APPENDICES

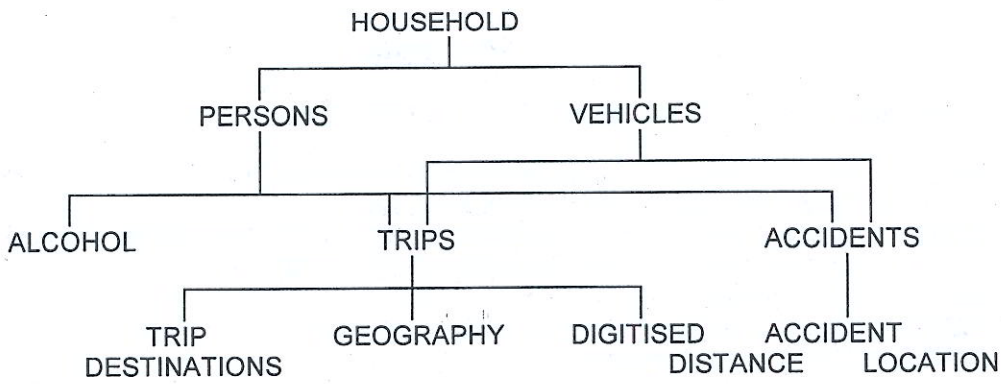
Appendix 1: Travel Survey Information

Information was collected for a representative collection of households over a calendar year (July 1989 - June 1990). Everyone in the household aged five or more was in the survey and provided travel information for each of two travel days.

This produced a number of inter-related files. They are :

HOUSEHOLD	- Details about the household and its response to the survey
PERSON	- Details about people in the household aged 5+ Information such as age, sex, occupation, income, driving experience, accident totals, work and school locations
VEHICLE	- Type, make, model, year, CCs, owner
TRIP	- Purpose, mode, date, time, distance
TRIP ADDRESS	- Text description of trip destinations (used for trip digitising)
ALCOHOL	- Drinking session times and locations
ACCIDENT	- Accident involvement over the last two years
ACCIDENT ADDRESS	- Text description of the accident location
TRIP DISTANCE	- Digitised trip distances
GEOGRAPHY	- NZ map grid reference of the trip destinations plus their local authority (1976 variety) and area unit

The inter-relationships are :



The trip destinations and digitised distance files are not available in SAS. The digitised distances have already been added to each trip record. Most walk trips do not have any distance estimates - these are based on walking time.

File linking variables

HOUSEHOLD	SAMNO
PERSON	SAMNO PERSON PEWADDN PESADDN
VEHICLE	SAMNO VEHICLE
TRIP	SAMNO PERSON TRIPDAY TRIPNO VEHICLE ADDNO
ALCOHOL	SAMNO PERSON TRIPDAY
ACCIDENT	SAMNO PERSON ADDNO
ACCIDENT ADDRESS	SAMNO PERSON ADDNO
GEOGRAPHIC	SAMNO PERSON ADDNO

Trip linking

Consider a commuter travelling from Johnsonville to Wellington. They walk to the station, travel on the train to Wellington, walk to the bus terminal, catch a bus to Willis St then walk to Pearse House. This would be in the trip files as five separate legs, the first four having a trip purpose of "change mode". When you are dealing with any of the first four legs you do not know what the overall trip purpose is.

To overcome this the trip legs are LINKED. Each trip leg gains information on the overall purpose of the trip, the trip number within the travel day, the number of legs in the trip, and the leg number within the trip.

Programs

There are a number of programs in TRTTR.PL1STU.S called :

NZTS1 - Reads raw data files (other than trips) and creates SAS files in TRTTR.NZTS
NZTS2 - Reads raw trip data and creates SAS files
NZTS3 - Adds information to trips files from HH (dates) PE (age and sex) VE (vehicle type)
NZTS4 - Adds weights ot the trips and error weights and group
NZTS5 - Links the trips
NZTS6 - Adds trip files for drivers, passengers, pedestrians and others
NZTS7-NZTS10 Example programs.

Raw data files

TRTTR.NZTS.HHCONV	- household data
TRTTR.NZTS.PECONV	- person data
TRTTR.NZTS.VECONV	- vehicle data
TRTTR.NZTS.TRCONV	- trip data
TRTTR.NZTS.ACCONV	- accident data
TRTTR.NZTS.AACONV	- accident address data
TRTTR.NZTS.TACONV	- trip address data
TRTTR.NZTS.TRIPOUT	- digitised trip distance data
TRTTR.NZTS.ALCONV	- alcohol data
TRTTR.NZTS.ADDOUT	- geographical data

Household information - NZTS.HH

SAMNO	Household number The first three digits are an Ampt Applied Research code for the meshblock used. The last three digits refer to the dwelling within the meshblock	
HHAUNIT	Statistics Dept. area unit code (1976 census)	
HHDAYN1	Travel day number of first travel day (days since June 3rd, 1989)	
HHDATE1	Date of first travel day - (DDMMYY)	
HHDAYW1	Day of week - 1=Mon, ... 7=Sun	
HHDAYN2	Travel day number of second travel day (see above)	
HHDATE2	Date of second travel day - (DDMMYY)	
HHDAYW2	Travel day of week - 1=Mon, ... 7=Sun	
HHINTVR	Interviewer number	
HHRESPN	Response status	
	Full response	1
	Sample loss	
	All persons in household out of survey	2
	Vacant dwelling	3
	Dwelling under construction	4
	Non-dwelling	5
	Derelict dwelling	6
	Dwelling demolished	7
	Non-response	
	Full non-contact	8
	Part non-contact	9
	Language problems	10
	Death/illness	11
	Full refusal	12
	Part refusal	13
HHBEFORE	Number of calls before travel day	
HHAFTER	Number of calls after travel day	
HHPHONE	1=yes, 2=no	
HHSTRUC	Home structure type	
	Separate house	1
	2 flats or houses joined together	2
	3 or more flats or houses joined together	3
	Flat or house attached to business or shop	4
	Beach, crib or hut	5
	Caravan, cabin or tent	6
	Non-private dwelling	7
HHTYPE	Household type - inferred by interviewer	
	Person living alone	1
	Married/de facto couple	2
	Other adults only	3
	Family (including extended) with children	4
	Family with adults only	5
	Single adult with other adults only	6
	Single adult with children	7
	Other	8
HHNUMPE	Number of people in household	
HHNUMIN	Number of people responding to survey	
HHNUMHV	Number of household vehicles	
HHNUMCYC	Number of bicycles in household	
HHNUMOV	Number of non-household vehicles used	

ESTWGT	Sample weight
ESTWGT2	Sample weights for cities only
ERRWGT	Sample weight for error estimation
ERRWGT2	Sample weight for error estimation for cities
GROUP	Group variable used in error estimation.

Person information - NZTS.PE

SAMNO	Household number
PERSON	Person number within household (01 -...)
PERELAT	Relationship to head of household

H	Head	GRD	Granddaughter
HUS	Husband	GRF	Grandfather
W	Wife	GRM	Grandmother
SON		GRS	Grandson
DAU	Daughter	HKP	Housekeeper
A	Aunt	M	Mother
BDR	Border	MLW	Mother in law
BLW	Brother in law	NCE	Niece
BRO	Brother	NPH	Nephew
CSN	Cousin	PTR	Partner
DLW	Daughter in law	SIS	Sister
F	Father	SIL	Sister in law
FLW	Father in law	SOL	Son in law
GNC	Grandniece	UNC	Uncle
GNP	Grandnephew	VIS	Visitor

SEX	Sex - M or F
DOB	Date of birth DDMMYY
AGE	Age last birthday
PEINOUT	Was person eligible to complete the survey ? 1=in survey, 2=out, 3=not in area
PEFORMS	Did this person complete their survey forms ? 1=complete, 2=part, 3=none
PEPROXY	Did they fill them in personally ? 1=person, 2=proxy

PEEMP01	Employment status	Student - Full time	1=yes, 2=no
PEEMP02		- Part time	
PEEMP03	Work	- Full time	
PEEMP04		- Part time	
PEEMP05		- Casual	
PEEMP06	Looking for work		
PEEMP07	Keeping house		
PEEMP08	Retired /Aged pensioner		
PEEMP09	Other pensioner		
PEEMP10	Other		

PEJOBS If PEEMP3 - PEEMP5 =1 then 1=more than 1 job, 2=one job

PEOCCUP Occupation

Professional, technical and related workers	1
Administrative and managerial	2
Clerical and related	3
Sales	4
Service	5
Agricultural, animal husbandry, forest, fishermen and hunters	6
Production and related, transport and equipment operators and labourers	7

These are Dept of Statistics major categories.

PEOCCUP	Occupation	Professional, technical and related workers	1
		Administrative and managerial	2
		Clerical and related	3
		Sales	4
		Service	5
		Agricultural, animal husbandry, forest, fishermen and hunters	6
		Production and related, transport and equipment operators and labourers	7
	These are Dept of Statistics major categories.		

PEEMP	Type of work.	For an employer for wages or salary	1
		In your own business - with employees	2
		- without employees	3
		Without pay in a family business	4
		Other	5

PE1MJOG	Was a memory jogger used on travel day 1 ?	1=yes, 2=no
PE1ANYW	Did the person go anywhere on day 1 ?	1=yes, 2=no
PE1STAY	If not did they stay in the same place all day ?	1=yes, 2=no
PE1START	Where were they at 4am on day 1 ?	

Home	1
Work - main job	2
Work - other job	3
Social / recreation	4
Hospital / medical	5
Other	6

PE1ADDN	Address number of starting location for day 1 on the travel address file (Addresses run from 001-999 within each SAMNO)
PE1TRIP	Number of trip legs in TRIPS file, day 1

PE2MJOG	1=yes, 2=no Details as for day 1
PE2ANYW	1=yes, 2=no
PE2STAY	1=yes, 2=no
PE2START	1 to 6
PE2ADDN	Address number
PE2TRIP	Number of trip legs in TRIPS file, day 2

PEEXP	Driving experience	Never driven	1
		Less than 2,000 km	2
		2,001-20,000 km	3
		20,001-200,000	4
		More	5
		Don't know	6

PEKMCAR	km driven in car last year
PEKMMC	km ridden on motor bike last year
PEKMCYC	km ridden on bicycle last year

PECLIC	Car licence - 1=yes, 2=no
PECTYPE	- type Full=1, Restricted=2, Learners=3
PECYEAR	- years held
PECMONTH	- months held

PEBLIC Bike licence - 1=yes, 2=no
PEBTYPE - type Full=1, Restricted=2, Learners=3
PEBYEAR - years held
PEBMONTH - months held

PETLIC Truck licence - 1=yes, 2=no
PETTYPE - type Full=1, Restricted=2, Learners=3
PETYEAR - years held
PETMONTH - months held

PEINCOME Income category. These are personal incomes before deductions. These relate

directly to Statistics Dept. categories

No income	1
$1 - $10,000	2
$10,001 - $15,000	3
$15,001 - $17,500	4
$17,501 - $20,000	5
$20,001 - $30,000	6
$30,001 - $40,000	7
$40,001 - $50,000	8
$50,001 - $70,000	9
Over $70,000	A
Don't know	B

PEAX1 Number of accidents in last year
PEAX2 Number of accidents in second-last year
PENUMAX Number of accidents in accident file
PERACE Racial category - 1=New Zealand Maori, 2=Pacific Islander, 3=European or other Pakeha, 4=Other
PE1ALC Any alcohol day 1, 1=yes, 2=no
PE2ALC Any alcohol day 2, 1=yes, 2=no
PEWADDN Work address number on the travel address file
PESADDN School address number on the travel address file

ESTWGT Sample weight
ESTWGT2 Sample weights for cities only
ERRWGT Sample weight for error estimation
ERRWGT2 Sample weight for error estimation for cities
GROUP Group variable used in error estimation.

