Institute of Alcohol Studies

Is alcohol too cheap in the UK?
The case for setting a Minimum Unit Price for alcohol

An Institute of Alcohol Studies report

By Tim Stockwell, PhD and Gerald Thomas, PhD
Centre for Addictions Research, University of Victoria, BC, Canada

April 2013

Summary

This paper offers a perspective on the research evidence for minimum pricing for alcohol as a public health measure from a country where this policy idea originated. It looks at the current data on the negative impacts from heavy drinking in the UK, framing the need for an effective policy response, and gives an overview of the evidence to support minimum unit pricing (MUP) as a means of addressing the issue.

In presenting the evidence to support MUP, this paper addresses some common criticisms of the policy, including those that have originated from alcohol industry sources. It concludes that policymakers can be confident that substantial total net health and social benefits will follow if MUP is introduced in the UK.

Key points

The extent of the problem

- Official estimates of about 9000 alcohol related deaths annually are low as they exclude 4600 deaths from alcohol-related cancer and a wide range of alcohol-related injuries
- UK alcohol consumption has risen in the last three decades and is now 80% above the global average
- More than half the alcohol sold in the UK is consumed above recommended daily limits
- Alcohol is 45% more affordable than in 1980 and both men and women can exceed recommended daily limits for about £1 if they purchase inexpensive alcohol from supermarkets or other outlets

Evidence to support minimum unit pricing

- There is strong and clear scientific evidence that increased alcohol prices reduce hazardous drinking and serious alcohol-related problems
- University of Sheffield researchers estimate an MUP of 45p would prevent 344 deaths, 13,900 hospital admissions and 24,100 crimes in England each year with additional benefits after 10 years
- Canada is one of six countries that have introduced some form of minimum pricing and recent peer reviewed research indicates the Sheffield estimates of benefits are conservative
- Data from Canadian provinces suggest that a 10% increase in average minimum price would result in the region of an 8% reduction in consumption, a 9% reduction in hospital admissions and a 32% reduction in wholly alcohol caused deaths - with further benefits accruing two years later
- Evidence shows MUP targets the heaviest drinkers, whilst havening minimal impact on the amount spent by moderate drinkers

Addressing criticisms of minimum unit pricing

- Criticism of the Sheffield and Canadian research, much of it from commercial vested interest groups, has been inaccurate and misleading
- Unintended negative consequences from MUP are minor in comparison with the substantial health, social and economic benefits the policy creates
- There is clear evidence that substitution with various forms of illicit or unrecorded alcohol would only slightly offset the significant health benefits of increased prices
- Individuals and families on low incomes would be among the least affected by the policy as they are more likely to be abstainers or low risk drinkers than those on higher incomes
- Low income families with heavy drinkers and others would benefit financially by having less risk of loss income through death, injury, illness and/or long-term disability of a drinking family member
- MUP would also reduce the risk of being harmed in some way by someone else's drinking

1. Introduction

Policies to reduce health and social problems related to alcohol use have been high on the political agenda in the United Kingdom in recent years. Concern about these negative outcomes and careful examination of the scientific evidence has led to calls to introduce Minimum Unit Pricing (MUP) for alcohol. Although the Scottish Parliament has passed legislation authorizing minimum prices for alcohol [1], implementation of the legislation has been stalled by objections brought to the European commission by alcohol industry groups and competing alcohol producing nations in the EU. In addition, the Scotch Whisky Association has mounted a legal challenge to MUP through the Scottish courts. The national UK government is currently conducting a consultation with all interested parties in relation to its stated intention to introduce a MUP of 45p [2]. This briefing paper will summarise the scientific evidence on the effectiveness of MUP for reducing consumption and alcohol-related harm, and discuss criticisms of the research expressed by some sectors of the alcohol industry. On the basis of the available evidence from the international literature, from influential modelling work conducted by researchers at the University of Sheffield [3, 4] and from recent Canadian research [5,6,7,8] it will be argued that the benefits of minimum pricing policies far outweigh the unintended consequences which some fear may flow from introducing MUPs in the UK.

Does the UK have a problem with alcohol?

