

RESEARCH REPORT

THE ALCOHOL PURCHASING PATTERNS OF HEAVY DRINKERS IN NZ

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for the Ministry of Health

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CONTENTS

Page No.

EXECUTIVE SUMMARY	1
DISCUSSION	3
A. BACKGROUND.....	6
B. OBJECTIVES	6
C. METHOD.....	7
1. OPERATIONAL DEFINITION OF THE TERMS.....	7
2. CHOICE OF METHOD.....	10
3. SURVEY SAMPLE	11
4. INTERVIEWING	13
5. INTERVIEWING PROCEDURE	14
D. FINDINGS: BI-VARIATE PERCENTAGED ANALYSIS	15
1. THE TERM WEIGHTED AVERAGE PRICE, DEFINED	15
2. THE USE OF QUINTILES IN THE ANALYSIS	16
3. FREQUENCY OF DRINKING BEER, WINE OR SPIRITS VIEWED AGAINST PRICE PER ML ALCOHOL PAID	17
4. NUMBER OF DRINKS ON A TYPICAL DAY WHEN DRINKING ALCOHOL	19
5. FIVE OR MORE DRINKS ON ONE OCCASION	21
6. PRICES PAID BY ETHNIC GROUPS.....	23
7. ALCOHOL TYPES PURCHASED IN EACH PRICE QUINTILE.....	24
8. THE VOLUME OF ALCOHOL BOUGHT IN THE LOWEST PRICE QUINTILE, BY DRINKERS OF VARIOUS FREQUENCY	25
9. PERCENTAGED TABLES	26
E. FINDINGS: MULTIVARIATE ECONOMETRIC ANALYSIS.....	35
1. INTRODUCTION.....	35
2. QUINTILE ANALYSIS OF PRICE AND QUANTITY	36
3. SINGLE EXPLANATORY VARIABLE	38
4. MULTIPLE EXPLANATORY VARIABLES	40
5. CONSUMPTION FREQUENCY.....	41
6. CONSUMPTION INTENSITY.....	41
7. TOTAL CONSUMPTION.....	42
8. FREQUENCY OF HIGH INTENSITY CONSUMPTION	43
9. TYPE OF DRINK.....	44
10. MISCELLANEOUS FINDINGS.....	45
F. APPENDIX: QUESTIONNAIRE.....	46

EXECUTIVE SUMMARY

One of the specific objectives of the National Drug Policy 2007-2012, is to reduce harm to individuals, families and communities from the risky consumption of alcohol.

In furtherance of this objective the Ministry elected as one of its approaches, to research the purchasing and consumption patterns of drinkers, with a particular focus on clarifying the purchasing behaviour of heavy drinkers relative to moderate and light drinkers. Specifically the Ministry sought to determine whether heavy drinkers purchased their alcohol at the cheapest prices, and whether this differentiated them strongly from more moderate drinkers.

The research design considered best suited to studying this link, was a survey interview which intercepted liquor shoppers soon after purchase, when they still had their purchase invoice with them. Shoppers answered a brief questionnaire on their drinking frequency and intensity, and provided their invoice to the interviewer for attachment to their questionnaire answers. Participation was voluntary and anonymous. A total of 2,000 exit interviews were undertaken in equal proportion at supermarkets and liquor wholesalers.

The analysis consisted of calculating the price per ml of pure alcohol paid, by using the alcohol strength, the volume of each drink purchased, and the price of the drink from the invoice and attaching this to the shoppers reported drinking frequency and intensity.

Bivariate and multivariate procedures were used to explore the relationship between how much drinkers pay per ml of alcohol and how frequently or intensively they drink.

For purposes of analysis this study considered that purchases made in the lowest cost per ml alcohol quintile, would provide a useful marker for identifying who was purchasing alcohol at the lowest prevailing prices.

The first comparison made was with the frequency of drinking. Here the survey showed that drinkers consuming alcohol four times a week or more, ie, the most frequent drinkers were more inclined to buy in this cheapest quintile than were moderate drinkers, but the great majority of them (75%) had in fact bought in dearer price brackets. This group was shown to have participated in all of the tiers of pricing albeit lesser in the dearest price bracket and greater in the cheapest.

An alternative measure of alcohol consumption is how many drinks the person has on a day they do drink alcohol. Here the heaviest drinkers were those who drank 10 or more drinks on a day they did drink. Much as with frequency of drinking, those drinking 10 or more on a day participated more often in the cheapest price bracket and were markedly less inclined to buy in the dearest. However, they are well represented across all the intermediate price ranges.

A third measure of hazardous drinking is binge drinking, measured here as the frequency with which the person has five or more drinks on an occasion. The alcohol shoppers in this survey at the upper end of this behaviour (three or more times a week) showed a clear trend toward purchasing in the lowest quintile of the price range, and progressively less often through progressively dearer price levels. Nevertheless, this trend is not steep enough to suggest a strong reliance on least cost alcohol by those drinkers. They were found to participate in all the price levels between cheapest and dearest.

In conclusion, while frequent, heavy and binge drinkers groups respectively do buy more of their alcohol at the cheapest end of the price range than do, less frequent, lighter, and non-binge drinkers, this does not account for the greater proportion of their purchases. In short they buy the larger part of their purchases in the middle and higher price-per-ml of alcohol ranges.

DISCUSSION

The overconsumption of alcohol by some New Zealanders who drink can be the cause of considerable health and social problems. Interventions by regulation or social marketing are challenged by the difficulty of designing moderation practises that inhibit the heavier, harmful drinker without concurrently impacting the reasonable enjoyment of the low risk social drinker.

One hypothesis receiving attention in both the general community and among health and social service agencies is that of a nexus between heavy drinking and cheapness of alcohol. This intuitively appealing argument asserts that since heavier drinkers will buy larger amounts of alcohol they will follow the economic imperative of seeking lower prices to fulfil their demand. Conversely that the presence of low priced alcohol will facilitate heavier drinking by removing the resistance that higher prices would assert to limit such behaviour. Both push and pull effects could be operating concurrently.

A solution that has been put forward to mitigate this effect if it is occurring is to intervene in the availability of cheap alcohol by regulating a minimum price below which alcohol cannot be sold. All else remaining the same, heavier drinkers would be able to buy less for the money they currently spend.

The implicit assumption underlying this reasoning is, that heavy drinkers do in fact buy, in large part, the cheapest alcohol from the price range available to them. A rival hypothesis might be that heavy drinkers, involved beyond the norm as they are with alcohol, may be selective and discriminating in their purchases, giving weight to quality, type, flavour, imagery, social context, and so forth.

In commissioning this study the Ministry of Health aimed to test the link between heavy drinkers and cheapest alcohol. The research was to answer the related questions.

- What proportion of heavy drinkers purchase alcohol at the cheapest price levels?
- Does a higher proportion of heavy drinkers, compared to moderate or light drinkers, purchase alcohol at the cheapest price levels?

Key aspects of the survey design were to sample alcohol shoppers emerging from liquor wholesalers and supermarkets where larger-pack, lower cost alcohol is sold, and to retrieve their itemised dockets to enable accurate price-per-ml information to be recorded. This solid information was then connected to three self-reported drinking measures, all three being standard survey question phrasings used widely in alcohol health research, collected in a concurrent interview with the shopper.

The study formed the price-per-ml observations collected into quintiles to provide a systematic dimension of the prices being paid, and then inspected each quintile for the presence of heavier drinkers. Of particular interest was whether heavier drinkers were a strong presence in the cheapest quintile and concurrently a weak presence in the progressively dearer quintiles.

Each of the three questions generally accepted by researchers as reflecting the extent of a persons alcohol consumption were inspected across the price quintiles in turn. For each it emerged that those shoppers reporting the heaviest drinking were active across the price range, and were not the dominant group making up purchasers of the cheapest alcohol. This means that there are more moderate and lighter drinkers present in the lowest price decile than heavy drinkers. A strategy of raising the minimum retail price per standard drink (10mls of alcohol in NZ) would not impact the majority of heavy drinkers, and would impact more moderate and lighter drinkers than heavy drinkers.

Of particular community concern is the purchasing of alcohol by the formative 18-24 year olds. While much of their drinking is known to occur in clubs and bars where the price per standard drink is at the highest, there is no support for the view that when buying packaged alcohol at supermarkets and liquor outlets, they take the least cost approach.

The present study recorded a good size sub-sample of 18-24 year olds. Their purchasing was evident across all five quintiles of the price range, rather than imbalanced noticeably toward the least cost range. In this data it was those shoppers aged 65 years and over who had the highest proportionate inclination to purchase alcohol in the lowest price quintile.

Considering ethnicities of alcohol shoppers, Pacific people at 24% were more likely than Maori at 22% or NZ European at 19% to purchase in the least cost price range. The differences are however, not of large magnitude.

We inspected the types of alcohol drinks appearing at each price level to see whether least cost alcohol was strongly identified with a particular type of drink. The data from a wide cross section of buyers, buying from a wide cross section of stores, does not support such a connection. Beer, wine, spirits, and RTD's could each be seen to have been bought in considerable numbers in each quintile tier of price per ml of alcohol.

An econometric multivariate analysis was undertaken to test for the presence of interactions amongst the measures which might lead to a different and more complex interpretation of what the bivariate analysis indicated.

The estimated equations confirm the expected negative relationship between the price paid for alcohol and the quantity of alcohol consumed, that is suggested by the quintile analysis.

However, this relationship is not that of a normal demand curve where everyone pays the same price. The equations are probably picking up a product mix effect whereby higher prices are charged for, and paid by consumers for higher quality products – whether real or perceived, and such products are consumed in smaller quantities than cheaper products. Thus we cannot make the usual inference that higher prices at the cheaper end of the market would reduce the quantity consumed by the amount indicated by the elasticities. Clearly though (from Table 3), to the extent that there is any sort of demand response to higher prices, it will be dominated by consumers in the highest consumption quintile – in absolute quantity terms if not in proportional terms.

