Alcohol units consumed and price paid per alcohol unit by patients of the Lothian Alcohol Problems Services, with a comparison to wider alcohol sales in Scotland

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Summary

Background The benefits of introducing a minimum price for a unit of alcohol are under scrutiny with opposing arguments being presented as to whether or not hazardous and harmful drinkers would then consume less alcohol, and therefore have fewer associated health harms.

Routine survey data in general population samples on alcohol purchasing probably fails to describe accurately that of the heaviest drinkers. A lack of empirical data on the effects of minimum pricing on hazardous and harmful drinking is a key weakness in the debate.

Method We interviewed a sample of patients with serious alcohol problems referred to the Alcohol Problems Services (NHS Lothian) in 2008/9. We recorded the type and volume of drinks consumed, with brand names to allow accurate recording of alcohol by volume (ABV%), type of outlet where purchased and purchase price. We calculated the units consumed per patient per typical drinking week (1 unit being 8g ethanol) and the mean price paid per unit. As socio-economic status was likely to affect an individual's expenditure, we requested patients' postcodes and used the Scottish Index of Multiple Deprivation (SIMD) as a proxy for income/social class.

Results These patients consumed a mean of 198 units in a typical drinking week. The mean price paid per unit was 43p, which is below the mean unit price for Scotland in 2007 of 72p per unit. The majority of patients' consumption was purchased from off-sales (mean 93%), the mean price being 34p per unit. This is also below the 2007 Scottish mean price per unit paid in off-sales of 40p. It is also noteworthy that 75% of patients never purchased alcohol from on-sales settings.

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The lower the price that a patient paid per unit, the more units he/she consumed.

Of units of alcohol consumed by our sample, 70% were sold at or below 40p, which is the mid range of the illustrative price models used by the Scottish Government, and 83% below 50p which has been proposed by the Chief Medical Officer in England.

Off sales purchases were made in roughly equal proportions from supermarkets and local independent shops/licensed grocers.

We considered whether these relatively low unit prices paid were due to a bias in the lower socio-economic status of our patient sample. Although our sample showed a higher proportion of patients in the lower ranks of the SIMD, a continuous increase in unit price from the lowest to the highest SIMD ranks was not seen, with the patients residing in post-codes in the mid-quintile reporting the highest price paid per unit.

Using Scottish sales data for 2008 (supplied by The Nielsen Company), we compared for each type of beverage the price paid per unit by the wider population of drinkers, to that reported by our patients. White cider is the beverage to which our patients appear to have particularly cheap access, along with whisky. Although vodka is the most popular beverage among patients (almost all purchased at off-sales), they do not report cheaper off-sales access to it than the wider population of drinkers.

Implications Because the mean unit price paid by this sample of ill chronic alcohol consumers was considerably lower than the mean for the rest of the ‘healthy’ Scottish population, it is likely, but still unproven, that elimination of the cheapest alcohol sales by minimum price legislation will result in reduced overall consumption of alcohol by this population of drinkers.
In the coming years, as licensing legislation comes into effect permitting licensing boards to censure discounted alcohol, and perhaps minimum pricing legislation is imposed by central government, we plan to continue monitoring beverage choice in this group, to ascertain whether they move to more on-sales purchasing, and whether they start to choose substitute alcohols or illicitly distilled beverages. We also plan to

collect data in another Scottish locality, and monitor hospital discharge rates and mortality related to alcohol use, locally as well as using national data bases.

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Introduction

There are counter arguments in relation to the assumed benefits of imposing a minimum permitted purchase price on a unit of alcohol (a U.K 'unit' referring to 8g or 10ml of ethanol). The basic premise, that such legislation will reduce the heaviest and most harmful consumption of alcohol, is debated.

In his 2009 annual report, the Chief Medical Officer for England predicted that there would be a reduction in health and social harms plus economic benefits by setting a minimum unit price for alcohol of 50p (Department of Health 2009a). These predictions were based on a model devised by the University of Sheffield (Meier et al 2008). A revised model was applied to Scottish data and revealed that similar potential benefits would result if minimum pricing was applied in Scotland (Meier et al, 2009).

The University of Sheffield model estimated that if alcohol prices increased, harmful drinkers (those defined as consuming alcohol at a level which is likely to adversely affect their health and/or cause other negative outcomes i.e. in excess of 50 units per week for men and in excess of 35 units per week for women) will reduce their overall consumption, in addition to a fall in the number of people drinking above that threshold, and thus there will be a decrease in alcohol attributable hospital admissions and deaths.

The University of Sheffield studies used data on drinking and purchasing patterns drawn from the UK General Household Survey, the Scottish Health Survey and the UK Expenditure and Food Survey to produce models which, simply put, predict the effect that changing the purchase price of alcohol will have on the level of purchases or demand for alcohol by type of drinker, referred to as price elasticity. One statement made in the Sheffield study (Meier et al, 2008) has caused some confusion, namely that " – at the highest level of aggregation – hazardous and harmful drinkers (combined elasticity of -0.21) are less price elastic than moderate drinkers (elasticity of -0.47)" (page 58). This means that, proportionately, hazardous and harmful drinkers are expected to reduce their overall drinking of all alcoholic beverages less than moderate drinkers, one possibility being (e.g. as suggested by the Centre for Economics and Business Research (CEBR, 2009)) that the heaviest drinkers might

more readily switch to a beverage which contains alcohol sold at a cheaper price per unit and/or pay the necessary increase to continue their pattern of drinking (that increase being estimated by Meier et al (2009) for 'harmful drinkers' to be £137 extra per year on average.

On the other hand, all must have some limit on their spending. Therefore if the cheapest alcoholic drinks were priced upwards due to a minimum pricing law, those who purchase the highest volume of alcohol units, because they perhaps already purchase very cheaply, might be expected to reduce their alcohol unit consumption in absolute terms. However, it needs first to be shown whether heavy drinkers do indeed purchase a large proportion of their consumption at below the illustrative minimum price for Scotland and the CMO proposed price for England. It is on this point that our study is pertinent.

Some observers find it difficult to follow technical modelling of price elasticity of alcoholic beverages, applied to differing groups of drinkers. Additionally, at a meeting of the Scottish Parliament Health Committee (1 April 2009) members of the Scottish Parliament commented that they sensed a lack of empirical data on the effects on minimum pricing. Data which can inform and promote further discussion in this important area of public health is vital while confusion still exists.

(Meier et al (2009) recognise (p.105) that data available to them in the General Household Survey, the Scottish Health Survey and the Expenditure and Food Survey on heavy drinking was somewhat restricted. It should also be noted that surveys such as these, on which price–elasticity estimates are based, obtain only sparse data on the most extreme drinkers – those who are actually ill with their drinking - because such individuals may be hard to contact and if contacted, less likely to agree to participate or to be frank. This is recognised as one reason why general population surveys of drinking account for only some 50% of alcohol sold according to national sales figures (Stockwell et al, 2004). The highest weekly consumption category analysed in the Scottish Health Survey for 2008 (Scottish Government, 2009a) was 50+ units/week, whereas the patients whom we report on below are report consuming a mean of 198 units/week (ranging up to 800 units/week).

This study aims to contribute to the current debate by presenting empirical data on the population of drinkers that any health policy should surely aim to influence.

To our knowledge, there has never been a UK study describing the extent and location of drink purchases by dependent and harmful drinkers. We have attempted to document this and to set their purchasing habits in the wider context of Scottish drinking.

Method

Patients attending the Alcohol Problem Services (NHS Lothian) from September 2008 to June 2009 were interviewed and asked to recall their most recent week of drinking or of that could not be recalled, their typical drinking week. We recorded the types of drink consumed, volumes consumed (natural volume), alcoholic strength of drinks (percentage of alcohol by volume (ABV%), brands of drinks (to enable accurate recording of ABV%), where purchased, and purchase price. Total alcohol units consumed per week and price paid per unit were computed. Patients invited to take part were those attending the Alcohol Problems Out-patient Clinic, and inpatients at the detoxification and assessment ward, both at the Royal Edinburgh Hospital (REH), and inpatients referred to the Alcohol Liaison Service at The Royal Infirmary Edinburgh (RIE).

Excluded were patients under 16 years old, those whose last week was not typical and who could not recall a period of their typical drinking which had occurred in the past 6 months, patients unable to read the information and consent form, and patients unable to understand English or with significant memory impairment, due for example to Korsakov's dementia. Also, at RIE patients being considered for liver transplant were not approached for interview as it was felt that it might interfere with the sensitive assessment and recommendation process. For logistical reasons every patient attending the alcohol services in this period could not be approached, however data collection was continuous over the time period. A total of 16 male and 25 female patients approached did not want to participate and staff declined participation on behalf of 18 male and 8 female patients for reasons such as the patient was too ill or was difficult and unlikely to cooperate. For 14 patients that were interviewed, the data could not be used for the analysis as the interview was stopped early or the responses were deemed unreliable. Interviews were recorded on an anonymised record sheet. Age, gender, place of interview/type of patient, date of interview and date of most recent drink were recorded. Also recorded were patients' illnesses associated with their drinking although this is not reported here.

Socio-economic status is a possible confounder in any analysis of purchasing habits. Instead of asking relatively intrusive questions about income and employment category, we requested patients to provide their full postcode: the Scottish Index of Multiple Deprivation (SIMD) (Scottish Government, 2006) allocates a code of deprivation to postcodes and we used this as a proxy for income/social class.

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Part 1

All Patients: Descriptive Data

In all, 377 interviews could be used for analysis, comprising 256 men and 121 women (67.9% and 32.1% respectively), whose mean age was 47 years (range 21-80) (47 for men and 46 for women) (all rounded to a whole number). Of these, 30% were inpatients from RIE, 37.9% were inpatients at REH and the remaining 32.1% were outpatients at REH.

