The Value of Accessibility

Report for the Road Controlling Authorities' Forum Shared Footpaths Working Group.

TDG and University of Waikato

9 March 2017

Transport infrastructure and the transport systems using the physical structure, significantly impact the wellbeing of individuals and people in general within New Zealand. There are typically direct private, public and intangible benefits and costs associated with most choices made in relation to transport. In this Report, the private, public and intangible aspects of transport relating to footpath usage are examined.

Executive Summary

Footpaths contribute greatly to the welfare of individual citizens, communities and the nation.

Footpaths and shared paths are used by people on foot, bicycle and with mobility aids. They facilitate independence and reduce congestion among other transport modes, and deliver health and wellbeing benefits to citizens.

Accurate assessment of the value of footpaths is essential to guide footpath construction and maintenance decisions.

Transport planners have long used estimates of benefit and costs to inform transport planning, largely confined to roads and public transport. Footpaths investment, like investment in other transport modes, benefits from robust investment analysis.

There is a shortage of information available as to who uses footpaths and the benefits they derive from using footpaths.

New Zealand Road Controlling Authorities (RCAs) have limited information on footpath usage.

Understanding footpath use patterns is important for both efficiency and equity concerns.

Understanding footpath usage patterns, and benefits from footpath usage, provides valuable information as to where benefits are greatest. This information also provides evidence as to how well footpath networks meet the needs of communities and people with greatest need or reliance on them, such as children, older people and those with disabilities.

Accurate valuation of footpaths assists in both optimising benefits and finding the most cost-efficient way to meet obligations.

New Zealand has domestic and international obligations pertaining to human rights and the particular rights of persons with disabilities. Constrained maintenance budgets call for more robust and transparent decision-making.

This report presents data on initial research into footpath usage in Hamilton, New Zealand.

The research aims to provide direction for policy and investment by improving the quantity and quality of data about people using paths. It investigates footpath usage by time of day and type of user for 70 hours across six different sites.

Footpath usage varies considerably with time of day.

For the surveyed sites, the number of cyclists at peak times is 10 times greater than at off peak times. The variation is similar for pedestrians and even more dramatic for users of mobility aids, suggesting those with mobility aids are disproportionately represented in off-peak times.

The number of persons with mobility aids using the paths was low at the surveyed sites.

Footpath usage data can guide future studies.	Footpath usage patterns raise questions about purpose of travel, preference for routes and modes, the quality of infrastructure and other characteristics of paths and destinations.
Future research can extend this analysis.	All Road Controlling Authorities can use these techniques to inform investment in paths. Insights can be gained by collecting similar data for longer time periods at more sites. This can be enriched by gaining information about the purpose of trips.
Evidence has been gathered on citizens' expressed views concerning footpaths.	An online survey and focus groups discussion were undertaken to gather footpath user perceptions and views. Those who rely most on footpaths are least likely to have independent access to a motor vehicle.
Respondents report footpath usages varying with time of day, day of week and season of year.	In addition to time of day, day of week and seasonal variation usage varies significantly with age group. The varying pattern of usage signals that the dominant user group varies with time, day, and season.
User benefits are correlated with a host of factors.	The environmental benefits from footpath usage has high correlation with public health benefits. Walking and cycling show negative correlation pertaining to benefits, with walking usage declining as cycling increases.
A Probit model was used to examine use of footpaths by persons with disabilities.	The initial model revealed important determinants, which were the accessibility of public buses, whether people had to walk to get to the footpath and the destination attainable via the footpath. Further work could enrich the insights available from Probit models of this type.
Focus group conversations reveal both commonly held and diverse views about footpaths and their usage.	Key themes identified pertained to footpath quality and design; safety; maintenance; impacts from property owners, vehicle owners, maintenance workers and others; the weather; the nature of shared use; availability of rest and toilet stops; and the behaviour of other path users.
The analysis so far indicates results consistent with theory. Footpaths provide private benefits and public benefits. They also provide spillover benefits to other citizens.	Private benefits include access and time saved. Public benefits include reduced congestion on road and buses. Spillover benefits include improved health and reduction in health costs, and broader benefits gained in a demonstrably more inclusive society.

Future analysis can make valuable use of survey data.	Given the survey data, reliable simulation models can be constructed to estimate the benefits to individuals, communities and the nation from footpaths of specific types, configurations and standards.
A range of benefits from footpaths have been identified.	Benefits include easier access to destinations; time saving; improved health; increased comfort; increased convenience; reduced stigma harms; reduced accident costs; increased participation in education, labour markets and civil society; increased access to support and social service agencies; increased life opportunities and perceptions of greater inclusiveness.
The findings can be used now to prioritise investment in paths.	Road Controlling Authorities can now use data collection and analytical methods to prioritise investment in paths to accrue measurable benefit. The robustness of these methods can be improved in the long term with more sophisticated analyses enabled by a growing data pool.

The Value of Accessibility

Introduction

To provide a framework of evidence-based policy development, the Shared Footpaths Working Group of the Road Controlling Authorities' (RCA) Forum commissioned a small three-component study of the value of footpaths, including shared pathways [1], for individuals, communities and New Zealand as a nation. Types of pathways and uses associated with them are constantly changing. To obtain the greatest benefits requires an evolving and dynamic thinking about pathways, especially in the context of their contribution to accessibility in transport. On the surface, a pathway predominantly contributes to pedestrian and near-pedestrian uses. Underneath they are often an easement for the transport of power – electricity and gas, water – reticulated, storm water and sewerage, communication – telephone and internet, and in the future maybe the airspace above becomes the pathways for drones delivering packages.

The basic issues concern how changes to transport and transport infrastructure impact people. If a broad based perspective of "wellbeing" such as the United Nations Human Development Index or UK Well-being index, is used then many aspects of accessibility emerge which will otherwise be overlooked. Such broad based indices are useful for making international comparisons[2] and provides a framework to address the big question of who benefits and the scope and magnitude of the gains.

A health and exercise linkage is well established in studies[3], and international research emphasises the importance of healthy places[4]. Importantly, studies overseas are revealing the very large magnitude of dollar gains to the public purse when people enjoy activities together.

[1] A 'shared path' is not clearly defined in New Zealand's Road User Rules but typically refers to a path that:
(a) may be a cycle path, a footpath, or some other kind of path; and
(b) may be used by some or all of the following persons at the same time:
i) pedestrians;
ii) cyclists;
iii) riders of mobility devices; and
iv) riders of wheeled recreational devices.
http://www.legislation.govt.nz/regulation/public/2004/0427/latest/whole.html Clause 11.1A(1)

[2] Measuring National Well-being: International Comparisons
https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/datasets/measuringnationalwellbeinginternationalcomparisons

[3] More time walking means less time in hospital - study http://www.stuff.co.nz/life-style/well-good/motivate-me/89597724/More-time-walking-means-less-time-in-hospital-study?cid=app-android

[4] The Case for Healthy Places: Improving Health through Placemaking. https://www.pps.org/blog/pps-releases-new-report-the-case-for-healthy-places-how-to-improve-health-through-placemaking/?mc_cid=96d60e011d

Psychological and mental health care cost reduction through accessibility are highlighted in Nelson, Wright, Thomas, & Canning (2017), "The social and economic benefits of community transport in Scotland" *Case Studies on Transport Policy*[5].

To provide a link between generic health benefits and investment in paths, three research questions are analysed in the context of a small empirical study. First, how does usage of paths vary across locations in terms of mode (un-aided pedestrian; mobility-aided pedestrian; cyclist); second, how does the value placed upon path usage vary among likely users and finally what is the recognised world best practice for computing the financial benefits? The generalisability of the results to differing regions and across time will vary. The foci encompasses urban pathways and is applicable to the growing network of recreational pathways. This latter context reinforces the dynamic component of asset management as attitudes alter with respect to riparian rights and waterways, and the issues relating to traditional iwi footpaths are yet to receive comprehensive consideration. A robust and reliable method of analysis available to assist policy formation within the economic and regulatory context of footpaths in New Zealand is discussed in this report.

Context

There is a dearth of data about diversity of people using shared footpaths. In transport, we have very little information about path users' age profiles, gender, ethnicity, and purpose for using the path. Furthermore, peoples' reasons for not using a path are unclear, which is particularly important for people who do not have independent access to a motor vehicle. The impact of a trip not made on individuals' health and wellbeing, is potentially at least as important as trips made and the respective benefits need to be articulated more clearly by RCAs. Rose, Witten and McCreanor (2016), exploring transport related exclusion in New Zealand, comment that non motor vehicle users face barriers to participation in work, education, social activities, sport and leisure, and to accessing basic goods and services. The observations, based on

[5] An inquiry by the Scottish Parliament Infrastructure and Capital Investment Committee launched in 2013 found that there is a lack of evidence on the social and economic benefits of community transport (CT) in Scotland. The paper reports the outcome of research designed to identify the economic, social and health benefits generated by CT. Following a review of available literature on the benefits of CT, a primary research programme was carried out with five case studies from across Scotland. Findings confirm that CT is a critically important service providing crosscutting benefits across a range of policy areas, including transport, health, social services and leisure, amongst others. It also plays an important role in tackling different types of inequality, an important issue on the policy agenda of many Governments.

qualitative research, with a particular interest in examining public transport, are apt for footpath usage analysis.

It is important that we learn more about perceptions and behaviour associated with shared paths, so that any move to increase their prevalence includes an explicit accounting of the impact of these decisions on all people. Although overall numbers of people using paths give some indication of quantum of participation, whether or not this is equitable and enabled for *all* people is important, but poorly understood. A recent study by Moniruzzaman and Páez (2016), using quantitative techniques (mainly cluster analysis), examines how the attributes of the physical environment affects pedestrian usage of pathways (sidewalks.) They found that environments

"where walking was more common than predicted by the covariates in the model tend to have more marked cross-walks, more four-way intersections, and fewer dead-ends or three-way intersections. These segments also had more highly connected side-walks, the terrain tended to be flat, and had more pedestrian-oriented lights. Also, for the case of seniors, the segments were more commonly single lane and therefore lower volume.

On the other hand, streets where walking was observed less commonly than predicted by the statistical analysis of walking behaviour tended to have fewer marked cross-walks, more dead-ends, and three-way intersections. The segments were also less connected, slight/steep slopes were more common, and had more road-oriented lighting. Furthermore, the segments tended to be high volume. In term of land uses, more walkable segments displayed more mixed land uses, more diversity in the rise of buildings, had fewer public spaces, but more coffee shops. Less walkable segments, in contrast, are more commonly single use (residential and/or vacant), building height tends to be more uniform, there are public spaces, but fewer coffee shops."(p94)

The rationale for investigating equity in transport investment stems from principles of human rights and legal obligations arising from national legislation and international convention. New Zealand has its own Human Rights legislation (Human Rights Act 1993) and is a signatory to the United Nations Convention of the Rights of Persons with Disabilities 2006. As well as rights-based arguments for equity, there are also economic imperatives to consider. Many RCAs face challenges maintaining physical transport assets, alongside increasing scrutiny about whether investment is best targeted to addressing real problems. Assets include extensive networks of footpaths, shared paths and road crossings.

Decision-makers in RCAs may assume that their investment in public infrastructure benefits all people in their communities, but with no measurement of diversity of use of that infrastructure, the assumption cannot be tested. Information about where people are and are not using infrastructure can help RCAs provide the best outcomes for all people, and the best return on investment, to meet their strategic objectives with demonstrable robustness.

Research Questions

Research questions are posed to illuminate whether investment is resulting in the best possible return for the investing RCAs. An overarching concern is the reality of transport domain commitment to human rights and its visibility. It is to be expected that a diversity in the number of people using shared paths by mode (three modes defined: cyclist / pedestrian / pedestrian using a mobility aid)? In this context the following research questions are addressed.

1. How does usage of shared paths vary across locations and time of day?

   This definition essentially includes all footpaths in New Zealand because they may be used by pedestrians and riders of mobility devices at the same time. However, shared paths are typically understood as paths that can legally be used by cyclists regardless of wheel diameter, in contrast to 'regular' footpaths, which are restricted to cyclists with wheels smaller than 355mm in diameter.

2. How does the value placed upon usage of a shared pathway vary across all users?

These questions are posed so that usage and value can be made more explicit, and a more robust investment framework can be populated. The examination of these research questions are undertaken in three discrete stages:

Stage 1: How does path usage vary?

Stage 2: How does value of paths vary?

Stage 3: What are the implications of usage and value variation for path investment decision-making?

Stage 1 How does path usage vary?

Method

A physical count approach is used across several locations for different times of the day. The pilot study involved counting people using shared paths over 70 hours across six sites in Hamilton.

Data was collected at various times between 7am and 6pm on weekdays, and between 10am and 12pm on Saturdays, during July 2016. All data collected on weekdays between 7am and 9am, and 4pm-6pm, were combined as 'peak'. All other data were combined as 'off-peak'. Surveyors counted all people using the paths, with separate columns for cyclists, pedestrians, and pedestrians using mobility aids (selecting from powered mobility scooter, manual and powered wheelchair, guide dog, white cane, and walking stick(s)/crutches, where applicable). Gender, ethnicity and age profile were not collected.

Results

The data showed diversity in the number and nature of people using these paths. The proportion of people using mobility aids varied from less than one percent at three sites (Hamilton Lake and alongside the Waikato River), to over nine percent on sections of Wairere Drive. Survey results are presented in Table 1. There were not enough people using mobility aids to meaningfully differentiate by type of aid; however, it is worth noting that no manual wheelchairs, white canes or walking frames were observed at all during the survey period. For comparison, the estimated proportion of people who use mobility aids in the NZ population is also provided (based on methods described in Burdett, 2014).

Table 1: Count of shared pathway users

Site	Number of direction-hours	Cyclists per hour	Pedestrians per hour	Average mobility aid percentage (of all pedestrians) per hour	Average mobility aid percentage (all New Zealand)
Wairere: Te Rapa	4	9	16	17%	3%
Wairere Dr: Crosby Rd Underpass	20	3	3	10%	3%
Wairere: Clyde	4	8	4	21%*	3%
River Path (Hayes Paddock)	12	2	12	1%	3%
River Path (Grantham Street)	16	2	8	0.0%	3%
Hamilton Lake (Veranda Café)	20	3	90	0.2%	3%
Total numbers observed	501	3366	42	1.2%	3%
***Fewer than 20 pedestrians in total across four hours**					

No data about trip purpose was collected in this initial stage, to avoid unnecessary interaction with people on these pathways. From observations, it is very likely that Wairere Drive is used more by commuters and people travelling to specific locations, whereas the river path and Hamilton Lake pathway are more likely to be used as recreational facilities.

Initial investigation suggests a disparity in use. For comparison, the average proportion of people using mobility aids in Hamilton City is estimated as 3%, based on age and gender-specific rates of disability and mobility aid use in New Zealand[6]. Rates of use in peak and off-peak times help to understand reasons for using the paths. Peak times are typically associated

[6] See Burdett (2013) for a discussion of estimates of catchment-specific rates of mobility aid use

with commuting between home and work, whereas recreational travel is more likely in off-peak times. Figures 1, 2 & 3 show the relationships between peak and off-peak use for cyclists, pedestrians and mobility aided pedestrians separately.