A minimum price on the cheapest drinks that brought their price up to the Q1-Q2 boundary, would involve a price increase on those products of about 1.4c/ml or about 18% (ie, 14 cents per NZ standard drink). If the elasticity in Table 4 operated as a true price elasticity, the reduction in consumption of such drinks would be about 6.3%, or only about 1.5% in total. This is because even though the top consumption quintile purchases more of its alcohol from the lowest price quintile than does any other consumption quintile, the proportion of its consumption purchased from the lowest price quintile is still only around 27% ($0.146/0.548$). Expressed in reverse, 73% of the alcohol consumed by the highest consumption quintile is not purchased from the lowest price quintile.

The results provide tentative evidence that the price of wine has a stronger influence on drinking intensity than the prices of spirits or beer, the latter two being more related to drinking frequency than drinking intensity.

In overview, it would be fair to infer from these findings that considerations other than heavy drinking explain least cost purchasing, and conversely considerations other than least cost drive heavy drinking. Among these may be affordability, cost conscious prudence, low attachment to brand imagery, low attachment to so called quality, the intended context of consuming it, and other factors.

A. BACKGROUND

One of the specific objectives of the National Drug Policy 2007-2012 is to reduce harm to individuals, families and communities from the risky consumption of alcohol. To this end a research project relating to the purchasing patterns of New Zealand drinkers was proposed.

B. OBJECTIVES

The research project was planned to answer the following research questions:

- What proportion of heavy drinkers purchase alcohol at the cheapest price levels?
- Does a higher proportion of heavy drinkers, compared to moderate or light drinkers, purchase alcohol at the cheapest price levels?

C. METHOD

1. OPERATIONAL DEFINITION OF THE TERMS

Operational definitions of three key terms were formed. These terms were, heavy drinkers, cheap(est) price and purchasing.

a. Heavy Drinkers

When survey interviews are used to obtain self-reports on drinking, the result is a relative scale rather than an absolute one. By this we are acknowledging that interview questions can distribute people into heavier, moderate and lighter drinkers along a relative continuum but can't readily state the volume of alcohol in mls that each point in the continuum represents. Alcohol survey research such as the Ministry of Health's NZHS and ADUS have settled on three questions which are relied on to differentiate each persons (respondents) relative use of alcohol. These questions do not prompt or assist the respondent with showcards of standard drinks, or define the quantity of a "drink".

The phrasing of the three questions is shown in the attached questionnaire.

The survey analysis made constructive use of the continuum of drinking as expressed in the three standard questions, but can also be read from a threshold approach. Specifically heavy drinkers for the frequency of drinking question are those who consume alcohol four times a week or more. Heavy drinkers for the question on how many drinks they have on a day that they do drink are those who take 10 or more drinks on such a day. Finally heavy drinkers for the question on how often they have five or more drinks on the same occasion are those who do so three or more times a week.

The questions entail the opportunity to then combine them by a simple multiplication to give each alcohol buyer a relative "drinks per month" figure for drinking intensity. This gives the analysis the freedom to define and redefine "heavy" drinker quite flexibly in examining the connection with price paid.

b. Cheap(est) Price For Alcohol

Given that alcohol strength, pack size, type of alcohol, quantity per pack, discounting and specials can influence the price, it is necessary to convert purchases item by item into mls of alcohol. Fortunately receipts for purchase identify brand, quantity and price so that the successive items listed on a sale docket can be converted to "cents per ml of alcohol" using the alcohol percentage and litre content of that item stated on the label.

It is important to recognise that retailing activity like 'specials' and store vs store competition mean we need to define cheapest in relation to the store and the day of purchase.

The initial approach was to obtain and convert into cents per ml each of the purchases shown on the docket of each customer emerging from a supermarket or liquor wholesaler, as the first step. The second step was to check that specific store's shelf prices to code the items individually as to whether they were, or were not, the cheapest available to the customer on the day at that store. This too being done on a cost per ml of alcohol basis. This second step was subsequently displaced by using the lowest (bracket of) actual prices paid by purchasers. The presence of poorly patronised brands, run-out stock sales, and deep specialing on launch-phase lines suggested the literal cheapest item of the day was a poor reflection of the lowest-price behaviour of the alcohol shoppers.

c. Purchaser Vs Drinker

A challenge facing this research project was that of dealing with the overlap of purchaser and drinker. The take-home purchaser may not drink all that he/she buys. Conversely the drinker often does not buy all the alcohol they consume. These are specially true of the supermarket and liquor wholesale outlets that provide the lower-priced options to the public. (Bars, clubs, restaurants and on-premise drinking implies significantly dearer alcohol options and for that reason are not included in this study).

In a theoretical but impractical option the researcher would screen among drinkers to find a sample of "heavy" drinkers and get them to retain their purchasing invoices and then match these invoices to the prevailing prices within the stores from which they had purchased, or more effectively against the lowest prices paid across the prevailing market.

More realistic in the sense of being achievable in practise, is to intercept purchasers exiting liquor wholesalers and supermarkets, obtain their dockets, and ask their drinking intensity using the questions in Appendix 1. This enables the study to calculate the cost per ml of alcohol they paid and determine where on the range of prevailing real prices paid, that falls.

A 'soft' resolution of the overlap problem would be to ask the purchaser whether the greater part of their purchases were to be consumed by themselves or by others – and if others (or an other), to give indications of that/those others drinking frequencies also.

The analysis can then be done by:

- i. First, including only those who were buying "mainly for themselves" in the dataset.
- ii. Then, adding back into the dataset those buying for "mainly for others" and seeing if any different conclusion resulted.

When we include all buyers in the dataset scenario we are effectively analysing whether light/moderate/heavy drinkers are buying at the cheapest price, regardless of whether they are going to drink it themselves or serve/provide it to others. This is the predominant thrust of the analysis of this study.

Analysis of this question for the present survey established that the percentage buying "mainly for others" was very small at 6%. Their impact on the finding of the survey was considered too small to influence the general inferences and conclusions drawn. While an argument might be made that reciprocally they benefit from others purchasing for them in turn, this is uncertain. With the advantage of hindsight it may be best to simply screen out the small number of buyers who are buying "mostly for others" from similar studies in future.

2. CHOICE OF METHOD

In this section we consider the two methods available to collect data for answering the question. We have a choice between taking recalled purchasing, eg, in a phone or doorstep interview at the home on the one hand, and observed purchasing, eg, in an exit interview at wholesalers and supermarkets at the time of purchase, on the other.

The **recall interview** at the home (whether on phone or doorstep) carries drawbacks both specific to the dependent variable and generic to the approach. With respect to the specific drawback, people may not be conscious that they are buying at the least-cost. This may be an option they have drifted into to suit their circumstances.

The home interview would therefore have to rely increasingly on recall of products purchased and price paid at past purchase occasions to see whether and to what extent the person was a lowest-cost buyer. Alcohol recall is substantially compromised by social desirability bias as well as forgetting and selective recall. We felt purchase reports would be compromised by a recall approach.

The number of interviews that could be performed if interviews are at household doorsteps was very likely much smaller than would support good analysis, given the budget available. If phone, the response rate for phone surveys has fallen to very low levels in recent years, giving rise to reservations about the representativeness of those who do participate, even if basic demographics are "balanced" by quotas or weighting.

The **exit interview** conducted at the point of purchase and thereby at the time of purchase provides more robust data for identifying and qualifying least-cost purchasing. The strategy is to station interviewers at a selection of alcohol outlets who intercept exiting shoppers and administer a short interview. During this interview the shopper is offered a small gift voucher on behalf of the researcher to provide their itemised docket to the survey and to also answer the drinking questions required for analysis. This approach gives sound information about the purchases and what they cost by way of the docket.

The one form of purchasing not covered by the exit interview is on-line purchasing via the Internet. Options to source this segments purchasing are phone or personal visits at home, or the use of an online consumer panel. Neither gives us direct access to real-cost information in the way that the exit interview does. The price actually paid is compromised by forgetting, unless the respondent can be persuaded to retrieve their online order – a type of task for which there is generally little co-operation in householder surveys. Where a given purchase or purchasers overall basket of purchases fell in the cost per ml of alcohol prevailing range, would be difficult to determine reliably.

3. SURVEY SAMPLE

Liquor wholesalers and supermarkets are observably the retail outlets offering the greatest volume sales of alcohol as also the most competitive prices. Any relationship between heavy drinking and least-cost purchasing would need to show up among customers of these outlets to be of importance.

Two stage random selection for the sampling of customers would best be applied to:

- The selection of liquor stores and of supermarkets respectively.
- The customer emerging from the stores, with the intent that sampling effort be applied roughly proportional to customer flow.

There is no administrative data by which to structure the sample formally and budget did not allow for developing one, even were this feasible. However, the sample of exit customers can be an acceptable basis for generalising any relationship found between least-cost purchasing and heavy drinking.

The relationship can be looked at separately for supermarket customers and liquor store customers as well as overall.

In practice the use of exit interviews requires permissioning from the management of the retail organisation. Supermarket and liquor stores of significant size and therefore trading area are virtually all now part of chains with centralised marketing. Some of these have blanket protocols precluding survey work from being done among their shoppers.

Permission was obtained from a spread of 10 large-footprint supermarkets for interviewing shifts to take place in their carpark areas. These were located as follows:

Central Auckland	Hamilton Central
South Auckland	Hamilton South East
East Auckland	Hamilton South
Auckland North	Christchurch North
	Christchurch West
	Dunedin

The sample plan was to include a North Island metropolitan and large provincial, and a South Island metropolitan and large provincial. Thus Auckland as the largest North Island metropolitan, rather than Wellington was chosen.

Similarly permission was obtained to interview at 25 liquor stores. The footprint of a liquor wholesaler is typically much smaller than that of a supermarket, calling for lower concentration of the sample obtained at each store. The smaller sample per store also recognised that managements wish to avoid a heavy interviewing presence at the store. Liquor outlet sampling took place in the following areas:

Auckland East	Wellington
Auckland West	Lower Hutt
Auckland North	Upper Hutt
Tauranga, Mt Maunganui	Wanganui
Hamilton	Wanganui
Hamilton East	New Plymouth
Hamilton North	New Plymouth
Christchurch	Hastings
Christchurch	Napier
	Gisborne

Sampling of both liquor wholesalers and supermarkets, while purposively selected to represent a socio-economic spread and relatively large footprints, cannot be viewed in terms of a finite probability of selection, either at the store level or respondent level.