Tables 1.1-1.3 show the mean number of units consumed in the week and mean price per unit (rounded to whole pence), for all patients and by gender. For all alcohol (i.e. on-sales and off-sales), the mean number of units consumed for all patients was 198 (210 for men, 172 for women). The mean price paid per unit for all alcohol was 43p (men 44p, women 41p). Note that the mean unit price paid at purchase in Scotland in 2007 for all on and off-sales alcohol was 72p according to sales data collected by The Nielsen Company and published by the Scottish Government (2008).

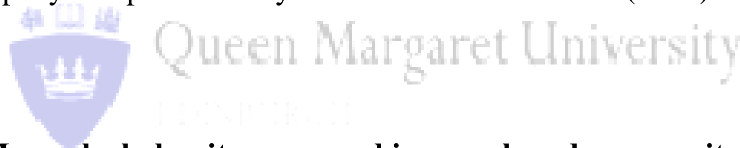

Table 1.1: Mean alcohol units consumed in a week and mean unit price for all alcohol consumed by patient sample (N=377)

All Alcohol			
Total units consumed in the week	**Mean**		**197.73**
	95% Confidence Interval for Mean	Lower Bound	184.76
		Upper Bound	210.70
	Minimum		10.31
	Maximum		800.15
Average cost per unit based on weeks drinking (£)	**Mean**		**0.43**
	95% Confidence Interval for Mean	Lower Bound	0.41
		Upper Bound	0.46
	Minimum		0.09
	Maximum		1.87

Table 1.2: Mean alcohol units consumed in a week and mean unit price for all alcohol consumed by male patients N = 256

All Alcohol – Men			
Total units consumed in the week	**Mean**		**210.02**
	95% Confidence Interval for Mean	Lower Bound	193.70
		Upper Bound	226.33
	Minimum		10.31
	Maximum		800.15
Average cost per unit based on weeks drinking (£)	**Mean**		**.44**
	95% Confidence Interval for Mean	Lower Bound	0.41
		Upper Bound	0.47
	Minimum		0.09
	Maximum		1.71

Table 1.3: Mean alcohol units consumed in a week and mean unit price for all alcohol consumed by female patients N = 121

All Alcohol – Women			
Total units consumed in the week	**Mean**		**171.75**
	95% Confidence Interval for Mean	Lower Bound	151.17
		Upper Bound	192.33
	Minimum		36.00
	Maximum		691.04
Average cost per unit based on weeks drinking (£)	**Mean**		**0.41**
	95% Confidence Interval for Mean	Lower Bound	0.37
		Upper Bound	0.46
	Minimum		0.12
	Maximum		1.87

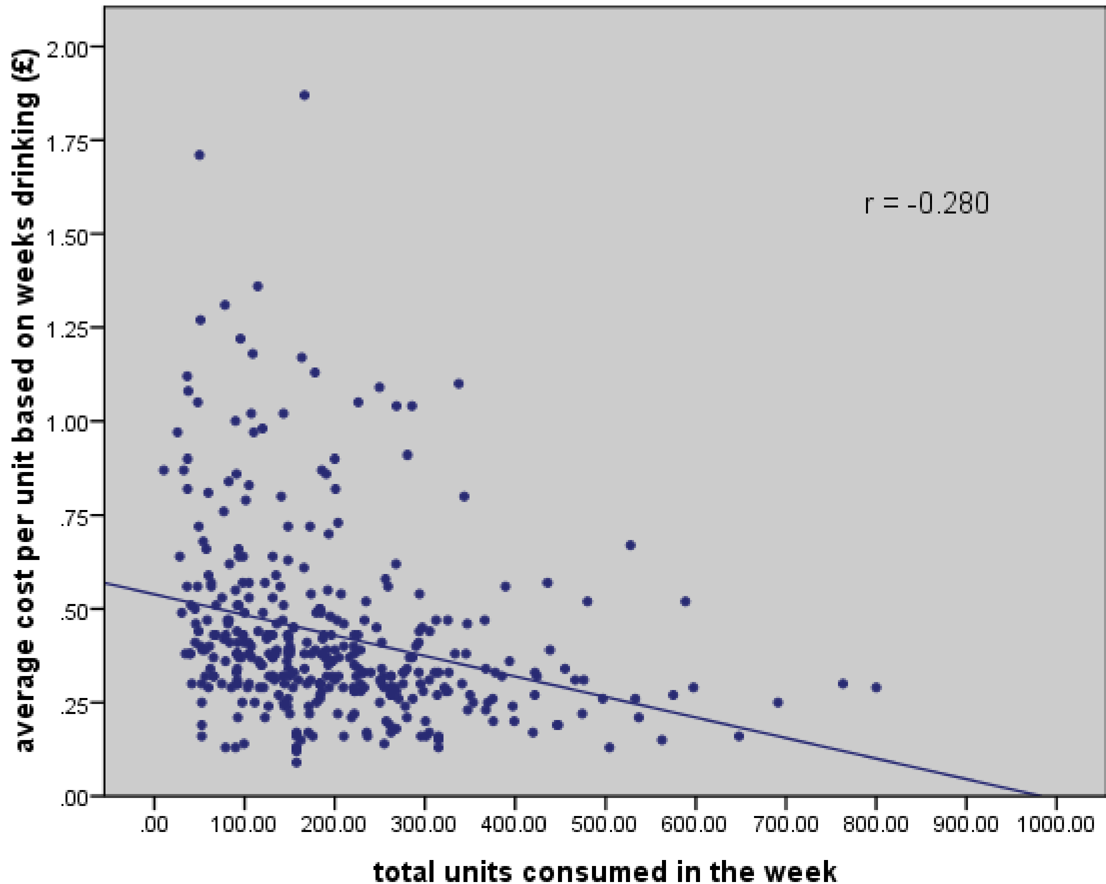

Figure 1.1: Scatter Graph showing correlation between unit price and units consumed, for all alcohol

Analysis presented in Figure 1.1 shows a statistically significant relationship between units consumed and unit price. Patients' mean unit consumption increases with decreasing mean unit price. (R = -2.80, which describes a medium strength relationship between these variables, significant at the 0.01 level).

On-sales consumption

We recorded the type of outlet (on- or off- sales) where patients made their purchases. A total of 96 patients (approximately 25%) consumed any of their units as on-sales. Table 1.4 shows the units consumed, unit price and proportion of units consumed as on-sales. Figure 1.2 shows a weak relationship between units consumed and unit price for on-sales (r = -0.107), which is not statistically significant. (Note that our patients always reported their on-sales as costing more than 50p per unit which is the minimum unit price proposed by the Chief Medical Officer of England).

Table 1.4: On-sales alcohol units consumed by mean units consumed in a week, mean unit price and % of patients' units consumed as on-sales N=96

Units consumed as on-sales	**Mean**		**71.27**
	95% Confidence Interval for Mean	Lower Bound	56.47
		Upper Bound	86.06
	Minimum		2.27
	Maximum		292.25
Mean price per unit as on-sales	**Mean**		**1.10**
	95% Confidence Interval for Mean	Lower Bound	1.04
		Upper Bound	1.16
	Minimum		0.59
	Maximum		2.37
% of units consumed as on-sales	**Mean**		**46.49**
	95% Confidence Interval for Mean	Lower Bound	39.11
		Upper Bound	53.87
	Minimum		0.35
	Maximum		100.00

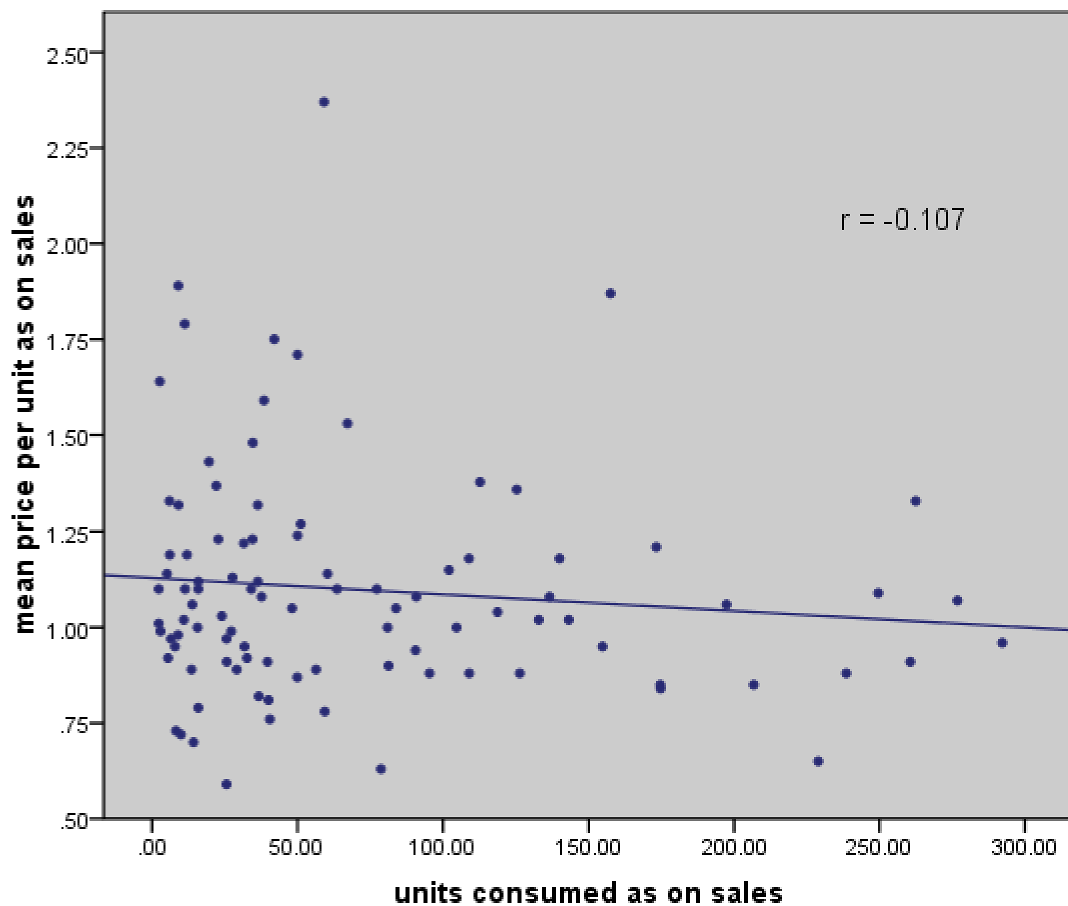

Figure 1.2: correlation between on-sales units consumed and on-sales unit price

Off-sales consumption

Table 1.5 shows the units consumed as off-sales, mean unit price and percentage of total units consumed as off-sales. The N is reduced to 359 because 18 patients purchased alcohol exclusively as on-sales.