Trip information

NZTS.TR, NZTS.DRIVER, NZTS.PASS, NZTS.WALK, NZTS.OTHER

This information is held in two forms : All trips combined in NZTS.TR, and trips split by mode.

You will be interested in driver trips most often and will save a small fortune by using DRIVER rather than TR.

SAMNO	Household number
PERSON	Person number within the household
TRIPDAY	Travel day - 1 or 2
TRIPNO	Trip number
TRLEAVE	Departure time, 24 hr clock (0400-2800)
TRARRIVE	Arrive time , 24 hr clock (0400-3600)
TRDAY	Travel day DD
TRMONTH	Travel month MM
TRYEAR	Travel year YY
DAY	Day of week - 1=Mon, ... 7=Sun

TRACTIV Trip leg purpose

Home	1
Work - main job	2
- other job	3
- employers business	4
Education	5
Shopping	6
Social welfare	7
Personal business / services	8
Medical / dental	9
Social / recreation	10
Serve passenger	11
Change mode	12

TRMODE Travel mode

Vehicle driver	1
Vehicle passenger	2
Cycle	3
Train	4
Bus	5
Ferry	6
Plane	7
Taxi	8
Other	9
Walk	0

Note: TRMODE is not in NZTS.DRIVER, PASS, etc. (of course).

ADDNO	Address number of the destination. Used to link to the travel address file
TRDISTD	Digitised distance (km)
TRDISTN	Reported distance
AGE	Persons age
SEX	Persons sex

Trip weights :

ESTWGT	Trip distance weight (expands data to represent 2 days travel)
ERRWGT	Weight for establishing standard deviation of estimate
ESTWGT2	Trip distance weight for cities only
ERRWGT2	Weight for establishing standard deviation of estimate for cities only
GROUP	Group variable used in error estimation.

Trip linking :

TRIP	Which trip this is for this person and day 1,2 ...
PURPOSE	What the overall purpose of this trip is (see TRACTIV for values)
NUMLEGS	How many legs this trip has
LEGNO	Which leg this is

If VEHICLE DRIVER or PASSENGER :

VEHICLE	Vehicle number - 1-9 are household vehicles, A-I are other vehicles used by the household. This field is used to link to the VEHICLES file to get vehicle details.		
VTYPE	Vehicle type	Car / SW	1
		Van / Ute	2
		Truck	3
		Taxi	4
		Motor Cycle	5
		Other	6
TRDIST1	Distance where 70 km/hr limit or lower (km)		
TRDIST2	Distance where not 70 km/hr limit		

If VEHICLE DRIVER :

TRPEOPLE	Number of people		
TRPARK	Where parked	Not Parked	1
	Off Street:		
		Residents Property	2
		Private	3
		Public	4
	On Street:		
		Time Limit	5
		No Time Limit	6
		Other	7

If PEDESTRIAN :

TRCROSS	How many roads crossed
TRPEDX	How many pedestrian crossings

Vehicle Information - NZTS.VE

SAMNO	Household number
VEHICLE	Vehicle number - 1-9 for household vehicles , A-L for other vehicles
VMAKE	Vehicle make
VMODEL	Model
VYEAR	Year of manufacture

VTYPE	Vehicle type	Car / SW	1
		Van / Ute	2
		Truck	3
		Taxi	4
		Motor Cycle	5
		Other	6
VCC	Engine size in cc		
VOWNER	Vehicle ownership	Owned by household member	1
		Company owned or leased	2
		Other	3
		Rented	4

Alcohol Information - NZTS.AL

SAMNO	Sample number		
PERSON	Person number		
ALDAYNM	Travel day		
ALSESSN	Drinking session number		
ALSTART	Time of start, 24 hr clock (0400-2800)		
ALFINSH	Time of finish, 24 hr clock (0400-3600)		
ALVENUE	Where drinking was done	Own home	1
		Other home	2
		Hotel / tavern	3
		Sports club	4
		Other club	5
		Restaurant, cafe or coffee shop	6
		Work	7
		Sports event or outdoors (like beach or park)	8
		Other	9

Accident Information - NZTS.AX

SAMNO	Sample number		
PERSON	Person number		
AXNO	Accident identifier - 1 to 99		
AXDATE	Date (DDMMYY) - 99 for don't know in DD or MM		
AXDAYWK	Day of week - 1=Mon, 2=Tue, ... 7=Sun, 8, 9, A		
AXTIME	Time of day - HHMM		
ADDNO	Accident address number		
AXSEV	Severity - 3=fatal, 2=hospitalised, 1=injury, 0=Other		
AXHOWIN	Involvement in the accident	Driver	1
		Motor cycle rider	2
		Vehicle passenger	3
		Motor cycle pillion	4
		Cyclist	5
		Walking	6
		Other	7
AXHHVEH	Was it a current household vehicle ? 1=yes, 2=no		
VEHICLE	If so which one ?		
NOCARS	How many cars were involved in the accident ?		

NOVANS	How many vans		
NOTRUCKS	How many trucks		
NOMC	How many motor bikes		
NOCYC	How many bicycles		
NOPED	How many pedestrians		
NOOTHER	How many other objects		
AXTYPE	Accident type	One vehicle hitting a parked vehicle	1
		Rear end	2
		Head on	3
		Angle collision	4
		Hitting an object	5
		Loss of control	6
		Other	7
AXSPEED	Speed limit	<= 70 km/hr	1
		> 70 km/hr	2
		Car park, not relevant	3
AXREPOR	Accident reported ?	Yes	1
		No	2
		Don't know	3
AXCOST	Damage cost	Nothing	1
		Less than $1,000	2
		$1,001 - $5,000	3
		$5,001 - $10,000	4
		Over $10,000	5
AXPLATE	First 2 letters of number plate		

Accident locations - NZTS. AA

SAMNO	Sample number
ADDNO	Address number
AXADDRS	Address (lines separated by ^)

Geographic Information - NZTS.AU

SAMNO	Sample number
ADDNO	Address number
STATUS`	Digitising status
EASTING	National grid easting (nearest 10m)
NORTHING	National grid northing
AUNIT	Area unit
TLA	Local body (1976 census variety)

Appendix 2

1988-89 New Zealand EXPOSURE SURVEY

This document was written by Mike Keall as part of the planning process to discuss sample sizes and costs. It is included here for its detailed discussion of the sampling method for the survey.

TABLE OF CONTENTS:

PART A: General Description

Introduction.

The purpose of the survey is to provide a bank of data to assist in the development and evaluation of a range of programmes relating to road use and road safety.

A probability sample of New Zealanders aged 5 or older is to be surveyed in order to estimate distances driven and duration of travel of drivers, passengers, pedestrians, and pedal cyclists.

These travel estimates will be used to describe travel behaviour generally, and also to calculate accident risks, especially in conjunction with existing collections of accident data.

The study will update the 1976-77 driver exposure survey. It will also provide much needed information on the risks of various groups of pedestrians, pedal cyclists, and passengers - such information has never been available in New Zealand.

Background.

New Zealand research into road safety gained impetus when the Ministry of Transport began computerising traffic accident reports in 1970. It soon came to be recognised, however, that exposure information would greatly enhance the explanatory power of this resource, so the decision was made to conduct a survey of driver exposure to risk of accident in 1976.

Rough and ready accident risk measures had been employed prior to the 1976 Driver Exposure Survey, such as accident involvements per person, per driver's licence, or per registered vehicle.

These exposure measures had two big disadvantages. First, they could not measure levels of driving activity. Second, the number of classification variables was severely limited.

The concept of exposure used in the study was based on the simple intuition that a driver's risk of being involved in a traffic accident is proportional to the quantity of driving he does, under specified conditions of driving. Basic road safety questions could not adequately be answered until the exposure survey was conducted.

The New Zealand Survey of Driver Exposure to Risk of Accident, 1976-77 has formed an integral part of traffic safety thinking, contributing much knowledge that is now taken for granted. The Exposure Survey laid the foundations for much subsequent research and decision-making about road safety.

To improve resource allocation is a major goal of agencies whose business it is to fund and otherwise promote road safety research. This goal will be furthered by the proposed survey. By enabling a better estimate of accident savings to be made for specific proposals, scarce road safety resources will be more efficiently allocated.

New Zealand's driver exposure survey remains one of the most fruitful and methodologically most sound exposure surveys conducted worldwide. However, there is an urgent need to extend and update this exposure data, now more than a decade old. Safety and transportation parameters have undergone fundamental change over the last decade. For example:

* There have been marked demographic changes, notably an accelerating population drift north, substantial increase in the Polynesian population and marked change in population age structure.

* The composition of the vehicle fleet has changed radically. Ten years ago 13% of cars were of Japanese design. Today the figure is about 60%. Vehicle design and size have changed drastically.

* Deregulation will have altered patterns of heavy truck exposure and risk.

* The balance of wealth has shifted from rural N.Z. to the main centres. Changes in the pattern of average real disposable income will have affected the proportion of driving done for recreational reasons.

* The distribution of wealth within communities has also changed. A small number of skilled and professional workers are now paid much more. Most are paid less, and unskilled workers are paid much less.

* Age patterns of commuting will have been affected by the move to inner city suburbs- in 1976 the inner city was inhabited predominantly by young people in flats.

A second exposure survey will also assist in the monitoring of events of road safety significance occurring during the survey period. Examples are the introduction of vehicle design regulations, traffic blitzes and other events of which we have no knowledge at present.

Brief Description of the Design

The sample design has benefitted from the 1976 Exposure Survey. The questionnaire design, interviewing and surveying techniques have been tested and refined in Australia, where very high response rates were achieved (e.g 1981 Sydney Travel Survey - 87.8%).

Substantial economies will come from utilising current travel survey technology and its practitioners. Liz Ampt has developed and refined methods for collecting transportation and exposure information in a series of surveys in Australia over the period 1980-1986.