4. INTERVIEWING

The ideal exit interview sample is one for which every xth shopper emerging from the store is intercepted, screened for eligibility, ie, bought an alcohol product, and then recruited into the interview. In practise this is very difficult to achieve with the latitude allowed the interviewers by store management, and without a very large interviewer team.

For this survey interviewers approached shoppers with the purposive consideration of including men and women, and people judged by eye to be aged up to 34 years, 35-54 years and 55 and over, in broadly equal proportions, relaxing this general specification to conform to the observed mix of the shoppers age/gender at the particular site.

The profile of the achieved sample of 2,000 is shown below.

Gender	Liquor Store	Supermarket	Total	%
Female	398	524	922	46.1
Male	607	471	1,078	53.9
	1,005	995	2,000	100

Ethnicity	Liquor Store	Supermarket	Total	%
NZ European	618	720	1,338	66.9
Maori	228	89	317	15.9
Pacific	51	60	111	5.5
Asian	42	52	94	4.7
Other	66	72	140	7.0
	1,005	995	2,000	100

Age Group	Liquor Store	Supermarket	Total	%
Up to 24 years	262	57	319	15.9
25 to 34 years	208	150	358	17.9
35 to 44 years	191	217	408	20.4
45 to 54 years	165	222	387	19.4
55 to 64 years	116	194	310	15.5
65+ years	63	155	218	10.9
	1,005	995	2,000	100

Liquor shoppers in this purposively conceived and controlled sample conform in broad terms to the general population along the demographics collected, indicating perhaps no more than that shopping for alcohol is a common population behaviour.

5. INTERVIEWING PROCEDURE

Shoppers were approached face-to-face by interviewers wearing NRB photo identity badges and asked whether they had purchased beer, wine or spirits on this particular visit to the store.

Where they affirmed they had done so they were told the survey offered a gift (\$5 in an envelope) in exchange for their invoice and the answering of a short interview. Those who agreed proceeded to hand over their receipt, receive the gift, and answer the questionnaire.

Response rates were not recorded but interviewers noted that refusals were rare and generally resulted from the person having run out of time, rather than any reaction to the topic or questions.

D. FINDINGS: BI-VARIATE PERCENTAGED ANALYSIS

1. THE TERM WEIGHTED AVERAGE PRICE, DEFINED

The term weighted average is used here to refer to the price per ml of alcohol paid by the shopper when the volumes and alcohol strengths of all the items he/she purchased on the surveyed occasion are taken together.

For example, a shopper may have purchased a 700ml bottle of wine of 10% alcohol strength for \$7, giving a price per ml of alcohol of 10¢ for that item. In addition, they may have purchased on the same occasion a 3 litre cask of wine of 10% alcohol strength for \$15, giving a price of 5¢ per ml of alcohol for that item. The weighted average paid for alcohol on that shopping trip is found as $2,200 \text{ cents}/370\text{mls} = 5.59 \text{ cents per ml}$. Since the NZ Standard drink is defined as 10mls of alcohol, this translates to 37 NZ standard drinks at 55.9 cents per standard drink.

The merit for inspecting self reported level of alcohol consumption in terms of weighted average price per ml of alcohol paid is that it overcomes the limitation of looking only at whether the person did or did not buy the cheapest alcohol available – seen in isolation the presence or absence of the cheapest item in their shopping might mask the true price per ml at which they are drinking.

2. THE USE OF QUINTILES IN THE ANALYSIS

Once each alcohol shoppers purchase invoices had been converted to weighted average paid per ml of alcohol, shoppers were then rank ordered from those who had paid the least to those who had paid the most per ml. Prices paid in cents per ml ranged from a low of just below 5 cents to a high of just above 56 cents. For a NZ standard drink this converts simply to 50 cents per drink to \$5.60 per drink.

For conceptual and practical reasons the analysis needed to form a variable from this range that would provide a continuum ranging from those who paid the least through those who paid in the middle range, to those who paid the most per ml of alcohol bought.

Given the sample size of 2,000 shoppers available it was deemed suitable to identify those shoppers paying in the lowest 20% range as the "lowest cost purchasers". This meant the sample base for this group would still be a stable number of 400 respondents for inspection. By extension the 20% quintiles would provide five points along the price-paid continuum to inspect the relationship with drinking frequency, intensity and price bracket shopped in.

The quintiles revealed by the survey are expressed below in price per ml and in NZ standard drinks.

Respondent Quintile	Cost per millilitre of pure alcohol	Cost per NZ standard drink
Lowest	4.57¢ - 9.13¢	46¢ - 91¢
2	9.15¢ - 10.19¢	92¢ - \$1.02
3	10.21¢ - 11.35¢	\$1.02 - \$1.14
4	11.36¢ - 13.86¢	\$1.14 - \$1.39
Highest	13.88¢ - 56.66¢	\$1.39 - \$5.67

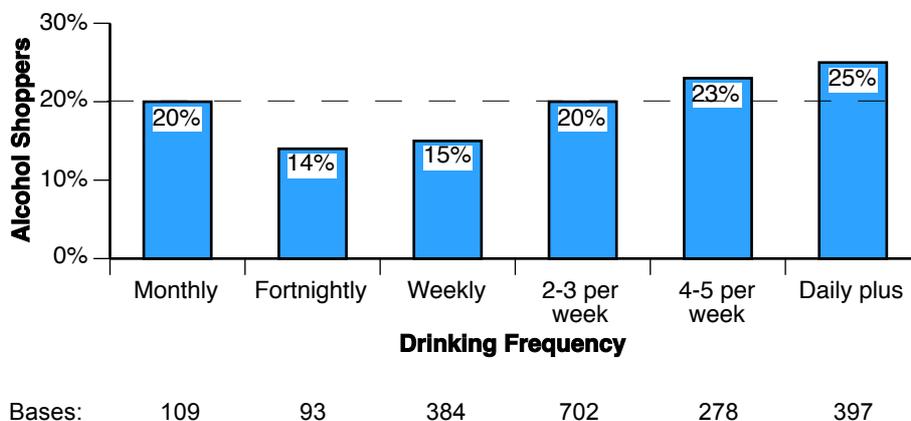
In New Zealand, a standard drink is defined as a drink containing 10mls of pure alcohol. Results have been rounded to the nearest cent.

3. FREQUENCY OF DRINKING BEER, WINE OR SPIRITS VIEWED AGAINST PRICE PER ML ALCOHOL PAID

One of the three questions recurrently used by alcohol researchers to mark the respondents drinking, is simply to ask how often they have a drink of beer, wine or spirits. The answer is taken open ended, without reading out options or showing a card.

Below we examine whether more frequent drinking is associated with more commonly purchasing in the lowest quintile price per ml alcohol.

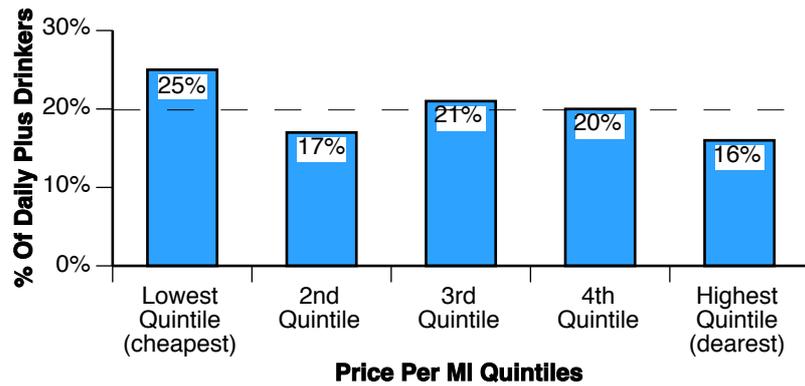
Figure 1: Proportion Of Alcohol Shoppers (vertical) Of Each Drinking Frequency Who Purchased In The Cheapest Cost Per ML Alcohol Quintile (figures rounded)



The strength of the relationship can be assessed by noting the departure from the 20% broken line. This figure shows that as drinking frequency increases, the proportion of drinkers who buy in the cheapest quintile of alcohol price rises. Given that only 25% of most frequent drinkers appear among the cheapest buying quintile we may view the relationship as not particularly strong, ie, 75% of the heaviest drinkers are paying more than the lowest cost range.

Following through on the most frequent drinkers we see them appearing in all five quintiles of purchase price at proportions not far different to an even spread, viz buying at all price levels relatively evenly.

Figure 2: The Price-Per-MI Quintiles (horizontal) In Which The Most Frequent Drinkers (ie, Daily Plus), Buy (figures rounded), Base = 397



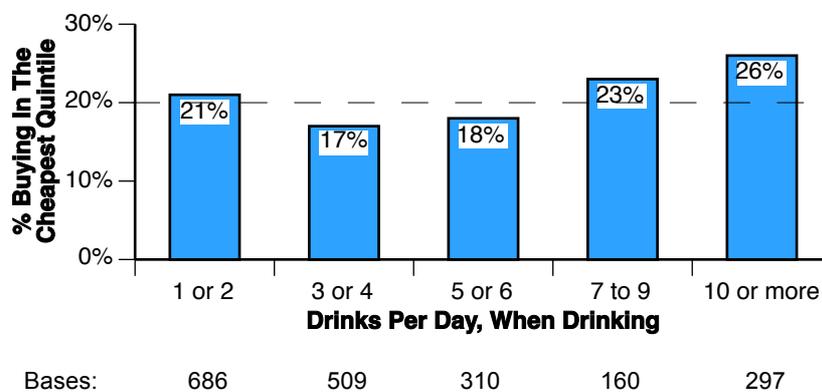
This profile shows the most frequent drinkers purchasing in all price ranges, with a moderate emphasis on the cheapest at the expense of the dearest.

4. NUMBER OF DRINKS ON A TYPICAL DAY WHEN DRINKING ALCOHOL

Another question recurrently used in alcohol research is that which asks the survey respondent how many drinks of wine/beer/spirits they have a on typical day when they are drinking. Where needed a drink is referred to as a glass or can, as appropriate to the drink. No showcard is proffered but where the respondent appears non-plussed in arriving at their answer, the options are read out to assist.

