



Validation of Operational Definition of Accessibility

Reduced CO₂ from Sustainable Household Travel Research Programme
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Technical Report
Objective 3 Milestone 4

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Introduction

This report describes the methodology and findings of a qualitative interview based study which aimed to validate an operational definition of accessibility. It has been prepared to satisfy the requirements of Objective 3, Milestone 4 of the *Reduced CO2 from Sustainable Household Travel Research Programme*.

Background

Objective 1, Milestone 2 of the *Reduced CO2 from Sustainable Household Travel Research Programme* established a GIS based operational definition of accessibility. Using the household as the unit of analysis, this definition provides for a model of ‘opportunities’ of travel based on a space-time prism concept. It assumes fixed or calibrated time budgets and fixed or calibrated mode availability, and takes into consideration real world data, such as destination weightings, household classification, and mode-dependent trips. Resulting from this is a quantitative model that can be used to assess variations (changes) in accessibility induced by strategies aimed to reduce fuel consumption.

Underlying the operational definition of accessibility is a space-time approach to accessibility. Space-time approaches view all human activities as taking place in space as well as time. People’s activities are intimately linked to their spatial and temporal settings since they are performed at specific locations, at specific times of the day, and for a given duration. The space time prism, one of the core concepts of the space-time framework, is created by the existence of fixed activities (which could include such inflexible options as having to be at work at a given time or attending an important appointment), which impose constraints upon an individual’s activity patterns. Free periods of time between fixed activities are known as time budgets. They determine the spatial extent of the individual’s action space (or ‘reach’) by a given mode of transport. This in turn can be translated into a set of locations at which activities or combinations of activities can be carried out and conversely a set of locations beyond reach within the constraints of the time budget.

The operational measure of accessibility will be based on the cumulative opportunities available to a household within functional transport networks using time budgets, represented as some function of the time available at a range of facilities and activity locations. The simulation model can be used to derive meaningful statements about what can be accessed for meaningful periods of time, and by a range of transport modes. It is important to note that this model only seeks to describe the range of choices afforded to households, not to simulate activity choice or travel behaviour.

The assumptions underlying the operational definition of accessibility need to be validated by determining whether they align with how household negotiate their travel patterns and behaviours.

Method

Qualitative interviews were conducted with a range of households in different locations in Auckland. These interviews sought information on how households make decisions relating to household members' travel needs in order to determine whether these align with the assumptions used in the operational definition of accessibility. The interviews also sought to gain some preliminary insights into the levels of flexibility in people's travel patterns and the ways in which a number of strategies to reduce household fuel use could impact on household travel decisions. (A copy of the interview schedule is contained in the Appendix).

Sampling frame

Six interviews were conducted with a range of household types in different locations. These were as follows:

Household type	Location
Single person (who lived at home with her parents), no children	Parnell
Couple, no children	Piha
Couple, no children	Western Springs
Couple, two young children (one at primary school the other at pre-school)	Morningside
Couple, two teenage children (both at secondary school)	Belmont
Couple, three children (one at intermediate, two at tertiary)	Birkenhead

Households were identified through existing networks and snowballing techniques. Interviews were conducted face-to-face with some or all of the household members.

The interview

Four general areas were covered in the interview:

1. The negotiation of household travel needs and times
2. Household travel patterns on a specific day
3. Flexibility or 'elasticity' in travel patterns on a specific day
4. The potential for alternative destinations or mode choices in scenarios that encouraged reduced fuel use.

These topics are represented visually in the figure on the next page.

Interviews were recorded and transcribed verbatim.

