

## Alcohol consumption in the Ongoing New Zealand Household Travel Survey

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### ABSTRACT

The Ongoing New Zealand Household Travel Survey is an ongoing survey of household travel conducted by the Ministry of Transport. Each year since 2003, people in 2200 or more households throughout New Zealand have been invited to participate in the survey by recording all their travel over a two-day period. Each person in the household is then interviewed about their travel and is also asked about their alcohol consumption up to and over the travel days and other travel-related information. This survey is important in that the follow-up interviewing occurs within a short time period of the travel and drinking in question so that it is still fresh in the mind of the person interviewed.

This paper presents an overview of the alcohol consumption data available from the survey for July 2003 – June 2007 and compares it to data from other New Zealand Travel Surveys. As respondents are asked about the starting time, finishing time and venue of each drinking session, as well as the type and number of drinks consumed, a variety of areas can be examined. Travel after said sessions can also be studied and an estimate made of driver trips made while the driver is over the legal Blood Alcohol Concentration (BAC) limit.

### INTRODUCTION

Alcohol consumption in New Zealand is a major area of interest to many people, from the health implications of the quantities of alcohol consumed, to the increased risk of crashing when it is combined with driving. We know that between 2005 and 2007, driver alcohol/drugs were a contributing factor in approximately 30 percent of fatal crashes in New Zealand (Ministry of Transport 2008). Between 2003 and 2008, between 141 and 109 people have died each year in these crashes (Ministry of Transport 2009). That is the current picture. In comparison, in 1989, 41% of fatal crashes had alcohol/drugs as a contributing factor and 351 people died. Since then, New Zealand has introduced compulsory breath alcohol testing, changed the blood and breath alcohol limits, changed the penalties for being over the limits and reduced the minimum alcohol purchase age from 20 to 18 years old (Ministry

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of Transport 2008). We have seen an improvement in the drink driving related casualties, but in order to better understand the underlying behaviour and the effects of such policy changes, we need to have an idea of the basic alcohol consumption and travel patterns.

Previous national surveys on alcohol use occurred in 1995 (Wyllie et al. 1996), 2000 (Habgood et al. 2001) and 2004 (Ministry of Health 2007), with the Alcohol Advisory Council (ALAC) publishing an annual drinking behaviour report for 2005/2006, 2006/2007 and 2007/2009 (Palmer et al. 2007, Palmer et al. 2007b, Palmer et al. 2009). However these studies have focussed on the health aspects of alcohol consumption, rather than on the road safety implications. Previous New Zealand Travel Surveys in 1989/1990 and 1997/1998 surveyed alcohol consumption in association with the travel days they surveyed, using methods similar to the Ongoing New Zealand Household Travel Survey.

The Ongoing New Zealand Household Travel Survey (ONZHTS) is a survey of household travel conducted for the Ministry of Transport; it started in 2002. Currently 4600 households are asked to participate each year, but prior to 2008, people in 2200 households throughout New Zealand were asked. Household members and those staying in the household at the time were asked to record all their travel over a consecutive two-day period. Each person in the household was then interviewed about their travel and was also asked about their alcohol consumption and various travel-related information. Similar travel surveys are conducted elsewhere in the world (eg UK National Travel Survey<sup>2</sup> and USA National Household Travel Survey<sup>3</sup>), however they do not include a component about alcohol consumption. This makes the New Zealand Travel Survey rare, if not unique for being able to connect alcohol consumption with travel data.

This paper presents an overview of the alcohol consumption data available from the survey for July 2003 – June 2007 and compares it to data from other New Zealand Travel Surveys. As respondents are asked about the starting time, finishing time and venue of each drinking session, as well as the type and number of drinks consumed, a variety of areas can be examined. Travel after said sessions can also be studied and an estimate made of driver trips made while the driver is over the legal Blood Alcohol Concentration (BAC) limit.

A selection of the alcohol consumption related results from the survey are presented here in order to introduce the data available to a wider audience. It is hoped this will increase the visibility of the Survey and that other researchers may be able to make further use of the alcohol consumption component of the survey data.