Below we examine whether drinking more drinks on a typical drinking day correlates with purchasing in the lowest quartile of purchase prices.

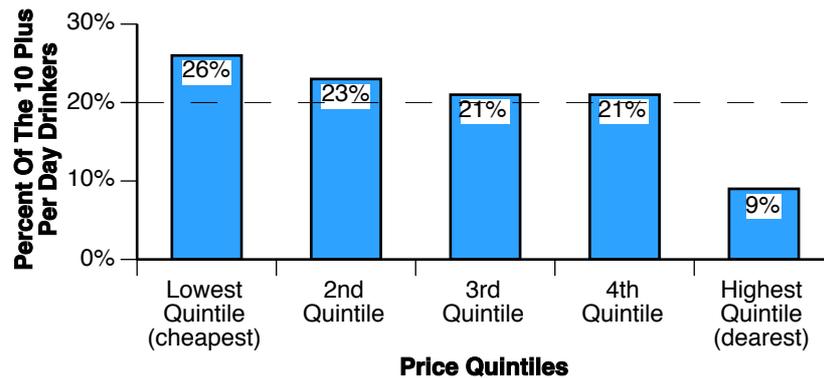
Figure 3: Proportion Of Drinkers Who Purchased In The Cheapest Cost Per MI Of Alcohol (horizontal) (percentages rounded)



The figure shows a definite inclination for the proportion of drinkers in progressively higher "drinks per drinking day" groups to buy within the lowest price quintile more often than moderate or lighter drinkers do. The effect however, is not quantitatively strong.

Following through on those who drink the largest number of drinks on the days when they do drink, ie, the "10 or more" column on the right of the figure above, we see that with the exception of the dearest quintile of prices, these drinkers are to be found buying in all price ranges.

Figure 4: The Price-Per-MI Quintiles (horizontal) In Which Those Who Drink 10 Or More Drinks On A Typical Day When Drinking, Buy Alcohol (horizontal), Base = 297 (figures rounded)



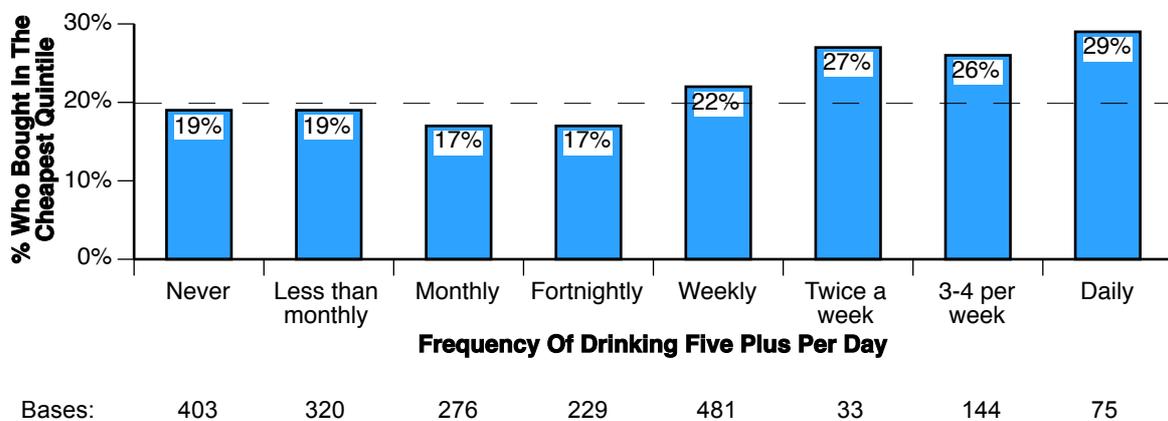
This profile shows that those in the group who have the highest number of drinks on a day when they are drinking, buy from within all of the price ranges. They tend to avoid the dearest price range in a step wise drop, appearing instead more commonly in each of the other price ranges, particularly in the cheapest.

5. FIVE OR MORE DRINKS ON ONE OCCASION

A third question recurrently used in alcohol research is to ask survey respondents how often they have five or more drinks on one occasion. The interviewer can also record a refused and a don't know option.

Below we examine whether the frequency with which people drink five or more drinks on an occasion correlates with the price range within which they purchase alcohol.

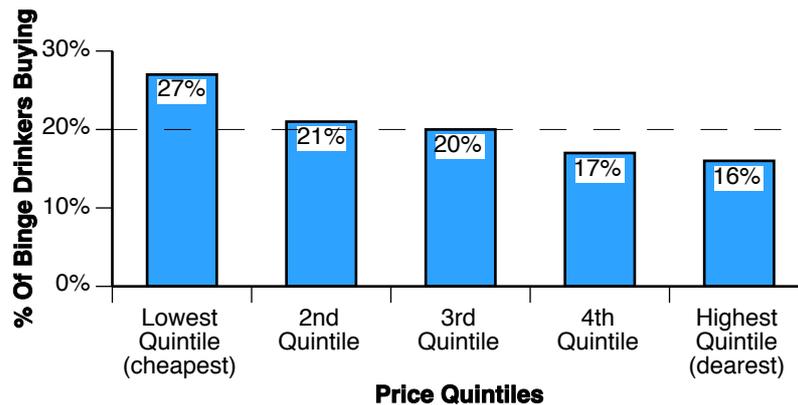
Figure 5: Proportion Of Drinkers (vertical) Of Each "5 Plus Per Occasion" Frequency (horizontal) Who Purchased In The Cheapest Cost Per MI Of Alcohol, Quintile (figures rounded)



The figure shows that there is clear upturn in the proportion of five plus per occasion drinkers who make their alcohol purchases down in the cheapest quintile of alcohol prices. However, even among the most avid of these drinkers the greater percentage are buying in higher cost quintiles.

Following through on the two most avid groups (3-4 per week and daily) in the above table, combined for this purpose, we see a similar effect. With the exception of the two highest quintiles of price, these drinkers are represented in proportions not greatly different to the 20% that might be expected if they were purchasing evenly across the price range.

Figure 6: The Price Per MI Quintiles In Which Those Who Binge Drink 3 Or More Times A Week, Buy Alcohol (figures rounded), Base 219

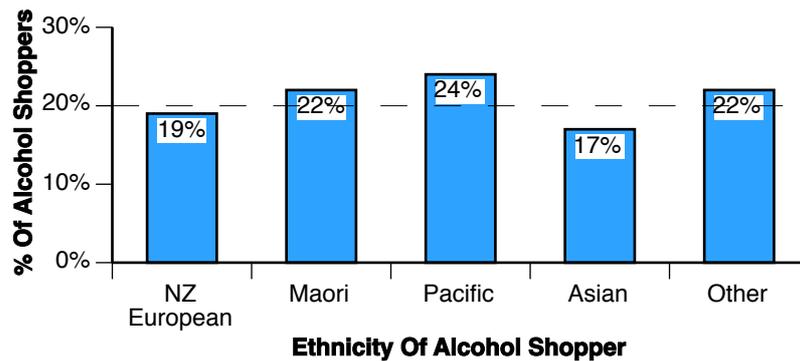


The figure shows that those binge drinking most frequently favour the cheapest quintile in the price range at the expense of the dearest quintile to a perceptible extent, but the predominant picture is of this group buying relatively evenly across the price range.

6. PRICES PAID BY ETHNIC GROUPS

Figure 7 below shows the percentage of each ethnic group purchasing alcohol in the cheapest quintile.

Figure 7: Percent Of Shoppers Within Each Ethnicity Group Who Bought In The Cheapest Quintile



Pacific people were more inclined to purchase in the cheapest quintile than other ethnic groups, as were Maori to a lesser extent. These two groups are markedly underrepresented in the dearest quintiles, with relatively higher representation spread over the other four quintiles.

7. ALCOHOL TYPES PURCHASED IN EACH PRICE QUINTILE

The 2,000 shoppers interviewed had purchased 2,714 'items' defined as charged line items on their invoices. The figures below show how often each of the alcohol types appeared in each price quintile of items.

	Cheapest Quintile	2nd Quintile	3rd Quintile	4th Quintile	Dearest Quintile
Cider	0 0%	1 <1%	5 1%	11 2%	19 3%
Beer	136 25%	222 41%	267 49%	228 42%	120 22%
Wine	248 46%	196 36%	178 33%	195 36%	240 44%
Spirits	37 7%	25 5%	23 4%	42 8%	41 8%
RTD's	122 22%	99 18%	70 13%	67 12%	123 23%
BASE	543	543	543	543	543

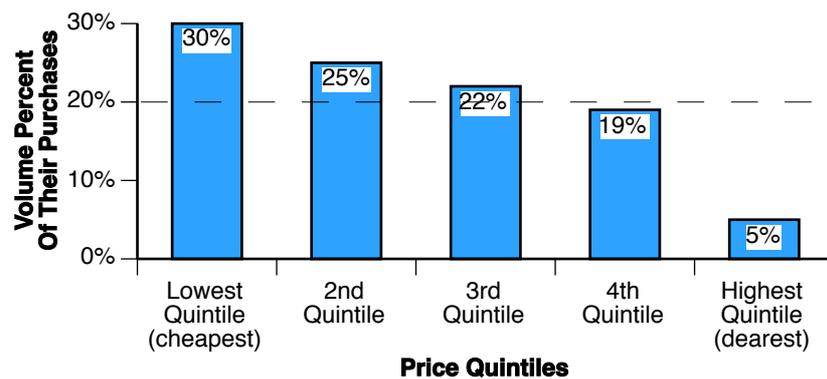
Wine, thanks to some extent to the lower price of cask wine, and RTD's, are notable in having a disproportionate presence in the cheapest quintile, relative to the other quintiles. These two products also appear strongly in the dearest quintile, a reflection of the way variants of them are price positioned to the consumer.

8. THE VOLUME OF ALCOHOL BOUGHT IN THE LOWEST PRICE QUINTILE, BY DRINKERS OF VARIOUS FREQUENCY

More frequent drinkers, heavier per-occasion drinkers, and more frequent binge drinkers were earlier shown to participate in price-per-ml alcohol relatively evenly over the price range except for some disproportion at the extremes of price. In brief they are not confined to least cost purchasing of alcohol.