The sample design is a stratified multi-stage cluster design. It is necessarily complex since high-quality estimates must be produced while minimising costs. Data from the 1976-77 exposure survey have been used in the development of a design which retains the basic structure of the former survey while maximising cost-effectiveness.

All people five years old and over will be interviewed in each selected household. The occupation, age and sex of each person interviewed will be recorded, as will household data relating to the number of occupants, family structure and vehicle ownership.

Since sampling will be spread evenly over all 365 days of the year, seasonal and geographic variations will be measurable. Intra-household behaviour will also be observable.

The survey will yield information on driving in commercial vehicles, although there are no plans to sample more heavily from this category.

The proposed survey has been designed to represent New Zealand as a whole, as well as providing separate estimates for the main population centres.

Stand-alone surveys have advantages in two main areas over the "Omnibus" approach, despite being more expensive.

Data on travel in the proposed survey will be obtained by asking each respondent to describe all travel over the past two days. This requires a careful interviewing approach which probes the respondent for all travel, no matter how trivial. Such techniques, which were tested in the 1976 NZ Driver Exposure Survey and refined in Australia, require thorough interviewer training. Interviewers can be specially trained for a stand-alone, but obviously not for an Omnibus survey which covers a wide range of topics and relies on a set pattern of questions and answers.

Secondly, response rates would certainly be lower for the Omnibus survey. Several devices will be employed in the current exposure survey to achieve a high rate of response, including approach letters to notify selected households of their inclusion in the survey. A high priority will be accorded to contacting "not-at-homes" since research has indicated that such people tend to travel more than average. If necessary the interviewer will call back five times to get responses from all household members. Market research companies have different priorities and substitute for non-respondents after minimal call-backs, a procedure which generates non-response bias and tends to lessen the resolve of interviewers to obtain responses from sampled households.

The Omnibus interview is necessarily much longer than that of a stand-alone survey (since many different surveys are served by the one interview). This is a significant burden on respondents which has a detrimental effect on both response rates and the quality of data.

It is for these reasons that a stand-alone survey was favoured for the current exposure survey.

Personal interviews have been favoured over mail questionnaires or telephone interviews because of the poor rate of return in mail surveys and the high rate of refusal in telephone interviews - it is much easier to get people to cooperate when the interviewer is there in person. The mail survey in particular is open to misinterpretation and partial response (reporting some travel, but not all). The process of selecting a sample is also much less likely to introduce biases when the interviewer systematically selects households within given meshblocks. Data quality considerations outweigh the greater expense of personal interviews.

PART B :Sample Design

B.1. Sampling Units

The sampling units are as follows:

(i) PSUs (primary sampling units) are either Major Urban Areas (MUA's) or Territorial Local Authorities (TLAs)

(ii) SSUs (secondary sampling units) are meshblocks

(iii) TSUs (tertiary sampling units) are households.

(iv) QSUs (quaternary sampling units) are people. All people aged five and over within sampled households are surveyed.

Definitions of sampling units[1]:

Urban areas are statistical concepts covering areas of unified community, economic and social interests. In addition to the central city or borough, urban areas include neighbouring boroughs and town districts, and parts of counties which are regarded as suburban to the centre of population. MUAs are urban areas with more than 45,000 people.

Territorial Local Authorities (TLAs)[2] are legally and geographically defined administrative territories whose status is decided upon from population size and other criteria. Local authorities include cities, boroughs, counties, districts and town districts.

Changes in boundaries of sampling units

The TLA boundaries are being continually updated: new TLAs are being created from the amalgamation and redistribution of existing TLAs. The TLAs selected for the exposure survey are those defined at the time of the 1986 census, so it is important that these TLA definitions are used when sampling.

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1 Taken from NZ Official Yearbook 1987-88 (Dept of Statistics). Note that these geographical units are not necessarily used by other government departments or organisations.

2 When a TLA overlaps one of the MUAs in the full coverage stratum, the sampling unit becomes that part of the TLA which is outside the MUA.

Coverage

All persons of five years and older who are normally resident[3] in New Zealand have a theoretical chance of selection.

Some categories of non-private dwellings will not be surveyed owing firstly to the difficulty in gaining access to inhabitants and secondly to the fact that the interviews are based around a four-day period which is not compatible with very short-term accommodation. Thus hotels and motels are excluded.

However caravan parks and camping grounds are included, as are nurses' homes, hostels, apartment buildings, hospitals (where there are resident staff). If an eligible non-private dwelling is present in a sampled meshblock, then it is sampled with each room/apartment/attached dwelling treated in the same way as private dwellings in the meshblock (i.e a sampling interval of 5 is used).

Other **ineligible dwellings** include dwellings where all occupants are not normally resident in New Zealand, and unoccupied dwellings (which are not obviously derelict). These are not counted as non-respondents and nor are they replaced. This procedure avoids the bias of sampling too many eligible households per meshblock (i.e more than 1 out of every 5). The numbers of ineligible dwellings which cannot be identified as such during enumeration are unknown, so any house which cannot be seen as obviously ineligible in passing (i.e when enumerating households within a sampled meshblock) should not be replaced by the house next door if it is sampled and subsequently found to be ineligible.

B.2. Stratification

The sampling frame was divided into two strata.

The first, or full coverage stratum consists of Main Urban Areas (MUA's) which are sampled with certainty.

The remainder, the non-full coverage stratum, consists of Territorial Local Authorities (TLAs) - or partial TLAs where a TLA overlaps a full coverage MUA - which are sampled with PPS (probability proportional to size[4]).

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3 "Normally resident" as defined by the Dept of Stats (this is the coverage of the Population Census).

4 where measure of size is total population as at 1986 Census.

B.3. Probabilities of selection

Full Coverage Stratum

(i) PSUs (MUAs) are included in the sample with certainty.

(ii) SSUs (meshblocks) are sampled with simple random sampling without replacement. Meshblocks are selected independently within each MUA with sampling fractions 0.0135, 0.024 for schemes 1 and 2 respectively. (Schemes 1 and 2 refer to different funding options).

(iii) TSUs (households) are sampled systematically with a sampling interval of 5. They are therefore sampled at a rate of approximately 1/5 that of meshblocks i.e .0027 and .0048 within each MUA. This is approximate since meshblocks precede households as sampling units and they vary in size.

The method of systematic sampling is modified by using the remainder of the sampling interval from the previous meshblock as the start for sampling the next meshblock[5]. Thus ideally a random start is obtained for only the first meshblock surveyed in the MUA. Using this technique, a fraction very close to 1/5 of all households should be selected.

Non-full coverage stratum

Sampling in 3 stages:

(i) Selection of PSUs (TLAs) using PPS (probability proportional to size) with replacement.

(ii) Selection of meshblocks within selected TLAs (simple random sampling, but using ratio estimator for estimation).

(iii) Selection of households within selected meshblocks (one in five, systematic selection modified as described above for full coverage case).

21 and 29 TLAs were selected respectively for sampling schemes 1 and 2. Sampling was with replacement - which resulted in some TLAs being selected more than once.

Within each singly selected TLA, 0.03 of all constituent meshblocks were sampled without replacement. Meshblocks within TLAs selected *n* times were sampled with a sampling fraction 0.03 x *n*.

This means that households/people in sampled TLAs were sampled with an approximate resultant sampling fraction of 0.006 (this fraction doubled, trebled etc if the TLA was selected twice, thrice etc.).

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5 This technique is also described in Hansen, Hurwitz and Madow p.349.

B.4. Sample Size

Expected[6] sample sizes (numbers of people) are :

	Full coverage Stratum	Non-fc Stratum
Scheme 1.	4,841	2,732
Scheme 2.	9,027	3,408
Total pop over fives.	1,798,222	1,256,447

(assuming both strata have same proportion of over 5's)

Note that these sample sizes are only approximate cosequences of the sampling fractions owing to the variability in size of the sampling units.

B.5. Estimation

Estimate[7] at TLA/MUA level

y_i = sample total for meshblock i (i=1,...,n)

$$= \sum_{k=1}^{l} y_{ik}$$

where y_{ik} is response from person k in mb i (k=1,...,l)

S = systematic sampling interval
= 5 for both strata

M_i = no. of people in meshblock i (taken from 1986 census)

M_o = total people in entire TLA/MUA

$\hat{Y}_{PSU}$ = estimated total for TLA/MUA

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6 The closest approximation to what would be achieved in the field for the given sample of meshblocks.

$$= \frac{S M_o \sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} m_i}$$

Estimate at Stratum level for non-full coverage stratum[8]

p = no of TLAs sampled

$\hat{Y}_{TLA_j}$ = estimated total for TLA_j (j=1,...,p)

L_j = no. of people in TLA_j (from census)

L_o = total no.of people in entire stratum(from census)

$z_j = L_j / L_o$ = pr(TLA_j is selected, pps with replacement)

$$\text{then } \hat{Y} = \frac{1}{p} \sum_{j=1}^{p} \frac{\hat{Y}_{TLA_j}}{z_j}$$

This can be expanded to become

$$\hat{Y} = \frac{SL_o}{p} \sum_{j=1}^{p} \frac{\sum_{i=1}^{n_j} y_{ji}}{\sum_{i=1}^{n_j} M_{ji}}$$

where y_{ji} is sample total for meshblock i within TLA j

M_{ji} is total no. of people in meshblock i, TLA_j

n_j is no. of meshblocks sampled in TLA_j

Estimate at Stratum level for full coverage stratum

q = no of MUAs in full coverage

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7 Source: Cochran p.250

8 Source: Cochran p.252 formula 9A.7

$\hat{Y}_{MUA_j}$ = estimated total for MUA_j (j=1,...,q)

then $\hat{Y} = \sum_{j=1}^{q} \hat{Y}_{MUA_j}$

B.6. Post-Stratification

This technique involves stratifying the sample data *after they have been collected*. The sample data are partitioned into post-strata by geographical region, sex and some (perhaps three) age categories. These post-strata are then weighted in a fashion which simulates the distribution of the population for these subgroups.

Temporal post-stratification

Ideally the survey should be spread evenly over the days of the week and months of the year: the variance of the estimates is less if this is so. If there is significant deviation from this then some form of post-stratifying must be applied. This involves weighting at the PSU level to correct firstly for days of the week and secondly for months of the year.

All post-strata weighting must be done simultaneously i.e the sample must be divided into domains by all the post-stratifying parameters before the data within the domains is summed and weighted. At this point the size of each post-stratum must be assessed to ensure adequate sample size.

B.7. Temporal allocation

Temporal allocation refers to the division of the sample over the survey period of one year. The purpose of temporal allocation is two-fold:

Firstly, from an estimation point of view, the sample evenly spread over the months of the year takes into account all seasonal variation and provides a true annual estimate of exposure.

Secondly, from an administrative point of view, it provides the survey interviewers with an even workload throughout the year.