Table 1.5: Off-sales alcohol units consumed by mean units consumed in a week, mean unit price and % of patients' units consumed as off-sales (N=359)

Units consumed as off-sales	**Mean**		**188.72**
	95% Confidence Interval for Mean	Lower Bound	175.22
		Upper Bound	202.22
	Minimum		4.20
	Maximum		800.15
Mean price per unit as off-sales	**Mean**		**0.34**
	95% Confidence Interval for Mean	Lower Bound	0.33
		Upper Bound	0.36
	Minimum		0.09
	Maximum		1.03
% of units consumed as off-sales	**Mean**		**92.56**
	95% Confidence Interval for Mean	Lower Bound	90.56
		Upper Bound	94.57
	Minimum		5.41
	Maximum		100.00

Figure 1.3 shows that, for off-sales, those consuming more units are purchasing at a lower unit price (R = -0.340, a medium strength relationship between these variables, significant at the 0.01 level).

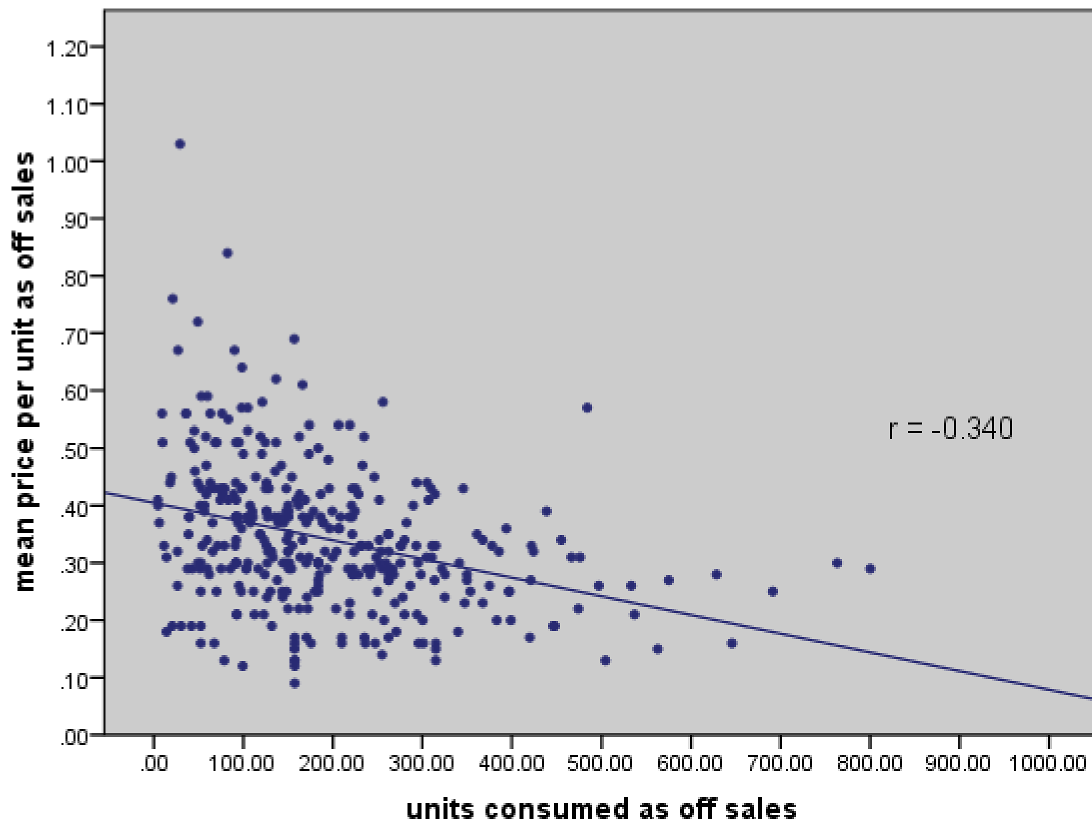

Figure 1.3: correlation between off-sales units consumed and off-sales unit price

Figure 1.4 details the percentage of units bought by our sample of patients by outlet type; 42.41% of all units were purchased from local independent shops/licensed grocers and 39.99% of all units were purchased from supermarkets.

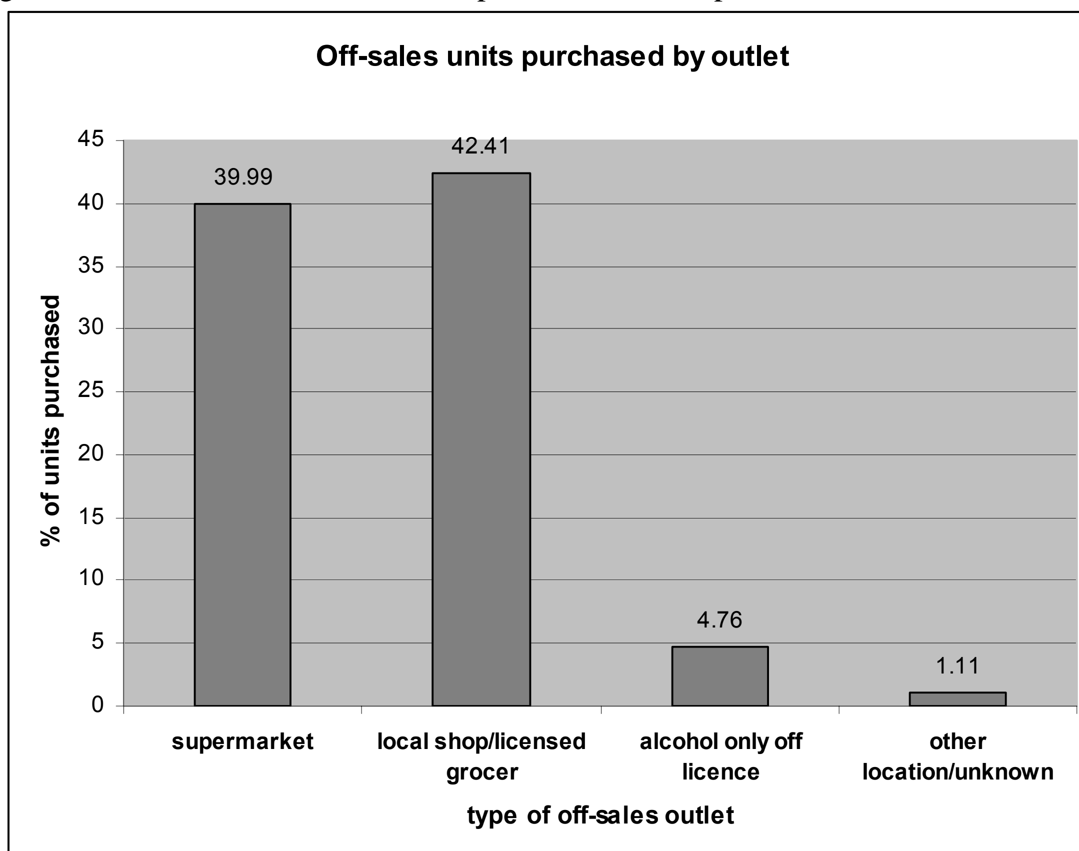

Figure 1.4: Breakdown of % of units bought as off-sales only by type of outlet

No patients reported illegal purchasing of beverages nor did they report consuming illicit alcohol. One patient reported consuming a very small amount of substitute alcohol in the form of perfume; in addition to the consumption of purchased drinks (the alcohol units from the perfume were not recorded). The 'other' category includes off-sales drinks which were purchased by someone else and stolen drinks: 4 patients advised that they had stolen drinks (3 from a supermarket, 1 from a licensed grocer) which amounted to approximately 0.4% of the sum of units purchased as off-sales for the week (284.43 units).

Figure 1.5 shows the proportion of units consumed by patients priced at a maximum of 30p, 40p, and 50p and the proportion of patients who were responsible for consuming units priced at these levels. (Note that this information is taken from the whole dataset.)