That "price participation" approach however leaves open the possibility that when heavy drinkers do make use of low cost, they purchase a disproportionately larger volume proportion of their requirements, than do lighter or moderate drinkers, when purchasing at low prices.

Figure 8: Comparing The Proportion Of Their Alcohol Purchased At The Different Price Quintiles, For People Who Drink 10+ Drinks On A Typical Day They Do Drink
Base: Volume in mls, 66,532 mls, purchased by "10 plus per typical day when drinking" shoppers (figures rounded)



This heaviest drinker group do show a clear tendency toward buying a greater proportion of their volume at the cheapest end, but largely at the singular expense of the dearest products. Much of their purchasing is done across the middle price ranges.

9. PERCENTAGED TABLES

Purchasing Patterns Survey-Beer/Wine/Spirits

Weighted averages (quintiles)..

	Gender		Outlet		Ethnic group					Social Deprivation Index					
	Total	Fe- male	Male	Liquor store	Super- market	NZ Eur.	Maori	Pac- ific	Asian	Other	01-02	03-04	05-06	07-08	09-10
Unweighted Base	2000	922	1078	1005	995	1338	317	111	94	138	312	299	453	476	460
Weighted Base	2000	922	1078	1005	995	1338	317	111	94	138	312	299	453	476	460
Lowest...1 (04.57 to 0913 cents per ml)	401 20.0	186 20.2	215 19.9	211 21.0	190 19.1	259 19.4	68 21.5	27 24.3	16 17.0	30 21.7	47 15.1	57 19.1	76 16.8	102 21.4	119 25.9
...2 (09.15 to 10.19 cents per ml)	396 19.8	184 20.0	212 19.7	193 19.2	203 20.4	240 17.9	80 25.2	34 30.6	17 18.1	25 18.1	66 21.2	47 15.7	72 15.9	107 22.5	104 22.6
...3 (10.21 to 11.35 cents per ml)	398 19.9	161 17.5	237 22.0	179 17.8	219 22.0	271 20.3	56 17.7	22 19.8	15 16.0	34 24.6	68 21.8	59 19.7	93 20.5	89 18.7	89 19.3
...4 (11.36 to 13.86 cents per ml)	403 20.1	175 19.0	228 21.2	205 20.4	198 19.9	270 20.2	67 21.1	18 16.2	24 25.5	23 16.7	63 20.2	73 24.4	98 21.6	90 18.9	79 17.2
Highest...5 (13.88 to 56.66 cents per ml)	402 20.1	216 23.4	186 17.3	217 21.6	185 18.6	298 22.3	46 14.5	10 9.0	22 23.4	26 18.8	68 21.8	63 21.1	114 25.2	88 18.5	69 15.0
Mean (in cents per ml)															
Mean	1185	1213	1160	1212	1157	1204	1137	1068	1189	1195	1192	1211	1251	1164	1118
Standard Deviation															
SD	450	494	407	504	386	471	397	294	342	504	390	475	512	436	411

Table 1: Demographics: The table shows the weighted average price per ml of alcohol paid across all items in the shopper's basket of alcohol purchases. Prices are grouped into Quintiles, and the percentages show the proportion of each drinking frequency/intensity group that shopped in each quintile, Base = 2,000 shoppers

Purchasing Patterns Survey-Beer/Wine/Spirits

Weighted averages (quintiles)..

	Total	Q3 How often would have wine/beer/spirits						Q4 Number of drinks on typical day					Q5 How often have 5+ drinks on one occasion								
		Mon- thly	Fort- night- ly	Once a week	2 or 3 times a week	4 or 5 times a week	Daily, 6 or 7 times a week	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	Never	Less than mnthly	Mnthly	Fort- night- ly	Weekly	W'ends /twice a week	3 or 4 times a week	Daily/ almost daily	DK/ ref.
Unweighted Base	2000	109	93	384	702	278	397	686	509	310	160	297	403	320	276	229	481	33	144	75	4
Weighted Base	2000	109	93	384	702	278	397	686	509	310	160	297	403	320	276	229	481	33	144	75	4
Lowest...1 (04.57 to 0913 cents per ml)	401 20.0	22 20.2	13 14.0	59 15.4	138 19.7	63 22.7	100 25.2	141 20.6	84 16.5	56 18.1	36 22.5	78 26.3	75 18.6	60 18.8	48 17.4	38 16.6	104 21.6	9 27.3	38 26.4	22 29.3	1 25.0
...2 (09.15 to 10.19 cents per ml)	396 19.8	18 16.5	11 11.8	79 20.6	147 20.9	61 21.9	68 17.1	112 16.3	96 18.9	76 24.5	32 20.0	67 22.6	73 18.1	43 13.4	61 22.1	39 17.0	120 24.9	4 12.1	29 20.1	16 21.3	0 0.0
...3 (10.21 to 11.35 cents per ml)	398 19.9	16 14.7	22 23.7	78 20.3	142 20.2	53 19.1	84 21.2	141 20.6	101 19.8	57 18.4	35 21.9	61 20.5	74 18.4	67 20.9	49 17.8	54 23.6	97 20.2	8 24.2	28 19.4	16 21.3	2 50.0
...4 (11.36 to 13.86 cents per ml)	403 20.1	23 21.1	22 23.7	93 24.2	135 19.2	43 15.5	80 20.2	128 18.7	112 22.0	60 19.4	33 20.6	63 21.2	80 19.9	69 21.6	56 20.3	49 21.4	100 20.8	5 15.2	23 16.0	14 18.7	0 0.0
Highest...5 (13.88 to 56.66 cents per ml)	402 20.1	30 27.5	25 26.9	75 19.5	140 19.9	58 20.9	65 16.4	164 23.9	116 22.8	61 19.7	24 15.0	28 9.4	101 25.1	81 25.3	62 22.5	49 21.4	60 12.5	7 21.2	26 18.1	7 9.3	1 25.0
Mean	1185	1204	1303	1233	1182	1168	1119	1215	1214	1181	1154	1083	1220	1237	1216	1204	1137	1189	1114	1041	1050
Standard Deviation																					
SD	450	403	581	519	438	440	377	491	445	453	443	346	438	509	494	450	436	500	355	246	406

Table 2: Drinking Behaviour: The table shows the weighted average price per ml of alcohol paid across all items in the shopper's basket of alcohol purchases. Prices are grouped into Quintiles, and the percentages show the proportion of each demographic group that shopped in each quintile, Base = 2,000 shoppers

Purchasing Patterns Survey-Beer/Wine/Spirits

Weighted averages (quintiles)..

	Total	QF Day of purchase				QA Age group					
		Sunday to Wed'day	Thurs-day	Friday	Satur-day	Up to 24 yrs	25-34 yrs	35-44 yrs	45-54 yrs	55-64 yrs	65+ yrs
Unweighted Base	2000	391	351	565	693	319	358	408	387	310	218
Weighted Base	2000	391	351	565	693	319	358	408	387	310	218
Lowest...1 (04.57 to 09.13 cents per ml)	401 20.0	78 19.9	77 21.9	108 19.1	138 19.9	74 23.2	61 17.0	75 18.4	69 17.8	57 18.4	65 29.8
...2 (09.15 to 10.19 cents per ml)	396 19.8	74 18.9	74 21.1	98 17.3	150 21.6	66 20.7	55 15.4	90 22.1	76 19.6	70 22.6	39 17.9
...3 (10.21 to 11.35 cents per ml)	398 19.9	71 18.2	72 20.5	113 20.0	142 20.5	48 15.0	81 22.6	78 19.1	91 23.5	61 19.7	39 17.9
...4 (11.36 to 13.86 cents per ml)	403 20.1	92 23.5	57 16.2	119 21.1	135 19.5	68 21.3	88 24.6	78 19.1	79 20.4	58 18.7	32 14.7
Highest...5 (13.88 to 56.66 cents per ml)	402 20.1	76 19.4	71 20.2	127 22.5	128 18.5	63 19.7	73 20.4	87 21.3	72 18.6	64 20.6	43 19.7

Mean (in cents per ml)

Mean	1185	1173	1176	1216	1169	1201	1211	1184	1174	1191	1130
------	------	------	------	------	------	------	------	------	------	------	------

Standard Deviation

SD	450	413	469	480	435	520	441	455	393	463	420
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Table 3: Whether least cost shopping is greater on different days of the week, or differs by the age group of the shopper

Purchasing Patterns Survey-Beer/Wine/Spirits

Individual invoice items (quintiles)..

	Gender		Outlet		Ethnic group					Social Deprivation Index					
	Total	Fe- male	Male	Liquor store	Super- market	NZ Eur.	Maori	Pac- ific	Asian	Other	01-02	03-04	05-06	07-08	09-10
Unweighted Base	2714	1283	1431	1293	1421	1846	408	141	107	210	472	409	608	624	570
Weighted Base	2714	1283	1431	1293	1421	1846	408	141	107	210	472	409	608	624	570
Lowest...1 (04.57 to 0913 cents per ml)	541 19.9	269 21.0	272 19.0	264 20.4	277 19.5	344 18.6	99 24.3	33 23.4	20 18.7	44 21.0	80 16.9	71 17.4	95 15.6	138 22.1	151 26.5
...2 (09.15 to 10.19 cents per ml)	545 20.1	254 19.8	291 20.3	222 17.2	323 22.7	354 19.2	98 24.0	40 28.4	20 18.7	33 15.7	102 21.6	83 20.3	108 17.8	120 19.2	127 22.3
...3 (10.21 to 11.35 cents per ml)	543 20.0	236 18.4	307 21.5	257 19.9	286 20.1	371 20.1	71 17.4	34 24.1	17 15.9	50 23.8	94 19.9	82 20.0	121 19.9	126 20.2	113 19.8
...4 (11.36 to 13.86 cents per ml)	540 19.9	251 19.6	289 20.2	261 20.2	279 19.6	367 19.9	87 21.3	20 14.2	25 23.4	40 19.0	97 20.6	94 23.0	125 20.6	126 20.2	93 16.3
Highest...5 (13.88 to 56.66 cents per ml)	545 20.1	273 21.3	272 19.0	289 22.4	256 18.0	410 22.2	53 13.0	14 9.9	25 23.4	43 20.5	99 21.0	79 19.3	159 26.2	114 18.3	86 15.1
Mean (in cents per ml)															
Mean	1220	1239	1203	1270	1175	1237	1172	1093	1205	1259	1217	1247	1299	1202	1140
Standard Deviation															
SD	526	563	491	601	443	533	530	334	363	616	449	609	584	509	467

Table 4: Demographics: The table shows the price per ml of alcohol paid on an item by item basis, Base = 2,714 items purchased

Purchasing Patterns Survey-Beer/Wine/Spirits

Individual invoice items (quintiles)..