The United Kingdom is one of the highest alcohol consuming nations in the world. In 2010 recorded per capita consumption was estimated at 10.2 L of pure alcohol per person aged 15 years or more [9], substantially higher than the global average of 6.1 L [10]. If a conservative estimate of 10% for unrecorded consumption (e.g., duty-free, home-made) is included (see Shield et al [10] for higher estimates) and further accounting for 10% of people who abstain, consumption increases to 12.3L per drinker. This translates to 1,217 units of alcohol per year, or 23 units per person per week, which is higher than recommended upper limits for low risk consumption both for men and women. Alcohol contributes to increased risk of death, disability, injury and/or illness from over 230 medical diagnoses including liver cirrhosis, a variety of cancers (breast, mouth, throat, oesophageal, stomach, colon), a range of chronic diseases and injury types [11]. Estimates for the number of alcohol related deaths can vary depending on how the figures are calculated. The Office for National Statistics (ONS) conservatively estimates the number of deaths directly caused by alcohol in 2010 to be 8748 [12] and notes a doubling in the rate of alcohol-related deaths between 1992 and 2008, a small decrease in 2009, and stable levels since. These estimates can be considered highly conservative because they exclude many causes of death (e.g. injuries and cancers) where alcohol is known to be a contributing cause. For example, a recent study estimated that 4,600 cancer related deaths could be prevented each year in the UK if alcohol consumption was reduced [13]. The risk of any alcohol related harm is directly related to the "dose" of alcohol whether consumed on one occasion for acute harms (e.g. injuries and poisonings) or over a number of years for chronic alcohol-related diseases, with risks highest for the heaviest drinkers. The "dose-response" relationship between drinking and risk of cancer is summarised in Figure 1.

Figure 1 – 'Dose-response relationship between drinking and risk of cancer
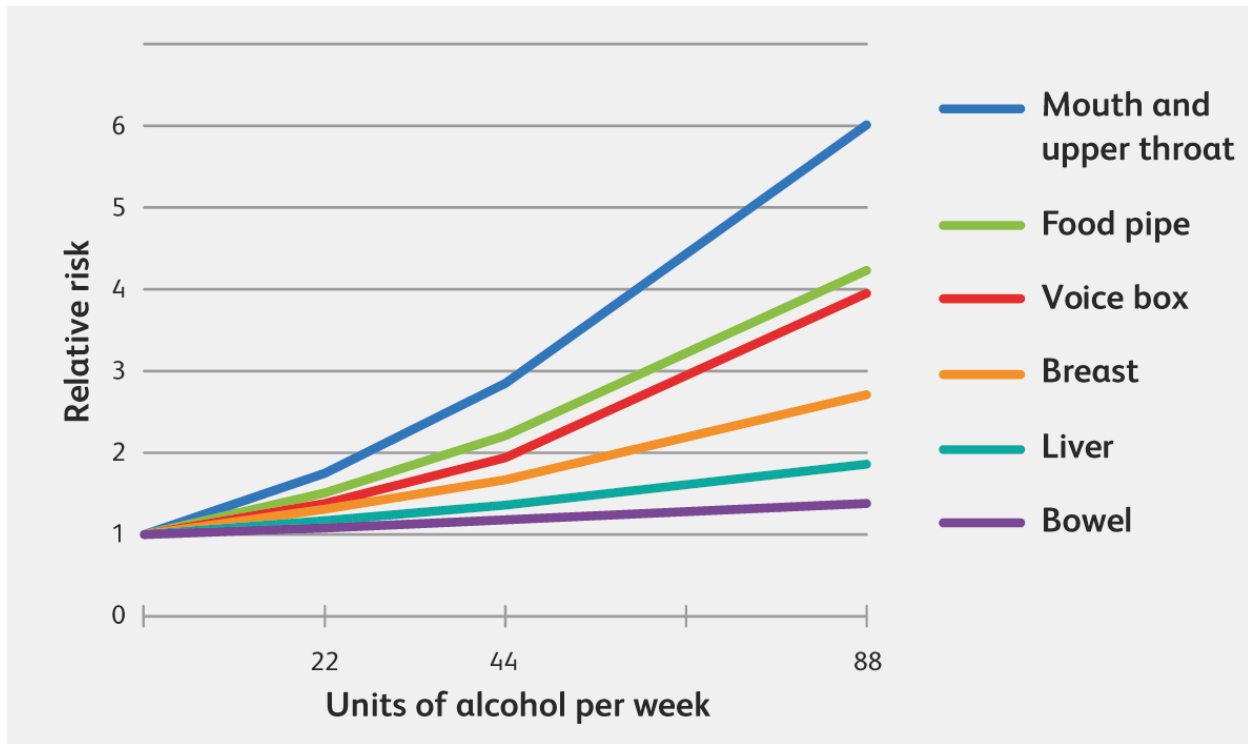
(Reproduced with permission from the UK Alcohol Health Alliance [13])