PSU level: The MUAs are each surveyed over the full survey period. This means that estimates of exposure for individual MUAs can be produced. Two TLAs (008 and 229) have samples of sufficient size to require year-round survey. The remaining TLAs, however, are too small to justify this treatment and are arbitrarily split into three (scheme 1) or four (scheme 2) equal-sized groups each of which is surveyed throughout the year. The TLAs

within these groups are in random order.

SSU level: All allocation of mbs within PSUs to periods of the year is proportional to the no. of interviews expected, so the given timetable is based on a totally even interviewing rate throughout the year. The mbs within PSUs are surveyed in random order to avoid coincidental bias of geographical location and time of year.

Sampling over holiday periods should not vary from the normal daily sampling rate. Sampling more heavily over holiday periods would increase the overall non-response rate of the survey (since experience has shown that the number of not-at-homes is much higher). However these periods have a high concentration of long recreational journeys which are an important component of the exposure picture. Hence the sampling rate should not be allowed to drop.

PART C : Elaboration of Sampling Procedure.

C.1. Sampling Units

The choice of sampling units was fairly clear-cut. Multi-stage cluster samples are standard for this type of population survey since they are fairly robust to changes in the population between censuses and are very cost-efficient.

C.2. Stratification

There are three main reasons for the division of NZ into a predominantly "urban" stratum (full-coverage) and a predominantly "rural" stratum (non-full coverage) with a larger sampling fraction applied to the former than to the latter.

(a) Estimation domains. Separate estimates can be produced for each MUA, an important consideration for research or policy-making at a regional rather than a national level. Note that the sample size for regional estimates is nevertheless insufficient for the sort of detailed analysis possible at the national level.

(b) Efficient selection of the sample. A sample which is arranged in groups of geographically proximal households can be surveyed more cheaply since travel by interviewers is minimised[9].

(c) It makes sense to concentrate sampling in areas where drivers are subject to the greatest number of collision opportunities i.e urban areas.

A larger sampling fraction within clusters was adopted in the non-full coverage stratum (where more travel by the interviewers is required *between* clusters owing to the relative sparseness of the population). Hence more meshblocks within TLAs were sampled in comparison with the full-coverage stratum.

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9 On the other hand, however, the estimates are adversely affected if the clustering is too "close". Thus for any given sample size a balance must be found between a cheap but inefficient sample and an efficient (i.e low variances for the estimates) but expensive sample .

C.3. *Probabilities of Selection*

PSUs

The sampling procedure most appropriate to the selection of the PSUs (TLAs) in the non-full coverage stratum is probability proportional to size (PPS) with replacement. The TLAs vary considerably in size (i.e population) so any procedure which does not take into account the sizes would be very inefficient.

Probability Proportional to Size has the added attraction of tending to select large TLAs, thus minimising administrative costs of the survey.

There are 187 TLAs in the non-full coverage stratum: too few to be able to ignore distortions to the probabilities resulting from "without replacement" sampling. One method of accounting for these distortions is to use the Horvitz-Thompson (or similar) estimator. However this is a very complex estimator in comparison with the PPS estimator, with an even more contorted variance estimator. Since "with replacement" sampling is quite acceptable for the TLAs, this was adopted with consequentially simple estimators.

SSUs

As meshblocks also vary considerably in size, it was decided to use simple random sampling with a ratio estimate. There is no advantage, as there was with the TLAs, in selecting large units - a natural result of PPS. As is explained in Cochran p.250 ff and Hansen, Hurwitz and M..dow p.348 ff, this procedure generates good estimates without the complexity of PPS selection, estimation and variance estimation. HH&M[10] (p.349) indicate that the systematic selection of households within meshblocks should be slightly altered to make the best use of this technique : within a given PSU a random start should be chosen for one meshblock, but for all subsequent meshblocks the start is calculated taking into account how many households remained in the previous meshblock. This is to reduce the 'tail-end' variance of the sample size and ensure that very close to one fifth of households are selected within the given PSU.

In many situations the ratio estimate has a bias, which decreases as the sample size increases. Thus a rule-of-thumb is applied[11]which restricts the use of ratio estimators to applications where the sample size is at least 30-50 (i.e the sample from each PSU would need to be of this order).

However, this bias is negligible, even for small samples, if the relationship between the variables of the ratio approximates a straight line through the origin. This approximate relationship holds for {distance travelled in mb} and {number of people in mb}. Thus the

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[10] Hansen, M.H, Hurwitz W.N, and Madow W.G (1953) *Sample Survey, Methods and Theory*

[11] Refer to Cochran p.153 or Yamane p.359.

minimums of the rule-of-thumb are not relevant (however common sense suggests that the sample from each PSU should not be too small, given this estimation strategy).

TSUs

A systematic sample with a sampling interval of 5 was used within each meshblock. The systematic sampling procedure is modified[12] so that within sampled meshblocks each person/household has a probability of being selected very close to 1/5.

Other schemes have been suggested which sample more households for a given cost by applying a much larger sampling fraction within meshblocks. Superficially this produces a higher status sample since more households are selected and more people interviewed. This is misguided as the sampling errors become higher if sampling is more concentrated within meshblocks. The meshblock is a widely-used sampling unit in New Zealand surveys since it is a convenient size and is economically and sociologically homogeneous. It makes sense to assume that meshblocks have a high internal correlation with respect to travel behaviour. On this basis, an efficient sampling scheme samples few households within meshblocks. Sampling error calculations on the data from the 1976-77 exposure survey confirm that a far greater contribution to overall variance comes from inter-meshblock variation than from intra-meshblock variation.

On the other hand, the cost of sampling meshblocks is much larger than for households.

QSUs

The 1976-77 Exposure Survey applied a higher sampling fraction to teenagers within households than to adults. However, as the current exposure survey incurs a large proportion of cost in making contact with any given household, it was considered more cost efficient to sample *all* occupants of sampled households - particularly as all travel behaviour is being recorded (not just driving, as in 1976-77).

Non-full coverage stratum: PPS selection

The expected size of a TLA selected with PPS is

$$\frac{\sum_{j=1}^{N} (P_i^2)}{\sum_{j=1}^{N} P_i}$$

[12] See B.3 for details.

where P_i is the population (1986 census)
of TLA_i and there are N TLAs in the non-full coverage stratum

This figure was computed to be 17,678, which becomes 16,329 when multiplied by a constant to adjust for over four-year-olds.

There are two main applications of this figure:
(i) When a given sample size is targeted the no. of TLAs required can be set correspondingly.
(ii) The program for selecting TLAs was tested to check that the PPS procedure was working correctly. The average size of TLAs selected in several iterations of the program was compared to 16,329.

21 and 29 TLAs were selected respectively for sampling schemes 1 and 2. Sampling was with replacement - which resulted in some TLAs being selected more than once.

Within each singly selected TLA, 0.03 of all constituent meshblocks were sampled without replacement. Meshblocks within TLAs selected *n* times were sampled with a sampling fraction 0.03 x *n*.

Ideally *n* independent samples (with sampling fraction of meshblocks 0.03) should be selected in this situation; but there is a potential flow-on effect where a given meshblock is sampled more than once, and possibly households more than once. To avoid this, a procedure mentioned in Yamane p.239 was used. This involves selecting a 'single' larger sample (i.e. a sample of *n* times as many meshblock's are selected as would be selected if the TLA were selected once) of the required size. Few TLAs were multi-selected and any bias due to this technique is minimal in the context of the survey as a whole. The alternative, although probabilistically more sound, is messy and potentially a source of non-sampling errors.

The internal sampling fraction of 0.3 is really a minimum which ensures an adequate sample size for estimation from each TLA (particularly for ratio estimation). If the sample size is reduced further for some reason then fewer TLAs should be sampled rather than reducing the internal sampling fraction.

A larger internal sampling fraction was not adopted at the design stage since the 1976 exposure survey data indicated that sampling errors are dominated by inter-TLA variance.

Non-full coverage: sampling meshblocks within small TLAs

Since the sampling procedure selects whole numbers of meshblocks within a TLA, a very small TLA may have less than half a meshblock sampled, which is rounded to 0 by the

sampling program. People within such TLAs would therefore have no chance of selection - a potential source of bias. It is necessary to consider such cases as they occur.

One such TLA was selected for scheme 2 (TLA 150): as 0.48 of a meshblock was its allotted sample, the program had rounded down to 0. It was necessary to intervene by sampling one meshblock, a treatment with minimal resultant bias.

C.4. Measurement of Distance

The estimation of distance travelled is central to the calculation of exposure to risk to accident, and hence the key variable of this survey. The Survey and Land Information Department is currently developing an index of street names and addresses with corresponding distances between addresses. This index would be ideal for the accurate calculation of distances travelled where the respondent lists actual locations visited. The anticipated completion date for this facility is mid 1992. However, Wellington should be finished within 6-12 months, so the index may still be useful for a subsample of the survey. No approximate charge for access to this facility could be predicted by SALID at this early stage.

A subsample of the Wellington area (say 70 persons) along with a subsample from a more rural area (say 40 persons) should be asked to list all addresses visited as well as estimated distance travelled and estimated time taken for each trip. These must be random samples (otherwise bias could invalidate the exercise), thus the pilot has been increased in size and consists of a random sample of meshblocks in the vicinity of Wellington.

Even if the index is unavailable at this point, a clerical exercise using large scale maps would be adequate for accurate distance measurement. For long trips (say more than 100 km) the names of towns/cities can be indicated instead of actual addresses.[13]

The listing of all addresses is burdensome for the respondent and the use of only one sample travel day should be considered for the subsample despite the loss of travel information. Ideally the *entire* sample should be asked to list addresses so that accurate distances can be estimated in the future when the index is complete, however two factors must be considered:

(i) Respondent burden. We must be wary of imposing too much on respondents as the data quality and response rates may suffer as a result. This could potentially negate the benefits of using the index.

(ii) The index is estimated to be completed a year after the exposure survey ends. Even if this is accurate, much analysis needs to be done on the exposure data as soon as it is available i.e before the index is finished. Changes in government policy, funding or priorities

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[13] Note that digitised trip distances were finally used for the survey.

may well delay SALID's project further (particularly as it is very expensive).

Thus it is suggested that

(a) the entire sample be required to furnish details on estimated length and duration of trip[14]
(b) subsamples from the Wellington area and some rural area provide trip origin and destination addresses as well as duration and length
(c) these subsamples be taken from the main sample of the above areas
(d) depending on the quality and variability of the above subsample data, weights be developed using (b) for estimating distance from the responses in (a)

Selection of pilot sample

Accordingly, the pilot sample was selected from two strata: one consisting of the MUAs Wellington and Lower Hutt, the other consisting of the two TLAs 149 and 151 (Featherston Borough and County). Approximately 70 and 40 people will be interviewed from each stratum respectively. The sampling fractions of meshblocks within strata are .00046708x5 and .0073x5 respectively. The meshblocks were selected by random sampling without replacement.