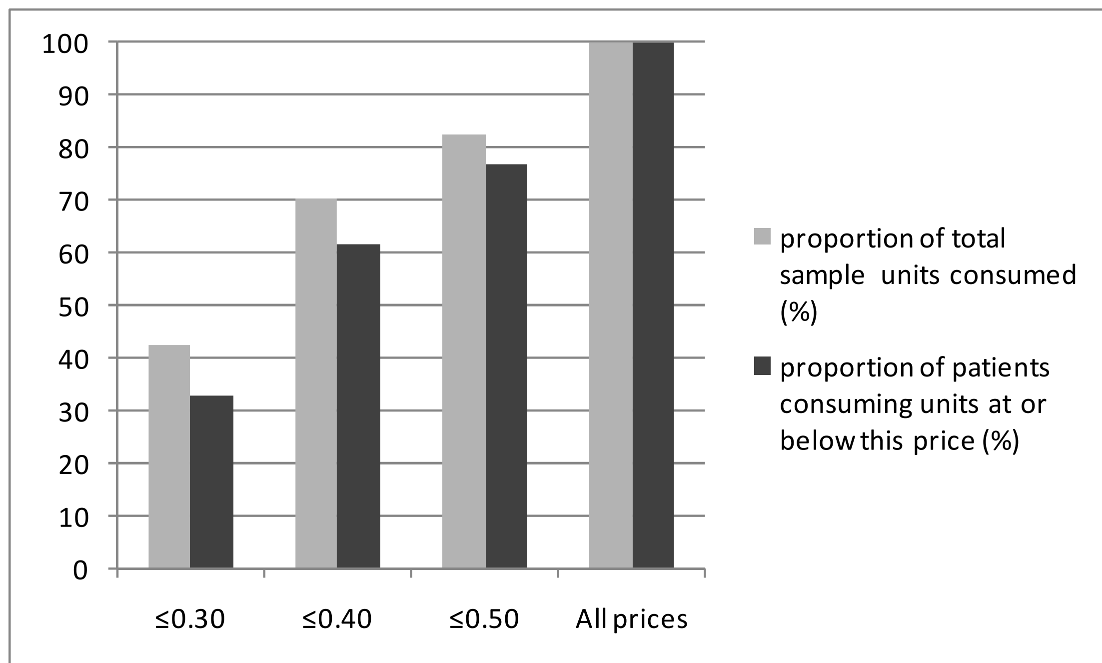

Figure 1.5: comparison of the proportion of consumed units priced at ≤50p, ≤40p and ≤30p with the proportion of patients who consumed units at these prices

These data show 2 key points, firstly that 70.29% of units within our sample were sold at or below 40p, which is the mid range of the illustrative price models used by the Scottish Government (Scottish Government, 2009) and 82.56% were at or below 50p which has been proposed by the Chief Medical Officer in England (Department of Health, 2009a); secondly, that the proportion of units that were consumed at these prices, exceeded the proportion of patients who consumed these units. Figure1.3 illustrates that as the price being paid per unit diminishes, the more individuals consume.

To summarise, 70.29% of units consumed were priced a maximum of 40p per unit and were consumed by 61.54% of patients; 82.56% of units consumed were priced at a maximum of 50p per unit and were consumed by 76.92% of patients; and 42.41% of units consumed were priced at a maximum of 30p per unit and were consumed by 32.89% of patients.

Therefore the patients who paid less per unit were responsible for consuming a greater proportion of the number of units consumed. Appendix Table 1 shows this data in table form.

Part 2

Descriptive data by Scottish Index of Multiple Deprivation

Having demonstrated that our patients are on average paying much less per alcohol unit (43p) than the average sales price of 72p as published by the Scottish Government (2008), an obvious question to ask is whether this difference can be accounted for by a bias towards lower socio-economic status (SES) amongst patients attending an alcohol problems service.

As expected, compared to the wider population, a higher proportion of patients are in the lower quintiles (quintile 1 comprise those postcodes with the greatest deprivation: SIMD web pages (Scottish Government, 2006)), with just over 50% belonging to quintiles 1 and 2. Table 2.1 shows the number and percentage of patients by quintile and tables 2.2 – 2.3 shows mean unit consumption and mean unit price by same. (The expected proportion in each quintile is, by definition, about 20%.)

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Table 2.1: Number of patients per SIMD quintile

SIMD quintile	N	Percent of total number	Cumulative Percent
1 ('lowest SES')	107	28.4	28.4
2	88	23.3	51.7
3	61	16.2	67.9
4	52	13.8	81.7
5	69	18.3	100.0
Total	377	100.0	

Table 2.2: Mean weekly units reported, by SIMD quintile

SIMD quintile	N	Mean units	95% Confidence Interval for Mean		Minimum	Maximum
			Lower Bound	Upper Bound		
1 ('lowest SES')	107	228.8	199.0	258.7	10.3	800.2
2	88	200.4	174.0	226.9	32.5	574.9
3	61	184.3	149.9	218.8	25.6	691.0
4	52	157.3	133.3	181.2	36	447.4
5	69	188.4	166.4	210.5	28.1	393.8

Table 2.3: Mean price (£) paid per unit of alcohol, by SIMD quintile

SIMD quintile	N	Mean	95% Confidence Interval for Mean		Minimum paid	Maximum paid
			Lower Bound	Upper Bound		
1 (‘lowest SES’)	107	0.400	0.351	0.448	.12	1.27
2	88	0.390	0.351	0.429	.13	1.17
3	61	0.530	0.442	0.615	.15	1.71
4	52	0.430	0.375	0.486	.14	1.02
5	69	0.442	0.383	0.503	.09	1.87
Total	377	0.430	0.405	0.456	.09	1.87

A one-way analysis of variance test (ANOVA) was performed to compare the mean expenditure by SIMD quintile, and showed that there was no significant difference between the quintiles (overall mean expenditure for the recorded week was £75.57). Those in quintile 1 (‘lowest SES’) spent the most with a mean of £82.36. Also of interest is that the lowest overall unit price of 9p was found in the highest quintile (Table 2.3). (As an aside, the sum of the expenditure for the sample of 377 patients for 1 week’s alcohol consumption was £28,491.)

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An ANOVA followed by post-hoc tests revealed that there is a statistically significant difference in the mean unit price paid for all alcohol by those patients in quintile 3 (53p) compared with those patients in quintiles 1 and 2 who report unit prices of 40p and 39p respectively. However, there is not a continuous increase in mean unit price from the lowest to the highest quintile (see figure 2.1). This appears to be partly because patients from higher social groups like those from lower social groups also purchase much of their alcohol from off-sales. Further analysis showed that those in quintile 3 (N=61) purchased 23.1% of their units as on-sales compared to the total sample mean (N=377) of 11.86%.

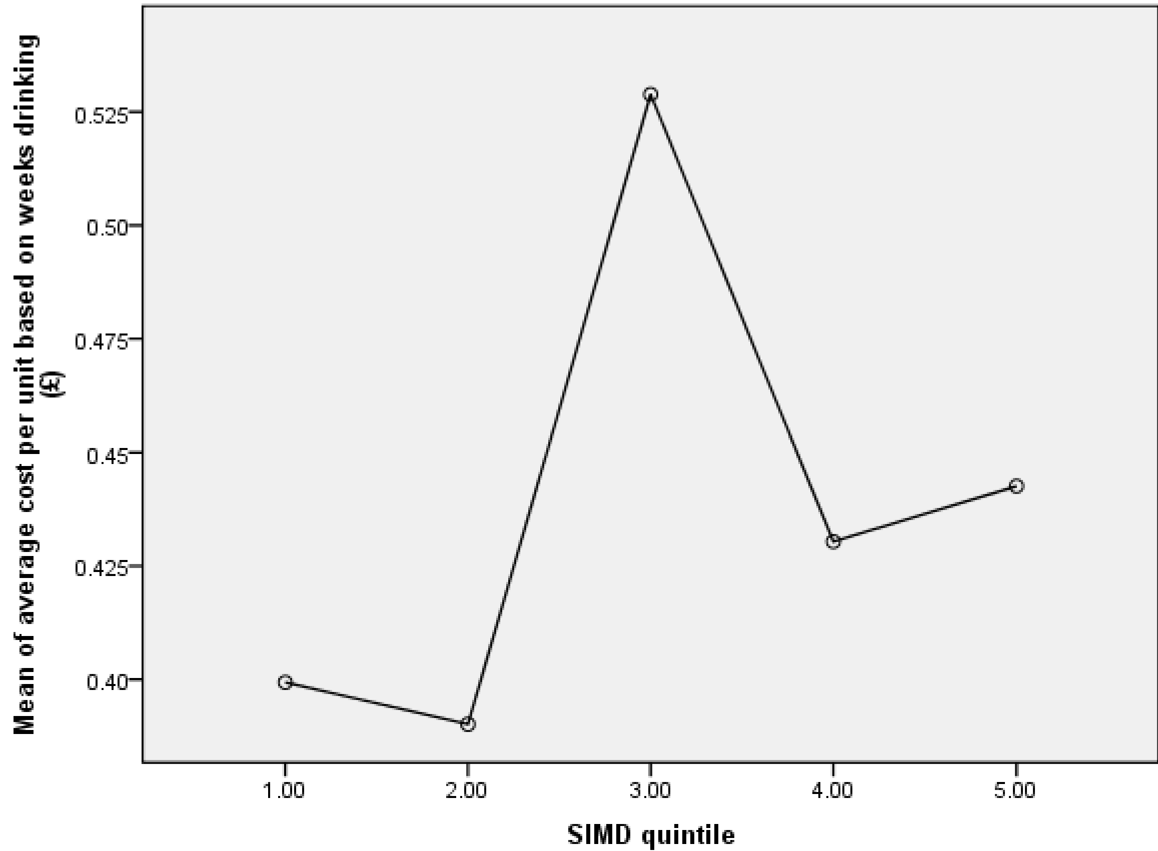

Figure 2.1: Mean price paid per unit, by SIMD quintile

Correspondingly, there is a significant difference in these same groups in the proportion of units they consume as off-sales. The total sample mean percentage of units consumed as off sales is 88.14%. Table 2.4 shows the mean percentage of units consumed as off-sales for all quintiles (figure 2.2 a means plot of the same).