Analysis

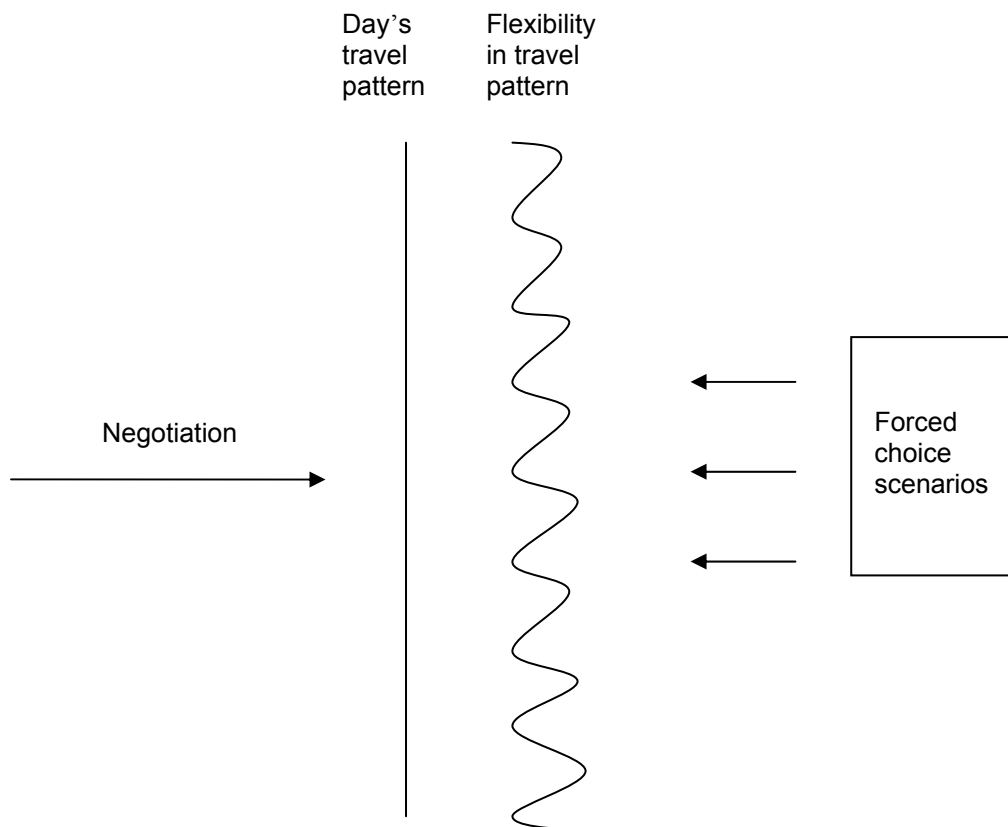
Transcripts were loaded into QSR's NVivo software package then coded and analysed using thematic and discursive approaches (Patton, 1990, Potter and Wetherell, 1987)¹.

¹ Patton, M. (1990) *Qualitative Evaluation and Research Methods*, Sage, California;
Potter, J. and Wetherell, M. (1987) *Discourse Analysis and Social Psychology: Beyond Attitudes and Behaviour*, Sage, London.

Working analyses were produced by close reading of the data and consideration of the commonalities and variations in the coded materials. These were adjusted until the analyst was confident that the emerging themes for each section covered in the interview were stable and an accurate reflection of the data.

Ethics

The project was conducted under the guidelines of the Massey University Human Ethics Committee and as such guarantees anonymity and confidentiality to all participants. Care has been taken in the gathering, transcription and analysis of all data to avoid identifying any person. Recognisable features relating to any person (apart from locations) are not reproduced in this report or any document for release beyond the research team.



Topics covered in interviews validating operational definition of accessibility

Findings

The findings are presented in three main sections with accompanying subsections.

1. The negotiation of household travel needs and times

- Factors considered in travel
- Different modes used
- Negotiation of travel needs and times
- Time constraints and free time

2. Household travel patterns and flexibility

- Weekday and weekend travel patterns
- Flexibility in destinations
- Flexibility in transport mode

3. The effect of scenarios encouraging reduced fuel use

- If congestion doubled
- If the price of petrol or diesel doubled
- If public transport improved

The negotiation of household travel needs and times

Factors considered in travel²

There were a range of factors that households considered when thinking about household travel. These included traffic, time of travel, time spent travelling, parking, the cost of fuel, the cost of public transport, the ease of using public transport, and environmental issues.

Traffic was a major issue for respondents. It affected the time that people chose to go places in an attempt to avoid the worst of the traffic. Traffic caused people to think of taking alternative routes to get to destinations. Traffic was particularly an issue for people who lived on the North Shore, with traffic on 'the bridge' being mentioned frequently.

Difficulty with finding a park near destinations or the cost of parking meant some respondents used alternative modes of transport to the car. Security issues with parking vehicles, for example a work vehicle that contained a lot of tools, were mentioned.