	Q3 How often would have wine/beer/spirits							Q4 Number of drinks on typical day					Q5 How often have 5+ drinks on one occasion								
	Total	Mon- thly	Fort- night- ly	Once a week	2 or 3 times a week	4 or 5 times a week	Daily, 6 or 7 times a week	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	Never	Less than mnthly	Mnthly	Fort- night- ly	Weekly	W'ends /twice a week	3 or 4 times a week	Daily/ almost daily	DK/ ref.
Unweighted Base	2714	135	120	508	933	409	563	980	729	403	198	358	558	454	397	321	612	42	190	92	6
Weighted Base	2714	135	120	508	933	409	563	980	729	403	198	358	558	454	397	321	612	42	190	92	6
Lowest...1 (04.57 to 0913 cents per ml)	541 19.9	32 23.7	15 12.5	88 17.3	181 19.4	92 22.5	126 22.4	196 20.0	123 16.9	78 19.4	45 22.7	92 25.7	106 19.0	80 17.6	77 19.4	54 16.8	134 21.9	9 21.4	46 24.2	27 29.3	1 16.7
...2 (09.15 to 10.19 cents per ml)	545 20.1	16 11.9	18 15.0	93 18.3	189 20.3	94 23.0	120 21.3	196 20.0	127 17.4	95 23.6	35 17.7	76 21.2	111 19.9	72 15.9	79 19.9	57 17.8	149 24.3	8 19.0	36 18.9	18 19.6	2 33.3
...3 (10.21 to 11.35 cents per ml)	543 20.0	20 14.8	25 20.8	108 21.3	199 21.3	76 18.6	111 19.7	179 18.3	154 21.1	78 19.4	50 25.3	79 22.1	92 16.5	88 19.4	83 20.9	69 21.5	133 21.7	10 23.8	40 21.1	24 26.1	1 16.7
...4 (11.36 to 13.86 cents per ml)	540 19.9	36 26.7	32 26.7	110 21.7	181 19.4	65 15.9	105 18.7	177 18.1	163 22.4	81 20.1	33 16.7	75 20.9	109 19.5	98 21.6	75 18.9	75 23.4	116 19.0	6 14.3	36 18.9	14 15.2	0 0.0
Highest...5 (13.88 to 56.66 cents per ml)	545 20.1	31 23.0	30 25.0	109 21.5	183 19.6	82 20.0	101 17.9	232 23.7	162 22.2	71 17.6	35 17.7	36 10.1	140 25.1	116 25.6	83 20.9	66 20.6	80 13.1	9 21.4	32 16.8	9 9.8	2 33.3
Mean	1220	1219	1359	1266	1222	1185	1172	1245	1249	1206	1200	1120	1240	1280	1237	1250	1158	1314	1195	1056	1284
Standard Deviation																					
SD	526	424	645	564	544	472	495	549	506	585	502	445	478	551	542	573	522	729	545	254	741

Table 5: Drinking Behaviour: The table shows the price per ml of alcohol paid on an item by item basis, Base = 2,714 items purchased

Purchasing Patterns Survey-Beer/Wine/Spirits

Pure alcohol volume (mls)

	Q4 Number of drinks on typical day						
	Total	1 or 2	3 or 4	5 or 6	7 to 9	10 or more	DK/ refused
Weighted Base	2672	980	729	403	198	358	4
Total (mls)	412274	134455	105615	63499	34496	66532	577
Quintile 1 (cheapest)	98579 23.9	32063 23.8	21180 20.0	14306 22.5	9813 28.4	19637 29.5	0 0.0
Quintile 2	92976 22.6	30077 22.4	21723 20.6	15762 24.8	6159 17.8	16277 24.5	527 91.3
Quintile 3	88369 21.4	26095 19.4	24558 23.3	12321 19.4	10164 29.5	14838 22.3	0 0.0
Quintile 4	77998 18.9	23200 17.3	22283 21.1	13375 21.1	5237 15.2	12391 18.6	0 0.0
Quintile 5 (dearest)	54352 13.2	23020 17.1	15871 15.0	7735 12.2	3123 9.1	3389 5.1	50 8.7

Table 6: The table shows the **volume** of alcohol in mls, purchased at each price quintile by each drinking frequency group, and by the sampled shoppers in total

Footnote: The base of 2,672 is smaller than the total items of 2,714 due to excluding people who bought "mainly for others". The findings are negligibly different either way.



INFOMETRICS

Dr A Stroombergen

CONTENTS

Page No.

E. FINDINGS: MULTIVARIATE ECONOMETRIC ANALYSIS.....	35
1. INTRODUCTION.....	35
2. QUINTILE ANALYSIS OF PRICE AND QUANTITY	36
3. SINGLE EXPLANATORY VARIABLE	38
4. MULTIPLE EXPLANATORY VARIABLES	40
5. CONSUMPTION FREQUENCY.....	41
6. CONSUMPTION INTENSITY.....	41
7. TOTAL CONSUMPTION.....	42
8. FREQUENCY OF HIGH INTENSITY CONSUMPTION	43
9. TYPE OF DRINK.....	44
10. MISCELLANEOUS FINDINGS.....	45

E. FINDINGS: MULTIVARIATE ECONOMETRIC ANALYSIS

1. INTRODUCTION

This report describes the results of an econometric analysis of a survey of alcohol purchasing patterns undertaken by National Research Bureau. The reader is referred to Section C for the sample and surveying procedure.

In essence we have available a dataset of 2000 observations containing data on the prices and quantities of purchased alcohol (from sales dockets), self-reported alcohol consumption, and some demographic information.

The main objective of the analysis is to ascertain the strength of the relationship between the price paid for alcohol and the consumption of alcohol, particularly the extent to which heavier consumption is dominated by cheaper drinks.

Alcohol consumption is econometrically investigated using four measures of consumption in two sets of equations. The four dependent variables are:

- a. Frequency of alcohol consumption (number of occasions per week).
- b. The intensity of consumption on the occasions that drinking occurs (number of drinks per occasion).
- c. Total alcohol consumption, the product of frequency and intensity.
- d. Frequency of high intensity consumption, defined as 5 or more drinks per occasion.
- e. For each respondent a weighted mean purchase price per millilitre (ml) of alcohol was calculated. Of the 2000 respondents, 519 purchased more than one item, buying an average of 2.4 items, with those items frequently coming from more than one price quintile, as summarised in Table 1.

Table 1: Price Distribution of Total Quantity Consumed

No. price quintiles spanned	Count
1	132
2	175
3	117
4	65
5	30

In only 132 of those cases did all of the items purchased come from the same price quintile. Thirty respondents bought items from right across the five quintiles. This should be borne in mind in the discussions below.

2. QUINTILE ANALYSIS OF PRICE AND QUANTITY

Before looking at the econometric analysis of the unit records we present some cross-tabulations of prices and quantities, disaggregated by quintile. As shown in Table 2 consumers in the highest consumption quantity quintile Q5 are over-represented in the lowest price quintile Q1; 25.5% of people in the heaviest consumption quintile purchase from the lowest price quintile. Only 13.5% of these consumers purchase alcohol in the highest price quintile.

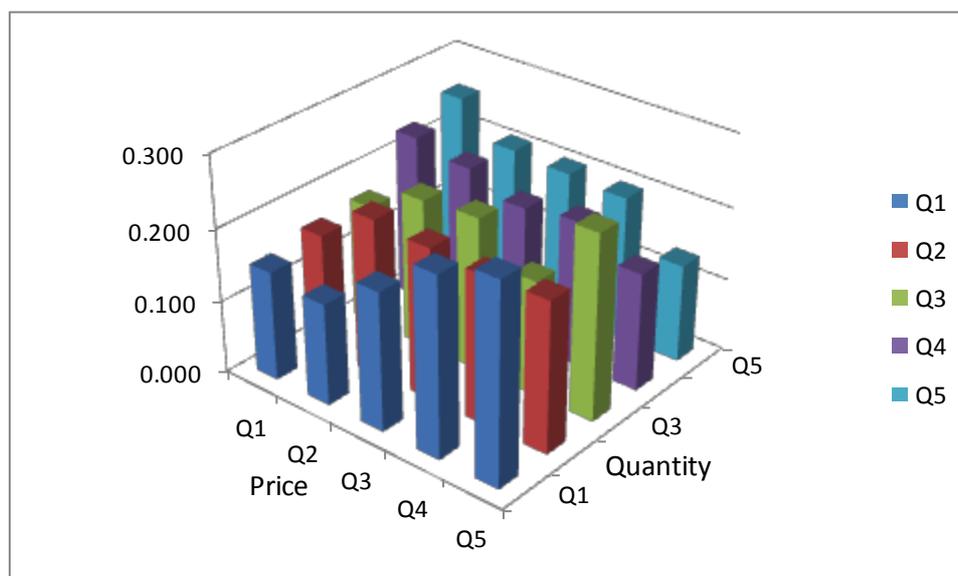
Forming almost a mirror image, 27.2% of people in the lightest consumption quintile purchase from the dearest price quintile. Only 15.1% of these consumers purchase from the lowest price quintile.