C.5. Estimation

For example, case weights for scheme 1, non-full coverage people (or households) would be:

$$\frac{5\times \text{ pop of entire TLAi}}{\text{Pop of sampled mbs from TLAi}} \times \frac{1{,}360{,}270}{21\times \text{ pop of entire TLAi}} \qquad \{\text{Note the cancellation that occurs}\}$$

(all people from TLA_i are given the same weight)

---

14 The latter is likely to be accurately recalled, particularly by pedestrians. A distance estimate can then be obtained with a weighting factor based on walking speed for the given age group.

and case weights for people from MUA_i (full coverage) would be:

$$\frac{5\times \text{ pop of entire MUAi}}{\text{Pop of sampled mbs from MUAi}}$$

Adjustment of weights to account for inter-censual change

The sample will reflect any population increase or decrease if it occurs within meshblocks existent at the time of the 1986 Census. Thus it is unnecessary to adjust estimation weights for changes at this level[15].

The Statistics Dept provides updated population estimates for all MUAs, which could potentially be used in estimation e.g if a MUA has increased in size by 5% since the census then the exposure estimate for that MUA could also be increased by 5%. However, since most changes occur within existing meshblocks, the achieved sample size should be 5% larger for this area, and no adjustment is necessary.

Construction of housing outside 1986 meshblock boundaries is less easy to account for. Such dwellings have zero chance of selection in the survey, a potential source of bias. No easy solution exists. Other similar surveys have used additional samples to cater for newly constructed dwellings. For example the US 1983-84 National Personal Transportation Study used the 1970 census as a sampling frame and then updated the sample from building permits issued thereafter. The NZ 1986 census provides us with good young (2-year-old) data which does not require updating to the same extent as the teenage US data.

In the context of the survey as a whole, housing constructed outside 1986 meshblock boundaries is of little consequence.

C.6. Post-Stratification

Several factors need to be taken into account before post-strata are defined.

(a) The population data for the poststrata must be accurate. This means that either the survey is being run not long after a census (as time passes it may be necessary to broaden the post-stratum categories e.g considering larger geographical areas or reducing the number of age divisions) or inter-censual estimates are available for use[16].

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15 However, post-stratum weighting can usefully use updated population information - see C.6.

16 Enquiries to the Dept of Statistics have indicated that updated population breakdowns by

There are two main consequences of using inaccurate population data:

-the sample estimate is biased

-the variance estimator underestimates the true error.

Both are undesirable (the second really results from the first). The benefits of post-stratification (in terms of more efficient estimation) are fairly modest in a well-designed large-scale survey such as this one. Thus the complexity of post-stratification may be both unnecessary and undesirable if good population data is not readily available.

(b) The sample should be fairly large in each post-stratum.

Cochran[17]suggests a minimum post-stratum size of 20 as a rule-of-thumb.

Such considerations dictate that decisions whether to post-stratify and how to define post-strata be made *once the entire sample is selected.*

The following is an example of the use of post-stratification for two classifying variables (in practice there will be more).

For this hypothetical TLA, census results indicate that
20% of the population are male teenagers
5% of the population are female teenagers
60% of the population are male adults
15% of the population are male teenagers
The following indicates the numbers[18] sampled in each category:

	m	f
teen	10	20
adult	30	40

---

age and sex are available for MUAs and TLAs (using 1986 TLA boundaries, if we so wish) .

Other sources of data are the census publication B24, which has age and sex breakdowns as at the 1986 census, and the Monthly Abstract of Statistics which has estimated population figures (but no age/sex breakdowns) for MUAs.

[17] See Cochran pages 134-135.

[18] Note that two of the post-strata here would be too small. In a real situation, the two "teen" categories would be combined into one post-stratum.

Weights are then calculated which are

{census percentage}/{sample percentage}.

So, for example, the weight for male teens is 20% / 10% = 2.

All weights are as follows:

	m	f
teen	2	.25
adult	2	3/8

All data in these categories is weighted by these factors.

C.7 Bibliography

Hansen, M.H, Hurwitz W.N, and Madow W.G (1953) *Sample Survey, Methods and Theory.* Vols.I and II. New York: John Wiley and Sons, Inc

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Yamane, T. (1967) *Elementary Sampling Theory*. Prentice-Hall, Inc.

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Appendix 3 - Weights and sampling errors

Weights

Each item of survey data has a weight. Depending on what level this data is at (ie. whether it is household, person or trip data), this weight is constructed from a series of two or more factors which are multiplied together to form the overall weight. These factors are referred to as sampling weights, household non-response weights, person non-response weights and post stratification weights. Each of these factors account for different aspects of sampling or non-response. Intuitively, one can regard the final weight as indicating the number of households, people or trips that the survey data is representing in the population. Thus a household with a final weight of 400.5 will effectively represent 400.5 households.

Sampling weights

These adjust for the probability of selection. So if a household was selected with a probability 0.0143, this weight would be 1/0.0143 = 69.93. The household was randomly selected so it can be regarded as representing 69.93 households at the time of the sampling. In some cases, an adjustment has been made to the sampling weight to account for differences in the sizes of the meshblocks which were selected. This adjustment is called the ratio estimator. However the sampling rate is still approximately the inverse of the probability of selection, as described above.

There is a second set of sampling weights which are used when estimates for individual cities are required. These differ from the normal sampling weights in some cases where the ratio estimator has been used. The reason for using different weights is that the ratio estimator (which generally gives more accurate estimates) can't be used in some situations when individual cities are being estimated.

Household non-response weights

A number of sampled households did not supply any data for the survey: either no-one was at home whenever an interviewer called or the household refused to give any information. Such households are referred to as non-responding households. To use zeros for these households would lead to an underestimate of actual travel. Therefore available household information is used to impute a response for these non-responding households. Any given non-responding household is matched to a group of responding households by geographical area and travel day of the week. This group is referred to as a household non-response group. Both area and travel day of the week are related to travel behaviour, therefore, a good imputed response for any non-responding household is the average response of all the responding households in the group to which it is matched.

The household non-resonse weight adjusts the weights of the responding households so that their responses can partially represent those of matched non-responding households ("partially", since the average response of several households is always used to impute).

Person non-resonse weights

Within sampled households, there are sometimes people who are difficult to contact or who refuse to supply any travel data, while other members do supply information about their own travel and about the household (including basic information about the non-responding

members of the household). For non-responding members of such households there is more information on which to impute responses, some of which is related to travel behaviour. As described above for households, any given non-responding person is matched to a group of responding people by geographical area, age and sex. This group is referred to as a person non-response group. The imputed response for any non-responding person is the average response of all the responding people in the group to which they were matched.

Of course, if household data is being estimated (e.g. the number of household vehicles), then person non-response weights are irrelevant., Only the sampling weights and the household non-response weights are used.

Post-stratification weights

By considering the sampling and non-response weights, each sampled responding person can be regarded as representing the number of people in the population with the same characteristics equal to the product of the three weights described above. Thus person A from Hamilton who is male and 21 years old may represent 401 21 year old males in Hamilton, where 401 is the product of the sampling and non-response weights for his household multiplied by his person non-response weight. Note that the more 20 to 25 year old males who did not respond the larger will be person A's non-response weight. By comparing demographic data from Dept. of Statistics population estimates with the survey results it is possible to see if the survey is truely representative in terms of age, area and sex. The post stratification weights are constructed by combining the relevant Dept. of Statistics population estimates with survey population estimates. They adjust for discrepancies which may be caused by systematic or random variation in the sample. Thus, if the Dept of Stats population estimate for a group was 22000 and the survey estimate was 11000 then the post stratification weight would be 2.

As mentioned above with reference to the person non-response weights, post stratification weights are irrelevant for estimating household data. They are used for estimating person and trip data only.

For the household and person non-response weights and post stratification weights, the area, age and sex categories are chosen so that an adequate number of sample members are always used to impute with.

Sampling errors

The random group method of variance estimation was used for estimating the confidence intervals (Wolter,1985). In this method the sample is divided into random groups which are randomly constructed subsets of the sample whose structure matches that of the sample. So each of the random groups has a sample design equivalent to that of the parent travel survey. In fact, each random group can produce estimates for NZ travel as though it were a small self contained travel survey. (Each group has its own set of weights to provide national estimates.) The variance of a parent survey estimator is estimated from the variability between the random group estimates.

There are 14 random groups used for most estimates. For the major urban areas there are two random group definitions for each city measblock; one for estimating the overall variances, another for individual city estimates. For some of the individual city estimates there are fewer than 14 sampled meshblocks.

Reference

Wolter, K.M., Introduction to Variance Estimation, Springer, Berlin, 1985.

Appendix 4 - Major Urban Areas

Sample numbers for the major urban areas

MUA	Sample numbers
Auckland North	501000 - 531999
Auckland West	532000 - 553999
Auckland Central	554000 - 617999
Auckland South	618000 - 659999
Hamilton	660000 - 679999
Tauranga	680000 - 690999
New Plymouth	716000 - 728999
Napier	692000 - 702999
Hastings	703000 - 714999
Palmerston North	729000 - 741999
Porirua	772000 - 784999
Upper Hutt	743000 - 749999
Lower Hutt	750000 - 771999
Wellington	786000 - 817999
Christchurch	818000 - 877999
Dunedin	878000 - 904999

The first 3 digits of the sample number identify the meshblock and the last 3 digits identify the dwelling.

Appendix 5 - Survey Questionnaires

There were two questionnaires. For each household there was a single form that provided information about the household. Each of the survey respondents (household occupants aged 5 years or over) filled in a personal form which included data that identified the age, sex, licence status etc of the respondent and also details of their travel over the two days of the survey.

Road Traffic Safety Research Council

1989/90 NEW ZEALAND TRAVEL SURVEY

FORM 1 --- HOUSEHOLD FORM

--- In Confidence ---

Workload Number ☐☐

Travel Dates: Day 1 ☐☐☐☐

Day 2 ☐☐☐☐

Interviewer No .. .. ☐☐

SUMMARY OF CALLS MADE TO HOUSEHOLD

	Before Travel		After Travel	
	Date	Time	Date	Time
1				
2				
3				
4				
5				
6				
7				
8				

DO YOU HAVE THE PHONE CONNECTED? Yes ☐ 1 No ☐ 2

Phone No_ _____ _

IF THE NEED ARISES, MAY WE PHONE YOU? Yes ○ No ○

HOME STRUCTURE TYPE

- Separate house ..... ☐ 1
- 2 flats or houses joined together ..... ☐ 2
- 3 or more flats or houses joined together ..... ☐ 3
- Flat or house attached to a business or shop ..... ☐ 4
- Bach, crib or hut (not a work camp) ..... ☐ 5
- Caravan, cabin or tent ..... ☐ 6
- Non private dwelling ..... ☐ 7

COMMENTS _____

APPOINTMENTS FOR INTERVIEW _____

1. INTRODUCTORY STATEMENT: COULD YOU TELL ME ALL OF THE PEOPLE WHO USUALLY LIVE HERE, STARTING WITH THE HEAD OF HOUSEHOLD

DATA ON PERMANENT RESIDENTS:

Person No.	(a) First Name/ Identifier	(b) Relationship	(c) Sex	(d) WHAT IS YOUR/ _____ 'S DATE OF BIRTH?						(e) In/Out Survey	(f) Completed Forms *(Leave blank if not in survey)*
		To Head	M/F	Day		Month		Yr.		In = 1 Out = 2 Not in Area = 3	Complete = 1 Incomplete = 2 None = 3
1											
2											
3											
4											
5											
6											
7											
8											
9											

PRE-CONTACT VISIT

o Complete Q. 1 (a) to Q. 1 (d)
o Check to ensure all people are in survey
o Complete Qs. 2-6

INTERVIEW DAY

FIRSTLY, I'LL CHECK WITH YOU THE LIST OF PERMANENT RESIDENTS AND THE HOUSEHOLD VEHICLE(S).

o Amend Q. 1 as applicable.
o Ask "Who is in survey" Question and complete Q. 1 (e)
o Amend Q. 2 as applicable and go to Form 2.