Figure 1: Cyclists per hour, per site: mean peak vs off-peak volume

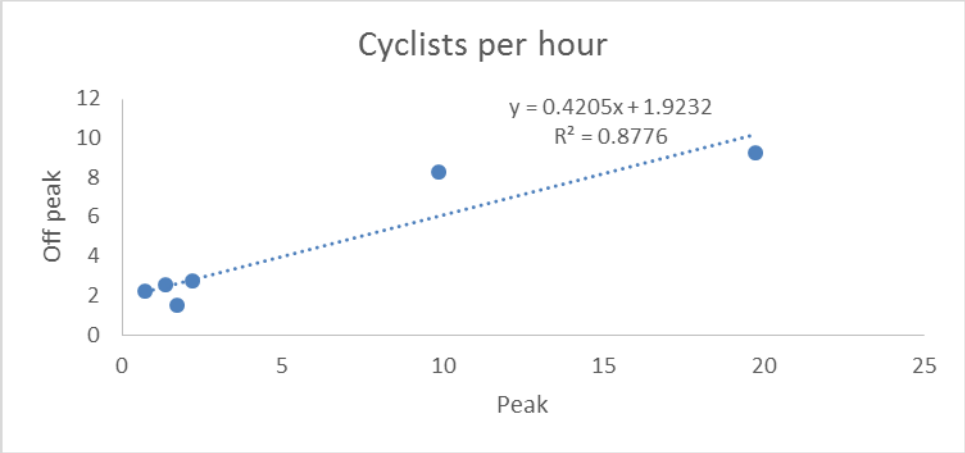


Figure 2: Pedestrians per hour, per site: mean peak vs off-peak volume

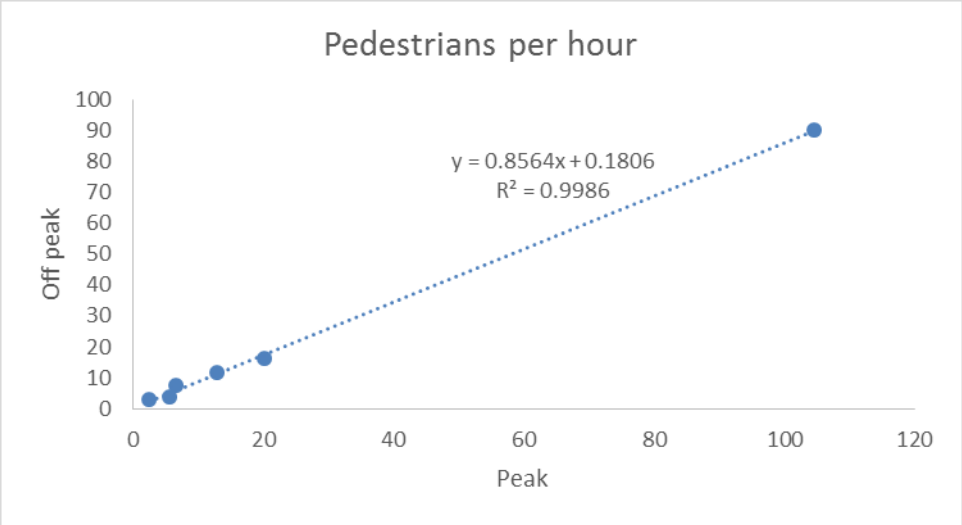
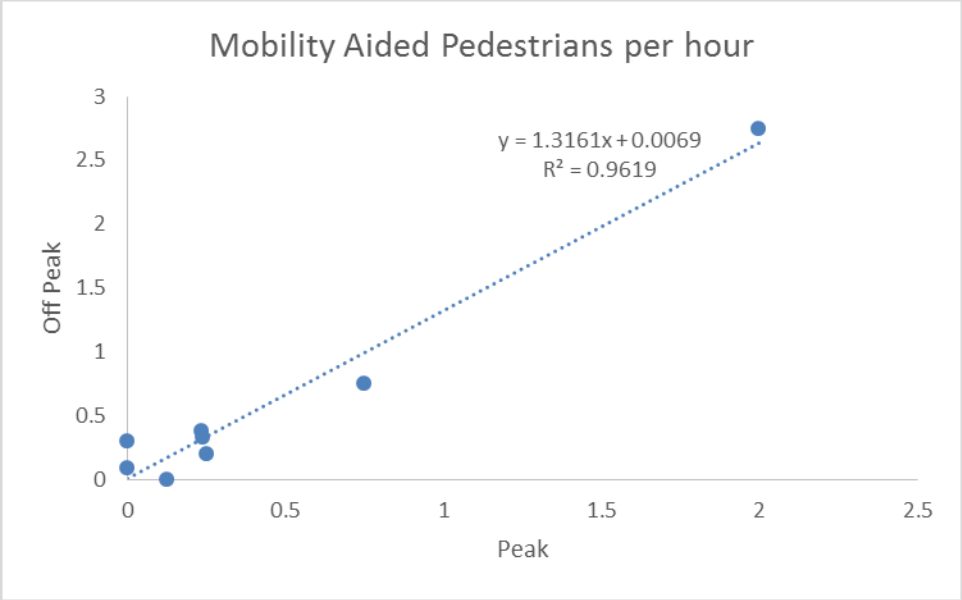


Figure 3: Mobility-aided pedestrians per hour, per site: mean peak vs off-peak volume



The data in Figures 1, 2 & 3 show that there is a strong relationship between peak and off-peak in terms of numbers of cyclists, pedestrian and mobility aid users across different locations. The three charts indicate for the pathways counted there is a difference between peak and nonpeak patronage. For both pedestrians and cyclists, there is generally more use of paths in peak than in off-peak times, indicated by a gradient of greater than one in the line of best fit. This effect is most pronounced for cyclists, who have the largest difference between peak and off-peak path use: the data show roughly 85 cyclists in off-peak times for every 100 in peak times. However, pedestrians using mobility aids are more common in off-peak times: 131 in off-peak times for every 100 in peak times. These findings suggest that people who use mobility aids may be more likely than other pedestrians to use paths for recreation, and in generally less-busy times. Perhaps most crucially, these data suggest that people who use mobility aids avoid using paths when they are busy (that is, at peak times). This is important, as any potential aversion to using a busier path is critical to understanding the potential effects of more intensive use of a path, such as making it a shared path with cyclists, for example.

Discussion

In terms of the first research question, results suggest that there is indeed diversity in the number of people using shared paths according to mode. This diversity in nature complements

information about overall usage, because it implies that equity of participation cannot be assumed by volume alone. For example, the highest numbers of people were observed on the shared path at Hamilton Lake. This may lead an RCA to consider its investment a success, but this depends on the investment objective sought. With only six using a mobility aid out of 2,636 people counted at Hamilton Lake, the investment is clearly benefitting some subset of Hamilton's community. Similarly, low proportions of mobility aid users were observed on Hamilton's river paths. However, higher proportions of mobility aid users were observed on Wairere Drive shared path. This path is constructed to a higher accessibility standard, with consistent 3m width, relatively shallow gradients and a smooth concrete surface.

The pilot data can help to address these questions by providing case study insights into who does and does not use shared paths, although it is clear that more comprehensive data would be more robust. In particular, data about why people do and do not use paths; the value people place on accessible infrastructure, and other aspects of a location that encourage them to use it (for example accessible parking; lighting; seating; access to toilets; proximity to their home or end-use facilities) is also desirable.

Regarding the question of equity in making decisions about infrastructure investment, these results suggest that revealed preference data (i.e., observational survey data, in this case including mobility aid proportion) can provide insight into relative equity. They can also inform policy and design standards with information about links between level of service and diversity of participation. The data suggest that some people using some types of mobility aids will use shared paths, so long as they provide a reliable level of service. However, busy paths with inconsistent standards of width, visibility and gradient are less likely to be used by the full cross-section of society.

Finally, the data suggest a research direction concerning economic benefits and costs associated with investment in shared paths. In particular, it is important to understand why people do and do not use particular paths. As well as level of service issues to do with technical path specifications, there may be other factors: high volumes of pedestrians or cyclists may be a deterrent to some people; the facilities available along the path (such as toilets and seating, and participation opportunities such as parks, playgrounds and cafes) may also affect peoples'

decisions about whether or not to use the path. These questions are important because without a comprehensive economic appraisal framework that considers all practically measurable components of peoples' decision-making, the value of any investment cannot be assessed. The questions are complex because the investment benefits (such as mental and physical health) may not be within the mandate of the investing agency (for example an RCA).

Further questions requiring attention

Measuring inclusiveness in transport is increasingly emphasised in Europe and North America but has not been embraced in New Zealand. Internationally it is recognised there is limited information about the contribution of transport investment to individuals' broader health and wellbeing, and whether or not transport investment benefits all people equally[7]. More qualitative and economic data is needed to establish the value of investment in infrastructure, and in particular the benefits to individuals, communities and broader society of being relatively more inclusive. Differences in the relative value of a trip for different people (for example, commuter vs recreational trips, for people with and without alternative transport choices) need to be understood to inform an economic appraisal framework for investment in public infrastructure.

RCAs are well placed to consider the wellbeing and broader benefits in their infrastructure decision making. Specifically, information about where people are and are not using infrastructure can help RCAs provide the best outcomes for their communities, ensuring the best return on investment, to meet their strategic objectives.

Results in Stage 1 are important in addressing equity in use of shared paths, testing whether human rights are being upheld, and evaluating whether investment is resulting in the best possible return for the investing RCAs. To progress this last point the present diversity in the number of people using shared paths by mode (three modes defined: cyclist / pedestrian / pedestrian using a mobility aid) points to different value sets.

[7] See for example http://www.itf-oecd.org/sites/default/files/docs/economic-benefits-improved-accessibility_0.pdf

Stage 2 How does value vary?

Method

A relatively small unbalanced online survey and focus group discussion, probing issues arising from the survey ws undertaken. The initial survey instrument design consisted of 15 questions, simple to complete and which posed no threatening or sensitive questions. This enhances the robustness of the instrument, which could then be crosschecked with demographic data and the New Zealand Household Travel Survey. The questions asked are listed in Table 3 and a simple tabulation/visual presentation of responses are collated as Appendix 1.

The response data, as recorded on the Spreadsheet, were checked for encoding errors or extreme responses indicative of a misunderstanding of a question or consistent heavy bias. No untoward irregularities in responses are observed. Choice variables such as how often do you walk are recoded as categorical variables such that "Most weekdays" becomes 4, a few times per week becomes a 3, etc.

Table 2: Conditional recoding

Most weekdays	**4**
A few times per week	3
A few times per month	2
Rarely	1
Never	0

To explore the data it is useful to consider univariate, bivariate and multivariate statistics. Comparing the data visually, using Pivot Charts, which is a tool available within Excel, is helpful to see patterns and possible trends. While "eyeballing" data often gives rise to perception biases it is, nevertheless, a potentially useful first step in becoming familiar with the information available. Pivot Charts reflecting the responses to the questions in the Survey are included as Appendix 2.

Table 3: Survey questions

1.	**Please enter your age as a number in years.**
2.	Do you live in a rural area, town or city?
3.	Do you have a long-term disability (lasting 6 months or more) that stops you from doing everyday things other people can do?
4.	Does a health problem or a condition you have (lasting 6 months of more) cause you difficulty with, or stop you from: - seeing, even when wearing glasses or contact lenses - hearing, even when using a hearing aid - walking, lifting or bending - using your hands to hold, grasp or use objects - learning, concentrating or remembering - communicating, mixing with others or socialising - no difficulty with any of these
5.	How many motor vehicles (not counting motorbikes, mobility scooters or farm vehicles) do the people who live at your home have available for their use?
6.	Do you use any of the following mobility aids when you are out of the house? - manual wheelchair that I push myself - wheelchair that someone else pushes - powered wheelchair - white cane - guide dog - walking stick or crutch (single) - walking sticks or crutches (two at once) - walking frame - other
7.	On a scale of 1-10 where 10 = “very valuable” and 1 = “not at all valuable” please say how much you value the following activities for yourself: - using a public bus - using a public library - going to see a movie - having a coffee in a café - going for a walk on public footpaths
8.	On a scale of 1-10 where 10 = “very valuable” and 1 = “not at all valuable” please say how much you value the following activities for society in general: - using a public bus - using a public library - going to see a movie - having a coffee in a café - going for a walk on public footpaths
9.	Is there a footpath on the street where you live?
10.	What times of the day are you most likely to use footpaths (any footpaths) on weekdays in Summer?

11.	**What times of the day are you most likely to use footpaths (any footpaths) on weekends in Summer?**
12.	What do you use footpaths for? - recreation - to get to the shops - to get to a park, swimming pool or library - to get to a health appointment - to visit friends or family - to attend a cultural event such as a club or church meeting
13.	On a scale of 1-10 where 10 = "very valuable" and 1 = "not at all valuable" please say how much you value the following (possible) benefits of a footpath on your street: - regular use by you (and others in your household) - occasional use by you (and others in your household) - use by other friends and family - use by others in the community - contribution to the local economy (by enabling economic activity) - contribution to property attractiveness and value - environmental benefits from more people walking - public health benefits from more people walking - connectivity with neighbours (adding to a sense of community)
14.	On a scale of 1-10 where 10 = "very valuable" and 1 = "not at all valuable", how much would you value the following changes in footpaths on your street for all the people who use them? - smoother footpath - more visibility around driveways - more kerb cutdowns - easier gradients - wider footpath (without legal footpath cycling) - wider footpath (designated as a shared path so that cycles can use it)
15.	If you have any other comments about footpaths please enter them here.

Conventional descriptive statistics such as mean and standard deviation do not provide a useful way of summarising nonparametric data. The relationship between pairs of responses i.e. bivariate analysis, nevertheless, is important. Spearman's rank correlation coefficient is appropriate for the nonparametric, categorical responses in the survey. In Table 4, the correlation matrix is presented. The columns and rows, depicting individual relationships between variables are recorded in cells. Two cells are highlighted. First, there is only one cell with a value above 0.8[8] while the second has a negative sign indicating an inverse relationship. A multivariate model uses the correlation between variables to estimate an explanatory equation and a regression approach is common for such modelling.

[8] A correlation coefficient of greater than 0.8 is seen to be high and this is important when using a multivariate model as it can result in multicollinearity issues.

Rows 2 -11 list the various benefits and moving across the columns the correlation with other forms of benefits noted are displayed. There is a degree of uniformity in responses between the various levels of users. If frequent users have very different views to those of the occasional users then it is likely that policies to get more occasional users out walking will upset the frequent users.

The correlation between user groups and value changes are less pronounced. However, there is consensus across the groups that improved gradient, improved visibility etc., do contribute in a material way to the value of the footpaths. The importance to footpaths to property values are not disproportionally different from other benefits of values. This suggests responses were not just related to what makes "my property" more valuable.

The correlations suggest there is consensus for many of the opinions and so these may be analysed as a set to investigate what are the key drivers in value of footpaths. This form of analysis is typically undertaken using methods called regression analysis. When we consider different groups such as those with disabilities there are specific benefit areas arising. The aim is to pool the response information from all the different participants in the surveys, combining the answers to examine what are variables that are most likely to influence value.

Probit Model

Probit regression is an appropriate way to handle nonparametric data, as contained in this sample, in a robust and theoretical sound manner. The impact of a one-unit change in each variable shown in Table 5 on the benefit of a disabled person using a footpath is presented in the marginal probit column. The interpretation is to say that for a one-unit change in the independent variables there will a one unit change in the dependent variable.