Of the 25 cells in Table 2, 13 are within the range 20%±2%. These are shaded in the table. This clustering suggests that about 52% of people tend to buy their alcohol from the middle three price quintiles.¹

Table 2: Prices and Quantities by Quintiles

Price	Quantity (No. drinks/week)				
	Q1	Q2	Q3	Q4	Q5
Q1 (lowest)	0.151	0.164	0.168	0.231	0.255
Q2	0.140	0.216	0.207	0.216	0.208
Q3	0.190	0.210	0.213	0.190	0.203
Q4	0.246	0.203	0.159	0.200	0.199
Q5	0.272	0.207	0.254	0.162	0.135
	1.000	1.000	1.000	1.000	1.000

Figure 1: Prices and Quantities by Quintiles



¹ Note that while the price quintiles are close to exact, the quantity quintiles are approximate as the discrete nature of the data produces many identical values that span quintile boundaries.

Table 3 shows that 23.6% of all alcohol consumed is purchased from the lowest price quintile, of which over 60% (or 14% of total consumption) is consumed by the heaviest consumption quintile.

Given the above results we would expect to see an inverse relationship between the price paid and the quantity consumed emerging from econometric analysis.

Table 3: Distribution of Total Quantity Consumed

Price	% of Total Quantity Consumed (No. drinks/week)					
	Q1	Q2	Q3	Q4	Q5	
Q1 (lowest)	0.3	0.8	1.7	6.2	14.6	23.6
Q2	0.4	1.1	2.2	6.0	11.3	21.0
Q3	0.5	1.0	2.2	5.1	11.4	20.2
Q4	0.7	1.0	1.7	5.5	10.4	19.3
Q5	0.6	1.0	2.6	4.4	7.1	15.7
	2.5	4.9	10.4	27.2	54.8	99.8

3. SINGLE EXPLANATORY VARIABLE

In the first set of equations the only explanatory variable is the weighted average price per ml of alcohol purchased. In the second set more explanatory variables are added to the models, using a general-to-specific approach. Table 4 shows the estimated effects of prices. The full set of results for the second set of equations is given in Table 5.

Table 4: Summary of Main Results

	Single Explanatory Variable		Multiple Explanatory Variables	
	% Δ for $\Delta 1c/ml$	Elasticity	% Δ for $\Delta 1c/ml$	Elasticity
Frequency: occasions/week	-1.4	-0.16	-1.3	-0.15
Intensity: No. drinks/occasion	-1.6	-0.19	-1.5	-0.18
Total: No. drinks/week	-2.9	-0.35	-2.5	-0.29
High intensity frequency: occasions/week of ≥ 5 drinks	-3.5	-0.41	-2.8	-0.34

In equations that contain no explanatory variables other than the average price of alcohol, a rise in the average price paid of 1c/ml, which is about 8.4% on average, is associated with the changes in quantity shown in the first data column in Table 4. For each equation the price variable is highly statistically significant (p-value <0.001). A rise in the price paid for alcohol of 1c/ml is associated with a reduction in the total number of drinks per week of 2.9%.

The difference in price between the means of the Q1 and Q5 price quintiles is 10.8c/ml, so the coefficient implies an associated difference in total consumption of 31%. This is substantially less than the observed difference in Table 3, suggesting that while consumers can be sorted into price quintiles, this does not necessarily imply that the sorting variable (price) is the variable that primarily drives their behaviour.

Figure 2, which is a simple scatter plot of alcohol consumption against price illustrates the point. Although there is clustering of higher consumption at lower prices, there are clearly factors other than price that determine consumption. We look at the effects of other factors in the following section.

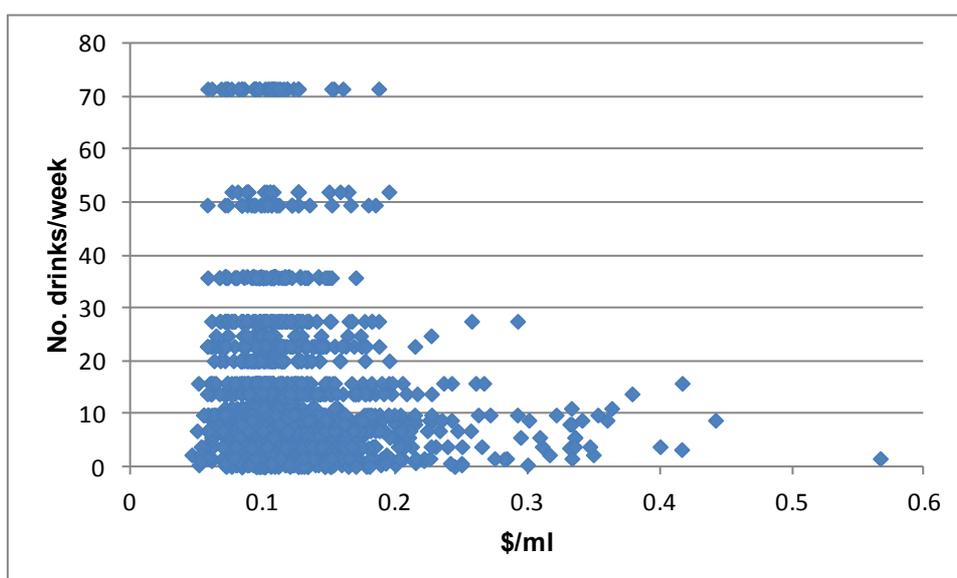
In the meantime, returning to Table 4, the elasticity column shows that a 10% higher price paid is associated with a 3.5% reduction in the total number of drinks (self-reported) per week. This is driven by roughly equal effects from the difference in the number of occasions per week on which alcohol is consumed and the difference in the number of drinks consumed on such occasions.

A 10% change in price is about 1.2c per ml on average, and a 3.5% change in the number of drinks per week corresponds to about 0.5 drinks on average.

The last row of the second data column shows that the elasticity with regard to five or more drinks per occasion is higher at 0.4, implying that a disproportionate effect in the reduction in the number of drinks per occasion with higher prices is coming from heavier drinking. Or in other words, heavier drinkers appear to be purchasing relatively more cheaper alcohol than lighter drinkers, as is also evident in Figure 2.

However, a caution is in order. What the results tell us is that there is an expected inverse relationship between the amount of alcohol consumption and the mean price of the purchased basket of drinks. We cannot necessarily infer that an increase in the listed prices of the cheapest products will lead to the decline in consumption suggested by the elasticity. The decline will be less to the extent that the affected consumers are prepared to pay more.

Figure 2: Alcohol Quantity v Price



4. MULTIPLE EXPLANATORY VARIABLES

The third data column Table 4 shows what happens to the strength of the price variable when other explanatory variables are added to the models.

If there is little interaction between price and other explanatory variables, the coefficients on price would not change much between models. The fact that they fall slightly (in absolute terms) implies that there is a degree of positive correlation between the price and some of the other explanatory variables. As shown in Table 5 these variables include gender, age, social deprivation index (SDI) and ethnicity.

Table 5: Summary of Results

	Frequency		Intensity		Total		High Intensity	
	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value
Mean price	-3.91	0.000	-6.95	0.000	-32.5	0.000	-2.48	0.000
Male	0.46	0.000	1.07	0.000	6.57	0.000	0.67	0.000
Maori	-0.88	0.000	1.54	0.000				
Pacific Island	-1.06	0.000	0.98	0.000	-3.02	0.022	-0.28	0.042
Asian	-0.94	0.000	-1.26	0.000	-7.81	0.000	-0.67	0.000
Age ≤24	-2.32	0.000	3.60	0.000	1.60	0.049	0.20	0.053
Age 25-34	-1.80	0.000	2.35	0.000			0.25	0.009
Age 35-44	-1.67	0.000	1.73	0.000			0.19	0.035
Age 45-54	-1.12	0.000	1.23	0.000			0.15	0.100
Age 55-64	-0.84	0.000	0.85	0.001				
SDI	-0.055	0.001	0.11	0.000	1.08	0.021	0.038	0.001
SDI ²					-0.066	0.107		
Buy for others	-0.33	0.000	-0.53	0.000	-3.58	0.000	-0.38	0.000
Liquor store			1.20	0.000				
RTD							0.27	0.004
Constant	5.41	0.000	1.92	0.000	12.1	0.000	0.65	0.000
R ²	0.20		0.33		0.12		0.11	

5. CONSUMPTION FREQUENCY

The frequency of drinking is higher for males than females, and rises with age. Maori, Pacific Islanders and Asians drink less frequently than other ethnic groups (notably Europeans and Other). Social deprivation (the SD index ranges from 1 to 10 where 1 corresponds to least deprived) is negatively correlated with drinking frequency. If SDI is a proxy for income this result suggests a positive income elasticity of demand for alcohol – or at least for the frequency of alcohol consumption.

6. CONSUMPTION INTENSITY

The model for consumption intensity has some interesting similarities and differences. As for consumption frequency, consumption intensity is higher amongst males than females, but it declines with age. So as one gets older the frequency of alcohol consumption rises, but the average number of drinks consumed on such occasions falls.

Maori and Pacific Islanders have higher, and Asians lower consumption intensity than other ethnic groups. The implication is that Europeans and Other ethnic groups drink more frequently than Maori and Pacific Islanders, but consume less on such occasions.

The sign on social deprivation is also reversed, suggesting that people on lower incomes (again assuming SDI is a proxy) drink more intensely, but less often than people with higher incomes.

A distinct feature of this model is the presence of the Liquor Store variable. The coefficient indicates that purchasing alcohol at liquor stores as opposed to supermarkets has a positive association with consumption intensity. This is not attributable to price as the average basket of alcohol bought at liquor stores is dearer by about 5% than the average basket of drinks bought at supermarkets, although the extent to which this reflects prices on offer rather than the composition of the basket is unknown. Possible explanations include physical location, ease of access and diligence of age checks.

In both the frequency and intensity models, people who purchased alcohol for themselves and others consume less alcohol than those who purchased primarily for themselves. Respondents were also asked about their impressions of the frequency and intensity of alcohol consumption by those people for whom they purchased alcohol. The mean frequency and mean intensity are both less than half of the frequency and intensity that respondents reported for themselves. Thus there is probably a systematic downward bias in people's estimation of their friends' alcohol consumption. It may also indicate that respondents' own reported consumption is not as negatively biased as is commonly thought to occur with surveys of this type.