Table 2.4: Proportion of units purchased as off sales by quintile

SIMD quintile	N	Mean %	95% Confidence Interval for Mean		Minimum	Maximum
			Lower Bound	Upper Bound		
1	107	87.97	82.44	93.50	0	100.00
2	88	93.42	89.46	97.37	0	100.00
3	61	74.87	65.30	84.45	0	100.00
4	52	89.75	82.72	96.78	0	100.00
5	69	92.19	87.04	97.34	0	100.00
Total	377	88.14	85.37	90.91	0	100.00

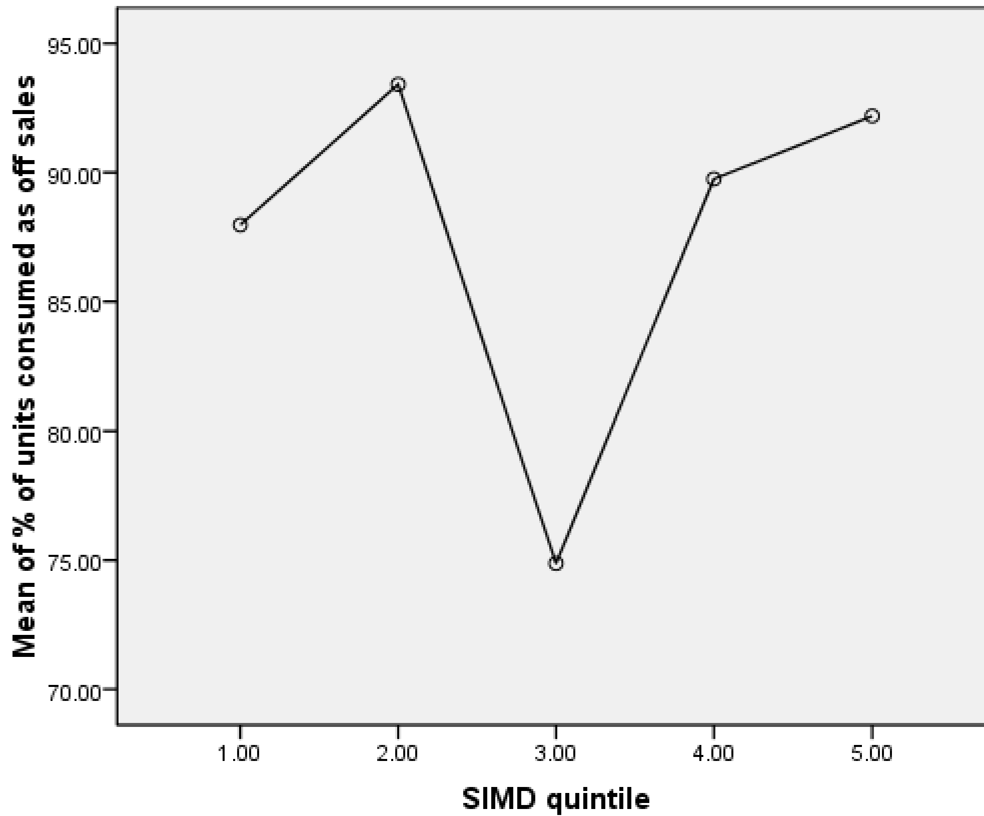

Figure 2.2: Percentage of units consumed as off-sales, by SIMD quintile

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For the entire patient sample, an independent-samples t-test shows a significant difference between the percentage of units consumed by men and women as on-sales (mean percentage for men was 14.5% and for women was 6.3%, P=0.02, equal variance not assumed). Thus a possible reason why patients from quintile 3 consume proportionately more as on-sales was due to the slightly higher proportion of men in quintile 3 (in this sample), 75.4% compared to the total sample mean of 67.9%. However, a Chi-square test of gender by quintile found this not to be statistically significant. An ANOVA test was performed to check whether age may be a factor in the quintile difference for on-sales consumption but the results did not reveal a significant difference in mean age according to their quintile as defined by postcode.

Table 2.5: Mean unit price for all off-sales by quintile

SIMD quintile	N	Mean (£)	95% Confidence Interval for Mean		Minimum	Maximum
			Lower Bound	Upper Bound		
1	99	0.31	0.28	0.33	0.12	0.59
2	87	0.35	0.32	0.37	0.13	0.84
3	54	0.34	0.31	0.37	0.15	0.58
4	51	0.37	0.33	0.41	0.12	1.03
5	68	0.38	0.35	0.41	0.09	0.72
Total	359*	0.34	0.33	0.36	0.09	1.03

** Note that N = 359 as this is the patient number who had any off-sales i.e. 18 patients purchased exclusively on-sales units.*

Table 2.5 shows that the mean price paid per unit for off-sales is slightly less in the lower than the higher quintiles. Comparing those in quintile 1 with those in quintile 5, the difference is 7p (ANOVA, P= 0.018 and 0.001 respectively, significant at 0.05).

We conclude that in our patient sample socio-economic status is not a linear determinant of overall price paid per unit such that alcohol consumed with increasing levels of deprivation predicts cheaper purchasing of alcohol. However, there is a slight relationship in the expected direction for off-sales purchased. It is also of note that quintile 1 had the lowest mean unit price (31p) and the highest mean unit consumption (224.27) for off-sales. (Appendix table 2 shows data for all quintiles.)

The following scatter plots (figures 2.3-2.7) show the relationship between units consumed and mean unit price individually by quintile. Only off-sales are represented as on-sales unit prices and consumption levels do not have a strong relationship.

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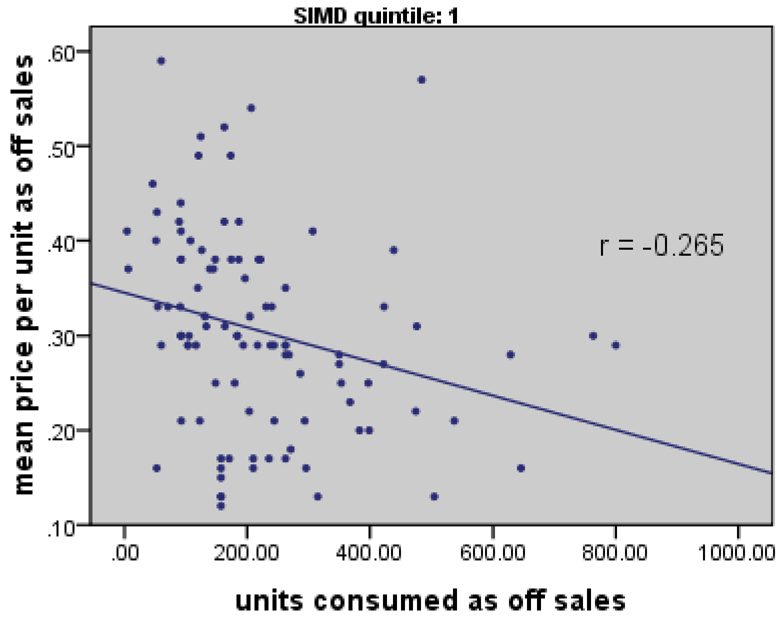

Figure 2.3: Correlation between mean unit price and mean units consumed as off-sales for quintile 1 (r is significant at 0.01)

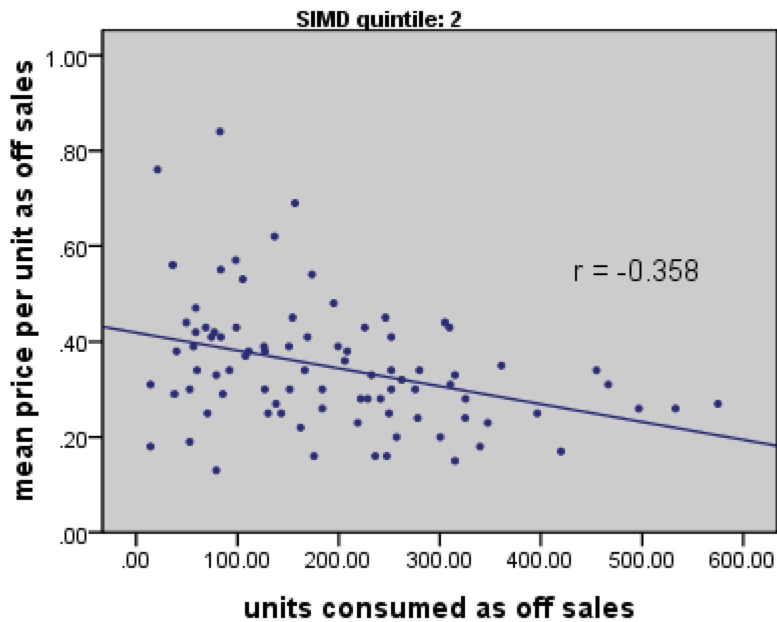

Figure 2.4: Correlation between mean unit price and mean units consumed as off-sales for quintile 2 (r is significant at 0.01)