Table 4 : Correlation Matrix

	Benefit-Foothpath Regular	Benefit-Foothpath Occasional Use	Benefit-Foothpath used by other F&R	Benefit-Foothpath used by other	Benefit-Foothpath contributing Local economy	Benefit-Foothpath Contribution to property	Benefit-Foothpath from environmental benefit	Benefit-Foothpath public health	Benefit-Foothpath connectivity with neighbour	Value change in footpath-Smoother	Value change in footpath-More visibility	Value change in footpath-More Kerb cutdown	Value change in footpath-Easier Gradients	Value change in footpath-Wider without cycling	Value change footpath-Wider with cycling.
Benefit-Foothpath Regular	1														
Benefit-Foothpath Occasional Use	0.7678	1													
Benefit-Foothpath used by other F&R	0.6792	0.7256	1												
Benefit-Foothpath used by other	0.5845	0.6005	0.6971	1											
Benefit-Foothpath contributing Local economy	0.4886	0.422	0.4958	0.5641	1										
Benefit-Foothpath Contribution to property	0.5152	0.4427	0.4903	0.5042	0.5877	1									
Benefit-Foothpath from environmental benefit	0.5334	0.4503	0.5614	0.5984	0.5616	0.6155	1								
Benefit-Foothpath public health	0.5054	0.4923	0.5208	0.5939	0.5151	0.6278	0.8865	1							
Benefit-Foothpath connectivity with neighbour	0.4726	0.481	0.5558	0.4936	0.4898	0.5711	0.6913	0.6621	1						
Value change in footpath-Smoother	0.2645	0.2475	0.3196	0.239	0.2871	0.231	0.3843	0.4324	0.3371	1					
Value change in footpath-More visibility	0.256	0.2565	0.2307	0.2198	0.2824	0.3086	0.3726	0.431	0.3277	0.6475	1				
Value change in footpath-More Kerb cutdown	0.2045	0.2144	0.2697	0.202	0.2389	0.3045	0.391	0.427	0.372	0.6284	0.5868	1			
Value change in footpath-Easier Gradients	0.185	0.2138	0.3039	0.219	0.2183	0.2521	0.3245	0.3623	0.2968	0.6394	0.5448	0.6654	1		
Value change in footpath-Wider without cycling	0.1836	0.203	0.2193	0.1709	0.2293	0.2234	0.2349	0.2938	0.2297	0.5189	0.4514	0.4962	0.5987	1	
Value change in footpath-Wider with cycling	-0.0031	-0.0055	0.0497	0.0584	0.038	0.0387	0.0853	0.0629	0.1004	0.0634	0.0317	0.0758	0.0295	-0.0552	1

Table 5: Probit Regression Model

	marginal probit
	disability
D public bus SY	0.562**
T statistic	(2.37)
D public library SY	0.0219
T statistic	(0.09)
D Movie Theatres SY	-0.127
T statistic	(-0.52)
D Going Café SY	0.237
T statistic	(0.81)
D Walk footpath SY	-0.992**
T statistic	(-2.28)
D public bus SS	-0.433
T statistic	(-0.97)
D public library SS	-0.406
T statistic	(-0.92)
D Movie Theatres SS	0.629**
T statistic	(1.98)
D Going to café SS	0.494
T statistic	(1.26)
D Going to public footpath SS	-1.219*
T statistic	(-1.79)
_cons	0.673
T statistic	(1.01)
N	366

The biggest gains, in terms of survey response preferences, from those with disabilities comes from being able to access and use footpaths, access to buses and go to the cinema. Interpretation of these findings immediately stalls at why cinema? The observation from the surveys showed that older folk and these with mobility impairments do cluster at shopping malls and cinemas. Cheaper tickets during the day and reasonably priced refreshments are likely to be important and it is an all-weather facility. Established patterns also tend to reinforce themselves. We observed that the walkway around Hamilton Lakes is popular and during the daytime where there is a significant number of mothers with babies and toddlers who walk and gather at the café for refreshments. The facilities suit this demographic whereas the older group have more

difficulty gaining access, unless they drive, and it is not so easy to find shelter from the elements as at an indoor facility.

To cross-check the sentiments revealed though the survey, a focus group consisting of more vulnerable and less mobile people in the community was convened.

Focus Group

The concerns of those who have impairments in mobility were gathered using 6 questions to prompt discussion. Notes of the discussions are provided in Appendix 3. As agreed by the participants, no recording or verbatim transcripts were prepared. The anonymity of responders is similarly maintained; however, it is important to emphasise that those participating are representatives of the disability community. There is likely to be overt activism impounded in the responses and the analysis is not based on an unbiased sample.

Specific questions raised are:

1. What do you use footpaths for?
2. What would make you choose between different footpaths?
3. Are there any reasons you would stay home rather than complete a journey using footpaths?
4. What do you think of footpaths that are shared with bicycles?
5. Have you had any experiences with footpaths blocked or changed because of roadworks?
6. Other related shared thoughts, which are broader than the focus of the questions 1-5.

The discussion suggests that transport is not a luxury good but something used out of necessity. Many transport options are inherently difficult to access, difficult to use, uncomfortable and are perceived to have high risks associated with them. The main conclusions of relevance to value of footpaths are that:

1. People who find travel on footpaths difficult (due to self-identification with disability) are also highly likely to rely on them for their day to day travel because they are unlikely to have independent access to a motor vehicle;
2. Compared with mobile people who find travel on footpaths easy, people with disability using footpaths and road crossings base their route choice on an explicit trade-

off between safety, personal security and travel time;

3. People with disabilities who use footpaths aim to minimise overall journey time because travel is stressful and effortful; but they have acute awareness of their vulnerability, so will only travel on footpaths and cross roads where they perceive themselves to be safe; and

4. Because of the explicit judgments about travel time, safety and security, obstructions in a footpath (including in particular people on bicycles, and temporary traffic management) represent a significant barrier to people with disabilities undertaking a journey using pedestrian networks of footpaths and road crossings. Encountering cyclists on footpaths affects people with disabilities' expectation about safety in particular, so they are less likely to select the same route in future. Their limited choices mean that the presence of cyclists can result in their decision not to undertake the trip at all.

Stage 3 Implications for an economic appraisal framework

Value of Transport

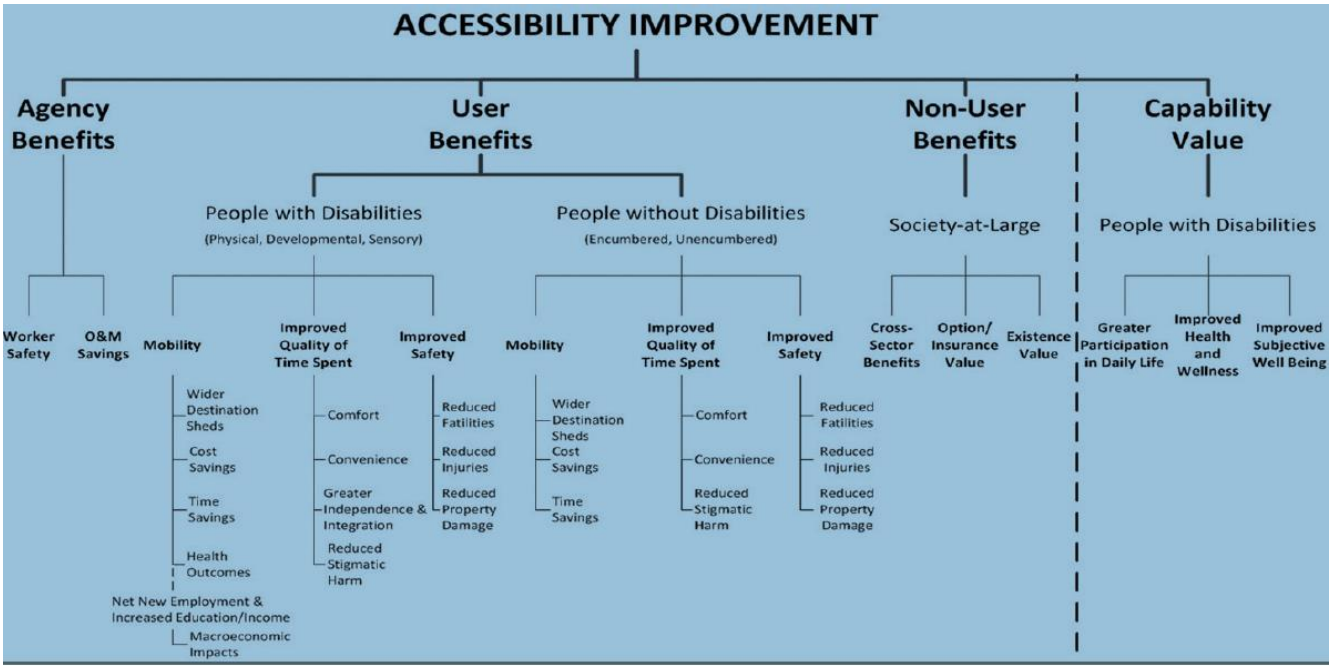
Three components of transport value are recognised from the research undertaken. Private benefits to individuals, public benefits and externalities (spill-over benefits). The first grouping includes time saving from better transport infrastructure and, where the benefits are greater than the cost, an argument can be made that this is a net benefit to individuals collectively. The second group captures accident amelioration, where it relates to human harm, which is typically a public benefit as ACC picks up the bill for accidents and a reduction is a measurable saving to the public purse.

Some user groups are likely to receive the greatest benefit from increased access to transport. Overseas studies are now moving to highlight these issues. Nelson et al (2017) conclude, in relation to community transport (CT) in Scotland, that:

> *From an economic perspective, the potential cost savings provided to social services, the NHS and local authorities, combined with the unremunerated productive hours offered by volunteers, suggests that CT generates significant economic benefits. The willingness to pay analysis identified the value of the CT services examined. The majority of CT users feel that the*

price they pay for their service is 'about right' with a not insignificant minority indicating that they would be willing to pay more. This suggests that CT generates extensive consumer surplus. The volunteering aspect of CT also provides significant productivity gains to the Scottish economy, in that a substantial number of uncompensated hours are being worked, often by people who would officially be defined as 'economically inactive'. Volunteering helps to make most if not all CT services viable and provides significant cost savings for local authorities through providing services which would be expensive to procure.

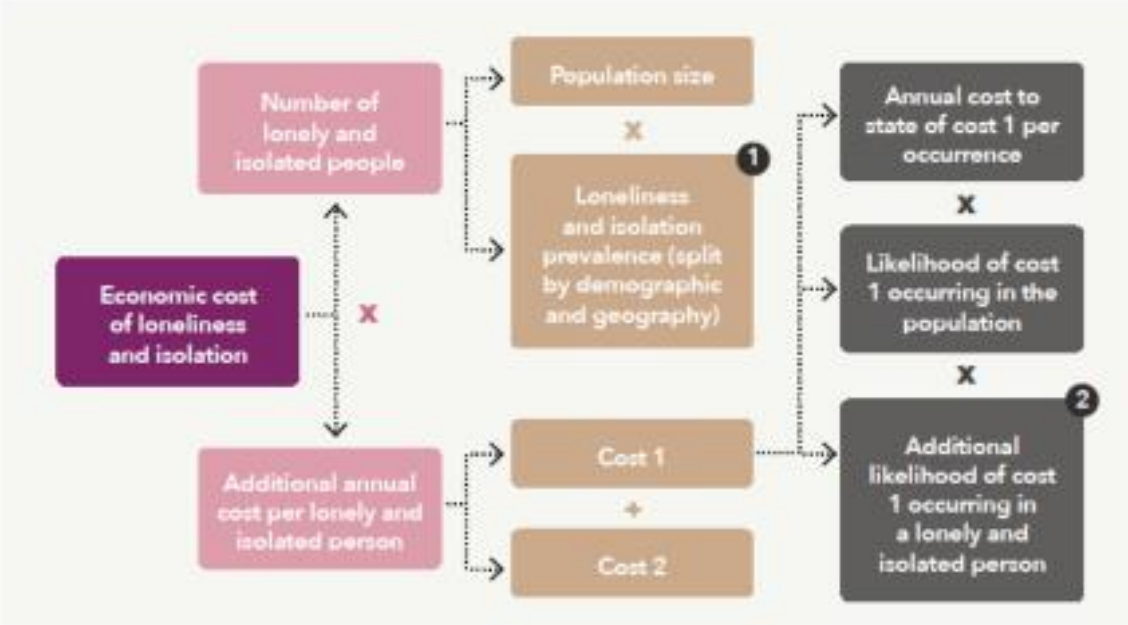
Figure 4: Components of economic value



Source: Federing & Lewis, 2016 http://www.itf-oecd.org/node/19772

What are the benefits for senior citizens of engaging in social activities four days per week? A 2016 study in Manchester in the United Kingdom addressed the question of costs to social welfare and health resulting from loneliness among the aged. The approach followed is presented in Figure 6.

Figure 5: Framework for quantifying the benefits of community transport. Source: Deloitte Analysis for ECT Charity, Why Community Transport Matters (2016)



The extensive investigation and analysis finds that the cost is £2,000 per person per year (or NZ$3,465)[9]. A reduction of loneliness and enhanced social interaction (through provision of community transport services, for example) produces a cost saving to health and social welfare services of £2,000 per person annually.

It is relatively simple to do the maths for a growing population of seniors. New Zealand had an estimated 626,000 people aged 65 years or over in 2013, which is projected to grow to 1,341,000 by 2043. If for example just 5% of New Zealand's senior population would benefit from reduced social isolation through improved transport access of some form (the lowest estimate from the study cited in Figure 6), the 2013 benefit from this investment would be ($3,465*0.05*626000=) $108 million per year. Therefore, any tangible investment of less than that amount, which could demonstrably address loneliness in older people would accrue a healthy benefit/cost ratio.

The returns at a local level are perhaps more tangible. Kapiti Coast District, for example, had 12,700 people aged 65 or older in 2013. If investment of say $100,000 in community transport in Kapiti Coast could reduce loneliness and social isolation for just five percent of those seniors, the return each year would be in the order of ($3,465*0.05*12700 =) M$2.2; a benefit/cost ratio of 22.

[9] ECT Charity (2016) Why community transport matters – report by Deloittes and ECT

Data gathered in the part 2 survey, found 8 types of usage of footpaths are predominant and these are listed in Table 5. All the activities have the potential to increase interpersonal interaction. In a budget-constrained world the question arising is, "which are the priority to increase to achieve the greatest net benefit?" Such a question raises all sorts of issues, from social engineering, through equity for all, to let's get the maximum bang for our dollar.

Table 6: Predominant reasons for using footpaths (ranked least common (1) to most common (8))

Count of Footpath- Attend cultural events	**1**
Count of Footpath- go to health appointment	2
Count of Footpath- social service	3
Count of Footpath-Park, Swimming pool, library	4
Count of Footpath- Recreation	5
Count of Footpath- Visit friends or family	6
Count of Footpath- go to Shop	7
Count of Footpath-go to school, work, study – (as they use it most often)	8

As choices need to be made, it is important that analysis provides informed options, as not everything can be done and certainly not all at once. To demonstrate a realistic way forward we take row six - Visit friends or family, and then determine the likely benefits of increased activity.

A simulation model permits the computation of additional net benefits. Rather than just saying what happens if we increase the number of users by 100% and calculate the result, simulation associates probability measures across a range of possible changes, e.g. 10%-500% and calculates the most likely gain in benefits. To illustrate the approach, we can select any shared pathway for which we have known usage patterns. If we ask the question of what would be the benefit of raising the usage of different user groups by varying amounts, we can compute the average benefit most likely to be achieved. Simulation is a widely used routine available in Microsoft Excel.