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<sup>2</sup> <http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/>

<sup>3</sup> [http://www.bts.gov/programs/national\\_household\\_travel\\_survey/](http://www.bts.gov/programs/national_household_travel_survey/)

## METHODS

The ONZHTS is specifically designed to collect data at a national and, on a longer timescale, regional level throughout the year so that information can be scaled up to represent a year's travel by all New Zealanders. To reduce the effect of under-reporting through forgetfulness, interviews take place as soon as possible after the assigned travel days and within a week of the days being surveyed. Participants are given memory jogger cards for their travel and asked to fill them out. The target population has no age restrictions but is restricted to those living in private residential dwellings. The alcohol consumption portion of the survey is restricted to those aged 15 years and over. Results are weighted to account for age, gender and non-response. More information on the survey methods and weighting is available at <http://www.transport.govt.nz/research/TravelSurvey/>.

The survey uses a face-to-face interview with results recorded either directly into a laptop or onto paper forms which are transferred onto a computer later. The data collection is contracted out to a third party. The analysis is done in house, by the Ministry of Transport.

For the alcohol consumption component of the survey, participants are asked if they drank any alcohol on the night before the travel days and on the two travel days. If they did drink, they are asked over what time periods they drank and where they drank. The participants are then prompted, using cue cards, to determine what they drank and how much. Drinking sessions are defined to be location specific so that if the participant changed location and continued drinking, a new drinking session is recorded.

While alcohol consumption information is asked for the evening before the first travel day, and for each of the two travel days, only the first 24 hour period is used for analysis. There is evidence of significant under-reporting of alcohol consumed in the second travel day, relative to the first travel day and the evening before the first travel day with 37% of the alcohol consumed being reported for that first day, compared to around 30% for the next 2 days. This pattern is not observed to the same degree with the travel as the first travel day makes up 51-52% of the travel done on both travel days (by distance, duration and number of trips). Therefore, the alcohol estimates presented are based on the first twenty-four hour period: from 6pm on the day before the first travel day, to 5.59 pm on the first travel day. This period is referred to as 'the study day'. It is not explicitly known why the alcohol consumption varies with day, but possible areas contributing may include the fact that the alcohol consumption questions occur quite late in the interview so people may be getting tired of answering questions, and that a diary for alcohol is not used so people don't have a memory jogger to remind them. Unlike the previous two travel surveys, where the alcohol consumption question was asked of respondents who drove during the survey only, the current survey includes alcohol consumption information from all respondents aged 15 and over, whether they drove or not.

The amount of alcohol consumed has been calculated by assigning standard volumes and alcohol contents by percentage to the different drink categories shown on the cue cards. The number of standard drinks is calculated using an assumed mean alcohol content by drink type, with an assumption of 10 grams of alcohol per standard drink. A table of the alcohol contents used is available upon request.

## REPORTING ISSUES

The survey currently approaches 4600 households per year, with 2200 households approached per year prior to 2008. For the time periods being reported on, the survey has a 72% response rate for households with at least one occupant completing a post-travel interview. 67% of eligible households provided a full response for all eligible household members.

Other reporting issues include the actual alcohol consumption reported. This involved a variety of factors such as those below.

As the post-travel interview is held as soon as possible after the travel days (within 7 days of the assigned travel days), the alcohol consumption around the travel days is still fairly recent in people's minds. However, people may not remember exactly. They may also deliberately conceal the amount consumed for a variety of reasons. Larger quantities of individual alcohol consumption may also have larger errors associated due to the memory lapses brought on by that much alcohol. Isolated cases may also be exaggerated by an individual bragging.

The amounts reported when drinking can differ from what was actually consumed, even when what was drunk was remembered. Quite apart from not remembering each drink accurately, the size of a glass can vary depending on the serving location and who is serving. For instance a single shot of whiskey bought at a pub will be the same size consistently, whereas one poured at home may vary a lot more. Fryer et al (2004) examining New Zealanders concepts of standard drinks, found that on average home drink measures were larger than the equivalent "standard" drinks and that as such, binge drinkers reported numbers of standard drinks should be multiplied by 1.6 to estimate the standard drinks consumed. To attempt to get around this cue card images have been used to identify the type and volume of alcohol consumed on the study day.

Statistics New Zealand calculates the total alcohol available for consumption in New Zealand each year, based on duties paid and external trade<sup>4</sup>. This is litres of alcohol available for consumption as it has been released to the market, so has not necessarily been completely consumed, and excludes home brew. For the four years covered by the survey, the listed alcohol

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<sup>4</sup> See <http://www.stats.govt.nz/datasets/manufacturing/alcohol-available-for-consumption.htm> for further information.

