses benefit, improving community cohesion: when services and amenities are available locally, walking trips often replace a longer (and more costly) motorised trip to a shopping centre further away[96].
- Businesses can be more productive: for example, a study of pedestrian connectivity and economic activity in Auckland concludes that 'there is a positive and statistically significant association between walking, EJD (job density) and estimated labour productivity within the Auckland city centre'[97]. Note that it can be difficult to disentangle the effects of location choice, density and productivity – but proximity to other workplaces facilitates the exchange of knowledge and ideas. If that proximity is walkable, then impromptu meetings for such exchange are more likely as it is easier to stop and talk on foot than it is in a car.

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- Business activity increases: surveys of pedestrians using shared space streets in Auckland show a median perception rating of economic impetus increase from -1.00 to 1.68, which was the most significant improvement amongst five performance measures.[98]
- An economic survey of nine shopping areas in Auckland, Christchurch and Wellington found that pedestrians 'contribute a higher economic spend' in proportion to their mode share and thus 'are important to the economic viability of local shopping areas'[99]. In contrast to what many shopkeepers believe, people walking and cycling spend $34 per trip on average and shop more often than drivers. The study also identified that shoppers value high quality pedestrian environments and good crossing facilities in shopping areas more than they value parking.

The tourism economy can also benefit:

- Walkable communities attract tourism[100,101] as tourists often prefer walking as a transport mode when on holiday[102].
- Around the world, 'car-free' central city streets such as the 1.1 km long pedestrian street of Strøget in Copenhagen have become major tourism destinations. Strøget and nearby pedestrianised streets support a walking mode share of 80% and feature festivals, cultural activities, ice-skating that help attract and retain tourists[103].
- In Dunedin, surveys indicate that over 60% of visitors participate in a 'walk in the city' and the enhancement of various walking activities is a key focus area for the city[104].

Supports public transport

A good public transport (PT) system relies on an efficient public transport network. A door-to-door journey using PT usually involves a walking element to and from the PT stops. A fully connected and comfortably designed pedestrian network is an indispensable precursor to great PT systems and to the urban activity levels that PT is designed to support.

Improving walking can leverage investment made in PT. When walking becomes more pleasant, access to PT is improved and ridership may increase, leading to a virtuous cycle of more walking, better public transport, and lower PT subsidies. Improving the walking environment around PT stops and stations will improve the attractiveness of

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public transport journeys[105] and help to maximise the effectiveness of existing and planned investments in PT in New Zealand.

Public transport users are more likely to walk than drivers or their passengers (see graphic below) and therefore achieve the health benefits that accrue from regular physical activity.

Figure 14: Public transport riders and walk times per day[106]

Research reveals that people undertaking a public transport journey remember the walking element of the trip more than the in-vehicle time. An attractive walking environment feels up to 14% shorter than a basic level of provision. Therefore, attractive walkable environments can lead to an increase in the catchment areas of public transport as the perception of the trip can lengthen the walking distance people are willing to take to a public transport stop or station.[107,108]

Further information

Public Transport Design Guidance – Getting to and from public transport

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