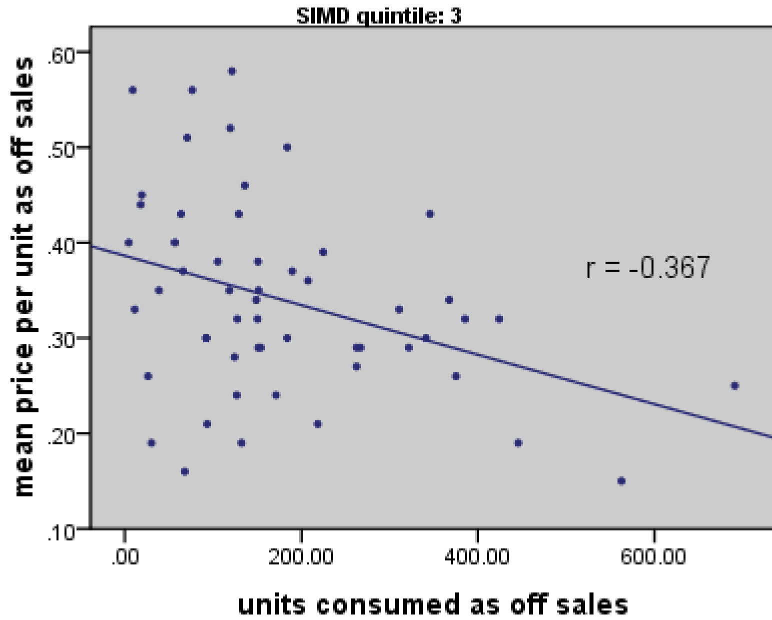

Figure 2.5: Correlation between mean unit price and mean units consumed as off-sales for quintile 3 (r is significant at 0.01)

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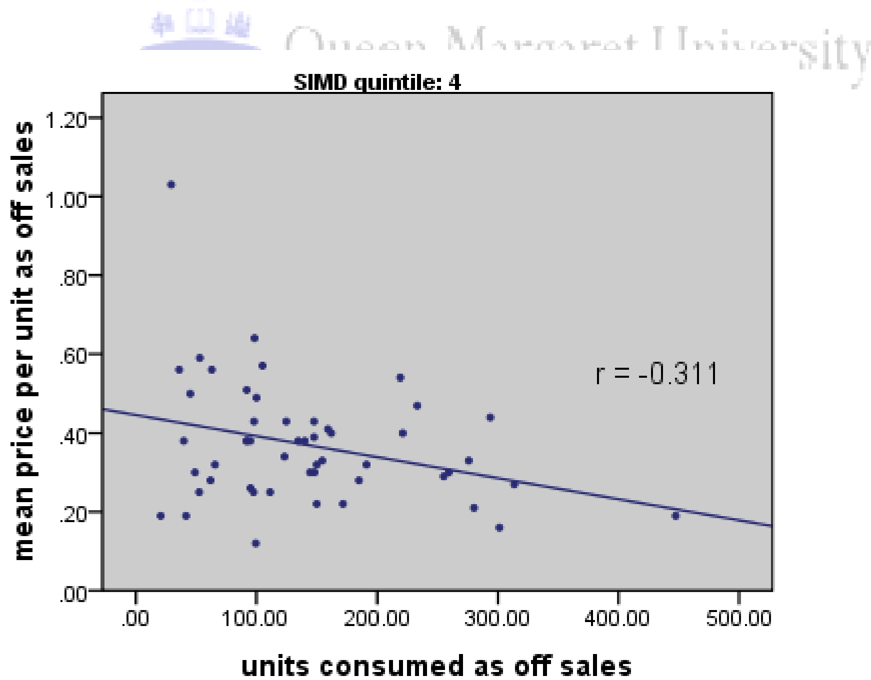

Figure 2.6: Correlation between mean unit price and mean units consumed as off-sales for quintile 4 (r is significant at 0.05)

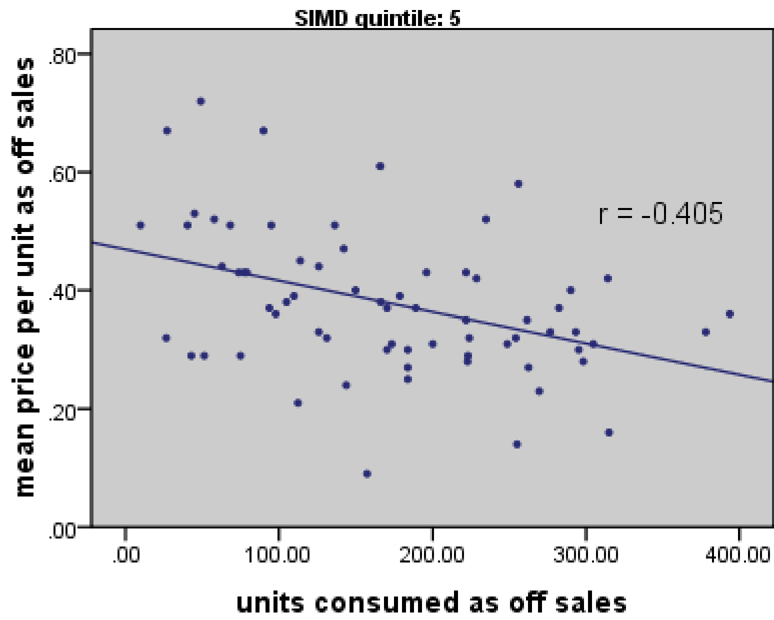

Figure 2.7: Correlation between mean unit price and mean units consumed as off-sales for quintile 5 (r is significant at 0.01)

Part 3

Highest unit consumers

The following describes characteristics of the highest unit consumers, those who consumed a minimum of 200 units in the recorded week of their consumption (N=137, male 105). Note that off-sales only are described here, because on-sales consumption contributed very little. The mean week's consumption in this group was 318 units (range 200-800).

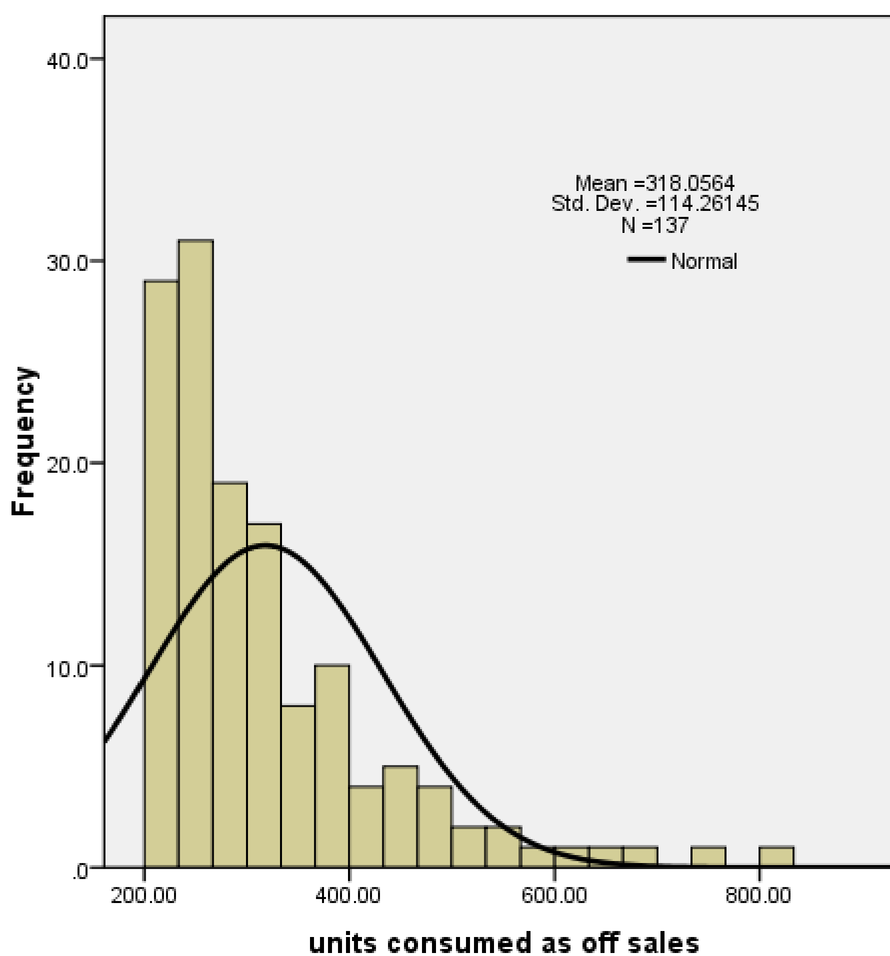

Figure 3.1: Highest unit consumers' (200+ units per week) mean unit consumption

Table 3.1 shows that the majority in this group are from the lowest SIMD quintiles with ~61% from quintiles 1 and 2.

Table 3.1: Number of patients consuming 200 plus units by SIMD quintile

Quintile	Frequency	Percent	Cumulative Percent
1	45	32.8	32.8
2	38	27.7	60.6
3	17	12.4	73.0
4	11	8.0	81.0
5	26	19.0	100.0
Total	137	100.0	

A one-way analysis of variance performed on this group showed that there was not a statistically significant difference in the mean unit price between the quintiles ($p=0.55$).

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Table 3.2 compares those consuming 200 plus units per week with the whole sample mean (off-sales only). The heaviest consumers consume more of their units as off-sales and pay a maximum of 58 p (average of 30p) per unit.

Table 3.2: Off-sales units consumed by patients consuming less than 200 units per week and patients consuming a minimum of 200 units per week

			patients consuming <200 units N = 222	**patients consuming ≥ 200 units N = 137**
Unit price	**Mean**		**0.37**	**0.30**
	95% Confidence Interval for Mean	Lower Bound	0.35	0.28
		Upper Bound	0.39	0.31
	Minimum		0.09	0.13
	Maximum		1.03	0.58
Units consumed	**Mean**		**108.91**	**318.06**
	95% Confidence Interval for Mean	Lower Bound	102.16	298.75
		Upper Bound	115.66	337.36
	Minimum		4.20	200.00
	Maximum		199.35	800.15
% of units consumed as off-sales	**Mean**		**89.15**	**98.09**
	95% Confidence Interval for Mean	Lower Bound	86.06	96.95
		Upper Bound	92.24	99.22
	Minimum		5.41	57.68
	Maximum		100.00	100.00

Price paid according to type of beverage

In the **Appendix**, we show Scottish sales data for 2008 supplied by the Nielsen Company, and compare for each beverage type the price paid per unit by the wider population of drinkers, with that reported by our patients.