"WHO IS IN THE SURVEY?"

WERE ANY OF THESE PEOPLE OUT OF NEW ZEALAND *ALL DAY ON* _____ AND _____ ?

Yes ○ Away, EXCLUDE *(Code 3 in Q. 1e.)*

No ○ *In New Zealand*

2a. COULD YOU GIVE ME A LIST OF ALL REGISTERED VEHICLES USED BY YOUR HOUSEHOLD AND USUALLY PARKED HERE OVERNIGHT, WHETHER PRIVATE OR COMPANY OWNED?

NIL cars in Household *(Go to Q. 3)* ◯

(a) VEH. NO.	(b) WHAT IS THE MAKE OF THE VEHICLE?	(c) WHAT IS THE MODEL OF THIS VEHICLE?		(d) WHAT IS THE BODY TYPE OF THIS VEHICLE?	(e) HOW MANY CCs DOES IT HAVE?	(f) WHO OWNS THE VEHICLE?
	Make	Model	Year	1 = Car/SW 2 = PVan/Van/Ute 3 = Truck 4 = Taxi 5 = Motor Bike 6 = Other *(Specify)*	CCs	1 = Owned by member of household 2 = Company - owned or leased 3 = Other-*(Specify)*
1						
2						
3						
4						
5						
6						

2b. **Prompt:** DOES THIS INCLUDE ALL VEHICLES — TRUCKS, VANS OR MOTOR BIKES?

3. HOW MANY BICYCLES IN WORKING ORDER ARE KEPT AT THIS HOUSEHOLD?

No of Bicycles . . . ☐

4. OTHER VEHICLES USED BY HOUSEHOLD AS RECORDED IN TRAVEL DIARY *(From Form 2)*

	Make	Model	Year	1 = Car/SW 2 = PVan/Van/Ute 3 = Truck 4 = Taxi 5 = Motor Bike 6 = Other *(Specify)*	CCs	1 = Owned by member of household 2 = Company - owned or leased 3 = Other-*(Specify)* 4 = Rented
A						
B						
C						
D						
E						
F						

5. APPOINTMENTS

A. EACH HOUSEHOLD IN THE SURVEY HAS BEEN ASSIGNED TWO TRAVEL DAYS. YOUR HOUSEHOLD'S DAYS ARE _____ AND _____

B. ARE YOU/IS ANYONE IN THE HOUSEHOLD LIKELY TO MAKE MORE THAN 10 TRIPS ON EITHER OF THOSE DAYS?

Yes . . . ○
No . . . ○

C. Explain and leave memory joggers for persons in survey.

D. Make appointments for all personal interviews

6. Household Type

Person living alone 1
Married/Defacto couple only 2
Other adults only 3
Family (including extended) with Children. . . . 4
Family with adults only 5
Single adult with other adults only 6
Single adult living with Children 7
Other *(Specify)* _____ 8

RESPONSE REPORT			COMMENTS
FULL RESPONSE of all persons who are "in the survey"	1		
<u>SAMPLE LOSS</u>:			
ALL PERSONS IN HOUSEHOLD "OUT OF SURVEY"	2		
VACANT DWELLING	3		
DWELLING UNDER CONSTRUCTION	4		
NON-DWELLING	5		
DERELICT DWELLING	6		
DWELLING DEMOLISHED	7		
<u>NON-RESPONSE</u>:		No. / Total in HH	
FULL NON-CONTACT	8		
PART NON-CONTACT	9		
LANGUAGE PROBLEMS	A		
DEATH/ILLNESS	B		
FULL REFUSAL	C		
PART REFUSAL	D		

REFUSAL REPORT _____

Road Traffic Safety Research Council

1989/90 NEW ZEALAND TRAVEL SURVEY

FORM 2 — PERSONS 5 YEARS OF AGE AND OVER

Interview Date _ _ _ _ _ _ _ _

— In Confidence —

Sample No. ☐☐☐☐☐☐ Person No. ☐☐

Person ☐ 1

Proxy ☐ 2

1. BEFORE ASKING YOU ABOUT YOUR/ _____'S TRAVEL DETAILS, COULD YOU PLEASE TELL ME WHICH OF THESE ACTIVITIES APPLY TO YOU/_____ AT THE MOMENT?
   (Interviewer: Show Card)

   STUDENT — FULL TIME ..... ☐ 1
   — PART TIME ..... ☐ 2
   WORK — FULL TIME ..... ☐ 3
   — PART TIME ..... ☐ 4
   — CASUAL ..... ☐ 5
   LOOKING FOR WORK ..... ☐ 6
   KEEPING HOUSE ..... ☐ 7
   RETIRED/AGED PENSIONER ..... ☐ 8
   OTHER PENSIONER ..... ☐ 9
   Other *(Specify)* _ _ _ _ _ _
   _ _ _ _ _ _ _ _ _ _ _ _ ☐ A

2. *SEQUENCE GUIDE: o If student, (Codes 1 or 2 in Q. 1) go to Q. 3*
   o Otherwise go to Q. 4

3. WHAT SCHOOL OR EDUCATIONAL INSTITUTION DO YOU/DOES _____ ATTEND?

   Name: _ _ _ _ _ _ _ _ _ _ _ _
   Street No. _ _ _ _ _ _ _ _ _ _
   Street _ _ _ _ _ _ _ _ _ _ _ _
   Suburb _ _ _ _ _ _ _ _ _ _ _ _

   ☐☐☐

4. *SEQUENCE GUIDE: o If worker, (Codes 3, 4 or 5 in Q. 1) go to Q. 5*
   o Otherwise go to Q.10.

5. DO YOU HAVE MORE THAN ONE JOB?

   Yes ..... ☐ 1
   No *(Go to Q. 7)* ..... ☐ 2

6. I WOULD NOW LIKE TO ASK YOU ABOUT THE JOB IN WHICH YOU USUALLY WORK THE MOST HOURS.

7. WHAT KIND OF WORK DO YOU DO (IN YOUR MAIN JOB)?

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ ☐

8. (IN YOUR MAIN JOB) DO YOU WORK ....

FOR AN EMPLOYER FOR WAGES OR SALARY? .. .. ☐ 1

IN YOUR OWN BUSINESS WITH EMPLOYEES?. .. .. .. ☐ 2

WITHOUT EMPLOYEES? .. .. ☐ 3

WITHOUT PAY IN A FAMILY BUSINESS? .. .. ☐ 4

Other .. .. ☐ 5

9. AND COULD I HAVE THE EXACT ADDRESS WHERE YOU WORK (IN THIS JOB)?

Name _ _ _ _ _ _ _ _ _ _ _ _

Street _ _ _ _ _ _ _ _ _ _ _ _

Identification _ _ _ _ _ _ _ _ _ _

Suburb _ _ _ _ _ _ _ _ _ _ _ _

☐☐☐

Other, including no fixed place of work ☐ 999

TRAVEL DAY 1

First Travel Date ☐☐☐☐

10. NOW I'D LIKE TO ASK YOU ABOUT YOUR/_____'S TRAVEL FROM 4 O'CLOCK (First Day) MORNING TILL 4 O'CLOCK (Second Day) MORNING
BY TRAVEL I MEAN, FOR EXAMPLE, WALKING TO A FRIEND'S PLACE, CATCHING A BUS . . .
OR ANYTIME YOU/_____ LEFT THE HOUSE, SAY TO BUY A NEWSPAPER.

11. DO YOU HAVE YOUR/_____'S MEMORY JOGGER HANDY?
- Yes . . . . . ☐ 1
- No . . . . . ☐ 2

12. DID YOU/_____ GO ANYWHERE AT ALL ON (First Day)?
- Yes *(Go to Q 14)* . . . . . ☐ 1
- No . . . . . ☐ 2

13. DON'T FORGET THIS INCLUDES EVEN WALKING DOWN THE STREET TO BUY SOME MILK OR BREAD . . .
DID YOU/_____ STAY IN THE SAME PLACE ALL DAY?
- Yes . . . . . ☐ 1
- No . . . . . ☐ 2

14. WHERE DID YOU/_____ START THE DAY ON (First Day)?
- Home *(Go to Q. 16)* . . . . . ☐ 1
- Work — Main Job *(Go to Q. 16)* . . ☐ 2
- Work — Other Job . . . . . ☐ 3
- Social/Recreation . . . . . ☐ 4
- Hospital/Medical . . . . . ☐ 5
- Other . . . . . ☐ 6

15. AND COULD I HAVE THE ADDRESS?
- Street/No. _ _ _ _ _ _ _ _ _ _ _ _
- Identification: _ _ _ _ _ _ _ _ _ _
- Suburb _ _ _ _ _ _ _ _ _ _ _ _ ☐☐☐

16. *SEQUENCE GUIDE:*
- *o If traveller (Code 1 in Q. 12 or Code 2 in Q.13), go to Q. 17*
- *o If non-traveller (Code 1 in Q. 13), go to Q. 18.*

No. of stops ☐☐

17.

Stop No.

A. WHEN DID YOU/_____ LEAVE? ☐☐☐☐

B. WHAT DID YOU/____ DO NEXT?
WHERE DID YOU/____ GO NEXT?
DID YOU/_____MAKE ANY STOPS ON THE WAY?

Destination Address

Street No./ Street:
_____
_____
Identification _____
_____
Suburb:_____
_____
☐☐☐

C. WHEN DID YOU/_____ GET THERE? ☐☐☐☐

D. WHAT DID YOU/____ DO THERE?

Home	1
Work	
Main Job..	2
Other Job..	3
Empl. Bus.	4
Education	5
Shopping	6
Social Welfare	7
Pers. Bus/ Services	8
Medical/ Dental	9
Social/Rec.	A
Serve Pass.	B
Change Mode.	C

E. HOW DID YOU/_____ GET THERE?

Veh. Dr.- Veh. No.	1
Veh. Pass- Veh. No.	2
Bicycle	3
Train	4
Bus	5
Ferry	6
Plane	7
Taxi	8
Other	9
Walk	0

F. WHAT ROUTE DID YOU TAKE?.....

G. HOW FAR WAS IT FROM _____ TO_____? ☐KM ☐ML ☐ME ☐YD

H. HOW MUCH OF THIS DISTANCE WAS IN SPEED ZONES OF 70 KPH OR LESS ☐☐☐☐☐ ⩽ 70
MORE THAN 70 KPH ☐☐☐☐☐ > 70

If passenger, go to next Stop.