UK low-risk drinking guidelines

UK guidelines for low risk drinking recommend that men should not regularly drink more than 3 to 4 units of alcohol per day and women should not regularly drink more than 2 to 3 units of alcohol per day, in order to reduce risks of long-term harm from drinking [14]. A unit of alcohol in the UK is about 10ml or 8g of absolute alcohol and is roughly equivalent to half a pint of regular strength beer, 85 ml or about **half** a glass of 12% wine or a single measure (25ml) of spirits. Baumberg et al [15] examined UK drinking patterns based on a national household survey and estimated that 46.6% (± 2.0%) of all alcohol consumed in the UK was drunk *in excess* of these daily low risk drinking guidelines. Given the substantial underreporting in self-report surveys of alcohol consumption [16] it can be concluded that at least half of all the alcohol consumed in the UK is consumed above government approved low risk drinking guidelines.

Is alcohol too cheap in the UK?

Since 1980, alcohol has become 45% more affordable in the UK and available for purchase from an ever-wider variety of outlets [17]. Large supermarket chains now deliver extremely low-priced alcohol by taking advantage of economies of scale and can offer heavily discounted alcohol to be offered as "loss leaders" to bring in customers to purchase food and other items [18]. A search of supermarket-discounted alcohol advertised on the Internet [e.g. 19] quickly reveals multiple

products priced at between 20p and 40p per UK unit. This is less than the price of a pint of milk or loaf of bread. At the present time it is possible for a man or woman to exceed daily low risk drinking guidelines for just £1.

Why consider Minimum Unit Pricing?

Minimum Unit Pricing (MUP) is a policy that primarily targets heavy and hazardous drinkers and is just one of a range of price and taxation interventions that have been shown to reduce demand for alcohol. Systematic analyses of all published studies have found significant negative associations between average prices for alcohol, levels of consumption and rates of serious alcohol-related harm [20, 21, 22, 23]. Wagenaar et al [22] concluded: **"We know of no other preventive intervention to reduce drinking or alcohol-related damage that has the numbers of studies and consistency of effects seen in the literature on alcohol taxes and prices."**

One particularly clear example from this large literature is illustrated in Figure 2 below. Professor Wagenaar and colleagues from the University of Florida published a scientific paper in the peer-reviewed *American Journal of Public Health* on the relationship between rates of death from alcohol-related causes in the US state of Alaska before, between and after two significant increases in alcohol taxes [24]. The figure shows immediate impacts on rates of alcohol-related deaths each time taxation levels were increased.

Figure 2 – Frequency of quarterly alcohol-related disease mortality in Alaska before and after two tax increases
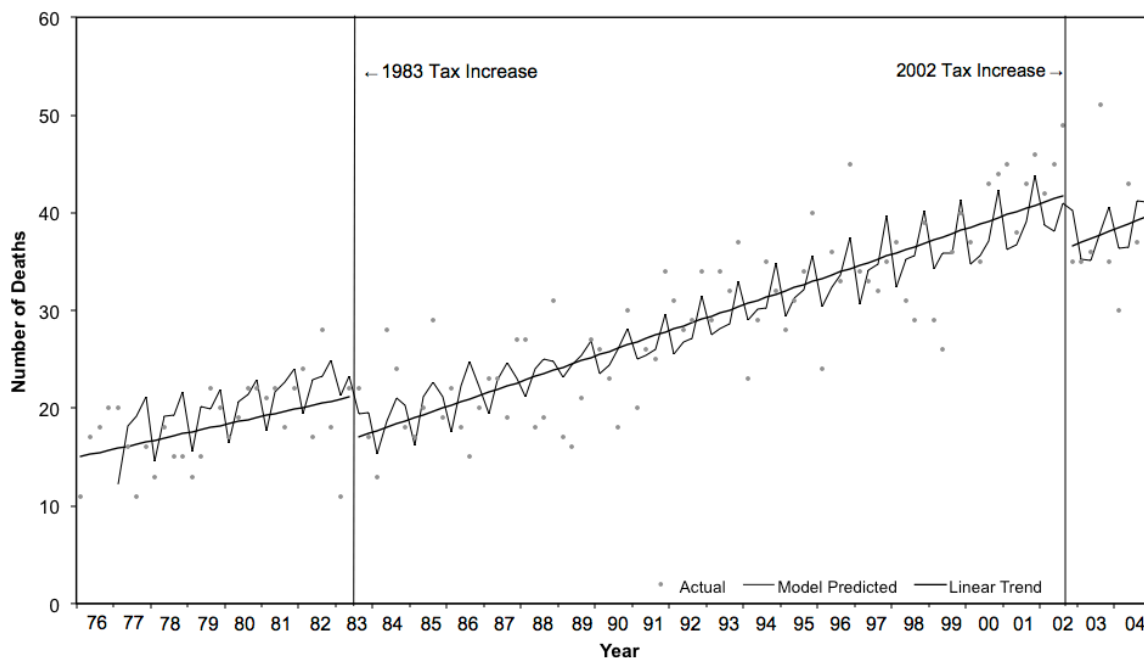
[Reproduced with permission from the *American Journal of Public Health* (24)]