² The findings reported in the following sections are based on data from six households. For a more comprehensive account of Aucklanders' transport related behaviours, choices and experiences see Witten, K., McCreanor, T. and Rose, E. (2005) *Travel Behaviours, Experiences and Choices of Aucklanders: A Qualitative Investigation*. SHORE & Whariki, Massey University, Auckland. <http://www.shore.ac.nz>

The cost of fuel made a number of respondents think twice about using their car all the time. This meant some households chose to use the most fuel efficient vehicle when going places if they had the choice or, in one case, using a company car as much as they could so that an employer covered the cost of fuel instead of the household. However, another household who only used cars to get places specifically mentioned that cost is not a factor when thinking about travel.

A number of households mentioned issues relating to public transport as factors they considered when thinking about household travel. The costs of taking public transport, the ease of its use, and seasonality were noted as relevant considerations.

Environmental concerns about fuel use were only mentioned briefly by one respondent.

Different modes used

The modes of transport respondents reported using were: car, bus, ferry, taxi, walking, cycling, car pooling, private bus (that delivered children to school), and train. One interviewee would sometimes get picked up while waiting at a bus stop by the driver of a car who wanted to use the Onewa Road bus lane (which requires having three or more passengers in the car). Mode choice was often related to going to particular destinations. Different modes were also often combined for one journey. Individual respondents only used one or some of the modes stated above. Some did not walk, cycle or use public transport at all. Public transport was not available to all households. Even if public transport was available, it did not always meet the needs of household members.

All households had cars. The single person did not have her own car but had access to a car within the household. The other five households had two or more vehicles. Two of the households had more vehicles than adult drivers.

Negotiation of travel needs and times

There is negotiation within households regarding travel so as to get household members to the places they need to go at the required times, particularly in households with children who do not drive. This involves communication between household members, working in with one another, and, in some cases, also working in with other households (who may take turns transporting children places).

Well there's quite a lot of organisation around it. Cause as you see we have two girls and they have requirements in terms of bus and taxi. So, like, we need to organise in advance about going to different dance lessons and then sharing transport with other people whose family also goes there and to organise then, either sometimes weeks in advance or sometimes just days in advance, whose picking up who or check that we need to pick them up and give such and such a ride. And so, sometimes this can happen like at last minute or sometimes, if we're well organised, it happens several days ahead.

(Couple, two teenage children, Belmont)

During weekdays most adults within households get to their destinations independently of each another. They do not generally have to negotiate with other adult household members about meeting their travel needs and times. This is largely due to the fact that most adults had their own cars.

The weekends were more likely to be times when household members would work in with each other or negotiate travel needs and times. Factors that may be considered included co-ordination in travel times, sharing the most fuel efficient vehicles (or in one case a company car which meant the household did not have to pay for the fuel), or trip chaining to make the most of journeys to meet household needs. For the household that lived in Piha trip chaining was more likely to occur during the week, with the associated household negotiation of meeting travel needs, as they preferred not to travel during the weekend. The couple would work in together to ensure these needs were met.

Well I definitely try to minimise, you know, both of us wouldn't drive if we had errands on a weekend, for instance, we both wouldn't start doing different errands, we'd obviously combine the two types, lists of errands.

So sort of join them on to each other?

Join them on to each other and do them together, rather than arrange to leave here in different cars.

(Couple, no children, Piha)

For the single person interviewed, the concept of negotiating household travel needs and times did not make sense. The interviewee was largely autonomous in her travel plans, being capable of getting to destinations independently. She rarely, if ever, had to work in with other household members to meet her travel needs and times. This lack of negotiation of household travel needs and times within a household was also true, although to a lesser degree, of one of the couple with no children households. They had their own transport and carried out many activities independently of one another. However, if they were travelling to the same destination at the same time they would travel together.

Time constraints and free time

All respondents had some constraints on their time in terms of places they needed to be at particular times. However, the extent of this did vary. During the week most people attended jobs, university or other educational institutions, or dropped off and picked up children at particular times. The start and end times or drop off and pick up times were often set.

I think just the same as most of us, you've got to be at school at a certain time, you've got to be at work and you've got to be at uni and stuff. Just the beginning times of everyone's day's a big thing.

(Couple, three children, Birkenhead)

So do you have particular places that you need to be at particular times or is it ...?

Yeah, the all of Auckland. At certain times. So you learn to calculate your time. If you're going to be going say to East Auckland, West Auckland, depending, you've got to allow yourself a certain amount of time and it's better to over calculate than under calculate cause in my business I rely solely on being at an appointment at a certain time, as with yourself, and you can't afford to be an hour late cause otherwise you miss out on the opportunity for the income so you've got to be very careful.