Table 7: Additional benefits from increased usage of footpaths

Type of user	Number of users	Percentage	Revised number of users	Incremental annual health benefit per person	Incremental Benefit
Regular	76	26.86	90	$2,000	$27,360
Occasional	69	24.38	71	$1,000	$2,070
Infrequently	93	32.86	111	$500	$8,835
Seldom	45	15.90	51	$100	$585
New user			39		
Total	283		322		$38850

An example is presented in Table 7. In column 2, the number of responses are shown and column 3 displays the column 2 numbers as a percentage of all responses. In column 4, an estimated, conservative level of increase in usage for each category recorded in column 1 is recorded. The revised totals are presented in column 4 (for regular 90 = 76*1.18). The incremental health benefits are shown in column 6. For our illustrative purposes, we have based these on the Manchester study mentioned above. Column 6 records the computed benefit. If 14 extra people were to take on regular exercise then this would generate $27,360 per year. Incremental benefits from adding an additional 6 seldom users is much lower. Nevertheless, if additional infrequent users add to the traffic it is likely to give the impression that this is a "good" activity and many may become users that are more frequent. If the numbers are made larger, for example by increasing usage by 1,000 people then the benefit assuming the same usage distribution is close to $1M (1000/[322-283]*38850=$996154 per year).

A practical way to realise these types of benefits with existing assets is the walking bus concept, which is another example of potentially large net benefits in in urban areas where footpaths typically do exist. As obesity becomes an increasing issue among the young healthier lifestyles will reduce health budget growth in the future. If a significant number of pupils were to start walking to school there will be benefits. The walking bus could involve senior citizens from the community, perhaps organised by the schools or respective parents and friends' association, resulting in the benefits being compounded. A coffee voucher for the bus people would be an affordable inducement.

Implications and Recommendations

There are short-term and long-term implications for this research. In the short-term, before appraisal methods are developed, it is recommended that road controlling authorities use tools such as accessibility audits to prioritise new, and to retrofit existing, infrastructure. Analysis of catchment demographics can help RCAs to identify where best practice may be most valuable based on the needs of people likely to use pedestrian and shared networks. The data presented here attest to the health and wellbeing benefits that can be gained by more people walking more often.

In the long-term, it is recommended that more data is gathered to build more sophisticated appraisal models. By developing 'willingness to pay' indicators and deeper understanding of the value of a trip for different sectors of society, the transport industry can work towards more realistic accounting of the benefits and costs of its investment.

Findings from the studies presented here confirm that transport infrastructure and systems, in this case pedestrian networks, including footpaths and road crossings, significantly impact on the wellbeing of individuals and people in general within New Zealand. There are direct private, public and intangible benefits and corresponding costs associated with most choices made in relation to investment in transport, and the benefits of this investment, although not routinely captured in project appraisal, are keenly felt, particularly by the most vulnerable people.

The analysis so far indicates results consistent with theory. It is concluded that footpaths provide private and public benefits. They also provide spillover benefits to other citizens. These benefits can be monetised for specific situations, enabling a more robust investment appraisal. Further research will better define beneficiaries and the nature of investment that enables participation. The US National Bureau of Economic Research (NBER) in Working Paper No. 11530 report the work of Sacerdote and Marmaros (2005) on the benefits of friendships. A telling observation made is that, "This result is consistent with a model in which the expected value of interacting with an unknown person is low (making travelling solely to meet new people unlikely), while the benefits from interacting with the same person repeatedly are high. Geographic proximity and race are greater determinants of social interaction than are common interests, [college] majors, or family background." The way to maximise benefits is to work

from local context and leverage off the infrastructure, networks and people to attain more satisfaction.

It is recommended that the research be shared with RCA representatives to determine the best ways to translate it into meaningful policy and appraisal changes. The research can be usefully extended with more data from a wider range of RCAs. Simulation models can be constructed to estimate the benefits to individuals, communities and the nation from footpaths of specific types, configurations and standards. This evidence can then be used by Road Controlling Authorities to prioritise investment in catchments of interest, and by national governing organisations to inform conversations about the relative importance of investment in different modes of transport.

The evidence suggests that there are big health and social benefits associated with footpaths and increasing the usage will have long-run sustainable savings for the health and welfare budgets. The current tendency to underestimate the benefits of this key infrastructure results from a failure to incorporate the true level of benefits as is increasingly common in Europe and North America.

It is also recommended that the results are shared with other agencies that have an interest in broader health, wellbeing and injury prevention. Current funding models for transport tend to rely on maintenance costs and reduction in reported ‘crash’ outcomes as potential costs and benefits. The benefits alluded to here are much broader than this, warranting shared approaches to accrue mutual benefits across health and social welfare portfolios as direct beneficiaries, but also affecting participation in the broadest range of activities including community amenities and events, education, recreation and leisure, and employment.

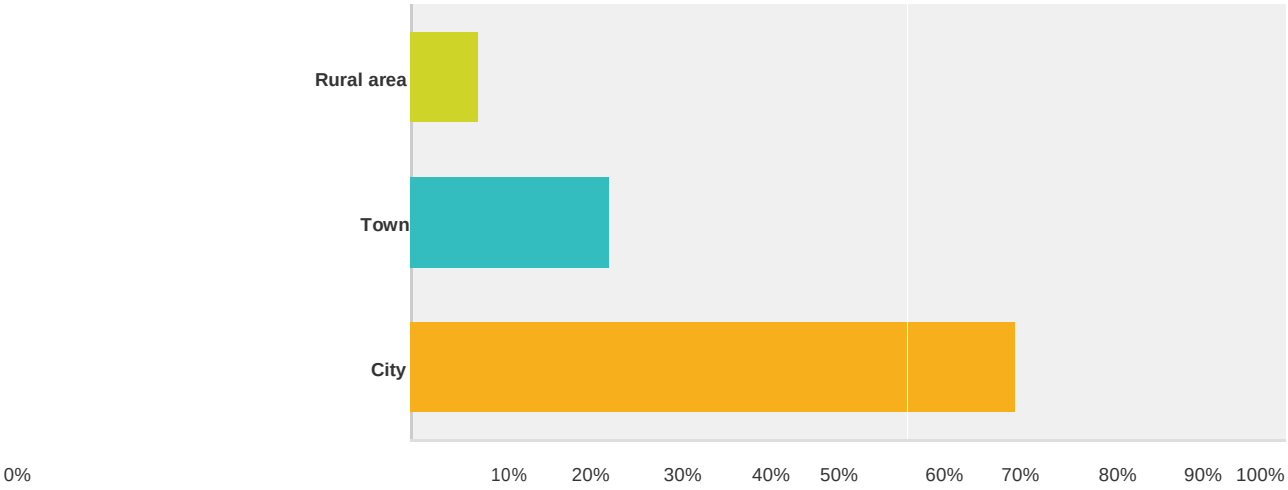
Appendix 1 Shared footpath survey questions

Q1 Please enter your age as a number in years (e.g. 35)

Answered: 431 Skipped: 7

Q2 Do you live in a rural area, in a town or in a city?

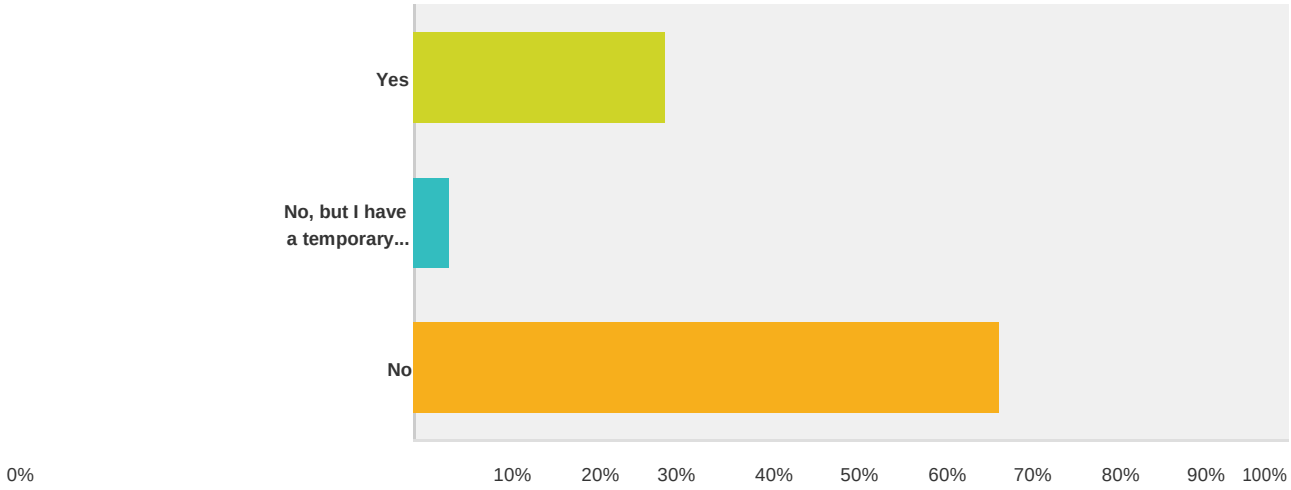
Answered: 438 Skipped: 0



Answer Choices	Responses	
Rural area	7.76%	34
Town	22.83%	100
City	69.41%	304
Total		**438**

Q3 Do you have a long-term disability (lasting 6 months or more) that stops you from doing everyday things other people can do?

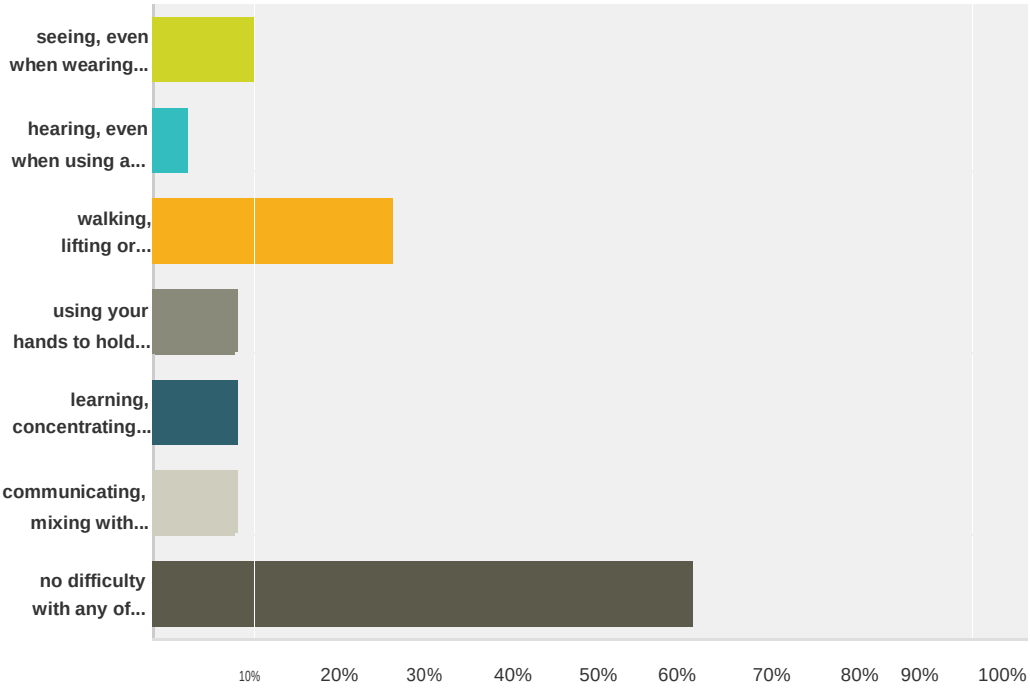
Answered: 437 Skipped: 1



Answer Choices	Responses	
Yes	28.83%	126
No, but I have a temporary disability at the moment	3.89%	17
No	67.28%	294
Total		437

Q4 Mark as many spaces as you need to answer this question. Does a health problem or a condition you have (lasting 6 months or more) cause you difficulty with, or stop you from:

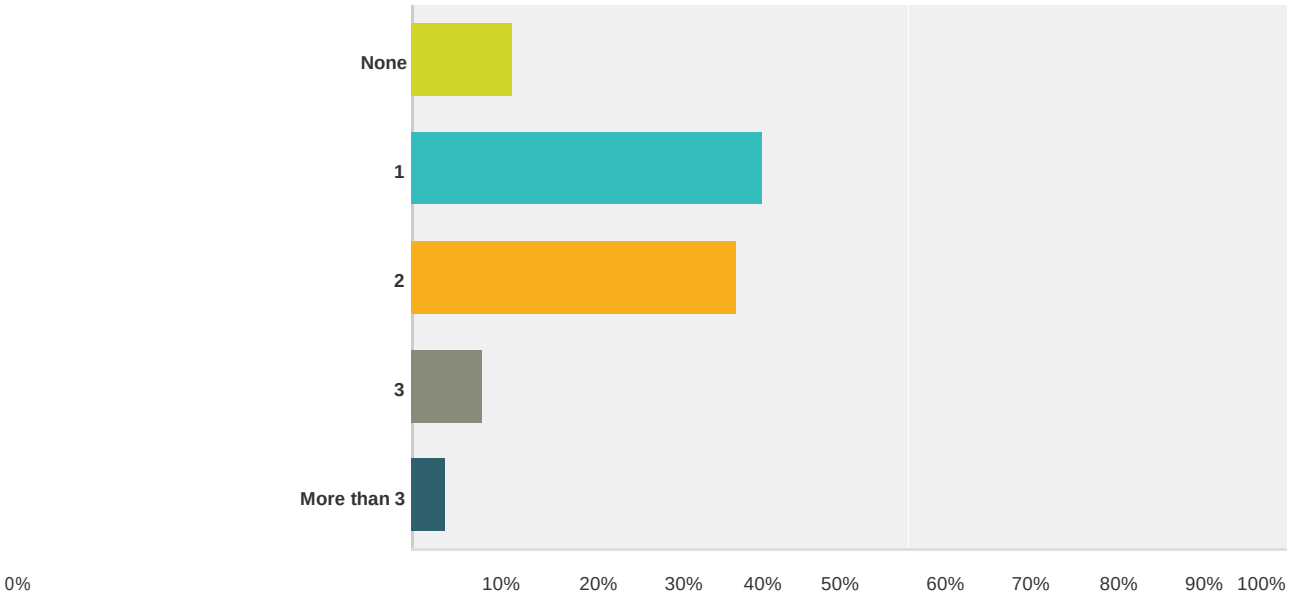
Answered: 420 Skipped: 18



Answer Choices	Responses	
seeing, even when wearing glasses or contact lenses	11.67%	49
hearing, even when using a hearing aid	4.05%	17
walking, lifting or bending	27.62%	116
using your hands to hold, grasp or use objects	8.57%	36
learning, concentrating or remembering	8.33%	35
communicating, mixing with others or socialising	9.52%	40
no difficulty with any of these	61.90%	260
Total Respondents: 420		

Q5 How many motor vehicles (not counting motorbikes, mobility scooters or farm vehicles) do the people who live at your home have available for their use?