6

The above meta-analyses [20, 21, 22, 23] of all relevant and high quality published literature are the kind of evidence incorporated into the well-known Sheffield Alcohol Policy Model which predicts what would happen to consumption, harms and government revenue if a MUP were introduced. As mentioned above, MUP is a pricing strategy which is especially targeted towards hazardous and harmful drinkers. A US study illustrates the point well that the heaviest drinkers gravitate towards the cheapest alcohol. Kerr and Greenfield [25] analysed US national alcohol survey data and noted that the heaviest 10% of drinkers in terms of overall volume consumed spent on average $0.79 for a US "standard drink (12 g) compared with $4.75 for the bottom 50% i.e. the lightest drinkers. Data from the UK also confirm that heavy drinkers are more likely to spend less per unit of alcohol [26]. Furthermore, Gruenewald et al [27] have demonstrated with the Swedish alcohol monopoly data how consumption of the cheapest alcohol is most responsive to price changes i.e. the alcohol preferred by more hazardous drinkers. They explain this observation by theorising that drinkers who consume more expensive alcohol have more room to trade down the price-quality spectrum when alcohol gets more expensive while those who are already drinking the cheapest alcohol have little option other than to reduce consumption. In short, while pricing and taxation strategies are considered to be the alcohol policies with the strongest evidence base for reducing harmful consumption, MUP is a variation which the evidence suggests is more targeted towards the heaviest drinkers.

2. Predicting the Impact of MUP: The Sheffield Model

In response to concern over increasing rates of alcohol related problems, the Department for Health commissioned a study to estimate the preventive potential of policies to restrict both cheap alcohol and various forms of alcohol promotions [3, 28]. The Sheffield Alcohol Policy Model was developed based on evidence published in high-quality systematic reviews as well as data from the UK on rates of alcohol-related deaths, hospital admissions, alcohol consumption patterns, income levels and alcohol purchasing patterns. The Model provides estimates of changes to harmful outcomes under various minimum pricing and other policy scenarios. Further work commissioned by the National Institute for Health and Clinical Excellence (NICE) in 2009 updated the model [3] and it has since also been adapted for Scotland [4] and Canada [29]. These studies have been a key reference point both for the Scottish legislation to introduce a minimum price of 50p for a unit of alcohol and the announcement by the UK Government of their intention to consider introducing a 45p MUP [2].

How was the Sheffield Model constructed?

The Sheffield Model was commissioned by governments with the specific task of using best available evidence to estimate impacts on alcohol-related deaths, hospital admissions and crimes, on the one hand, and economic consequences such as impacts on government revenue and expenditure on alcohol on the other. **The model is based on two fundamental elements that are well established in the much larger literature on the relationship between alcohol consumption and alcohol-related harms:**

(i) **When the price of alcohol increases consumption by most drinkers goes down including, critically, consumption by hazardous and harmful drinkers;**
(ii) **When alcohol consumption in a population declines, rates of alcohol-related harms also decline.**

All subsequent debate about the Sheffield Model has centred on the degree of certainty regarding the size of these effects. Evidence for both of these relationships is of the highest order and no one on any side of the debate has seriously questioned their scientific validity.