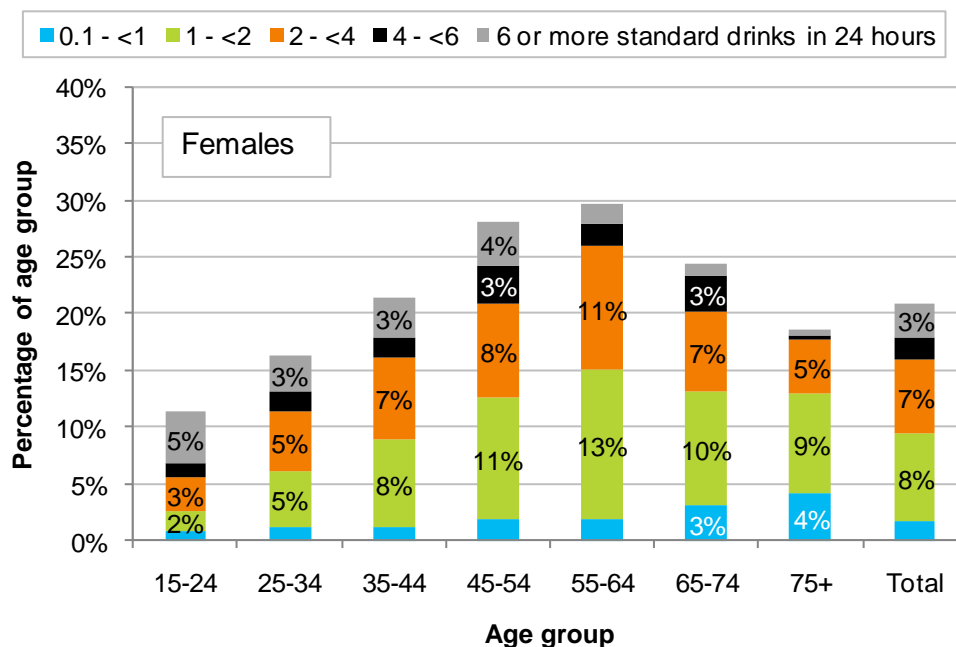
available for consumption is 120 million litres of pure alcohol. Converting the alcohol reported consumed in the survey to an equivalent quantity, 75.9 million litres of pure alcohol is reported consumed (which equates to 63% of the alcohol available). While other estimates of alcohol consumption in New Zealand exist (such as Palmer et al. 2007, Palmer et al 2007b, Palmer et al 2009), these have not been compared directly with the travel survey results due to differences in the definitions of drinking sessions between surveys, and differences in the way the drinking rates are reported.

Questions about the respondent's alcohol consumption were asked at a separate point in the survey from questions about travel to discourage the perception of interest in peoples' drink driving patterns.