(Couple, two young children, Morningside)

Some people had a degree of flexibility, such as the respondent who worked on glide time and from home quite regularly.

Whereas I think maybe I'm in a bit of a different situation because I don't have, my full time work is on glide time. There's no, I don't have to be at my work at a certain time and also ... cause I work from home a fair bit. So my only time constraint is during deadline time and that's only ...

So you have to go into the office?

I have to go into the office to do the layout and so forth. So, when that happens I'm constricted cause of time constraints because of the deadline that has to be met. But for the rest of the period, ... I can work around traffic and also I'm staying at home a lot more so, to save on petrol and stuff.

(Couple, no children, Piha)

The Piha household also noted that distance from destinations per se was a constraint.

Respondents were more likely to consider that they had unallocated or free time in the weekends. However, one respondent who wasn't in employment but was looking after young children had some degree of flexibility or unallocated time during the weekdays.

I need to get the kids off to school and kindy so I really have to be, should be out of the door by 8.30, if not before to get to school and to get to kindy. And at the moment I just come home or do jobs I've got in the morning but, yeah, ... But if I have other things to do during the day I wouldn't do them later than the day around about 5.00, 5.30 if I didn't have to, to get into that, cause we're quite central here, to get into that city traffic, St Lukes Road and everything. So I would consider that time in terms of doing ... if I've got flexibility.

So perhaps during the middle of the day you've got a bit more flexibility and you might take that opportunity to go places that you need to?

Yeah, definitely. I'll get it done once I'm out. If I'm going to drop the kids off then I'm out and I'll do them then and get them over in the morning when it's quieter.

(Couple, two young children, Morningside)

Households without children were more likely to have a greater degree of unallocated or free time in the weekends.

And are there some situations that you have unallocated or free time that may allow you to choose what you might want to do or the places that you might want to go?

In the weekends, yeah, totally. But the way that we get to them is always by car. That never changes. To be honest I would never consider leaving the car in the garage and getting on a bus.

(Couple, no children, Western Springs)

Household travel patterns and flexibility

Weekday and weekend travel patterns

Respondents' descriptions of weekday and weekend travel patterns detailed a range of destinations where people go. These included work, study, family and leisure time activities. Patterns of travel were generally quite rigid during the weekdays, with behaviours generally less routine during the weekends.

While some respondents mentioned a range of transport mode choices available to them, at times requiring weighing up of factors to determine decisions, most trips were made by car. This was particularly the case in the weekend.

And then we would both go to work mostly and we would mostly take our cars.

I have, I bike sometimes and I'm trying to bike a bit more with summer coming around.

And I take public transport sometimes. That means driving my car to the ferry, catch the ferry. There's two ferries I can take from here. And walk to work.

And I used to car pool. It became inconvenient and I'm not doing it much now.
(Couple, two children, Belmont)

Social events by car. Always usually, evening event by car.

It's easiest by car. Or else you've have to plan ahead more. Like if we were going to catch the ferry, then you've got to plan more, like when the ferries go and what time they finish. Who'll pick us up.

And you've got to, I always think about clothing, and if I'm going out for the night you may not have clothing that you'd want to walk in, up the street in. So that would deter me.

(Couple, two children, Belmont)

Knowledge of factors influencing travel, such as traffic, were considered in respondents' travel patterns. This emerged clearly when respondents described their weekday travel patterns.

I have a flexibility with work to avoid the bulk of the traffic rush hour. What I prefer to do is skirt down the, at nine o'clock, if you don't know, Onewa Road you can use the bus lane after nine o'clock, so I prefer to leave here at ten to nine. By the time I get to the top of Onewa Road it's just on nine o'clock so I

can just scoot down the bus lane at nine o'clock. In which case my journey would take me twenty to twenty-five minutes to Parnell. The same journey, if I left at eight o'clock, would take me a full hour easily, easily an hour. It has taken me in traffic an hour and a half literally. But normally that trip is an hour, but if I just time it on the cusp of nine o'clock.

(Couple, three children, Birkenhead)

Flexibility in destinations

Destinations such as work and education were perceived to be fixed. No one seriously suggested the possibility of getting a job closer to their home (although one woman who was looking for work wanted to get a job fairly near to where her children went to school). The closest educational institution was not always chosen by participants, but there was always some reasoning behind this, such as a particular course being offered that was not offered elsewhere.

Respondents did not generally consider that they had that much flexibility in the destinations they went to to meet their other needs. There was generally some rationale for going to particular places.