(i) When the price of alcohol increases consumption by most drinkers goes down including, critically, consumption by hazardous and harmful drinkers

Two high quality systematic reviews sought to identify all published scientific studies that had estimated the relationship between alcohol prices and levels of consumption, both for drinkers in general [21] and for all as well as heavy or "problem" drinkers [22]. The latter study identified 1003 estimates of these relationships on data from 112 studies worldwide spanning almost 200 years. Results from these two reviews were similar suggesting that a 10% increase in overall prices results in a reduction in alcohol consumption of approximately 5%. Wagenaar et al [22] estimated a slightly smaller effect size of 2.8% for heavy drinkers versus 4.4% for drinkers in general. However,

it is not possible to directly compare these estimates because quite different research methods (individual self-report surveys) were used by the studies of heavy drinkers. Some studies which do allow direct comparisons suggest larger effects for heavy versus moderate drinkers [30] while others do not [31]. Notably, the study most often quoted as suggesting heavy drinkers are less responsive to price changes [31] only looked at frequency of binge drinking as an outcome and will therefore have underestimated effects on total volume of consumption. Furthermore, Gruenewald et al [27] work shows that price elasticities for cheap alcohol - known to be preferred by the heavier drinkers - are larger when prices go up across the board than are more expensive categories. In relation to minimum alcohol prices this suggests that heavier drinkers may in fact have higher price elasticities than light drinkers i.e. be more responsive to price changes.

There are no firm grounds for suggesting effect sizes would be weaker for hazardous or harmful drinkers than they are for low risk drinkers. However, to be conservative, the Sheffield team tried running their models with different assumptions about the degree to which low risk and hazardous drinkers respond to price changes and estimates were not greatly changed. The Model also incorporated evidence that hazardous and harmful drinkers are more likely to drink cheap alcohol than are moderate drinkers [25, 26]. Further, the Sheffield Model also estimated how setting different levels of minimum price (e.g. 20p, 30p, 40p, 50p, 60p etc. per unit) would influence the consumption of different drinking groups. To achieve this they had to estimate the proportion of drinks consumed by low risk, hazardous and harmful drinkers that would be affected by a particular minimum price increase and then how they would respond to that price change.

(ii) When population alcohol consumption declines rates of alcohol-related harms also decline

The second key proposition, that alcohol-related harm declines when alcohol consumption goes down, is similarly well founded. High quality reviews confirm that when total consumption of alcohol in the population declines, consumption among heavier drinkers is reduced and, further; rates of alcohol-related mortality also decline [32]. The Sheffield Model applied these general principles specifically to the UK and provided numerical estimates of the benefits.

Sheffield model – estimates of health and social impacts from MUP

Compared with a policy of no change, the Sheffield Model estimated that an MUP of 45p for England would result in the following outcomes in the first year:
- A moderate drinker would on average pay an extra £10 for their alcohol and drink 7 fewer units per year
- A harmful drinker would on average reduce their consumption by 254 units and pay an extra £165 per year
- There would be annual reductions of 344 deaths, 13,900 hospital admissions and 24,100 crimes all attributable to alcohol with further delayed benefits 10 years later at a saving of 5.2bn (direct costs) or 6.6bn (including quality-adjusted life year (QALY) gains from health and crime harm reductions) over the 10 years.

- The overall value of alcohol sales would increase by £1040m while government tax revenues would remain virtually unchanged.

Similar types of health, crime and economic consequences were predicted for the Canadian provinces of British Columbia and Ontario [29]. For British Columbia it was possible to compare the size of the estimated changes with those observed in empirical studies on rates of alcohol-related deaths and hospital admissions following changes to minimum pricing in that province. British Columbia has been implementing minimum liquor prices and updating them periodically for at least four decades. **As will be described below the estimates of health benefits from the Sheffield Model are approximately half those observed in these empirical studies.**

Criticisms of the Sheffield Model

Industry criticism of the methods used in the Sheffield Model has largely focused on uncertainties around some of the assumptions required to run the model and not the existence or direction of the fundamental underlying relationships between alcohol consumption and related harm discussed above. For example, Duffy and Cohen [33] criticise the Sheffield Model for: (i) relying on self-report survey data which often underestimates levels of alcohol consumption (ii) relying on estimates of risk from drinking which are based on studies from other countries conducted at other times (iii) making assumptions about risk relationships in the absence of controlled studies (iv) not acknowledging the level of uncertainty in the assumptions made. This critique was funded by commercial vested interest groups and has been dealt with at length elsewhere by the Sheffield Model team [34].