I. HOW MANY PEOPLE WERE THERE IN THE VEHICLE INCLUDING YOURSELF? ☐

J. WHERE DID YOU/_____ PARK ?

Not parked	1
Off Street:	
Resident's Property	2
Private (e.g. business premises)	3
Public	4
On Street:	
Time limit	5
No time limit	6
Other (specify)	7

K. HOW FAR WAS IT FROM _____ TO_____? ☐KM ☐ML ☐ME ☐YD

L. HOW MANY ROADS DID YOU CROSS? ☐☐

M. HOW MANY PEDESTRIAN CROSSINGS DID YOU USE? ☐

Stop No.

A. WHEN DID YOU/_____ LEAVE? ☐☐☐☐

B. WHAT DID YOU/____ DO NEXT?
WHERE DID YOU/____ GO NEXT?
DID YOU/_____MAKE ANY STOPS ON THE WAY?

Destination Address

Street No./ Street:
_____
_____
Identification _____
_____
Suburb:_____
_____
☐☐☐

C. WHEN DID YOU/_____ GET THERE? ☐☐☐☐

D. WHAT DID YOU/____ DO THERE?

Home	1
Work	
Main Job..	2
Other Job..	3
Empl. Bus.	4
Education	5
Shopping	6
Social Welfare	7
Pers. Bus/ Services	8
Medical/ Dental	9
Social/Rec.	A
Serve Pass.	B
Change Mode.	C

E. HOW DID YOU/_____ GET THERE?

Veh. Dr.- Veh. No.	1
Veh. Pass- Veh. No.	2
Bicycle	3
Train	4
Bus	5
Ferry	6
Plane	7
Taxi	8
Other	9
Walk	0

F. WHAT ROUTE DID YOU TAKE?.....

G. HOW FAR WAS IT FROM _____ TO_____? ☐KM ☐ML ☐ME ☐YD

H. HOW MUCH OF THIS DISTANCE WAS IN SPEED ZONES OF 70 KPH OR LESS ☐☐☐☐☐ ⩽ 70
MORE THAN 70 KPH ☐☐☐☐☐ > 70

If passenger, go to next Stop.

I. HOW MANY PEOPLE WERE THERE IN THE VEHICLE INCLUDING YOURSELF? ☐

J. WHERE DID YOU/_____ PARK ?

Not parked	1
Off Street:	
Resident's Property	2
Private (e.g. business premises)	3
Public	4
On Street:	
Time limit	5
No time limit	6
Other (specify)	7

K. HOW FAR WAS IT FROM _____ TO_____? ☐KM ☐ML ☐ME ☐YD

L. HOW MANY ROADS DID YOU CROSS? ☐☐

M. HOW MANY PEDESTRIAN CROSSINGS DID YOU USE? ☐

TRAVEL DAY 2

Second Travel Date ☐☐☐☐

18. AND NOW I'M GOING TO ASK YOU ABOUT YOUR/_____'S TRAVEL FROM 4 O'CLOCK (Second Day) MORNING TILL 4 O'CLOCK THIS/ (Next Day) MORNING.

19. DO YOU HAVE A MEMORY JOGGER FOR THIS DAY?
- Yes . . . . . ☐ 1
- No . . . . . ☐ 2

20. DID YOU/_____ GO ANYWHERE AT ALL ON (Second Day)?
- Yes *(Go to Q. 22)* . . . . . ☐ 1
- No . . . . . ☐ 2

21. REMEMBER THIS INCLUDES EVEN WALKING DOWN THE STREET TO BUY SOME MILK OR BREAD . . . DID YOU/_____ STAY IN THE SAME PLACE ALL DAY?
- Yes . . . . . ☐ 1
- No . . . . . ☐ 2

22. WHERE DID YOU/_____ START THE DAY ON (Second Day)?
- Home *(Go to Q. 24)* . . . . . ☐ 1
- Work — Main Job *(Go to Q. 24)* . . ☐ 2
- Work — Other Job . . . . . ☐ 3
- Social/Recreation . . . . . ☐ 4
- Hospital/Medical . . . . . ☐ 5
- Other . . . . . ☐ 6

23. AND COULD I HAVE THE ADDRESS?

Street/No. _ _ _ _ _ _ _ _ _ _ _ _

Identification: _ _ _ _ _ _ _ _ _ _ _

Suburb _ _ _ _ _ _ _ _ _ _ _ _ ☐☐☐

24. *SEQUENCE GUIDE:*
- *If traveller (Code 1 in Q. 20 or Code 2 in Q. 21), go to Q. 25.*
- *If non-traveller (Code 1 in Q. 21), go to Q. 26.*

No. of stops ☐☐

25.

Stop No.

A. WHEN DID YOU/_____ LEAVE? ☐☐☐☐

B. WHAT DID YOU/____ DO NEXT?
WHERE DID YOU/____ GO NEXT?
DID YOU/_____MAKE ANY STOPS ON THE WAY?

Destination Address

Street No./ Street:
_____
_____
Identification _____
_____
Suburb:_____
_____
☐☐☐

C. WHEN DID YOU/_____ GET THERE? ☐☐☐☐

D. WHAT DID YOU/____ DO THERE?

- Home . . . . ☐ 1
- Work
  - Main Job.. ☐ 2
  - Other Job.. ☐ 3
  - Empl. Bus. ☐ 4
- Education . . ☐ 5
- Shopping. . . ☐ 6
- Social Welfare. . . ☐ 7
- Pers. Bus/ Services. . ☐ 8
- Medical/ Dental. . . ☐ 9
- Social/Rec.. . ☐ A
- Serve Pass. . ☐ B
- Change Mode. ☐ C

E. HOW DID YOU/_____ GET THERE?

- Veh. Dr.- Veh. No. ☐ 1
- Veh. Pass- Veh. No. ☐ 2
- Bicycle ☐ 3
- Train . . . . . ☐ 4
- Bus . . . . . ☐ 5
- Ferry . . . . . ☐ 6
- Plane . . . . . ☐ 7
- Taxi . . . . . ☐ 8
- Other ..... ☐ 9
- Walk . . . . . ☐ 0

F. WHAT ROUTE DID YOU TAKE?.....
.....
.....

G. HOW FAR WAS IT FROM ☐☐☐☐☐ _____ TO_____? ☐KM ☐ML ☐ME ☐YD

H. HOW MUCH OF THIS DISTANCE WAS IN SPEED ZONES OF 70 KPH OR LESS ☐☐☐☐☐ ⩽ 70
MORE THAN 70 KPH ☐☐☐☐☐ > 70

If passenger, go to next Stop.

I. HOW MANY PEOPLE WERE THERE IN THE VEHICLE INCLUDING YOURSELF? . . . . . ☐

J. WHERE DID YOU/_____ PARK ?
- Not parked . . . . . ☐ 1
- Off Street:
  - Resident's Property . . . . . ☐ 2
  - Private (e.g. business premises) ☐ 3
  - Public . . . . . ☐ 4
- On Street:
  - Time limit . . . . . ☐ 5
  - No time limit . . . . . ☐ 6
- Other (specify) ..... ☐ 7

K. HOW FAR WAS IT FROM ☐☐☐☐☐ _____ TO_____? ☐KM ☐ML ☐ME ☐YD

L. HOW MANY ROADS DID YOU CROSS? ☐☐

M. HOW MANY PEDESTRIAN CROSSINGS DID YOU USE? ☐

Stop No.

A. WHEN DID YOU/_____ LEAVE? ☐☐☐☐

B. WHAT DID YOU/____ DO NEXT?
WHERE DID YOU/____ GO NEXT?
DID YOU/_____MAKE ANY STOPS ON THE WAY?

Destination Address

Street No./ Street:
_____
_____
Identification _____
_____
Suburb:_____
_____
☐☐☐

C. WHEN DID YOU/_____ GET THERE? ☐☐☐☐

D. WHAT DID YOU/____ DO THERE?

- Home . . . . ☐ 1
- Work
  - Main Job.. ☐ 2
  - Other Job.. ☐ 3
  - Empl. Bus. ☐ 4
- Education . . ☐ 5
- Shopping. . . ☐ 6
- Social Welfare. . . ☐ 7
- Pers. Bus/ Services. . ☐ 8
- Medical/ Dental. . . ☐ 9
- Social/Rec.. . ☐ A
- Serve Pass. . ☐ B
- Change Mode. ☐ C

E. HOW DID YOU/_____ GET THERE?

- Veh. Dr.- Veh. No. ☐ 1
- Veh. Pass- Veh. No. ☐ 2
- Bicycle ☐ 3
- Train . . . . . ☐ 4
- Bus . . . . . ☐ 5
- Ferry . . . . . ☐ 6
- Plane . . . . . ☐ 7
- Taxi . . . . . ☐ 8
- Other ..... ☐ 9
- Walk . . . . . ☐ 0

F. WHAT ROUTE DID YOU TAKE?.....
.....
.....

G. HOW FAR WAS IT FROM ☐☐☐☐☐ _____ TO_____? ☐KM ☐ML ☐ME ☐YD

H. HOW MUCH OF THIS DISTANCE WAS IN SPEED ZONES OF 70 KPH OR LESS ☐☐☐☐☐ ⩽ 70
MORE THAN 70 KPH ☐☐☐☐☐ > 70

If passenger, go to next Stop.

I. HOW MANY PEOPLE WERE THERE IN THE VEHICLE INCLUDING YOURSELF? . . . . . ☐

J. WHERE DID YOU/_____ PARK ?
- Not parked . . . . . ☐ 1
- Off Street:
  - Resident's Property . . . . . ☐ 2
  - Private (e.g. business premises) ☐ 3
  - Public . . . . . ☐ 4
- On Street:
  - Time limit . . . . . ☐ 5
  - No time limit . . . . . ☐ 6
- Other (specify) ..... ☐ 7

K. HOW FAR WAS IT FROM ☐☐☐☐☐ _____ TO_____? ☐KM ☐ML ☐ME ☐YD

L. HOW MANY ROADS DID YOU CROSS? ☐☐

M. HOW MANY PEDESTRIAN CROSSINGS DID YOU USE? ☐

26. *SEQUENCE GUIDE:*
- *o If NOT a Vehicle Driver on Day 1 OR Day 2, go to Q.32*
- *o If a Vehicle Driver on Day 1, go to Q.27.*
- *o Otherwise, go to Q.29.*

27. DID YOU DRINK ANY ALCOHOL AT ALL ON (Day 1) ? THIS INCLUDES AT HOME, WHILE VISITING, OR ANYWHERE ELSE, LIKE WORK, A CLUB OR A PUB.