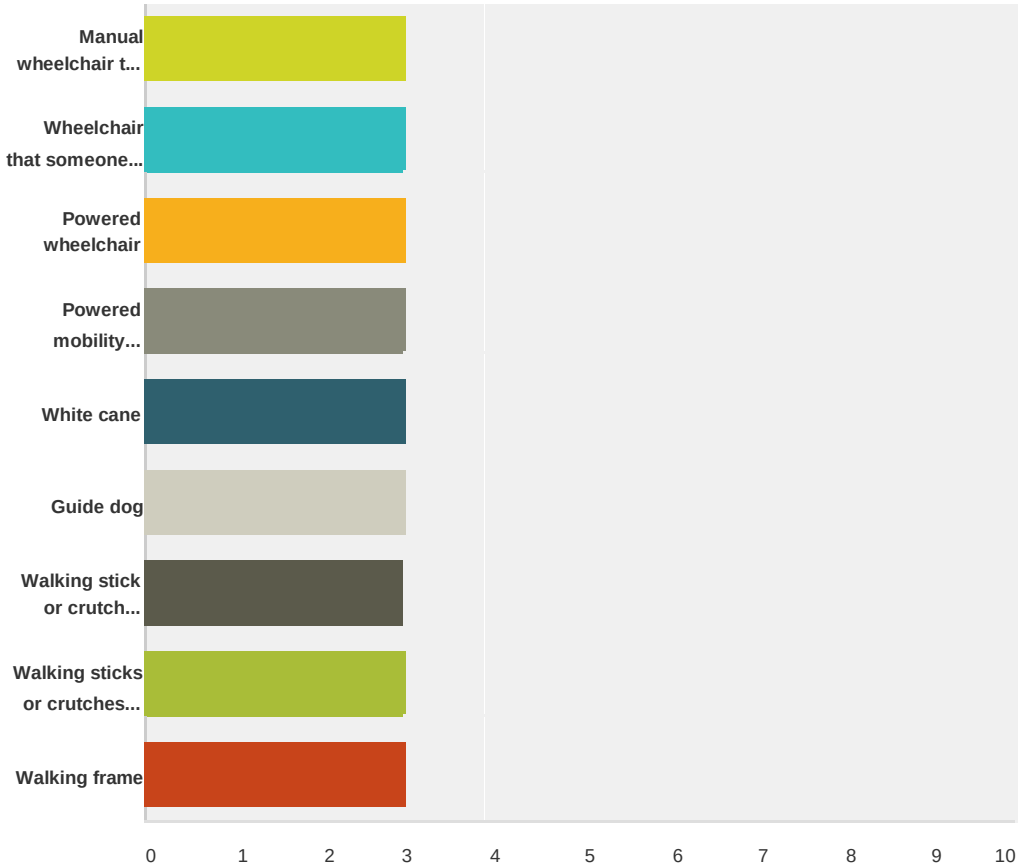
Answered: 437 Skipped: 1



Answer Choices	Responses	
None	11.21%	49
1	40.05%	175
2	37.07%	162
3	8.01%	35
More than 3	3.66%	16
Total		**437**

Q6 Do you use any of the following mobility aids when you are out of the house?

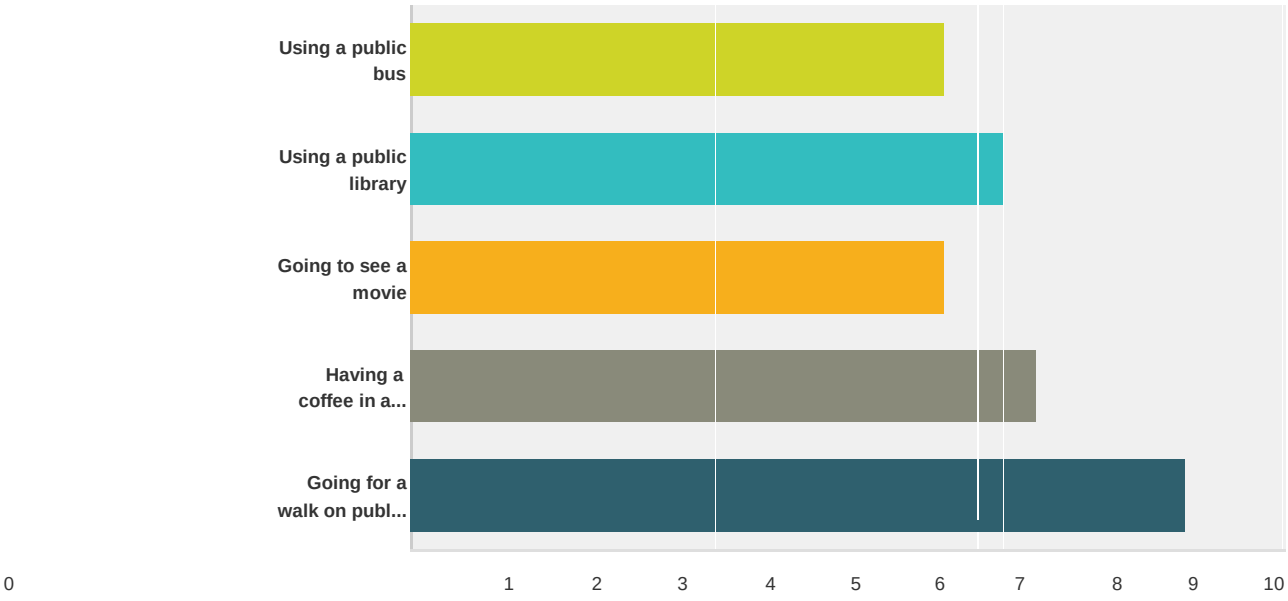
Answered: 410 Skipped: 28



	Yes, all the time	Yes, sometimes	No	Total	Weighted Average
Manual wheelchair that I push myself	**2.69%** 10	**2.42%** 9	**94.89%** 353	372	2.92
Wheelchair that someone else pushes	**1.09%** 4	**2.73%** 10	**96.17%** 352	366	2.95
Powered wheelchair	**4.30%** 16	**1.08%** 4	**94.62%** 352	372	2.90
Powered mobility scooter	**1.09%** 4	**2.72%** 10	**96.19%** 353	367	2.95
White cane	**3.50%** 13	**2.16%** 8	**94.34%** 350	371	2.91
Guide dog	**1.11%** 4	**0.28%** 1	**98.61%** 355	360	2.98
Walking stick or crutch (single)	**2.44%** 9	**6.78%** 25	**90.79%** 335	369	2.88
Walking sticks or crutches (two at once)	**1.10%** 4	**2.48%** 9	**96.42%** 350	363	2.95
Walking frame	**1.93%** 7	**1.93%** 7	**96.14%** 349	363	2.94

Q7 On a scale of 1-10 where 10 = "very valuable" and 1 = "not at all valuable", please say how much you value the following activities for yourself:

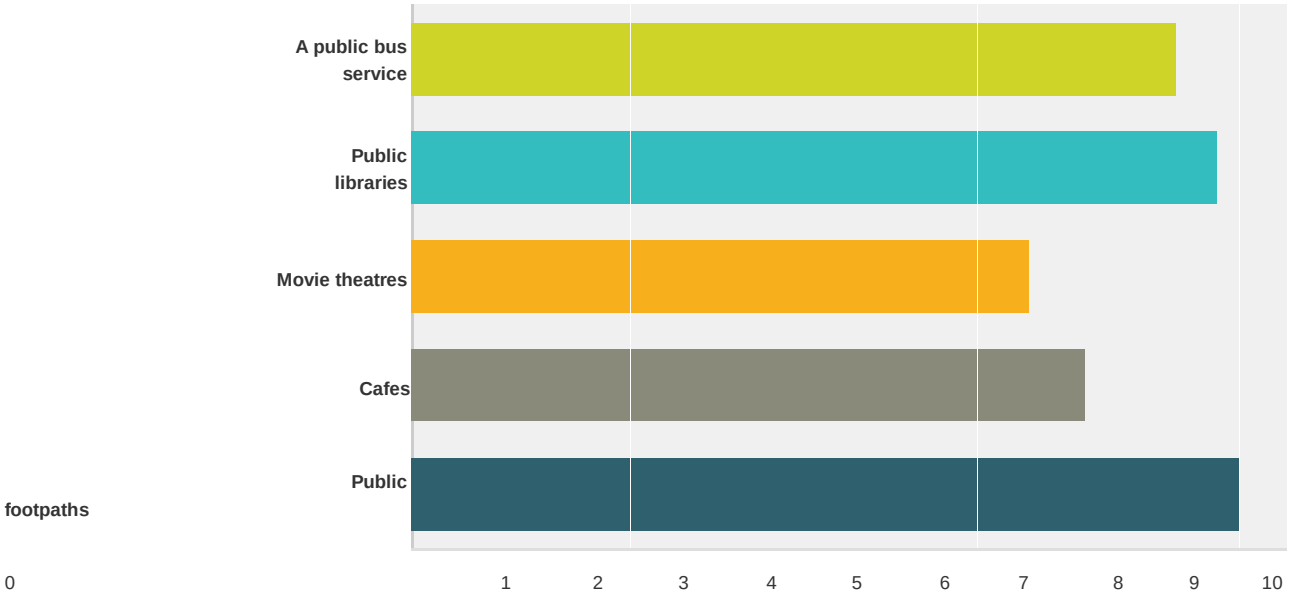
Answered: 399 Skipped: 39



Answer Choices	Average Number	Total Number	Responses
Using a public bus	6	2,343	389
Using a public library	7	2,699	395
Going to see a movie	6	2,376	393
Having a coffee in a cafe	7	2,850	397
Going for a walk on public footpaths	9	3,530	397
Total Respondents: 399			

Q8 On a scale of 1-10 where 10 = "very valuable" and 1 = "not at all valuable", please say how much you value the following activities for society in general:

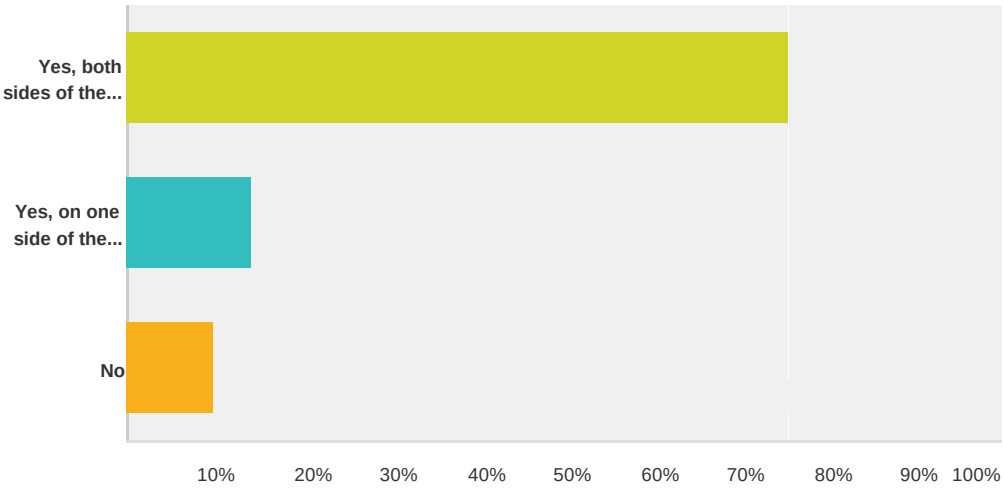
Answered: 396 Skipped: 42



Answer Choices	Average Number	Total Number	Responses
A public bus service	9	3,464	394
Public libraries	9	3,637	393
Movie theatres	7	2,799	394
Cafes	8	3,040	394
Public footpaths	10	3,767	396
Total Respondents: 396			

Q9 Is there a footpath on the street where you live?

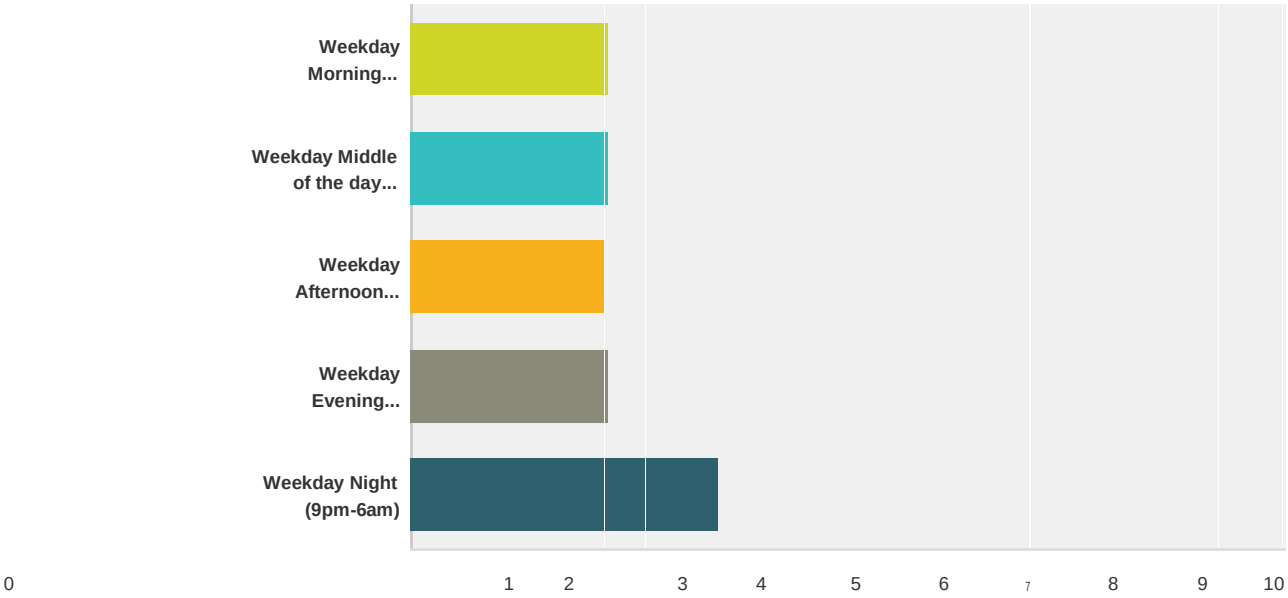
Answered: 387 Skipped: 51



Answer Choices	Responses	
Yes, both sides of the street	**76.23%**	295
Yes, on one side of the street	**13.95%**	54
No	**9.82%**	38
Total		**387**

Q10 What times of the day are you most likely to use footpaths (any footpaths) on weekdays in Summer?

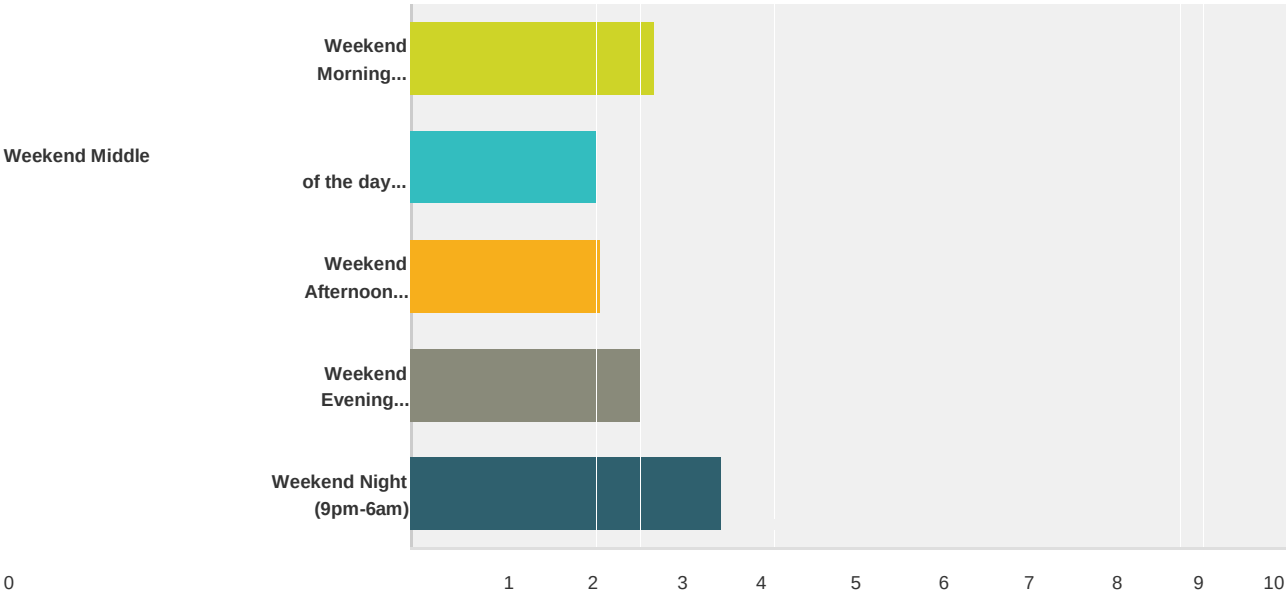
Answered: 386 Skipped: 52



	Most weekdays	A few times per week	A few times per month	Rarely	Never	Total	Weighted Average
Weekday Morning (6am-9am)	**46.09%** 165	**19.55%** 70	**14.80%** 53	**13.13%** 47	**6.42%** 23	358	2.14
Weekday Middle of the day (9am-2pm)	**40.23%** 142	**31.44%** 111	**10.48%** 37	**13.88%** 49	**3.97%** 14	353	2.10
Weekday Afternoon (2pm-5pm)	**39.55%** 142	**30.36%** 109	**15.60%** 56	**12.26%** 44	**2.23%** 8	359	2.07
Weekday Evening (5pm-9pm)	**34.07%** 123	**27.98%** 101	**20.50%** 74	**15.24%** 55	**2.22%** 8	361	2.24
Weekday Night (9pm-6am)	**5.01%** 17	**13.86%** 47	**22.42%** 76	**40.12%** 136	**18.58%** 63	339	3.53

Q11 What times of the day are you most likely to use footpaths (any footpaths) on weekends in Summer?