Some of Duffy and Cohen's claims are false and others do not acknowledge the careful work done by the Sheffield team. For example, the Sheffield Model conducted extensive sensitivity tests using alternative assumptions, a standard approach for dealing with uncertainty in this kind of modelling exercise. Further, the great majority of risk relationships employed in the Sheffield Model were based on meta-analyses of controlled epidemiological studies, an approach which is widely regarded as international best practice. Finally, Scottish data were used extensively to estimate the local impacts of pricing changes and the proportions of Scottish drinkers who exceeded low risk drinking levels were based on Scottish surveys. Scottish data on deaths and hospital admissions either fully or partially caused by alcohol were employed - and indeed on crimes and absenteeism. In order to estimate the proportions attributable to hazardous drinking patterns and how these would change in response to price changes, it was necessary to look at all high-quality studies conducted in other countries where local studies were absent so as to generate the most accurate estimates of potential outcomes in Scotland.

The Sheffield project team described their methods and assumptions in explicit detail and followed best practice guidelines in modelling the outcomes of different policy scenarios for government decision-making [35]. The project team also consistently erred towards more conservative assumptions such as making only modest adjustments for the considerable underestimation of alcohol consumption present in self-report surveys [36] and assuming effects on some alcohol-

related diseases would be delayed by as much 10 years. By contrast, recent Canadian research identified significant impacts on both deaths and hospital admissions due to chronic alcohol-related diseases only two years following minimum price increases [7, 8]. In each case, larger impacts on consumption and alcohol-related harms would be estimated were less conservative assumptions made. Again, the conservative nature of the Sheffield Model was demonstrated when it was applied to Canadian data and compared with the results of empirical studies that were able to make direct estimates of impacts on alcohol-related mortality and morbidity. As described below, the Sheffield Model estimated effect sizes were about of those directly observed when minimum prices were introduced or increased in Canadian provinces.

3. The implementation of minimum pricing in Canada

Canada is among six countries to have already implemented some form of minimum alcohol pricing, the others being USA (selected states), Russia, Moldova, Ukraine and Uzbekistan [37]. Recently, a collaboration of researchers at the Centre for Addictions Research of British Columbia, the Centre for Addiction and Mental Health in Ontario, the Alcohol Research Group, Emeryville, California and the Prevention Research Centre in Berkeley, California have investigated the impacts of changes to minimum alcohol prices on rates of consumption and alcohol-related harm. This work has been funded by a grant obtained in open competition from the Canadian Institutes for Health Research. To date, four scientific papers have been published with peer reviewed academic journals, three focusing on the province of British Columbia and one on Saskatchewan. In addition, a Canadian application of the Sheffield Model has been completed which estimates likely impacts on health, crime and government revenue under the different minimum pricing scenarios for the provinces of British Columbia and Ontario [29].

How does minimum pricing work in Canada?

Canada has a federated governance structure with 10 provinces and three territories each of which have different approaches to the distribution, sale and regulation of alcohol and its consumption. The majority of Canadian provinces have some form of government control over the distribution of alcohol with most having a mixture of government owned and privately owned liquor stores [38]. In the majority of cases, the government-owned distribution authority sets a minimum dollar value per litre of beer, wine, spirit, alcoholic sodas, ciders or other specific beverage types. Some provinces such as Ontario (all products) and Quebec (for beer) adjust minimum price rates each year with the rate of inflation. British Columbia does so only occasionally and to different degrees and frequencies for different beverage types. In Saskatchewan, minimum price rates are adjusted to reflect the alcohol content of a particular beverage type. For example beer greater than 8.5% alcohol by volume (ABV) has a proportionately higher minimum price than those with an alcohol content by volume of below 8.5%, 7.5% or 6.5% ABV. This approach to minimum pricing was introduced in April 2010 and its impact on alcohol sales of different beverages was evaluated in one of the published reports from the Canadian research program [6]. **In practice, for the great majority of alcoholic products for sale in the province, Saskatchewan's approach to minimum alcohol pricing is very similar to the proposed MUPs in Scotland, England and**

Wales. It is also important to note that a substantial amount of alcohol sold in Canadian provinces is retailed from private liquor outlets while government owned liquor stores differ only in that their staff are unionized, the stores tend to be larger and are open for slightly shorter hours. In British Columbia about half the alcohol sold for off premise consumption is from some form of privately owned store [39]. The Canadian consumer's experience in government owned liquor store and their responsiveness to price changes is likely to be similar to that of consumers in other countries with fully privatized systems such as the UK i.e. the frequent charge from critics of MUP that the Canadian experience is irrelevant is not justified.