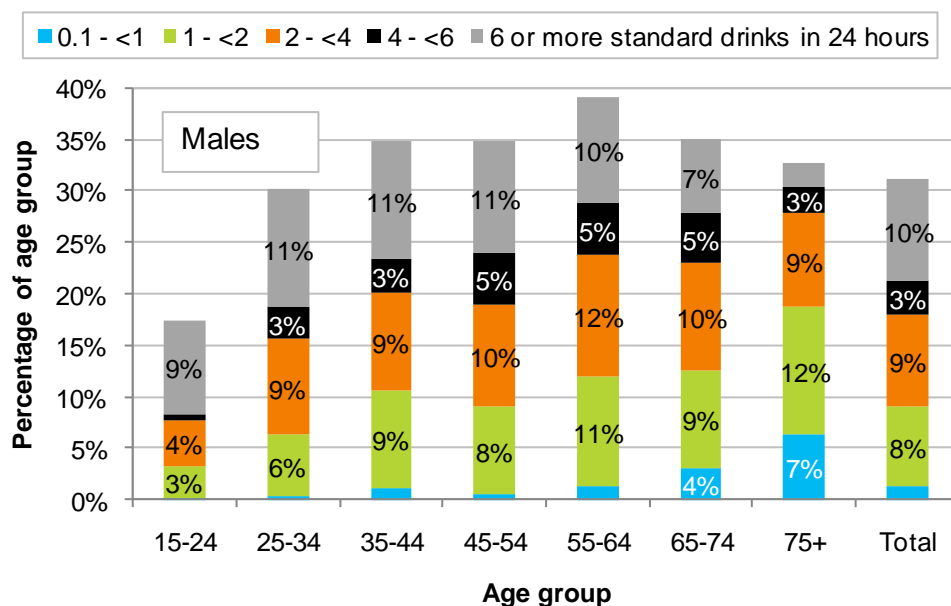
## QUANTITIES OF ALCOHOL CONSUMED

From the respondents' reports of the number and type of drinks consumed in each individual reported drinking session, the average number of standard drinks consumed per person per day could be estimated. (This was used in preference to the number of drinks per drinking session, given the variability of the definition of a drinking session.)

**Figure 1: Percentage of females by age group who reported drinking alcohol (in standard drinks) during the first study day.**



**Figure 2: Percentage of males by age group who reported drinking alcohol (in standard drinks) during the first study day.**



On any given day, approximately 26% of people 15 years and over surveyed reported consuming alcohol. If we look at the data by age and gender (Figure 1 and 2), men are more likely to report drinking on a given day than women (31% of men said they drank on the study day, whereas 21% of women said they drank). Within the genders, drinking rates vary with age. Both males and females aged 15-24 years old are least likely to drink on a given day (83% of males and 89% of females didn't drink). The percentage of people who have consumed alcohol on a given day increases with age, reaching a maximum in the 55-64 year old age group, and then decreases slightly with age. 29% of females and 38% of males aged 55-64 drank on a given day and this decreases to 19% of females and 32% of males 75 years and over.

As a safe limit, ALAC recommends<sup>5</sup> that:

*On any one drinking occasion drink no more than:*

- six standard drinks (for men)
- four standard drinks (for women)

On any given day, 5% of females 15 years and over reported drinking more than 4 standard drinks and 10% of males 15 years and over reported drinking more than 6 standard drinks. Of these, 77% of them described their drinking as taking place over a single drinking session, placing them over the safe limit. This is 4% of all women in New Zealand aged 15 years and over and 8% of all men in New Zealand aged 15 years and over.

For women (Figure 1), the percentage of the age group drinking more than 4 standard drinks on a day stays relatively constant by age (5% for those 15-24

<sup>5</sup> <http://www.alcohol.org.nz/LowRiskDrinking.aspx> (accessed 5 Jan 2009)

and 45-54, 4% for those 25-34 and 35-44). This decreases to 2% or less for those aged over 55.

For males (Figure 2), there is a similar consistency with age but the percentage of the age group drinking more than 6 standard drinks in a day is much higher. 11% of males 25-34, 35-44 and 45-54 and 9-10% of those 15-24 and 55-64 drank 6 or more standard drinks in a day. This dropped to 7% or less for those aged 65 years and over.

Looking in more detail at those who did drink (Table 1), women most commonly have 1-2 standard drinks in a day (37% of those who drank), whereas men have 6 or more standard drinks (32% of those who drank). As a general trend, the older the age group, the fewer standard drinks are consumed by a person in a day.

For those women 15-19 years old who are drinking, 50% drink more than 4 standard drinks in a day. Of the 15-19 year old males who drink, 56% drink more than 4 standard drinks in a day and 52% drink 6 or more standard drinks in a day.

**Table 1: Of those who drank: Consumption by age group – percentage distribution of who drank a given number of standard drinks within a 24-hour period.**

| Number of standard drinks in a day |           | Age group |       |       |       |       |       | Total |     |
|------------------------------------|-----------|-----------|-------|-------|-------|-------|-------|-------|-----|
|                                    |           | 15-24     | 25-34 | 35-44 | 45-54 | 55-64 | 65-74 |       | 75+ |
| <b>Females</b>                     | 0.1 - 1   | 8%        | 8%    | 6%    | 7%    | 7%    | 13%   | 22%   | 9%  |
|                                    | 1 - <2    | 15%       | 30%   | 37%   | 38%   | 44%   | 41%   | 47%   | 37% |
|                                    | 2 - <4    | 27%       | 32%   | 34%   | 30%   | 36%   | 29%   | 25%   | 31% |
|                                    | 4 - <6    | 10%       | 11%   | 8%    | 12%   | 7%    | 13%   | 2%    | 9%  |
|                                    | 6 or more | 40%       | 20%   | 16%   | 14%   | 6%    | 4%    | 3%    | 14% |
| <b>Males</b>                       | 0.1 - 1   | 1%        | 2%    | 3%    | 2%    | 3%    | 9%    | 20%   | 4%  |
|                                    | 1 - <2    | 18%       | 19%   | 27%   | 24%   | 28%   | 27%   | 37%   | 25% |
|                                    | 2 - <4    | 25%       | 31%   | 27%   | 29%   | 30%   | 30%   | 28%   | 28% |
|                                    | 4 - <6    | 4%        | 10%   | 9%    | 14%   | 13%   | 14%   | 8%    | 11% |
|                                    | 6 or more | 52%       | 38%   | 33%   | 31%   | 26%   | 21%   | 7%    | 32% |