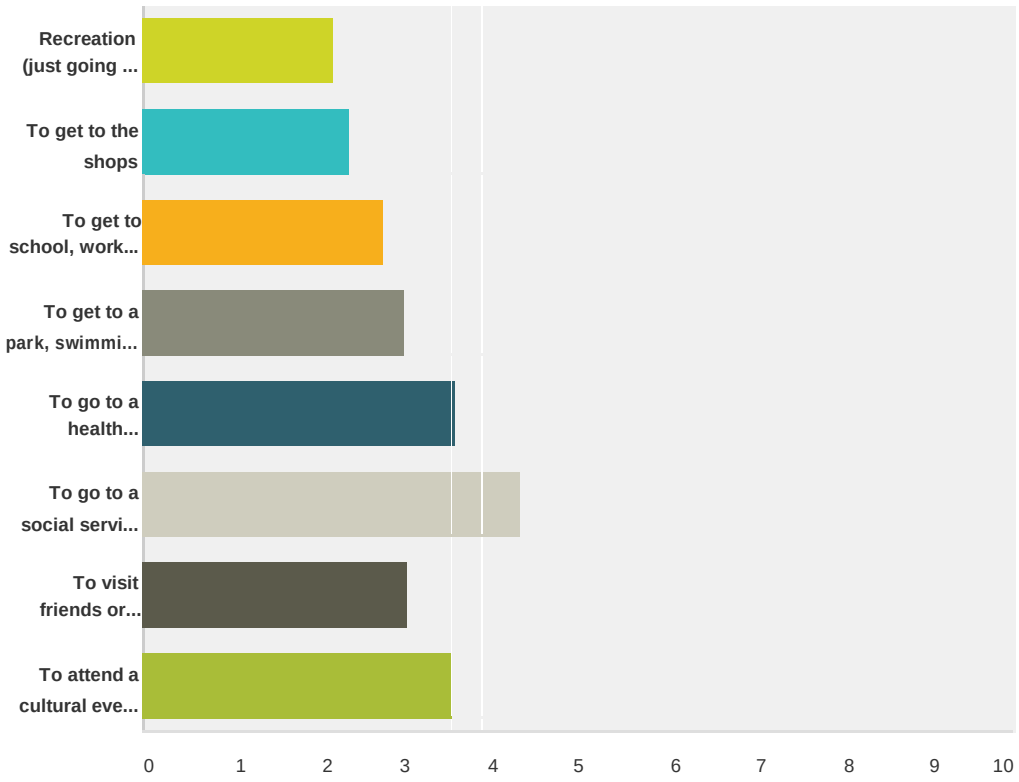
Answered: 386 Skipped: 52



	On both days of most weekends	On one day of most weekends	On one weekend day a few times per month	Rarely	Never	Total	Weighted Average
Weekend Morning (6am-9am)	**22.51%** 79	**21.37%** 75	**19.37%** 68	**29.06%** 102	**7.69%** 27	351	2.78
Weekend Middle of the day (9am-2pm)	**38.57%** 140	**31.40%** 114	**18.73%** 68	**10.19%** 37	**1.10%** 4	363	2.04
Weekend Afternoon (2pm-5pm)	**32.04%** 116	**33.15%** 120	**22.38%** 81	**11.60%** 42	**0.83%** 3	362	2.16
Weekend Evening (5pm-9pm)	**19.72%** 71	**26.94%** 97	**25.28%** 91	**24.72%** 89	**3.33%** 12	360	2.65
Weekend Night (9pm-6am)	**5.28%** 18	**13.49%** 46	**21.70%** 74	**40.18%** 137	**19.35%** 66	341	3.55

12 What do you use footpaths for (any footpaths)?

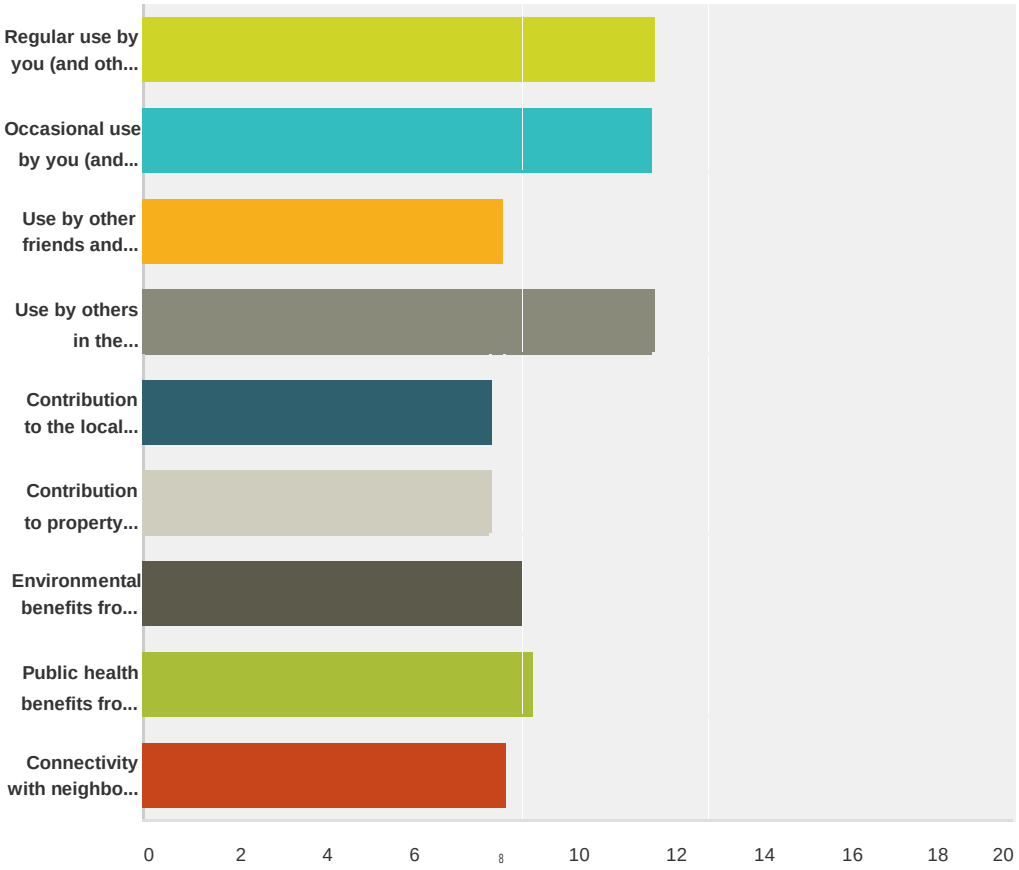
Answered: 388 Skipped: 50



	Most days	A few times per week	A few times per month	Rarely	Never	Total	Weighted Average
Recreation (just going for a walk)	**31.38%** 118	**34.31%** 129	**21.01%** 79	**10.37%** 39	**2.93%** 11	376	2.19
To get to the shops	**23.31%** 86	**33.60%** 124	**29.27%** 108	**11.38%** 42	**2.44%** 9	369	2.36
To get to school, work or study	**39.15%** 139	**11.83%** 42	**8.73%** 31	**15.77%** 56	**24.51%** 87	355	2.75
To get to a park, swimming pool or library	**12.29%** 44	**24.58%** 88	**32.96%** 118	**21.51%** 77	**8.66%** 31	358	2.90
To go to a health appointment (doctor, dentist, physio etc)	**3.05%** 11	**6.93%** 25	**32.96%** 119	**44.60%** 161	**12.47%** 45	361	3.57
To go to a social service appointment (e.g. WINZ)	**2.26%** 8	**1.98%** 7	**6.78%** 24	**38.98%** 138	**50.00%** 177	354	4.32
To visit friends or family	**9.24%** 34	**23.10%** 85	**35.87%** 132	**20.65%** 76	**11.14%** 41	368	3.01
To attend a cultural event such as a club or church meeting	**4.71%** 17	**13.02%** 47	**29.92%** 108	**32.41%** 117	**19.94%** 72	361	3.50

Q13 On a scale of 1-10, please say how much you value the following (possible) benefits of a footpath on your street:

Answered: 365 Skipped: 73



Answer Choices	Average Number	Total Number	Responses
Regular use by you (and others in your household)	12	4,212	363
Occasional use by you (and others in your household)	12	3,923	339
Use by other friends and relatives	8	2,831	347
Use by others in the community	12	4,136	353
Contribution to the local economy (by enabling economic activity)	8	2,799	348
Contribution to property attractiveness and value	8	2,805	352
Environmental benefits from more people walking	9	3,120	357
Public health benefits from more people walking	9	3,194	357
Connectivity with neighbours (adding to a sense of community)	8	2,961	356
Total Respondents: 365			

Q14 On a scale of 1 to 10 where 10 = "Very valuable" and 1 = "Not at all valuable", how much would you value the following changes in footpaths on your street for all the people who use them?

Answered: 361 **Skipped: 77**

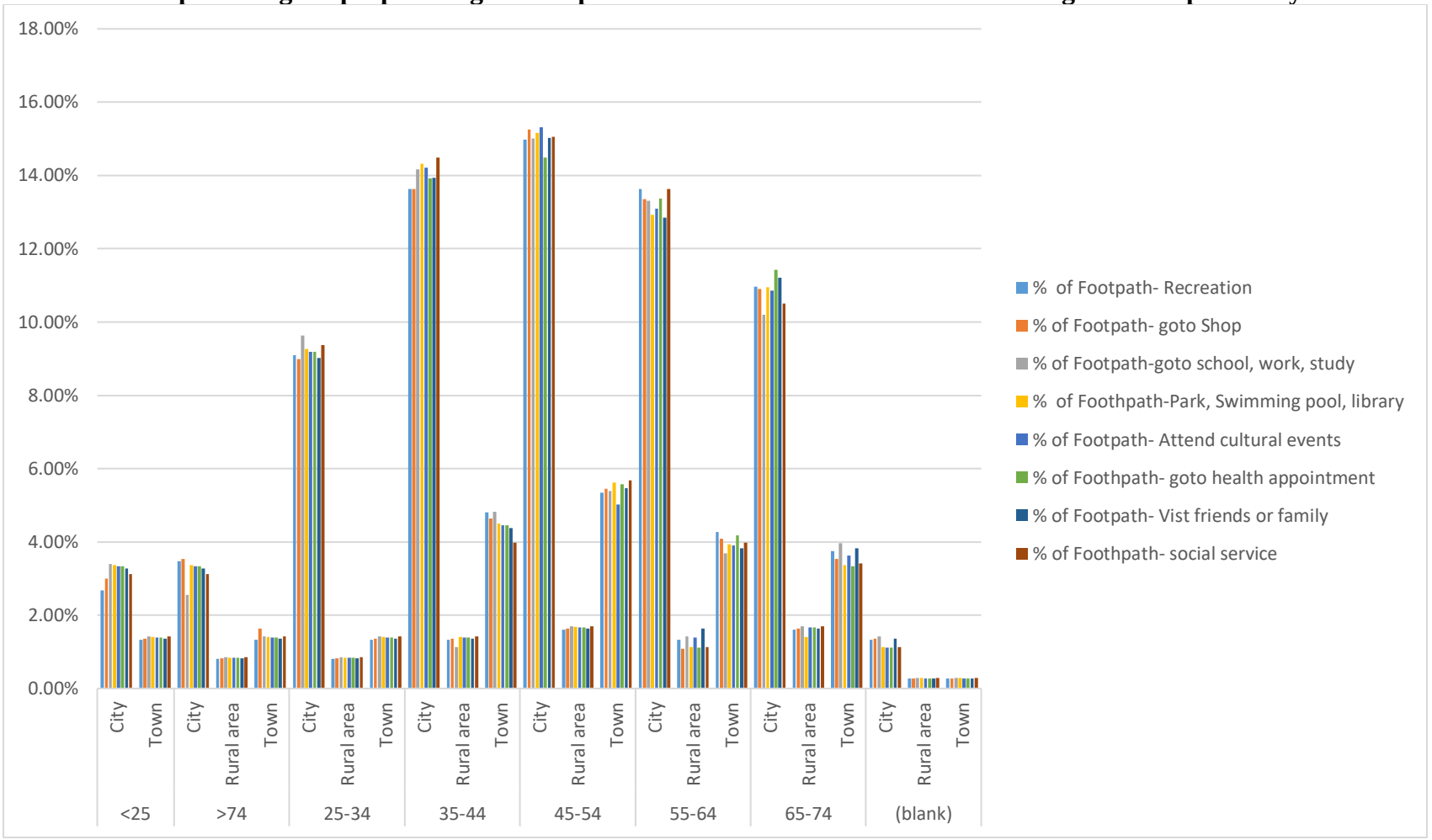
Answer Choices	Responses	
Smoother footpath	**99.17%**	358
More visibility around driveways	**97.51%**	352
More kerb cut downs (places to cross the road for people using small wheels such as children's' scooters, wheelchairs or prams/buggies)	**98.34%**	355
Easier gradients	**97.78%**	353
Wider footpath (without legal footpath cycling)	**97.51%**	352
Wider footpath (designated as a shared path so that cycles can use it)	**98.06%**	354

Q15 If you have any other comments about footpaths please enter them here.