... I guess I'm just wondering, are there some places you go to but perhaps you could go somewhere closer or ...?

Yes, at the weekend. I mean we wouldn't necessarily have to go up to Albany to do some shopping. We could go somewhere closer. But we don't, just in terms of choice, price, things like that.

(Couple, two children, Belmont)

Yeah, some of the after school activities is a bit of a choice thing and we try to go as close as we can but that doesn't really always. The dancing isn't as close as it could be. Drama is.

What sort of things would determine that, is it like availability or preference?

Availability, preference, you know, what you hear about or where somebody else might be going. Yeah, I mean, I would easily go into the city for, say, dancing myself when I could locally. Sometimes I go locally, sometimes I go into the city. So we generally choose local Devonport.

But you prefer the city don't you? A better class.

We do sometimes.

(Couple, two children, Belmont)

Instead of going to town I guess I could walk to, instead of driving into town, I could walk to Newmarket.

So you perhaps could go slightly closer?

Yeah.

And so why do you go into town? What takes you there?

Some of the shops are different. They have different things in there. Say if there's the same shop in both areas there can be different things.
(Single person, no children, Parnell)

What about his gym, would he possibly have other gyms he could go to?

Yep, he could of just run down the road to one down here. That would of taken probably a couple of minutes to run. But he's familiar with the one in Newmarket and he likes the facilities there. He chooses to drive to Newmarket each morning, which probably doesn't take him too long because he goes at about quarter to six in the morning and there's no traffic. And it's easy.
(Couple, no children, Western Springs)

The thought of not going to some of the destinations that people usually go to was generally considered odd. Some respondents acknowledged that this could be possible. However, it would mean missing out on something or not being able to participate in activities that people like to do. Respondents did not consider their travel patterns excessive or unnecessary. They were part of the behaviours that made up their lives.

I think you could choose not to go there, but then I'd miss something. So not really, no.
(Couple, two children, Belmont)

Ok, so just thinking about the day that you've just described are there some destinations that perhaps you or Kyle don't have to go to or could go to alternatives instead of the places that you do?

Kyle will always say I couldn't never go shopping. So, no, I certainly don't have to get out of the house. I could potter around the house all day or, well, no, yeah, that's an odd question, cause you choose to do the things that you choose to do cause that's what you feel like doing and if I want to go shopping I don't see another alternative.
(Couple, no children, Western Springs)

Respondents generally made attempts to be efficient in their travel to some degree.

And what about you, are there some of the destinations that you talked about that you did not have to go to or could've gone to alternative destinations to do the things you needed.

Yeah. Obviously, not dropping off the banners and so fourth. But I could have done everything in the alternate. I could have done it the other way round or done it in a less efficient, like I definitely tried to do it in the most efficient way. But I mean I could of alternatively gone straight into town, then from town after I dropped off some of the banners, decided to go to work or, but if I'd done that I wouldn't of gone to Albany.

So it sounds like you actually worked out the most efficient ...

Absolutely.
(Couple, no children, Piha)

However, there was an example of choosing an alternative destination for an activity that meant less travel time even though the respondents preferred another location.

So thinking of Kyle's golf, like would he ever consider going to other golf courses?

Yes, he used to go out to Aviation, which is out by the airport. But he found that, that it would take a good 20, 25 minutes to get out there and back again. Whereas he's now at, I can't even think of the name, one in Mt Roskill. So it's really only a 10 minute drive now and, yeah, he prefers the location. He doesn't enjoy the course very much and he doesn't the clientele, you know the other players as much, he finds it a bit snobby in comparison. But, when it comes down to time and fitting everything in, in his day, an extra 20 minutes or so is worth it.

(Couple, no children, Western Springs)

Flexibility in transport mode

Some people had a degree of flexibility in their mode choices to get to their destinations. This was more likely to be for weekday travel patterns.

I could take the bus to work instead of the car. I could catch a bus. I don't even know what time it goes at all, but I could catch a bus.

(Couple, two children, Belmont)

But, once again, there were factors which worked against the possibility of mode switch.

One of the reasons that I don't bike so much is that our work doesn't have a shower, a convenient shower, so it's, a little bit bloody off putting. I use a wash basin and have a wash if I can. So, things like that make a difference.