Drinking patterns can also be examined by time of week (Table 2). While during the week, approximately 21% of people report drinking, in the weekend<sup>6</sup>, 38% of people report drinking. On weekdays, the largest group of people drink 1 – 2 standard drinks in a day (37%), whereas in the weekend the largest group drank 6 or more standard drinks in a day (34% each). On weekend days 47% of people who drank, drank 4 or more drinks in a day,

<sup>6</sup> Defining a weekend in this context to be 6pm Fri to 6pm Sun.

whereas on weekdays 25% of people who drank, drank 4 or more drinks in a day.

**Table 2: Consumption on weekdays and weekends: Percentage distribution of people who drank by how much they drank in 24 hours.**

|         | Standard drinks consumed in a day |        |        |        |           | Total |
|---------|-----------------------------------|--------|--------|--------|-----------|-------|
|         | 0.1 - 1                           | 1 - <2 | 2 - <4 | 4 - <6 | 6 or more |       |
| Weekday | 7%                                | 37%    | 30%    | 8%     | 17%       | 100%  |
| Weekend | 5%                                | 20%    | 28%    | 13%    | 34%       | 100%  |
| Total   | 6%                                | 30%    | 30%    | 10%    | 24%       | 100%  |

## ALCOHOL CONSUMPTION BY TYPE

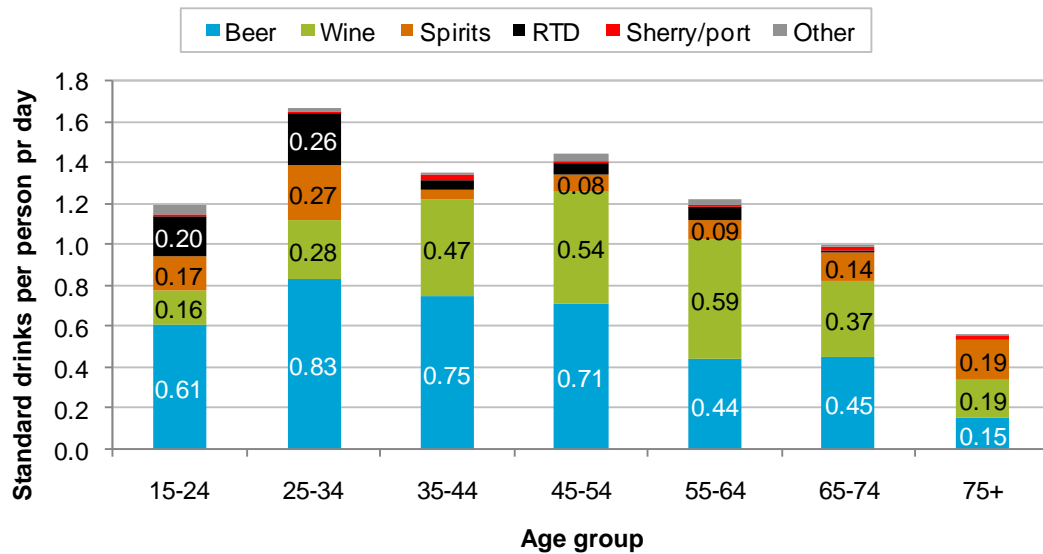
Overall, the most common type of alcohol consumed (Figure 3 and Figure 4) is beer (47% of standard drinks consumed per person), with wine reported the next most common type of alcohol consumed (31%).