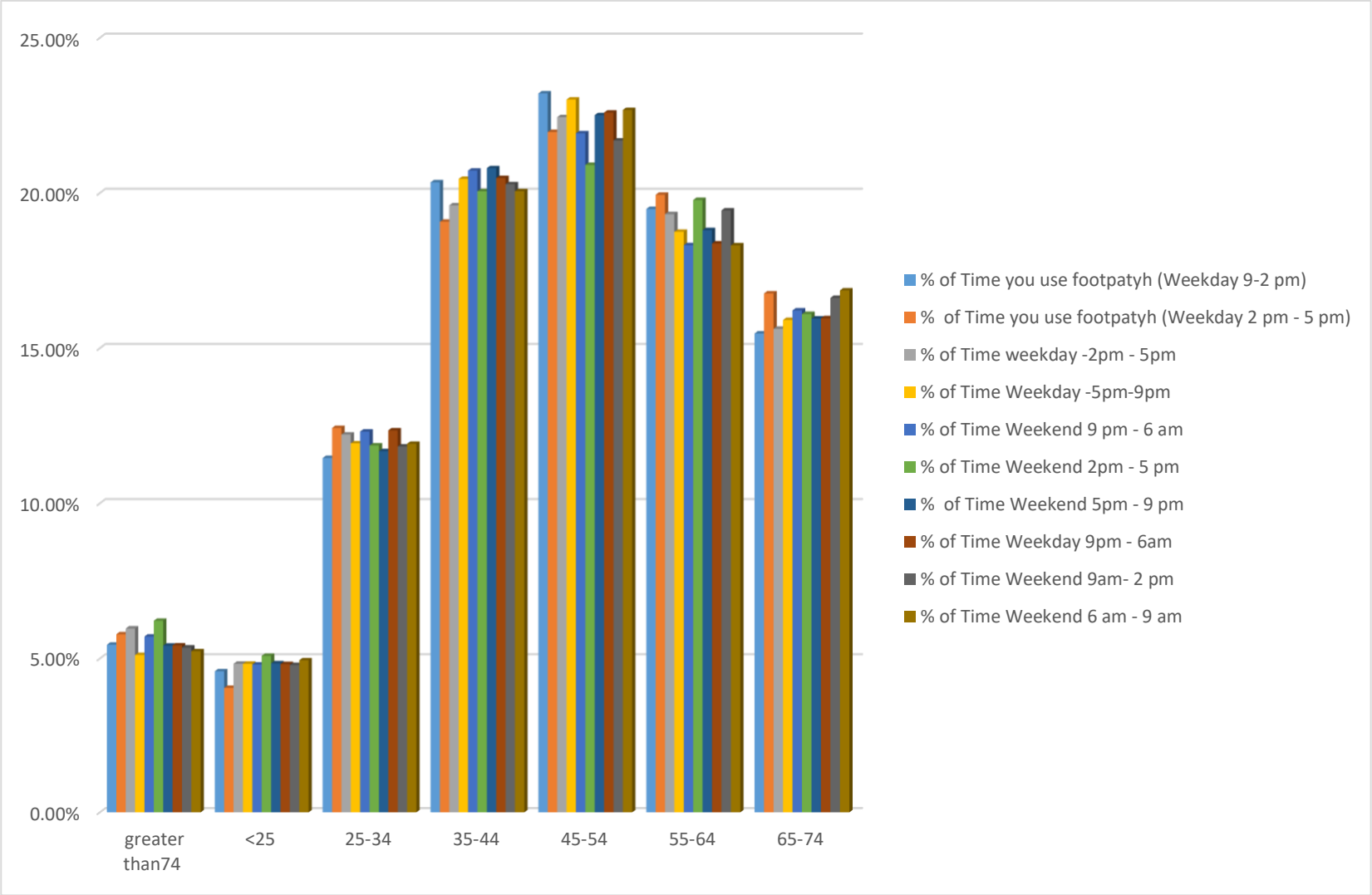
Answered: 205 **Skipped: 233**

Appendix 2 Pivot Charts for Survey Questions

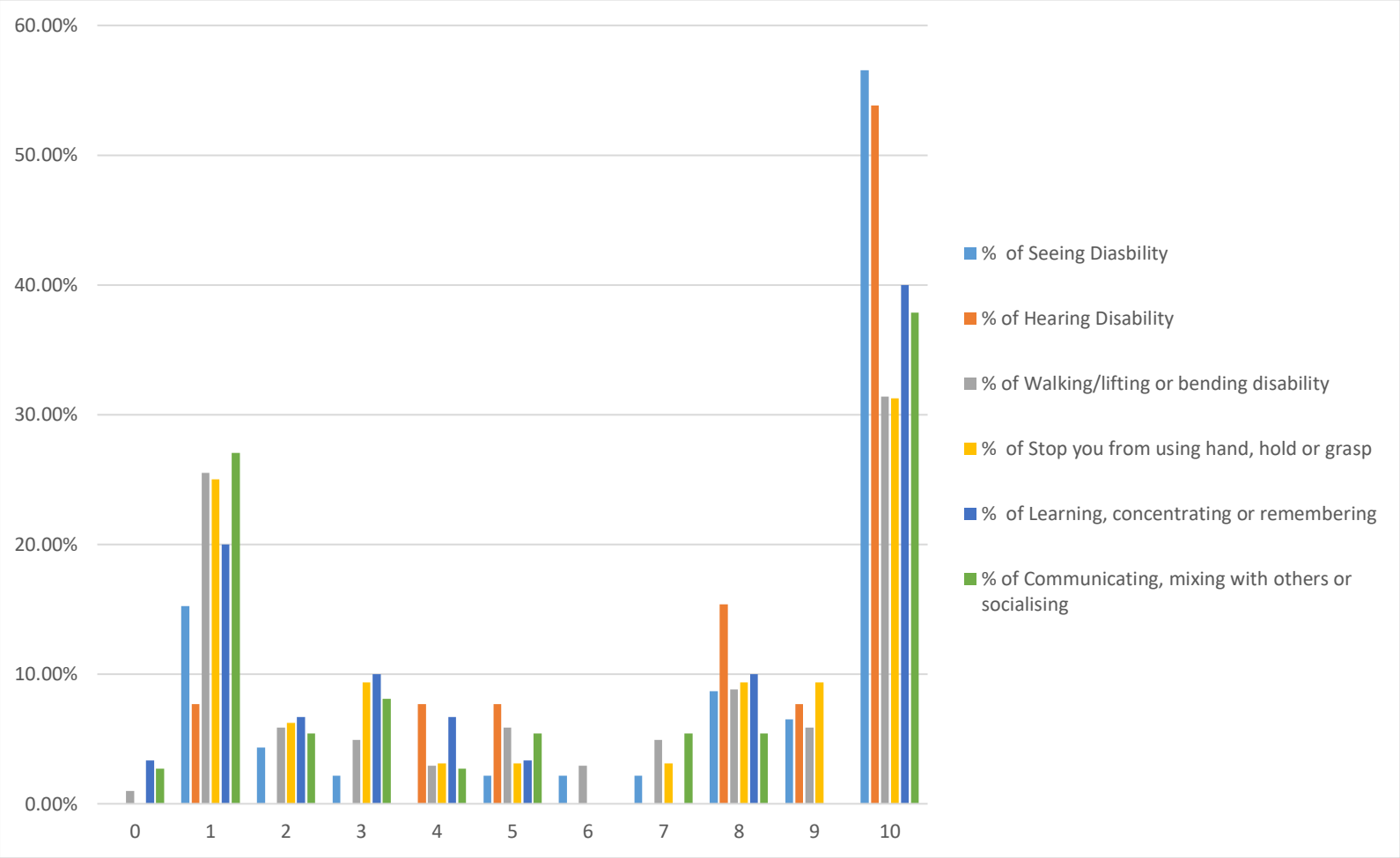
Pivot chart for percentage of people using the footpath for various activities based on their age and the place they live



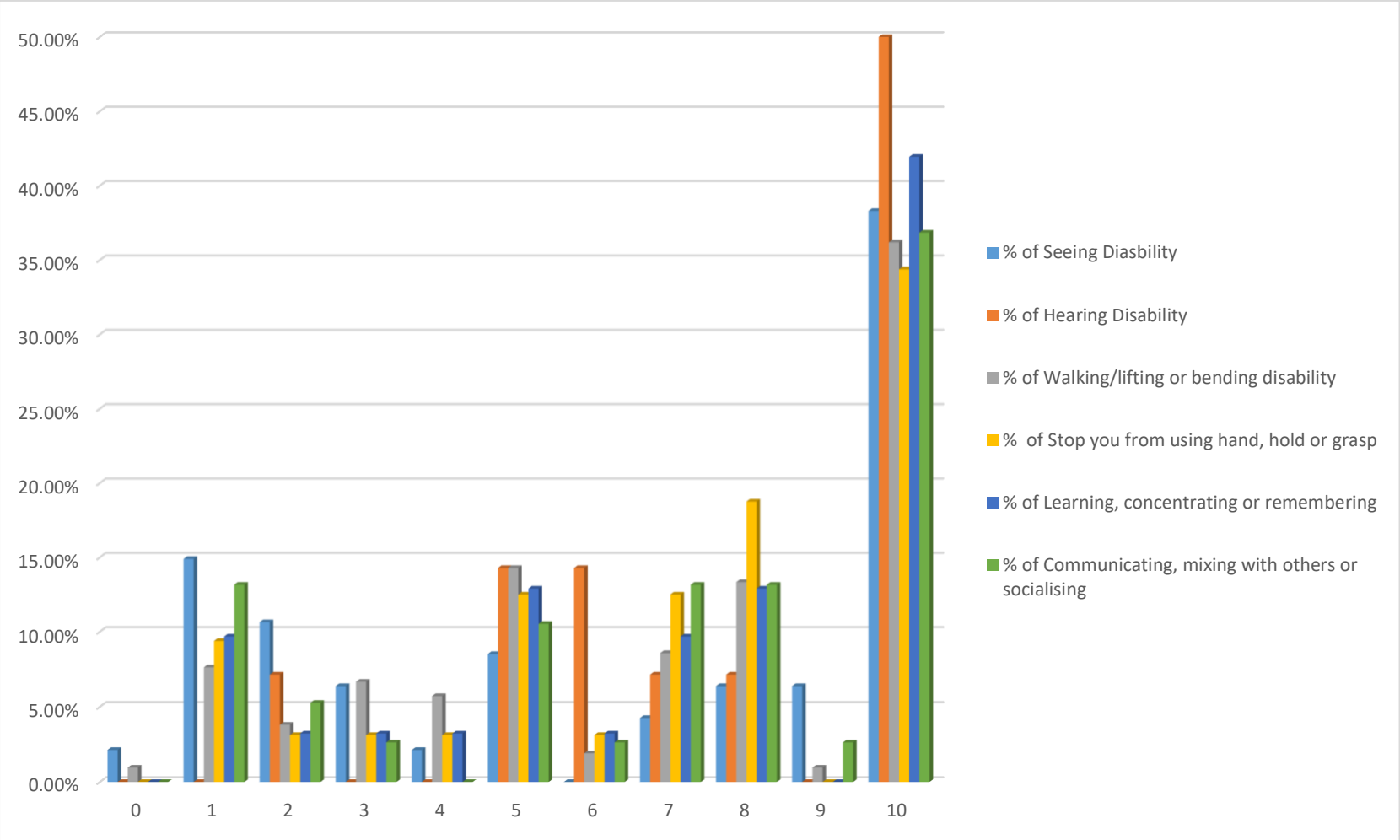
Pivot chart for percentage of people of various age group who used footpath during different time of the day



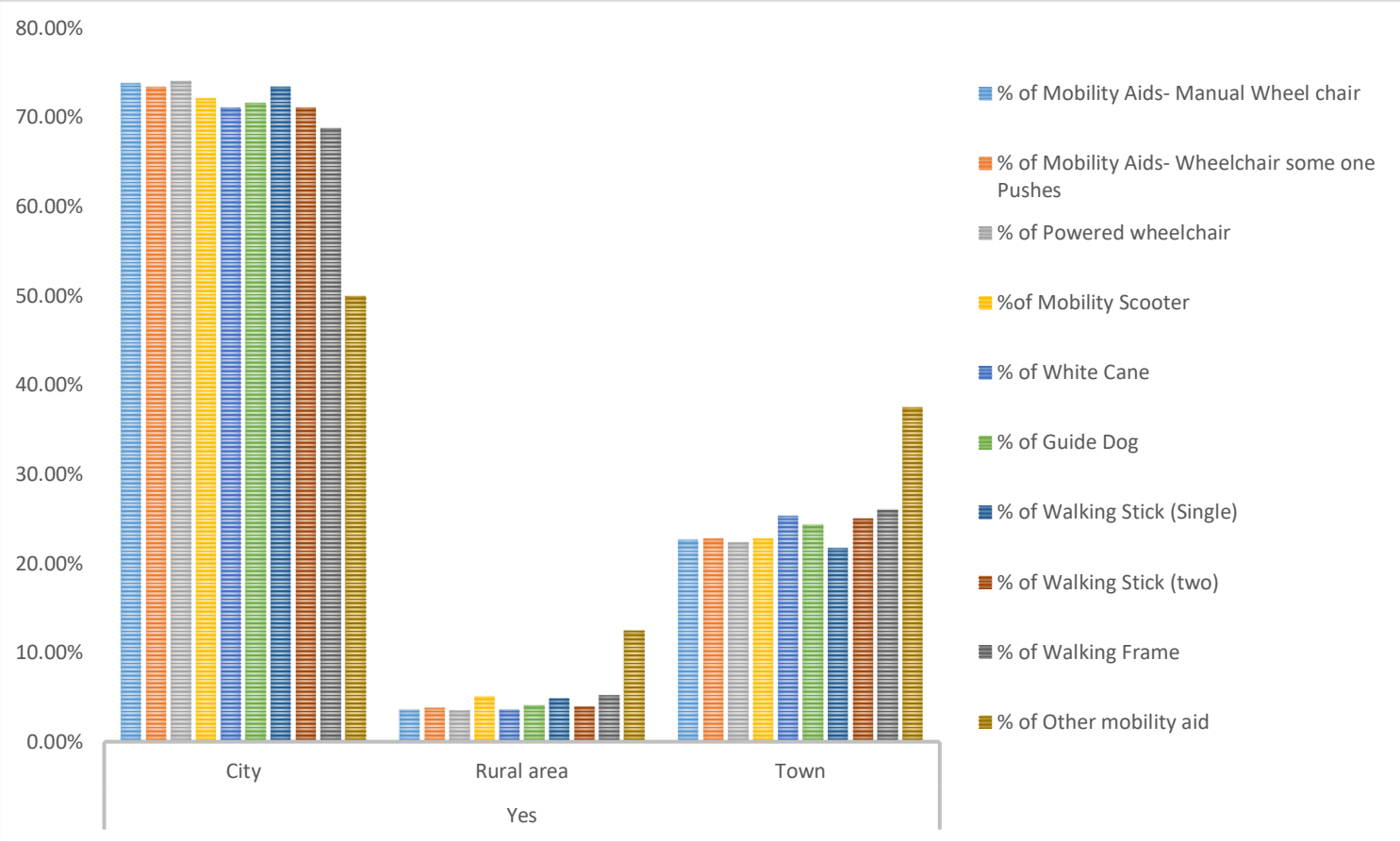
Pivot chart for percentage of people with various disabilities and who have public bus service strong themselves