(Couple, two children, Belmont)

Couple of things, like I have to use my car at work sometimes and, you know, I'll have an appointment or I'll go and do some liaison with somebody or I'll go to a different venue of work and have to get to another venue once I'm there. Well mostly that's really why I take my car more and sometimes it's the weather too. If I'm in one of those modes of catching public transport, which I do sometimes get into, get more into the regularity of it, and I look out there and see the rain and the harbour bridge and it's crawling over there, cause we can just see it I think, either I decide to go on my car and not take public transport so I can avoid the rain or I think I will take public transport cause I know I'll never get there [in the car].

(Couple, two children, Belmont)

For some respondents, however, there was no flexibility with transport mode to meet weekday travel patterns. This could be because distances were too great to walk or cycle, there was no public transport, or that a car was required during the day for travel.

Kyle couldn't, he has to have a car because he has to have the ease of whipping out to a client at any given time during the day.

(Couple, no children, Western Springs)

For me, also, I couldn't imagine going to quote for my business hopping off an ARA bus knocking on the doors then getting back on a bus. I'd be the laughing stock of the business community throughout Auckland. I'm sure it'd even hit the headlines.

(Couple, two young children, Morningside)

The car was the dominant mode choice in the weekend and often perceived as the only feasible choice for many weekend activities. This was not simply because public transport or walking or cycling couldn't get the respondent where they wanted to go, but rather they were not convenient or efficient options that would be considered.

And, ok, so still thinking about this day, are there some alternative modes of transport that you could use to get to the places that you would want to go to?

That would be difficult. You would have to, I don't know, how many buses in order to get there or not, to dancing. You could take a bus to go to the gym on Saturday mornings. That might be possible. You'd just have to be more organised, you just can't go whenever you want.

It's the time.

It takes longer. That's about it.

So, sort of time getting to places quickly, when you want to, is that the sort of reasons?

The convenience of that. Not spending too much time getting to a place like that cause it's just your exercise.

(Couple, two children, Belmont)

The effect of scenarios encouraging reduced fuel use

Respondents were presented with a number of scenarios that aimed to reduce household fuel consumption. They were asked whether these scenarios would result in the household choosing to go to alternative destinations to meet their needs, not going to some destinations at all, or using alternative modes of transport to get to those destinations. The scenarios presented were: if congestion on the roads doubled, if the price of petrol or diesel doubled, or if public transport improved (including if there were a viable and efficient train system).

If congestion doubled

Respondents talked of a number of impacts that traffic congestion doubling would have on their travel behaviour. These impacts ranged from making people think about the destinations they go to, the regularity of their going out, and the time of travel.

For example we love movies as a family, so we often decide well should we go to a movie, to a cinema or shall we rent a new release DVD. ... So in a typical week, if congestion doubled the traffic and doubled the hassle of going out on a weekend when all you want to do is relax, then we would walk to our nearest

Video Easy, for example, and rent a god damned DVD instead of going into the city or Takapuna.

(Couple, three children, Birkenhead)

We might go out less. We might, would, for example if congestion doubled on the dance trip and that, we'd think seriously about not going to that and either trying to find a local alternative or just not doing it. Looking at trying to do something else.

(Couple, two children, Belmont)

Oh yeah, I'd definitely avoid going out in rush hour.

(Couple, no children, Piha)

Working from home or working hours that enabled respondents to avoid peak traffic time were mentioned.

I would have to think about flexible time.

(Couple, two children, Belmont)

It would give me more ammunition to talk my boss into allowing me to work more and more from home. So, you know, it would add more strength to that argument.

(Couple, no children, Piha)

It would mean I would have to start work a lot earlier to get to work earlier to try and avoid some of the traffic and also in the hope of leaving work earlier to again to avoid traffic. I tend not to want to stay at work later. I'd rather leave earlier. You know, I'm quite capable of working earlier in the morning, you know, I'm more of a morning person, so I'd be fine to push it in, in the front of the day rather than the back end.

(Couple, no children, Western Springs)

For those that had to drive around as part of their work, congestion doubling was envisaged as making their work less productive, more costly and more stressful. However, respondents did not consider there to be much they could do about this.

For me, I'd still be caught up in the same scenario. I'd have to be going from here to there to there. But if it was so congested that you would just about be strangled because of the traffic, I'm sure I would probably even take a longer way around route to get from where I had to, to where I have to, to avoid such issues. If I have to. It would cost me more in petrol, that's too bad. I'd have to wear the cost of it. But sometimes the stress on the road has such impact on people that you're better off to take an alternative route even if it's 40 minutes longer, depending where you're going. Sometimes you're better off to do that than get caught up in such traffic jams and things like that actually. It costs you more in fuel and time to get there, you just have to allow that extra time and predetermine it when you do such things.