The most common type of alcohol consumed also varies with age group. For those under 55 years old, beer makes up more than half of standard drinks consumed per person. For 55-64 year olds, however, wine is the most common alcohol consumed (48% of standard drinks consumed per person in this age group). Spirits and wine make up about one third each of the standard drinks by those over 75 years old, but their overall amount drunk is far lower per person than the other age groups. Ready to Drink (RTDs) forms of alcohol such as premixed spirits, cocktails and alcopops really feature only in the drinking habits of 15-34 year olds, making up 16-17% of the standard drinks they drink per person. "Other" alcohols includes any other alcohol types not covered under beer, wine, spirits, RTDs and sherry/port, such as cider and cocktails.

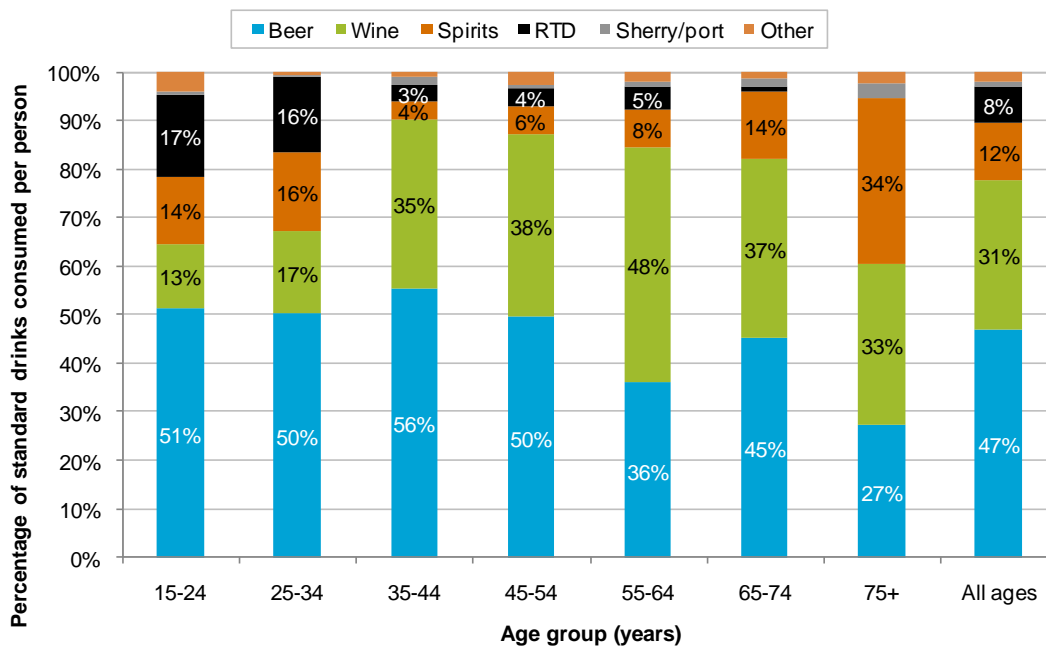
Overall on average, New Zealanders between ages 15 and 64 consume more than 1 standard drink per day, and those aged 25-34 1.6 drinks per day. The total number of standard drinks of all types consumed per person by those 75 years and older is less than the amount of beer per person for the age groups under 55 years old.



**Figure 3: Alcohol type: Standard drinks per person in 24 hours.**



**Figure 4: Percentage of standard drinks consumed per person, by age and alcohol type (2003 - 2007).**



## WHERE DO NEW ZEALANDERS DRINK?

As well as alcohol types and quantities, the venue where the alcohol was consumed was recorded. Over half of all standard drinks are reported consumed at home, with a further 17% consumed at someone else's home. Nearly a quarter are consumed outside the home at hotels, clubs, restaurants or cafes, with the remaining 7% of standard drinks being consumed at other

venues such as sports events, outdoors, at work or any other venues not in the other categories. From Figure 5, younger people do far less of their drinking at home compared to older people. Only a quarter of drinking by 15-24 year olds is at home, whereas it is more than half for those 35 years and over, increasing to more than 80% for those 75 years and over. 15-24 year olds are most likely to drink at someone else's house (34%), followed by a hotel or club.