Evidence for impacts on consumption

The first study from the Canadian minimum price research project examined 20 years of sales and minimum price data from the province of British Columbia [5]. These data were provided by the BC Liquor Distribution Authority and included a list of dates when minimum prices for specific beverages changed. Population estimates were obtained from official government sources and these data were used to generate estimates of average alcohol consumption for residents aged 15 or over based on recorded sales data. Statistical models were constructed with these data to explore the relationships between changes in minimum alcohol prices and changes in alcohol consumption while taking account of seasonal factors, long-term trends, the consumer price index, and household income. Separate models were constructed for each main beverage type and also for total alcohol consumption. Minimum alcohol prices were measured in dollars per standard drink for each annual quarter for each beverage type over a 20-year period.

The first analysis estimated that across all beverage types a 10% increase in its minimum price would result in a 16% reduction in consumption relative to all other beverages. Individual beverages showed different degrees of responsiveness to minimum price changes ranging from an absolute reduction of 14% for alcoholic sodas and ciders, a 9% reduction for wine, a 7% reduction for spirits and liqueurs, and 1.5% reduction for beer. **Overall, it was estimated that a 10% increase in average minimum prices across all beverage types would result in a 3.4% decrease in total alcohol consumption.**

The average minimum prices in British Columbia towards the end of the above study were on average equivalent to CA$1.15 per Canadian standard drink (approximately 43p per UK unit). Higher minimum prices were set in the province of Saskatchewan early in 2010 which were mostly in the region of 45p to 60p per unit and were adjusted by strength of alcoholic beverage. The change was applied simultaneously and comprehensively to all beverages, unlike the more sporadic and piecemeal approach in British Columbia. An analysis of consumption for 26 financial periods before and 26 periods after the Saskatchewan policy change resulted in an estimated 8.4% reduction in total alcohol consumption for a 10% increase in average minimum price [6]. Interestingly, the new policy of having a higher minimum price for higher alcohol content varieties of a particular beverage type (e.g. 8.5% + ABV beer versus below 6.5% ABV) significantly shifted consumption towards lower alcohol content varieties of both beer and wine. Further, effects were more pronounced for off premise versus on premise consumption. The observed effects were

achieved by a minimum price increase which impacted only 11% of all alcoholic products for sale at that time in Saskatchewan.

It can be concluded that comprehensive and simultaneous increases in minimum prices across all beverage types and adjusted for alcohol content have a strong impact on total alcohol consumption. Further, this type of policy is close to the ideal of a fixed minimum price for a unit of alcohol as is being proposed in the UK.

What is the impact of minimum pricing on alcohol-related harms?

Two recent studies investigated impacts of minimum price changes on alcohol-related deaths [7] and hospital admissions [8] in British Columbia, Canada. Both studies focus on an eight-year period during which time there were four increases in the minimum prices for spirits, three for beer and none for other alcoholic beverages. Examining sales data across 16 distinct geographic regions of the province while controlling for demographic and economic variables, significant negative associations were found between minimum price changes and wholly alcohol related deaths (e.g. deaths due to alcoholic poisoning, alcoholic gastritis, alcohol use disorder). There were no significant associations with acute alcohol related deaths (mainly injuries) but there were significant delayed effects on deaths from alcohol-related diseases (e.g. liver cirrhosis, various cancers) after two years. Figure 2 below illustrates how: (i) as the CPI-adjusted value of average minimum alcohol prices fell (in Canadian dollars per standard drink—17.05mL of ethanol) in the first four years wholly alcohol caused deaths increased, and (ii) how deaths fell while minimum prices rose over the second four years [40]. **From this analysis, it was estimated that a 10% increase in average minimum alcohol prices was significantly associated with a 32% reduction in wholly alcohol caused deaths [7]**.

The second study on alcohol-related harm applied similar statistical methods to alcohol-related hospital admission data over 89 areas of the province for the same time period [8]. There was more power in this analysis given the greater volume of hospital admission data. A 10-cent (approximately 6p) increase in average minimum price was estimated to be associated with 166 (2%) fewer acute admissions in the first year and 275 (3%) fewer chronic admissions two years later for a population of 4.6 million. This is equivalent to an increase from 43p to 47p. **In both cases a 10% increase in minimum price was significantly associated with 9% reductions in both these types of hospital admissions.**

Finally, the Canadian adaptation of the Sheffield Model [29] makes highly conservative estimates of the impacts of different increases in minimum alcohol prices on rates of alcohol related deaths and hospital admissions. For the province of British Columbia it was possible to compare Sheffield Model estimates with those observed in the published studies described above. In a policy scenario of a minimum price for all alcoholic beverages set at CA$1.50 the Sheffield Model estimated a reduction of 39 deaths and 244 hospital admissions in the first year with additional health benefits 10 years later [29]. In the direct empirical studies described above, a minimum price of CA$1.45 was estimated to result in a reduction of 92 deaths [7] and 1,212 hospital admissions [8] and in

both cases additional health benefits were observed for chronic alcohol-related conditions just two years later.