White cider is the beverage to which our patients appear to have particularly cheap access, along with whisky. Although vodka is the most popular beverage among patients (almost all purchased at off-sales), they do not appear to have particularly cheaper off-sales access to it than the wider population of drinkers.

Strengths and Limitations of the Study

Strengths

The data collection: 40 pilot interviews were carried out in which feedback from patients on the acceptability of the questions was encouraged. The content validity of the questionnaire at pilot stage (and ongoing), was enhanced by input from clinical staff with years of experience working with Lothian patients. For example, some less common drinking habits such as 'drinking clubs' where financial resources were pooled to purchase alcohol and other characteristic drinking behaviours were covered and reflected in the data.

A finalised structured interview was constructed. This was separate from the patient's clinical assessment and conducted in a deliberately non-judgemental style. Patients appeared very ready to describe volumes and type of beverage consumed and the interviewer could clarify such statements as 'I drank the whole bottle' in terms of actual volumes. The interview itself was not time-limited which allowed ample dialogue and opportunity to clarify and quantify in detail.

The reliability of the data was enhanced by using the same interviewer for all pilot and live interviews.

The accuracy of the alcohol content of drinks consumed by the patients is an important strength in our study. This was obtained by asking which brand had been purchased and then by checking the stated ABV% on packaging. In the case of wine where brands were usually not known by patients, they had generally checked the

ABV% before purchase. If we had to make assumptions about the strength of wine, it was entered as 12.5% in line with Scottish Government (2008) published figures. Whilst we acknowledge that our record of units consumed and unit prices may not be precisely accurate, which would be too much to hope for when the data depended on recall, our data are likely to be much more accurate than routinely collected survey or sales data for which beverages are put into broad categories with assumptions made about ABV%.

For many patients, the focus of the day was their consumption of alcohol, and this seemed to make recollection easy for many – they often had a routine. Patients seldom reported drinking in a social setting where they had little personal control over drinks bought/poured. Also, having already acknowledged the severity of their alcohol problem by involvement in the alcohol service, they were probably less likely to dissemble about their drinking than respondents in general population surveys.

Limitations

The exclusion criteria adopted for the study meant all Lothian patients who contribute to both the alcohol harm statistics and alcohol sales data in Scotland could not be approached for interview. Those too ill to participate, liver transplant patients and those under 18 years of age are not represented in our data. Not all drinkers with health problems access the services; and we had to exclude those with poor communication and literacy skills which may have included some of those whose first language is not English. Therefore as this unsampled group will vary by region, there will be issues with transferability to other Scottish regions.

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Discussion

We do not believe that harmed drinkers such as we interviewed are buying cheap alcohol because of their low social status. For each SIMD quintile, a statistically significant correlation between decreasing unit price and increasing consumption is evident, and perhaps surprisingly this appeared most strongly in the high SES quintile, quintile 5.

The mean price per unit paid by our patient sample for off-sales alcohol for <u>each</u> of the SIMD quintiles (range 31p to 38p) is less than the mean for off-sales in Scotland

in 2007 of 40p (Scottish Government, 2008); indeed the lowest prices being paid per unit (9p) by any patients in the study were patients in quintile 5.

The advantages to society of imposing a minimum unit price for alcohol, from the perspective of public health and social harms, depend on whether those individuals who contribute to alcohol harm statistics will reduce their consumption and become fewer in number, with a reduced incidence of health and social harms. The patients in our study had all experienced, and sometime caused, such harm. There are several key points to be made about this study.

A) *Consumption by harmed drinkers in relation to other drinkers* To our knowledge, this is the first study which has attempted to document the volume of pure alcohol consumed by a population of chronic alcohol consumers harmed by their drinking. In the context of the current debate on pricing, it is worth contrasting their consumption levels with accepted drinking guidelines and other current definitions of different drinker types.
For weekly consumption, it is recommended that drinkers should not exceed 14 units for women and 21 for men; it is also recommended that in one day, the unit consumption does not exceed 2-3 units for women and 3-4 for men (Department of Health 2009b). Additionally in October 2008 the Alcohol Awareness Week campaign in Scotland advised against consuming alcohol every day, but rather to have at least 2 alcohol free days per week (Scottish Government Alcohol Industry Partnership 2008). Risky single occasion drinking ('binge drinking') is generally defined as consuming two or more times your recommended daily units in one session (8 for men and 6 for women) (ONS, 1999).

The definition of harmful and hazardous drinkers from national surveys has a much lower unit consumption threshold than the mean for our study population. For example, the current Alcohol Statistics Scotland Bulletin reports the highest consumption category as exceeding 50 units per week for men and 35 units per week for women (ISD 2009). Other data such as published in the General Household Survey which was used in the report by the University of Sheffield (Meier et al 2008), also defined harmful and

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hazardous drinkers as consuming in excess of 50 or 35 units per week respectively for men and women. This definition is also presented in the Annual Report 2008 of the Chief Medical Officer for England (Department of Health 2009a). Among our patients, the mean consumption in a drinking week was almost 200 units with a range up to 800 units. Therefore a question generated by our study is how represented are such patients within other data sets which are used to contribute to the debate on legislative changes impacting on the sale of alcohol? This is an important consideration especially in the debate about the interpretation of price-elasticity models. In the very heaviest consumers, a small percentage change in purchasing might be expected to have a large absolute effect on consumption. It may be that the current reported categories of drinking in survey data should be revised to include a higher category than ‘exceeding 50 units per week’.

B) *Setting a minimum price:* Regarding the specific issue of setting a minimum unit price for any alcohol sold, we have presented evidence which demonstrates two key points; (i) – that this patient population purchase alcohol units on average at 29p less per unit than that of the general Scottish population, that their purchases are mainly in off-sales, and that within the off-sales market they buy at 6p/unit lower than the average Scottish off-sales purchase (and at as little as 9p per unit); and (ii) – that those who pay the lowest prices per unit tend to consume the greatest number of units. Whether setting a minimum unit price in Scotland would reduce the units consumed by drinkers such as the patients presented here cannot be answered at this point without a follow-up study if the proposal becomes law. However, responding to criticism of elasticity models, our findings suggest that hazardous and harmful drinkers have little ‘room’ for elasticity as they already purchase their alcohol at very low prices. The point made by the CEBR (2009) about the Sheffield price elasticity calculations that “the evidence seems to suggest that heavier drinkers are more likely to switch from one product category to another in the face of price changes” (page 22) becomes less relevant if we recall that ‘heavier drinkers’ in the elasticity computations derived from survey data are not nearly such heavy drinkers as our patients,

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and if many of the seriously harmed drinkers are already drinking as cheaply as they can (as anecdotally our patients reported).

C) *Substitution* Some patients interviewed also used non-prescribed drugs. Drinking illicit, smuggled or substitute alcohol was only reported by one patient on one occasion (perfume). Theft was reported by a few. For minimum pricing to cause an increase in substitutes in our patients, there would need to be a change in their attitudes towards substitutes, which anecdotally few patients say they would follow (with perhaps the exception of the subculture of those already using some non-prescribed drugs). However, only a further study during and after such pricing legislation could answer how prevalent substitute consumption would become.

D) Implications for women. Female patients (N=121) paid a lower mean unit price than males (41p versus 44p). There was also a significant difference between the percentage of units consumed by men and women as on-sales; women consumed 6.3% of their units as on-sales, men 14.5%. In this sample the male to female patient ratio was 256:121 i.e. 2.1:1, a value very similar to the gender ratio (2:1) among alcohol dependent individuals and quoted in the Scottish Alcohol Needs Assessment (Drummond et al, 2009). This publication also highlighted the fact that the female prevalence of alcohol dependence in Scotland is approximately twice that reported for England. The possibility that legislative change may impact differently on the genders in terms of consumption habit and associated harm may merit investigation.

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Glossary of terms

Unit — Unless stated otherwise, this refers to a UK alcohol unit which equates to 10ml or 8g of pure alcohol. The current guidelines advise that no more than 21 units for men and 14 for women should be consumed in a week and no more that 2-3 and 1-2 units respectively for men and women per day.

SIMD — Scottish Index of Multiple Deprivation. This provides a relative measure of deprivation by using 7 indicators (employment, current income, education, skills and training, graphic access to services, housing and crime) to small areas across the whole of Scotland. There are 6505 data zones ranked 1-6505, 1 being the most deprived. For more information see http://www.scotland.gov.uk/Topics/Statistics/SIMD/

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Quintile — Here refers to the SIMD rank, patients were categorised according to where their postcode corresponded on the SIMD scale i.e. quintile 1 includes ranks 1-1301 (20% of the ranking) etc. (Based on data available the distribution of the Scottish population is approximately 20 % per SIMD quintile.)

Price Elasticity — Here refers to the model produced by Meier *et. al* of The University of Sheffield (2009) which quantifies the change in demand for alcohol via alcohol purchasing levels, which can be expected when alcohol prices change.