**Figure 5: Percentage of standard drinks consumed by age group by venue (2003 - 2007).**

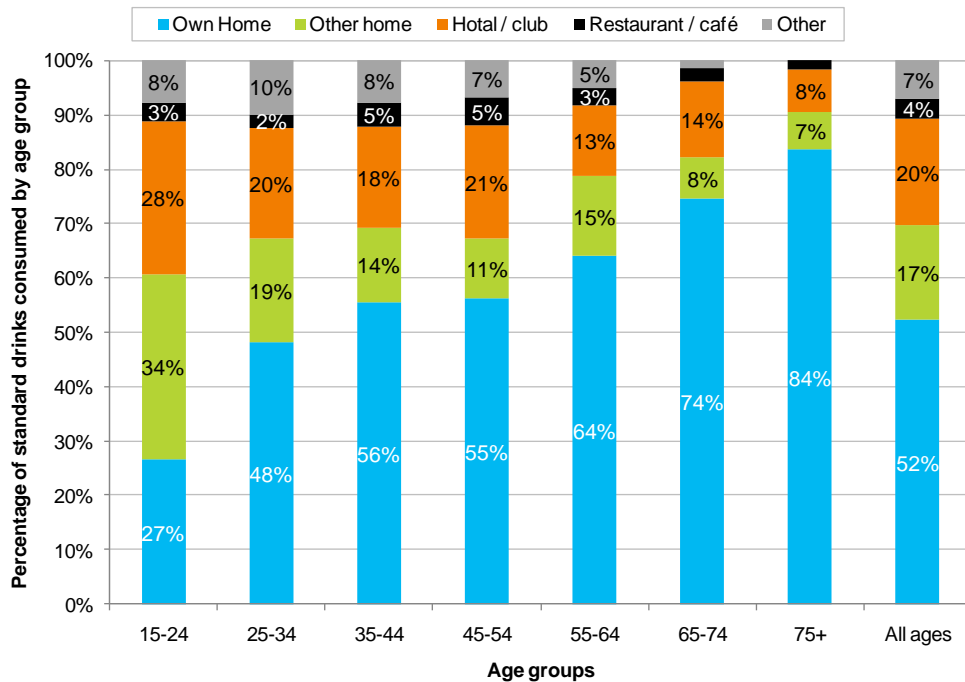
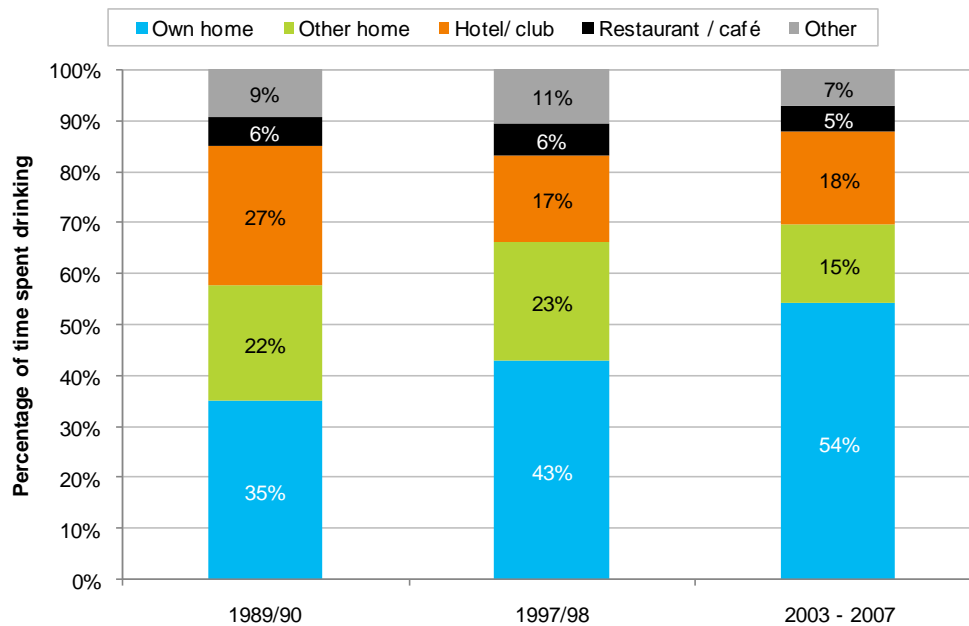


Figure 5 compares drinking venues reported in three periods: 1989/1990, 1997/1998 and 2003-2007. From Figure 6, there has been a shift in drinking patterns—more drinking is now being done at home, both as an absolute number of hours spent drinking, and as a percentage of the time spent drinking.