(Couple, two young children, Morningside)

Kyle, it would impact quite heavily with him being in the car travelling around a lot. It means he may not be able to fit as much into his day, into his working day with travel in between sites.

(Couple, no children, Western Springs)

Using alternative modes of transport was something that many respondents would consider. Although buses were considered likely to be slower than they are now unless there were bus lanes.

It would definitely have an impact. I would bike more to work.

I'd just use public transport whenever you could.

Like I wouldn't bus more cause the bus would be stuck in traffic as well if it doubled. But I would bike more to work. I might even consider walking. It's a pretty long walk.

(Couple, two children, Belmont)

The thought of congestion doubling was particularly unattractive to one household, which had four of its members commuting from the North Shore over the harbour bridge every weekday. This household mentioned that congestion doubling could cause them to move so that their house was closer to where they worked and received education.

I mean well if congestion doubled, cause it's pretty bad as it is ...

It's pretty bad here, on the North Shore heading over that bridge everyday already it's pretty bloody hard. I mean traffic builds up at seven in the morning, what does it do, have you got to get up at 4.30 every morning to be on the road by five?

It could radically, I'd just catch the ferry every day and be done with it.

If it did double we'd move.

Oh, we'd probably move. I mean [name] is right, it would be something that we would consider. We'd just move closer to where we work and where we need to commute to. And that would be a serious influence if it doubled.

(Couple, three children, Birkenhead)

If the price of petrol or diesel doubled

The price of petrol or diesel doubling would have varying effects on the households talked to; ranging from very little to quite considerable effects. One household noted that while it probably wouldn't change what they did, they might be more mindful of where they went. Others mentioned that they would try and be more efficient with their travel. This could mean tacking various errands onto a single trip or arranging work hours or patterns so less trips were required. Making less trips during the weekends was also mentioned.

Using public transport instead of the car was mentioned by a number of respondents. One household thought that they would make sure they tried to use one member's company car as much as they could for their travel. Another household considered the possibility of selling one of their cars that used a lot of petrol for a more fuel efficient vehicle. However, it was noted that realistically this was unlikely to happen.

For those who had to travel as part of their work it was reported that transport costs would be passed on to the customer. Another person, who did IT work, noted that they would try and work remotely wherever possible, lessening the need for travel out to clients.

A respondent who was not working but was looking after her two young children stated that when she decided to take a year off and look after her children the cost of childcare needed if she was at work was a consideration in this decision. She noted that if the price of petrol or diesel doubled this too would be another consideration in deciding whether it would be worth her while to get a job or more efficient to stay looking after her children full time.

If public transport improved

Most respondents were enthusiastic about the possibility of using an improved public transport service, provided that it met a number of requirements. Trains, in particular, were a more attractive form of public transport than buses for a number of respondents.

Respondents wanted to see a public transport system that was simpler, easier to use, and went more regularly. A system where you didn't have to "add the time of everything to the nth degree" (*Couple, two children, Belmont*). The system would need to run at the times people needed to get them places. Information about public transport would need to be more accessible and easier to understand. The connections between different modes of transport and different routes on the same mode would need to be better co-ordinated. Public transport would need to be fast and cost effective compared with the car. Safety on public transport and at public transport terminals and stations would need to be vastly improved. So too would the general cleanliness of the public transport systems, stations and terminals.

For those who required transport as part of their job, it seemed unlikely to them that public transport, no matter how much it was improved, would ever be able to replace the use of the car for their work.

Conclusions

Findings from qualitative interviews show that many of the factors relevant to household travel decisions align with the assumptions underlying the operational definition of accessibility. Amongst the factors people considered when thinking about household travel were the length of time spent in traffic or the time it takes to get places and the weighing up of the efficiency of different transport modes in enabling destinations to be reached in a timely manner. The idea of having constraints on people's time in terms of having fixed places that people needed to be at particular times was relevant to all respondents. These constraints restricted the places people could go and the times that they did so. All respondents had pockets of unallocated or free time that provided them with a range of choices in where they could go, if anywhere, during these periods. The pockets of time could range from a few hours to whole days. For most respondents the negotiation of household travel needs and times involved a process of identifying where people had to go and working in with household members, and sometimes other households, to meet these needs. The complexity of this negotiation process generally deepened with households that had children who were dependent on adults to drive them places.