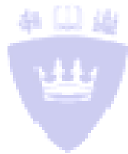
Appendix

Appendix Table 1: proportion of units consumed at unit prices of 30p, 40p and 50p.

unit price £	patient N	proportion of total sample units consumed (%)	proportion of patients consuming units at or below this price (%)
≤0.30	124	42.41	32.89
≤0.40	232	70.29	61.54
≤0.50	290	82.56	76.92
All prices	377	100.00	100.00

Appendix Tables 2: mean units consumed and mean unit price for off-sales only, by SIMD quintile

Quintile	N	Mean units consumed	Mean unit price
1	99	224.27	0.30
2	87	193.81	0.35
3	54	179.95	0.34
4	51	142.48	0.37
5	68	172.11	0.38
Total	359	188.73	0.34



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Comparison of specific beverage prices reported by our patients compared to the average prices per drinker in Scottish sales data

The population of drinkers in Scotland over age 18 was calculated as follows:
The General Registry Office for Scotland GRO (GRO, 2009) estimated the mid-2008 population age 18+ population 4,122,807 (1,964,870 men and 2,157,937 women). We cannot find an estimate of abstainers in the population of aged 18+, but for the population over 16 years it was estimated to be 8% of men and 13% of women (Scottish Executive, 2003).
This gives a total of 437,720 who are abstainers (1,964,870 x 0.08 = 157,189 male abstainers, 2,157,937 x 0.13 = 280,531 female abstainers) .
And thus **3,685,087 drinkers**

We use this to calculate the litres of pure alcohol per capita for each main beverage type for Scottish drinkers: Tables (i) to (iii) using national alcohol beverage sales data supplied to us by the market research company The Nielsen Company. From the data supplied by Nielsen, we show the price paid per unit for the main beverage types by Scottish drinkers in 2008.

Having calculated a mean unit price by drink and sales type this could be compared with the same for the patient sample (Tables (iv) to (vi)). Note, however, that some of the drink categories which have low patient numbers.
Attending only to the beverages most commonly purchased by our patients which are vodka, lager/beer and ciders, Table (iv) shows that, by percentage, patients are paying respectively 32.76, 21.18 and 16.92 less than the mean price paid for the beverage in Scotland. However, that is partly because they buy mostly at off sales. Table (v) shows that, of the four most popular drinks consumed by patients, it is only white cider that is purchased at clearly below the average Scottish price per unit (16.67% less), although the fifth most popular beverage, whisky, is also be purchased relatively cheaply by our patients (17.07% less than the Scottish mean price at off-sales).

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Table (i) Scottish (drinker) population: consumption and price paid per unit: all-sales

Drink	total L pure alcohol	L pure alcohol per capita	units per capita (year)	total sales value net £	Per capita expenditure	£ per unit
Vodka	6457000	1.75	175.22	376,000,000	102.03	0.58
Whisky	4127000	1.12	111.99	247,000,000	67.03	0.60
Gin	1117000	0.30	30.31	71,000,000	19.27	0.64
Brandy	635000	0.17	17.23	40,000,000	10.85	0.63
white rum	625000	0.17	16.96	46,000,000	12.48	0.74
dark rum	735000	0.20	19.95	64,000,000	17.37	0.87
super lager or beer	322000	0.09	8.74	11,000,000	2.99	0.34
strong lager or beer	4452000	1.21	120.81	274,000,000	74.35	0.62
lager or beer	13413000	3.64	363.98	1,138,000,000	308.81	0.85
white cider	282000	0.08	7.65	5,000,000	1.36	0.18
strong cider >6%	425000	0.12	11.53	14,000,000	3.80	0.33
cider <6%	2084000	0.57	56.55	136,000,000	36.91	0.65
white wine	5333000	1.45	144.72	322,000,000	87.38	0.60
red wine	4626000	1.26	125.53	279,000,000	75.71	0.60
fortified wine	1115000	0.30	30.26	55,000,000	14.93	0.49

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Table (ii) Scottish (drinker) population: consumption and price paid per unit: <u>off-sales</u>

Drink	total L pure alcohol	L pure alcohol per capita	units per capita	total sales £	£ per capita	unit price
Vodka	4,934,000	1.34	133.89	167,000,000	45.32	0.34
Whisky	3,299,000	0.90	89.52	136,000,000	36.91	0.41
Gin	868,000	0.24	23.55	32,000,000	8.68	0.37
Brandy	536,000	0.15	14.55	23,000,000	6.24	0.43
white rum	421,000	0.11	11.42	17,000,000	4.61	0.40
dark rum	424,000	0.12	11.51	18,000,000	4.88	0.42
super lager or beer	312,000	0.08	8.47	10,000,000	2.71	0.32
strong lager or beer	2,955,000	0.80	80.19	115,000,000	31.21	0.39
lager or beer	4,687,000	1.27	127.19	184,000,000	49.93	0.39
white cider	282,000	0.08	7.65	5,000,000	1.36	0.18
strong cider >6%	326,000	0.09	8.85	7,000,000	1.90	0.21
cider <6%	1,233,000	0.33	33.46	46,000,000	12.48	0.37
white wine	4,471,000	1.21	121.33	197,000,000	53.46	0.44
red wine	3,983,000	1.08	108.08	181,000,000	49.12	0.45
fortified wine	1,066,000	0.29	28.93	43,000,000	11.67	0.40

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Table (iii) Scottish (drinker) population: consumption and price paid per unit: <u>on-sales</u>

Drink	total L pure alcohol	L pure alcohol per capita	units per capita	total sales £	£ per capita	unit price
Vodka	1,523,000	0.41	41.33	209,000,000	56.72	1.37
Whisky	828,000	0.22	22.47	111,000,000	30.12	1.34
Gin	249,000	0.07	6.76	39,000,000	10.58	1.57
Brandy	99,000	0.03	2.69	17,000,000	4.61	1.72
white rum	204,000	0.06	5.54	29,000,000	7.87	1.42
dark rum	311,000	0.08	8.44	45,000,000	12.21	1.45
super lager or beer	11,000	0.00	0.30	1,000,000	0.27	0.91
strong lager or beer	1,497,000	0.41	40.62	159,000,000	43.15	1.06
lager or beer	8,727,000	2.37	236.82	954,000,000	258.88	1.09
white cider	0	0.00	0.00	0	0.00	0.00
strong cider >6%	1,330	0.00	0.04	119,000	0.03	0.89
cider <6%	850,000	0.23	23.07	90,000,000	24.42	1.06
white wine	862,000	0.23	23.39	125,000,000	33.92	1.45
red wine	643,000	0.17	17.45	98,000,000	26.59	1.52
fortified wine	49,000	0.01	1.33	13,000,000	3.53	2.65

Table iv: Unit Price comparison between patients and Scottish drinkers - all-sales

Drink	*patient N (total 377)	patient sample unit price £	Scottish unit price £	patient £ less than Scottish unit price	patient % less than Scottish unit price
Vodka	158	0.39	0.58	0.19	32.76
Whisky	55	0.59	0.60	0.01	1.67
Gin	13	0.55	0.64	0.09	14.06
Brandy	10	0.50	0.63	0.13	20.63
white rum	4	0.48	0.74	0.26	35.14
dark rum	7	0.36	0.87	0.51	58.62
super lager or beer	39	0.34	0.34	0.00	0.00
strong lager or beer	57	0.51	0.62	0.11	17.74
lager or beer	119	0.67	0.85	0.18	21.18
white cider	66	0.15	0.18	0.03	16.67
strong cider >6%	12	0.30	0.33	0.03	9.09
cider <6%	56	0.54	0.65	0.11	16.92
white wine	67	0.55	0.60	0.05	8.33
red wine	28	0.48	0.60	0.12	20.00
fortified wine	23	0.40	0.49	0.09	18.37

** note that this column does not add up to 377 as patients can appear in more than one drink category*

Table v: Unit Price comparison between patients and Scottish drinkers - off-sales

Drink	*patient N (total 359)	patient sample unit price £	Scottish unit price £	patient less £ than Scottish unit price	patient % less than Scottish unit price
Vodka	149	0.33	0.34	0.01	2.94
Whisky	44	0.34	0.41	0.07	17.07
Gin	10	0.39	0.37	-0.02	-5.41
Brandy	9	0.43	0.43	0.00	0.00
white rum	4	0.35	0.40	0.05	12.50
dark rum	7	0.36	0.42	0.06	14.29
super lager or beer	39	0.34	0.32	-0.02	-6.25
strong lager or beer	46	0.35	0.39	0.04	10.26
lager or beer	78	0.39	0.39	0.00	0.00
white cider	66	0.15	0.18	0.03	16.67
strong cider >6%	12	0.3	0.21	-0.09	-42.86
cider <6%	48	0.34	0.37	0.03	8.11
white wine	64	0.46	0.44	-0.02	-4.55
red wine	27	0.47	0.45	-0.02	-4.44
fortified wine	23	0.4	0.40	0.00	0.00

** note that this column does not add up to 359 as patients can appear in more than one drink category*

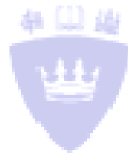
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Table vi: Unit Price comparison between patients and Scottish drinkers - <u>on-sales</u>

Drink	*patient N (total 96)	patient sample unit price £	Scottish unit price £	patient £ less than Scottish unit price	patient % less than Scottish unit price
Vodka	19	1.23	1.37	0.14	10.22
Whisky	15	1.44	1.34	-0.10	-7.46
Gin	3	1.07	1.57	0.50	31.85
Brandy	1	1.14	1.72	0.58	33.72
white rum	1	0.88	1.42	0.54	38.03
dark rum	0	-	-	-	-
super lager or beer	0	-	-	-	-
strong lager or beer	13	1.14	1.06	-0.08	-7.55
lager or beer	63	1.02	1.09	0.07	6.42
white cider	0	-	-	-	-
strong cider >6%	0	-	-	-	-
cider <6%	13	1	1.06	0.06	5.66
white wine	8	1.29	1.45	0.16	11.03
red wine	2	0.9	1.52	0.62	40.79
fortified wine	0	-	-	-	-

** note that this column does not add up to 96 as patients can appear in more than one drink category*

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