**Figure 6: Percentage of time spent drinking by venue for 1989/1990, 1997/1998 and 2003-2007.**



## ALCOHOL-IMPAIRED TRIPS

In deciding whether drivers were likely to be alcohol impaired, we must consider the amount of alcohol consumed, normal rates of absorption and elimination of alcohol from the blood, and the time lag between drinking and driving. As the survey recorded start and end times of drinking sessions, as well as the quantity of alcohol consumed, this could be combined with the recorded trips in order to calculate if a given trip was likely to have been made while under the influence.

The current New Zealand adult legal blood alcohol concentration (BAC) limit is 80mg of alcohol per 100ml of blood. In many overseas countries, this limit is lower, at 50mg per 100ml of blood.

In order to calculate the number of impaired trips, the number of standard drinks consumed in the drinking session was used to calculate an instantaneous BAC in the average body for the start time of the drinking session. Alcohol was then assumed to be processed away at a rate of 1 standard drink per hour (0.0174 g per decL per hour). This compared favourably with a metabolism rate of 0.017 for an “average drinker”, 0.02 for a heavy drinker and 0.012 for a below-average alcohol metabolizer (US Department of Transportation, 1992).

The amount of alcohol drunk in a session was calculated and the amount of alcohol left in the driver’s system at the end of the session was used to calculate how much alcohol was in their system at the start of their trip. If more than one session was recorded for the day, this information was used to

estimate the residual BAC at the start of the next session. Otherwise BAC was assumed to be zero at the start of a session. The resultant BAC at the start of the trip was compared to the desired comparison blood alcohol limit (80mg and 50mg levels) and used to calculate a rate of alcohol impaired trips per 10 000 driver trips.

In calculating the blood alcohol level for the trip, gender was taken into account, but age was not. For these calculations, drivers under 20 years old are held to the adult limit of 50mg, even though legally their blood alcohol limit is 30mg. This was done to simplify calculations and because there were so few drivers under the age of 20 with any alcohol in their system before a trip (only 2 with a BAC over 50 mg).

Table 3 shows how often people drive with a blood alcohol concentration (BAC) of 50mg (or over) and 80mg (or over) as estimated from the Survey. New Zealand drivers are most likely to drive when they are over the BAC of 50mg and over the legal limit (80mg) during high alcohol hours<sup>7</sup>. "High alcohol hours" are defined as those between 10pm and 4am daily, plus 4am-6am on Fridays, Saturdays and Sundays and are defined based on motor vehicle crash risk due to alcohol.

**Table 3: Alcohol-impaired trips per ten thousand driver trips.**

| Time of day and week            | Alcohol-impaired trips (BAC 50mg or over) per ten thousand driver trips | Alcohol-impaired trips (BAC 80mg or over) per ten thousand driver trips |
|---------------------------------|---|---|
| Trips at all times              | 23  | 14  |
| Trips during high alcohol hours | 200   | 180   |

## POTENTIAL AREAS OF FURTHER INVESTIGATION

This is a small sample of the information available from the Travel Survey. Other information available and future areas of work (subject to sufficient sample size) include drinking patterns by:

- time of day
- region
- area of residence (urban/rural)
- metropolitan area (Auckland/Wellington/Christchurch currently)
- ethnicity
- income status
- employment status

<sup>1</sup> Further breakdown (e.g., by age group or gender) is not possible due to the relatively small number of drivers in the survey who had exceeded drink-driving guidelines (N=38 drivers).

- type of drivers licence held
- method of transport to and from drinking venue

As the survey is ongoing, the cumulative increase in sample sizes means that finer data resolution is available as time goes by. Also, trends over time become more resolvable within the dataset, as well as in comparison to previous surveys.

## **CONCLUSION**

Alcohol consumption data is available from the Ongoing New Zealand Household Travel Survey from 2003 onwards. It offers a rare insight into alcohol consumption patterns by age and gender and information on which New Zealanders drink, where they drink, and how much they drink. It can also be used to start to build up a picture of alcohol use in association with travel. This can potentially inform policy on anything from restrictions on where alcohol is consumed, to alcohol availability by venue for different age groups, to estimating drink driver trips and alcohol risk on New Zealand roads. It is an invaluable resource which we would like people to be aware of and make more use of.

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