7. TOTAL CONSUMPTION

With a number of oppositely signed variables in the frequency and intensity equations, it is not surprising to see a smaller list of statistically significant variables in the model for total consumption.

As expected, total alcohol consumption is higher amongst males than females. The only significant age variable is Age \leq 24, with the positive coefficient implying higher total consumption for this group than for any other age group. Their higher intensity of consumption outweighs their lower frequency of consumption.

If the Liquor Store variable is included in the equation the Age \leq 24 becomes insignificant, implying a high degree of correlation between these two variables. This means that the incidence of purchasing alcohol at liquor stores is relatively high amongst this age group. We have retained the Age \leq 24 variable in the model rather than the Liquor Store variable as the theoretical justification for the latter requires more investigation.

With regard to ethnicity Asians and Pacific Islanders consume less than other ethnic groups. As Asians feature as having both low frequency and low intensity, this result is as expected. For Pacific Islanders the inference is that although their intensity of consumption is relatively higher, this is offset by their relatively lower frequency of consumption.

The SDI variable enters with a quadratic term (of marginal significance), with the coefficient values implying that total alcohol consumption peaks around the 8th SDI decile.

8. FREQUENCY OF HIGH INTENSITY CONSUMPTION

This model relates to the frequency with which people consume five or more drinks per occasion.

As in the previous models, males drink more heavily than females. Asians and Pacific Islanders have fewer occasions of heavier drinking than other ethnicities. This result for Pacific Islanders is in some contrast, though not necessarily inconsistent with the result from the consumption intensity model which indicated that Pacific Islanders have relatively high consumption intensity. However, measurement error may be affecting the reliability of the results.

With regard to age, occasions of heavier drinking are more common amongst younger age groups, suggesting a peak around age 25. Social deprivation has a positive sign, implying a higher frequency of heavier drinking amongst more socially deprived groups, consistent with the model for consumption intensity.

A new variable in this model is RTD, indicating that spirits that are bought in *Ready to Drink* form are positively associated with the frequency of high-intensity consumption.

In all four models the R^2 is low. This is driven partly by the discrete nature of the data, but nonetheless still implies a vast amount of missing information about what determines alcohol consumption. The model with the highest goodness of fit is the model for consumption intensity with $R^2=0.33$, which is a reasonable result for a cross section model of this type. That consumption intensity seems to be better explained by the given variables than consumption frequency could indicate that the latter is less precisely measured – that is, estimated by respondents. Consumption frequency may be inherently more volatile than consumption intensity, perhaps containing some seasonality (such as holidays), or varying with the weather.

9. TYPE OF DRINK

The dataset also includes a variable relating to the type of drinks – wine, beer or spirits – that people mostly consume:

- mostly wine
- mostly beer
- mostly spirits
- mostly all equally
- mostly spirits and wine or spirits and beer
- mostly wine and beer
- mostly cider.

If the drink that people mostly consume is also the drink that dominates their basket on the occasion of the survey (which is not necessarily the case),² we can interact the mean price with the three clear drinking preferences and infer something about which prices in particular (beer, wine or spirits) have the strongest association with the various measures of consumption. Table 6 shows the results. They portray an interesting picture.

Bearing in mind the above caveat, there is tentative support for the hypothesis that cheaper wine dominates the (total) consumption of people who drink more heavily on the occasions that they drink at all, but the frequency of drinking is not related to the price of wine.

Table 6: Price Impacts by Type of Drink

Model	Price of Wine	Price of Beer	Price of Spirits
Frequency	not signif	-ve, signif	-ve, signif
Intensity	-ve, signif	+ve, signif	not signif
Total	-ve, signif	not signif	-ve, signif
High intensity frequency	-ve signif	not signif	not signif

The price of spirits is also related to total consumption, but its effect is via the frequency of drinking, not the intensity of drinking. The price of beer also has an effect on the frequency of drinking.

² Further analysis would be required to test this hypothesis.

10. MISCELLANEOUS FINDINGS

- Testing for weekend versus week day effects proved unproductive, with unreliable results and mostly negative coefficients on weekend purchasing – not a result with a clear theoretical explanation.
- Logarithmic specifications provide no real benefit.
- Similarly for quadratic terms, with the exception of the SDI variable.

F. APPENDIX: QUESTIONNAIRE



PURCHASING PATTERNS SURVEY FOR BEER, WINE, SPIRITS

QUESTIONNAIRE

APPROACH EXITING SHOPPER.

"Hello, I'm Xxxx from NRB (SHOW LAPEL BADGE). Can you spare 3 minutes?" (CONFIRM ACCEPTANCE). We are doing a short survey with the store's customers today. Have you purchased beer, wine or spirits today?" (IF YES PROCEED. IF NO, THANK AND CLOSE).

"We give you this gift in exchange for your receipt and for answering some easy questions. Is that alright with you?"

HAND OVER GIFT, TAKE DOCKET AND PRINT QUESTIONNAIRE NUMBER ON IT.

Q.1 "Would you say that you ..." (READ OUT AND CIRCLE ONE ONLY)

- "Mostly drink wine" ----- 1 } → GO TO Q.3
 - "Mostly drink beer" ----- 2 } → GO TO Q.3
 - "Mostly drink spirits"----- 3 } → GO TO Q.2
 - "Mostly drink all equally" ----- 4 } → GO TO Q.2
 - "Mostly drink spirits and wine or spirits and beer"----- 5 } → GO TO Q.2
 - "Mostly drink wine and beer" (spirits not mentioned)---- 6 → GO TO Q.3
- DO NOT READ OUT:
DON'T DRINK ALCOHOL MYSELF ----- 7 → GO TO Q.7

Q.2 "When buying at a store (or having someone buy for you) do you most often buy spirits straight, or as RTD's/premixes?" (CIRCLE ONE ONLY)

- Straight ----- 1
- RTD's/premixes ----- 2
- About the same of each ----- 3

Q.3 "About how often would **you** have a drink of wine, beer or spirits?"
(DO **NOT** READ OUT AND CIRCLE ONE ONLY)

- Monthly – once a month or less often ---- 1
- Fortnightly (every 2-3 weeks)----- 2
- Once a week----- 3
- 2 or 3 times a week ----- 4
- 4 or 5 times a week ----- 5
- Daily, 6 or 7 times a week ----- 6
- Can't say/don't know----- 7
- Declined to say----- 8

RECORD ANY ALTERNATIVE ANSWERS GIVEN:

Q.4 "How many drinks of wine/beer/spirits do **you** have on **a typical day when you are drinking?**"
(CIRCLE ONE) (REFERS TO A GLASS OR CAN OF BEER, WINE OR SPIRITS)

- 1 or 2----- 1
 3 or 4----- 2
 5 or 6----- 3
 7 to 9----- 4
 10 or more ----- 5
 DON'T KNOW ----- 6
 REFUSED ----- 7

RECORD ANY ALTERNATIVE
ANSWERS GIVEN:

Q.5 (SHOWCARD A) "Looking at this card how often do **you** have **five or more drinks on one occasion?**" (CIRCLE ONE)

- Never----- 1
 Less than monthly ----- 2
 Monthly----- 3
 Fortnightly (every 2-3 weeks)---- 4
 Weekly----- 5
 Three or four times a week ----- 6
 Daily or almost daily----- 7
 DON'T KNOW ----- 8
 REFUSED ----- 9

Q.6 (SHOWCARD B) "Are your purchases today ..." (CIRCLE ONE ONLY)

- Mainly for yourself to drink ----- 1 → SKIP TO DEMOGRAPHICS
 For yourself and your immediate household----- 2] → GO TO Q.7
 Mainly for yourself and other people----- 3
 Or mainly for other people to drink----- 4]

Q.7 "About how often would **these other people you are buying for** have a drink of wine, beer or spirits?" (READ OUT AND CIRCLE ONE ONLY)

"Monthly – once a month or less often" ---- 1

"Fortnightly (every 2-3 weeks)" ----- 2

"Once a week"----- 3

"2 or 3 times a week" ----- 4

"4 or 5 times a week" ----- 5

"Daily, 6 or 7 times a week"----- 6

CAN'T SAY/DON'T KNOW----- 7

DECLINED TO SAY ----- 8

RECORD ANY ALTERNATIVE
ANSWERS GIVEN:

Q.8 "And just going on your personal impressions, how many drinks of wine/beer/spirits would **these other people** have on a **typical day when drinking?**" (CIRCLE ONE)

1 or 2----- 1

3 or 4----- 2

5 or 6----- 3

7 to 9----- 4

10 or more ----- 5

DON'T KNOW ----- 6

REFUSED ----- 7

RECORD ANY ALTERNATIVE
ANSWERS GIVEN:

DEMOGRAPHICS:

Q.A (SHOWCARD C) "Finally, can you give me the letter on this card that matches your age group?" (CIRCLE ONE ONLY)

Up to 24 years -----1

25-34 years-----2

35-44 years-----3

45-54 years-----4

55-64 years-----5

65 years plus-----6

Q.B (SHOWCARD D) "Which ethnic group or groups do you belong to?" (CIRCLE ONE ONLY)

- NZ European----- 1
 - Maori ----- 2
 - Pacific Islander ----- 3
 - Asian ----- 4
 - Other ethnicity (SPECIFY)----- 5
- _____

Q.C "What is the name of the suburb you live in please?"
(RECORD) _____

Q.D RECORD GENDER Female – 1 Male – 2

Q.E RECORD OUTLET NAME AND SUBURB OR TOWN:

Q.F RECORD DAY AND TIME OF INTERVIEW
DAY: Mon – 1 Tues – 2 Wed – 3 Thurs – 4 Fri – 5 Sat – 6 Sun – 7
TIME: _____

Q.G Liquor store – 1 Supermarket – 2

"That's all. Thank you very much for your time."

ATTACH THE DOCKET TO THE QUESTIONNAIRE BEFORE PROCEEDING TO THE NEXT INTERVIEW.

Interview Duration: _____ minutes (RECORD)

CERTIFICATION: I hereby certify that this is a true and accurate record of an interview conducted by me at the time and with the person specified. TICK WHEN CHECKED:

INTERVIEWER'S NAME: _____ Date: _____
(Please PRINT)

Supervisor Sign: _____ Date: _____