Exploring respondents' weekday and weekend travel patterns and the associated levels of flexibility revealed that people perceived that they had limited destination flexibility and some mode flexibility. Respondents were able to present reasons or rationales for going to the destinations that they did. Most people tried to be efficient in their choices of travel destinations; however, distance to destinations was not always the only relevant consideration in decision making. Other factors included preferences for going to particular destinations or particular things offered at certain destinations that were not offered at others. For many respondents there were a range of mode choices that could be taken. However, the car was often the most efficient mode choice. This was particularly so for weekend activities.

Presenting respondents with a range of scenarios that would encourage reduced household fuel use showed how some people may change their travel behaviours in the future. Change of mode choice away from cars was the most frequently stated response from respondents to the scenarios of: congestion doubling, the price of petrol or diesel doubling, or public transport improving. The thought of congestion doubling was the scenario that appeared most likely to get a change of behaviour from respondents. A change in the price of petrol or diesel would make some people reconsider their travel patterns, but would have had no or very little effect on other respondents. Respondents would be very interested in using public transport more if the systems improved. However, it was clear that dramatic improvement would be required as respondents provided detailed descriptions of what would need to change before public transport would present a better option to the car.

The validation process has indicated that the assumptions underpinning the operational definition of accessibility resonate with the access-related behaviours and experiences of the small but diverse number Auckland households interviewed. The

research team will proceed with the development of an accessibility model that is based on the space time prism approach.³

³ Huisman, O (2005) Reduced CO2 from Sustainable Household Travel, Operational Definition of Accessibility, Centre for Social and Health Outcomes Research and Evaluation, Massey University, September, <http://www.shore.ac.nz>

Appendix: Interview Schedule

This interview will explore how you / your household make decisions around travel and some of your travel behaviours.

Four general areas will be covered:

5. The negotiation of household travel needs and times
6. Household travel patterns on a specific day
7. Flexibility or ‘elasticity’ in travel patterns on a specific day
8. The potential for alternative destinations or types of transport choices in scenarios that encouraged reduced fuel use.

The negotiation of household travel needs and times

- What sort of factors do you / your household consider in terms of household travel (e.g. parking, time, or cost)?
- How do you / household members negotiate travel needs and times?
- [Probe] Tell me about the different types of transport that members of this household may use.
- [Probe] Tell me about the constraints you may have on your time that may affect what you do or where you go?
- [Probe] And are there situations where you unallocated or free time that may allow you to choose what you might want to do and where you might want to go?
- [Probe ONLY IF NECESSARY] Describe to me the travel patterns and negotiations on a usual weekday, the weekends, other times, such as holidays.

Household travel patterns on a specific day

- Thinking of a normal weekday, could you take me through the routine of where household members go and when and by what type of transport? It may be easiest to start out with your activities in the morning through to those in the evening.

Flexibility or ‘elasticity’ in travel patterns on a specific day

- [Focusing on the normal weekday described above] Are there some destinations you described in this day that household members did not have to go to or could go to alternatives to meet household needs?
- [Focusing on the normal weekday described above] Are there alternative types of transport that could have been used to get to any of the destinations or meet household needs on that day?

Household travel patterns on a less ordinary day

- This time thinking of a day that may be less routine, such as a weekend or holiday, could you take me through the pattern of where household members go and when and by what mode of transport? Perhaps if you think about one of the days in the weekend just been.

Flexibility or ‘elasticity’ in travel patterns on a less ordinary day

- [Focusing on the less ordinary day described above] Are there some destinations you described in this day that household members did not have to go to or could go to alternatives instead of these places?
- [Focusing on the less ordinary day described above] Are there alternative modes of transport that could have been used to get to any of the destinations or meet household needs on that day?

The potential for alternative destinations or types of transport you could use in scenarios that encouraged reduced fuel use

- I am now going to describe a number of scenarios and would like you to consider whether these would result in you / your household
 - choosing to go to alternative destinations to meet your needs
 - (or not going to that destinations at all)
 - or using alternative modes of transportto get to destinations. I am interested in what the social impact of these changes would be on your household.
 - If congestion on the roads doubled
 - If the price of petrol or diesel doubled
 - If public transport improved (e.g. there was a bus stop near you that went to useful destinations regularly)
 - In there was a viable and efficient train system (folk hate buses!)