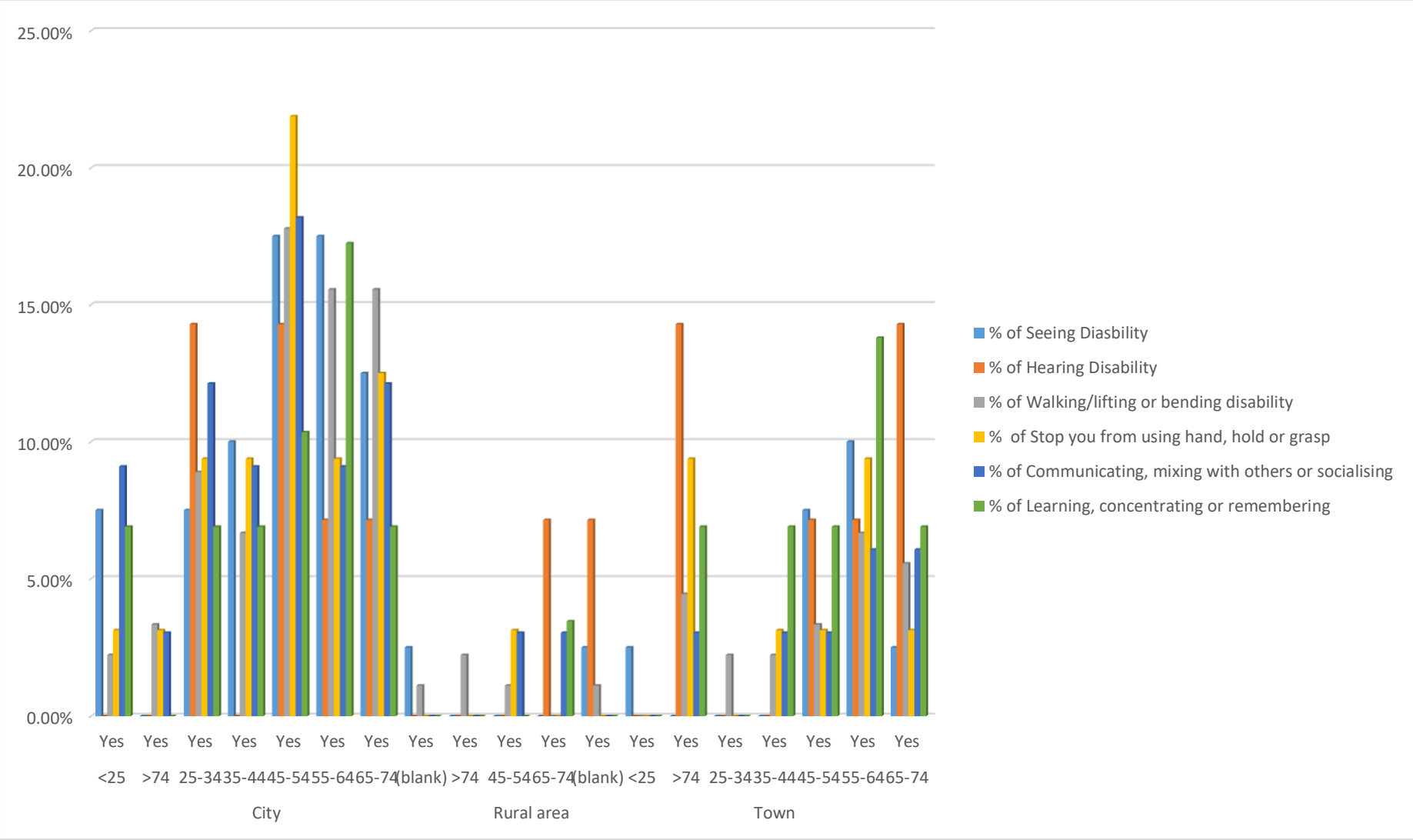
Pivot chart for the percentage of people who value public library strong yourself with various disabilities



Pivot chart for the people who have long-term disability and as per their residence area



Pivot chart for the people with long term disability as per their age group



Appendix 3 Focus Group notes

Date: 07-11-2016
Duration: 10:15 – 12:08

1. What do you use footpaths for?

The focus group answered this question one by one, to give them the opportunity to talk a bit about themselves in this context of mobility with the first question put generally. The direct answers to the question are that all people are dependent on footpaths, someone specifically said it "I can't avoid footpaths" and another person said it in the way of footpaths being the main infrastructure for them to get around. But a lot of people were not fond on the quality of the footpaths. The footpaths are used for everyday usage like:

- Walking the dogs
- Going to places you know
- Getting more confident in area you know
- Shopping
- Social neighbourhood talk/walk
- Railway crossing
- Access to buildings
- A to B
- Getting to bus stops/PT
- Park
- Library
- Playing with children in playground
- Visit friends/family
- Visit the supermarket

2. What would make you choose between different footpaths?

The focus group could answer this question in a conversation-like way. All people did participate in the conversation. I asked deeper understanding questions when I felt necessary or asked for extra context or confirmation on statements. Or I asked if an opinion was shared among the other group members. The following factors were brought up when answering the questions what footpath would be favourable:

If the footpath is in an isolated area, there is a little chance that you would find help if you need, so that makes footpaths in isolated areas less favourable.

Another person mentioned that at certain times of a day some footpaths can get crowded because of children/school times or business in town centres. One person said to avoid some footpaths when he/she expect a lot of people on the path. Another person indicated that the school children next to his home were curious and treated him with respect because they were taught to do so and brought up with the understanding why they need to do so. Despite this example, in general the lack of education was shared among the focus group members of being the one reason that it is sometimes hard to move around. People are not seemingly consciousness about people with disabilities, sometimes the disability itself is not visible to the public or sometimes people bully disabled persons or just don't seem to bother on some basic manners. This makes more people in an area being a reason for avoiding that area/footpath.

Another reason is given around the infrastructural features. The steep ramps or kerbs are sometimes too hard to overcome in a wheelchair. Another issue is around steep hills/gradient and unexpected sags, tile misplacements or depths. Also manoeuvring into a crossing area can be quite difficult with the placement of poles and the ramps (and their steepness). The surface features (gravel, concrete etc.) are also a factor. When the surface is rough or slippery people don't feel comfortable in walking/going over them. The car volumes and speed environment are also taking into account when choosing a footpath to walk along a street. If the area is a high speed environment with a lot of traffic, the safety deteriorates. Other factors of safety deterioration are:

- maintenance going on
- untrimmed trees

- driveways with high fences
- tree roots making the footpath rocky
- lot of driveways (cars don't expect/see you till latest moment; scooters are not hearable)
- get across in haste because cars don’t stop, or stop long enough, even at zebra crossings
- roundabouts are not crossable
- glass on footpaths
- zebra crossings are still unsafe (placement of crossing)
- closing (parts of) footpaths (so the people may need to use (less favoured) other footpaths, but might not able to find suitable footpaths for all needs of the disabled persons within a reasonable distance and safety perception)
- bicycles racing through on footpaths
- potholes, kerb cuts
- weather (wind, rain)
- slippery roads
- number of detours needed, energy saving mode is always a priority
- people look into their phones, don't take notice of you (in time) which makes them a hazard as well

If the issue is too risky in terms of safety or comfort, than a lot of the focus group members indicated they would make a (number of) detour (s) to avoid the particular hazard.

People with disability tend to learn their walking area by hard in order to not having to assess every little detail of the infrastructure again and again to make the trip in a safe manner. It is not worth for them to take the risk, since they will be in severe trouble when they fall down or get stuck (in crossings).

A lot of planning is involved before disabled people go out, moving is for them not a spontaneous matter. The energy saving and safety (not taking risks) is for them the highest perceived value of when getting to their goal. Their trips are goal oriented and they can usually not relax up to the point that they are where they need to be “up straight”. Unknown areas are rather avoided. Unexplored areas are rather explored by car than by foot.

The inconsistency of tactile placement is for visibility impaired persons a reason to not rely

on them.

3. Are there any reasons you would stay home rather than complete a journey using footpaths?

The focus group members indicated that for them it is always a trade-off between safety and social engagement. Some visits have to be made, but if the issue of getting somewhere is too risky people in the focus group tend to opt for another route go with another mode (car/taxi). They indicate that in any case they always need to plan ahead carefully when going somewhere, which takes away spontaneity nor do they go somewhere to wander, but only with a purpose. Planning and the effort when moving makes you real tired.

For some people in the focus group the weather is significant in deciding on whether or not to make the trip. The weather influences the road surfaces, slipperiness; wind can be an issue for staying straight as well as for visibility. For example, if the ground gets wet it loses some of its potential to indicate the surface features. Sometimes people need therefore to delay their trips.

A person indicated that people with disability should be prepared to ask for help, so making their choices easier.

4. What do you think of footpaths that are shared with bicycles?

This was not favoured by the focus group members., because:

- people are not consciousness
- bicycles racing past you
- bicycles parked on footpaths
- bicycles don't belong on footpaths, why not separate those modes?
- people won't move out of your way

5. Have you had any experiences with footpaths blocked or changed because of roadworks?

All focus group members said collegiately "yes". They stated that roadworks, also on footpaths, are ongoing. Though some thoughts were shared on the bad quality of footpaths and the need to maintain them better. A trade-off is needed between safety and effort of the detour because of roadworks.

On roadworks a lack of information is shared with public on what is going to be changed and planned for when and especially what that entails for the temporary footpaths. No details are provided on the temporary road arrangements beforehand (physically on the spot or in approaching the spot nor digital/information-wise). Roadworks are never being announced when they concern footpaths

It has to be taken in mind that a sign is not readable for everyone and that poles with bars are too high for cains, so missed holes are missed easily. Poles are usually places right at the edge of the whole, so with previous statement, could go wrong easily.

Further issues were raised on that signs are often not clear and confusing. Planners seem not to take notice that a detour is not always possible the way they are being proposed (high kerbs/steep/unsafe crossings or too many crossings (safety issue). Or the provided ramp is too steep to go over a whole/rocky surface. It seems that signs for roadworks and closure of footpaths are not put ahead for efficient detour of pedestrians.

It is noted by the focus group that workers at the location are not always prepared to help a hand. Or if they are they aren't there every moment of the day.

Planning is hard when there are roadworks because roadworks tend to change a lot because of weather dependency. Another issue is that cars are often parked on the footpath, not only during roadworks. Sometimes impossible to make a small detour because of safety issues or kerb issues (get stuck). Pedestrians need extra care in facilitating them an efficient and effective detour with effective when roadworks are ahead.

A person shared that when acknowledging on high dependency of footpath because of a person living close with a disability, no care of that is taken it seems. They just ignore the

message. Or they tend to help, but actually don't (too steep ramp or not there every time of the day to lift people out of the sewage).

6. Other related shared thoughts, which are broader than the focus of the questions are recorded here:

When disabled persons need different things on their route, so often social walking is not possible and a lot of planning involved to find overlapping route, which is safe for both. This may mean a detour of 1.5 hours in order to stay together while moving.

You need to plan also for energy saving reasons, you get tired of assessing new environments continuously in that detail.

Education is lacking to teach to understand mobility impaired persons better and understand the base behaviours on social interaction why you have to give priority to them on the streets and stand up to let them seat etc.

Social attitude for people age 40 was taught not to interact with people with disability and not to stare, so “no one” of around those ages understands because they don't know anyone with a disability.

Disability becomes part of your identity.

Disability always needs explaining, it's not bad to explain except for when you are not letting to (because of social taught attitude of not asking 'difficult' questions).

People can get real mean and bully mobility impaired persons, not only kids or teenagers but also drivers.

Driveways with parked cars often block access to footpaths.
All areas I want to go are reachable by footpaths

Taxis often don't take disabled people or taxis take you only for longer trips.

Driving for getting to unknown areas is preferred over walking/using footpaths.

Often crossing for pedestrians are in wrong placement in relation to walking direction/desire lines and you find yourselves needing to do a little detour (which costs energy) to cross at the aimed crossing. But another option is usually not there for disabled persons because of the safety risk it involves.

The level of stress during crossing or walking is usually very high.

You have to look to the ground when walking, not safe in general and not enjoyable.

People tend to not move out of your way, especially because they do not walk consciousness or don't understand your disability and limited range of flexibility and often don’t understand your planning issue.

Mitigating measures for not disabled people for watching their phones when crossing:

- Flashing lights at a crossing for people not watching where they go

Another issue is that cars are often parked on the footpath, not only during roadworks.

Appendix 4 Sources of economic Benefit

Class of benefit	Type of benefit	Beneficiary	Description	Quantification	Monetisation
Use	Mobility	People with disability	Easier access to destination	Demand analysis ● Gravity index ● Isochronic index	Willingness to pay/accept
Use	Mobility	People with disability	Time saving	Demand analysis ● Gravity index ● Isochronic index	Willingness to pay/accept
Use	Mobility	People with disability	Improved health (BB: health appointments and/or health benefits of active travel and/or mental health and wellbeing benefits of participation?) Can add these as separate bullets. We need to be able to associate dollar values in the end so may choose to show as items but aggregate against index.	● Quality of life index	Willingness to pay/accept
Use	Mobility	People without disability	Easier access to destination		Willingness to pay/accept
Use	Mobility	People without disability	Time saving		Willingness to pay/accept
Use	Mobility	People without disability	Improved health		Willingness to pay/accept
Use	Quality of time spent	People with disability	Increased comfort		Willingness to pay/accept
Use	Quality of time spent	People with disability	Increased convenience		Willingness to pay/accept
Use	Quality of time	People with	Reduce stigma harms		Willingness to

	spent	disability			pay/accept
Use	Quality of time spent	People without disability	Increased comfort		Willingness to pay/accept
Use	Quality of time spent	People without disability	Increased convenience		Willingness to pay/accept
Use	Safety	People with disabilities	Reduced fatalities, injuries, property damage	Demand & incident analysis	Contingent valuation
Use	Macroeconomic	Society	Participation in: ● Labour market ● Education	Input-output analysis	Direct, indirect & induced GDP changes
Non use	Cross sector	Society	Social service agency	Demand and budget analysis	Budget resource saving
	Option value	Society	Insurance	Stated preferences and willingness to pay	Contingent valuation
	Existence value	Society	Civil society	Stated preferences	Contingent valuation
Capability		People with disabilities	Access to freedom through process ● Political ● Judicial	Periodic randomised sample	Change in participation rate
		People with disabilities	Increased life opportunities	ditto	Change health wellness index
		People with	Feeling of greater inclusiveness		Change in

		disabilities			Subjective well-being index
Capability		People with disabilities	Increased life opportunities: this is a big category, I'm thinking ability to choose a different supermarket; ability to find out about jobs and get to them; increased education choices; increased opportunities to volunteer	Some of these could be bullets under "Increased life opportunities"	

References:

ECT Charity (2016) *Why community transport matters* – report by Deloittes and ECT Charity staff Geoff Warren and Antonia Orr, http://ectcharity.co.uk/files_uploads/ECT_Why_community_transport_matters_Final_version4.pdf

Federing, D. & Lewis, D.,2016 Towards a Framework for Identifying and Measuring the Benefits of Accessibility *The Economic Benefits of Improved Accessibility to Transport Systems Roundtable* http://www.itf-oecd.org/node/19772

Md Moniruzzaman a, Antonio Páez (2016) An investigation of the attributes of walkable environments from the perspective of seniors in Montreal, *Journal of Transport Geography*, 51 (2016) 85–96.

Nelson, J. D., Wright, S., Thomas, R., & Canning, S. (2017). The social and economic benefits of community transport in Scotland. *Case Studies on Transport Policy*.

Rose, E., Witten, K. & McCreanor, T. (2009) Transport related social exclusion in New Zealand: Evidence and challenges, Kōtuitui: *New Zealand Journal of Social Sciences* Online, 4:3, 191-203, DOI: 10.1080/1177083X.2009.9522454

Sacerdote, B. &, Marmaros, D (2005) *How Do Friendships Form?* NBER Working Paper No. 11530, Issued in August 2005, NBER

United Kingdom Office of National Statistics, *Well being*, https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing

United Nations, *Human Development Index*, http://hdr.undp.org/en/content/human-development-index-hdi

US National Bureau of Economic Research (NBER) (2005), *Working Paper No. 11530: How do friendships form?* http://www.nber.org/papers/w11530.pdf