Yes 1
No *(Go to Q. 29)* 2

28. BETWEEN WHEN AND WHEN?

Prompt: ANY OTHER TIMES (AT HOME?)
(Record all times)

	Start	
	Finish	
	Start	
	Finish	
	Start	
	Finish	

28a) AND WHEREABOUTS DID YOU HAVE THIS DRINK / THESE DRINKS? *(Show card)*

29. *SEQUENCE GUIDE:*
- *o If a Vehicle Driver on Day 2, go to Q.30.*
- *o Otherwise go to Q.32.*

30. DID YOU DRINK ANY ALCOHOL AT ALL ON (Day 2) ? ANYWHERE AT ALL?

Yes 1
No *(Go to Q. 32)* 2

31. BETWEEN WHEN AND WHEN?

Prompt: ANY OTHER TIMES? (AT HOME)
(Record all times)

	Start	
	Finish	
	Start	
	Finish	
	Start	
	Finish	

31a) AND WHEREABOUTS DID YOU HAVE THIS DRINK / THESE DRINKS? *(Show card)*

32. THINKING BACK OVER THE LAST 12 MONTHS, THAT IS TO _____ LAST YEAR..... HAVE YOU/HAS ____ BEEN INVOLVED IN AN ACCIDENT OF ANY KIND?

AND BY ACCIDENT I MEAN,
IF YOU/THEY WERE DRIVING OR A PASSENGER IN A MOTOR BIKE, TRUCK, BUS, OR CAR, OR RIDING A BIKE, OR WALKING.

THAT IS, ANY KIND OF AN ACCIDENT, EVEN IF NO-ONE WAS HURT AT ALL OR EVEN IF THERE WAS NO DAMAGE TO A VEHICLE OR BICYCLE, OR EVEN IF IT WAS NOT REPORTED.

ANYTHING YOU CAN THINK OF?

Yes 1
No *(Go to Q. 34)* 2

33. HOW MANY ACCIDENTS HAVE YOU/THEY HAD SINCE _____ ?

34. NOW THINKING BACK TO THE 12 MONTHS BEFORE THAT,
BETWEEN _____, 198__ AND _____, 19__,
WERE YOU/THEY INVOLVED IN AN ACCIDENT OF ANY KIND DURING THAT TIME?

Prompt: REMEMBER TO INCLUDE ANY WHICH MAY HAVE HAPPENED WHEN YOU/THEY WERE DRIVING, OR A PASSENGER, OR ON A BIKE OR WALKING, EVEN WHEN NO-ONE WAS HURT AND NOTHING WAS DAMAGED.

Yes . . . . . ☐ 1
No *(Go to Q. 36)* . . . . . ☐ 2

35. HOW MANY ACCIDENTS DID YOU/THEY HAVE IN THAT 12 MONTH PERIOD? ☐

36. *Sequence Guide:* *If ACCIDENTS, [1] in Qs. 32 or 34, go to Q. 37.*
If NO ACCIDENTS, [2] in Questions 32 or 34,
- *o If less than 15 years, no more questions*
- *o Otherwise go to Q.69.*

37. THINKING BACK TO THIS ACCIDENT (THE LAST TIME YOU/THEY HAD AN ACCIDENT), WHEN DID IT HAPPEN?

WHAT DATE WAS IT? ☐☐☐☐☐☐
Don't know = 99

WHICH DAY OF THE WEEK?

Monday . . . . . ☐ 1
Tuesday . . . . . ☐ 2
Wednesday . . . . . ☐ 3
Thursday . . . . . ☐ 4
Friday . . . . . ☐ 5
Saturday . . . . . ☐ 6
Sunday . . . . . ☐ 7
Weekday . . . . . ☐ 8
Weekend . . . . . ☐ 9
Don't Know . . . . . ☐ A

38. WHAT TIME OF DAY WAS IT? ☐☐☐☐
_____

39. WHERE DID IT HAPPEN - - IN WHICH SUBURB OR TOWN, OR ON WHAT HIGHWAY DID IT HAPPEN?

Intersection/ Other Identifier _____
Nearest Suburb/Town _____
_____

40. WERE THERE ANY FATALITIES INVOLVED?

Yes . . . . . ☐ 1
No . . . . . ☐ 2

41. DID ANYONE HAVE TO GO TO HOSPITAL - - YOU/THEY OR ANYONE ELSE?

Yes . . . . . ☐ 1
No . . . . . ☐ 2

42. DID ANYONE RECEIVE ANY INJURIES AT ALL?

Yes . . . . . ☐ 1
No . . . . . ☐ 2

43. IN THIS ACCIDENT, WERE YOU/THEY

THE DRIVER OF A MOTOR VEHICLE . . . . . ☐ 1
THE DRIVER OF A MOTOR BIKE . . . . . ☐ 2
A PASSENGER IN A MOTOR VEHICLE . . . . . ☐ 3
A PASSENGER ON A MOTOR BIKE . . . . . ☐ 4
ON A BICYCLE . . . . . *(Go to Q.46)* ☐ 5
WALKING, OR. . . . . *(Go to Q.46)* ☐ 6
NOT THERE AT THE TIME? . . . . . *(Go to Q.46)* ☐ 7

63. ALTOGETHER,

	Write in No.		
HOW MANY CARS	☐	A	WERE INVOLVED?
HOW MANY VANS	☐	B	
HOW MANY TRUCKS	☐	C	
HOW MANY MOTOR BIKES	☐	D	
HOW MANY BICYCLES	☐	E	
HOW MANY PEDESTRIANS	☐	F	
HOW MANY OTHER OBJECTS, LIKE TREES OR POLES (*specify*) _____	☐	G	

64. *Sequence Guide:*
- *o If the accident involved at least one motorised vehicle (A-D), go to Q.65.*
- *o Otherwise go to Q.67.*

65. DO YOU KNOW THE FIRST 2 LETTERS OF THE NUMBER PLATE OF THE VEHICLE/ANY OF THE VEHICLES?

Yes ..... ☐☐
No ..... ☐ ?

66. HOW WOULD YOU DESCRIBE THE ACCIDENT:

ONE VEHICLE HITTING A PARKED VEHICLE/S ONLY	☐ 1
ONE VEHICLE HITTING THE BACK OF ANOTHER (NOT PARKED)	☐ 2
A HEAD-ON COLLISION	☐ 3
VEHICLES HITTING EACH OTHER AT AN ANGLE	☐ 4
HITTING AN OBJECT OF SOME SORT	☐ 5
A DRIVER LOST CONTROL	☐ 6
SOMETHING ELSE? (*specify*) _____	☐ 7

67. IN WHAT SPEED ZONE DID THE ACCIDENT HAPPEN?

70 Kph or less	☐ 1
> 70 Kph	☐ 2
Car park, not relevant	☐ 3

68. WAS THE ACCIDENT REPORTED TO THE POLICE, OR A TRAFFIC OFFICER AT ANY TIME?

Yes	☐ 1
No	☐ 2
Don't know	☐ 3

69. WOULD YOU SAY THAT THE TOTAL DAMAGE TO ALL VEHICLES AND BICYCLES WOULD HAVE COST

NOTHING AT ALL	☐ 1
LESS THAN $1,000	☐ 2
$1,001 - $5,000	☐ 3
$5,001 - $10,000	☐ 4
MORE THAN $10,000	☐ 5

70. *Sequence Guide:*
- *o If MORE ACCIDENTS in last 2 years, fill in separate forms.*
- *o If NO MORE ACCIDENTS*
  - *o If less than 15, no more questions.*
  - *o Otherwise, go to Q. 71.*

71. IN YOUR LIFE SO FAR, COULD YOU ESTIMATE HOW MANY KILOMETRES YOU HAVE DONE AS THE DRIVER OF ANY MOTOR VEHICLE - - A CAR, MOTOR BIKE, TRUCK OR ANY OTHER VEHICLE? *(Show card)*

Never Driven . . . . . ☐ 1
Less than 2,000 km *(Go to Q.74)*. . ☐ 2
2,001 - 20,000 km *(Go to Q.74)* . . ☐ 3
20,001 - 200,000 km *(Go to Q.74)*. ☐ 4
More than 200,000 km *(Go to Q.74)* ☐ 5
Don't know *(Go to Q.74)* . . . . . ☐ 6

72.. IN THE LAST 12 MONTHS, THAT IS SINCE _____ LAST YEAR, HAVE YOU RIDDEN A BICYCLE AT ALL ?

Yes . . . . . ☐
No *(Go to Q. 76)* . . . . . ☐

73. HOW MANY KILOMETRES HAVE YOU RIDDEN ?

☐☐☐☐ Km

Go to Q. (76)

74. IN THE LAST 12 MONTHS, THAT IS SINCE _____ LAST YEAR, HOW MANY KILOMETRES HAVE YOU DRIVEN

IN A CAR AS A DRIVER . . . . . ☐☐☐☐☐ Km
ON A MOTOR BIKE AS DRIVER . . . ☐☐☐☐☐ Km
ON A BICYCLE . . . . . ☐☐☐☐ Km

75. DO YOU CURRENTLY HOLD A LICENCE TO DRIVE .....

A CAR . . . .Yes ☐ 1 → IS IT FULL ☐ 1; RESTRICTED ☐ 2; OR A LEARNER'S ☐ 3
. . . .No ☐ 2

HOW LONG HAVE YOU HAD IT?
☐☐ Years ☐☐ Mths

A MOTOR BIKE . . . .Yes ☐ 1 → IS IT FULL ☐ 1; RESTRICTED ☐ 2; OR A LEARNER'S ☐ 3
. . . .No ☐ 2

HOW LONG HAVE YOU HAD IT?
☐☐ Years ☐☐ Mths

A TRUCK . . . .Yes ☐ 1 → IS IT FULL ☐ 1; RESTRICTED ☐ 2; OR A LEARNER'S ☐ 3
. . . .No ☐ 2

HOW LONG HAVE YOU HAD IT?
☐☐ Years ☐☐ Mths

76. WHICH OF THESE BEST DESCRIBES YOU? *(Show card)*

New Zealand Maori . . . . . ☐ 1
Pacific Islander . . . . . ☐ 2
European or other Pakeha . . . . . ☐ 3
Other *(specify)* _____ ☐ 4

77. WHICH OF THESE CATEGORIES BEST REPRESENTS YOUR PERSONAL INCOME BEFORE DEDUCTIONS LIKE TAX AND SUPERANNUATION?

(Interviewer: Show Card)

Code: . . . . . ☐
Don't know . . . . . ☐ B

Many thanks for your help!