Response to criticisms of the Canadian research

The Canadian research described above was published in respected academic journals after peer review by independent scientists. Nonetheless, each of the above studies received critical comment from alcohol industry sources as soon as they were published. The first two studies were criticised for only demonstrating reductions in alcohol consumption and not harm [e.g. 41]. When the third study reporting significant impacts on harm was published, a series of industry sources claimed that the results were contradicted by official BC government data. These claims have been shown to be without foundation [40]. The industry spokespersons claimed there were in fact small increases in annual numbers of alcohol-related deaths over the study period [42, 43]. However, when the significant rise in the population of British Columbia during that time is taken into account, there was actually an overall reduction in rates of these deaths. Furthermore, the BC study took account of the effects of inflation on the value of minimum prices focusing on short-term changes in these and corresponding changes in wholly alcohol caused deaths. As shown in Figure 3, wholly alcohol related deaths did increase for the first half of the study period until there was a significant increase in *real* average minimum alcohol prices halfway after which deaths reduced substantially and stayed at a lower level.

Figure 3 – Rates of deaths wholly caused by alcohol and average minimum alcohol prices in British Columbia, 2002-2009
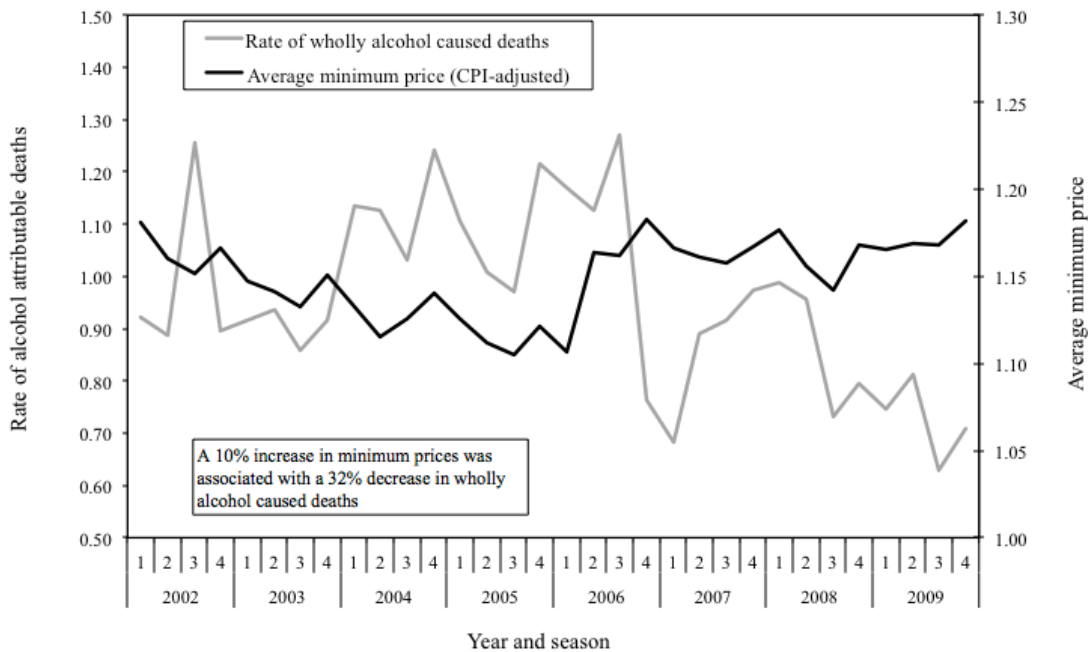
(Reproduced with permission from the journal *Addiction* [40])

14

Sections of the alcohol industry have also attempted to minimise the relevance of the Canadian research by pointing to the degree of government control in most provinces in the distribution and sale of alcohol. As explained above, a large and growing proportion of alcohol purchased in Canada is from private stores and, further, from the consumer's perspective the experience of purchasing alcohol from a government or private store will in any case be similar, especially given significant efforts in recent times to increase the commercial appeal of government outlets. The Canadian experience is at least a highly relevant model of what might transpire if minimum alcohol prices were to be introduced to in the UK.

Forbes magazine also provided inaccurate and misleading criticisms of the Canadian research [44]. For example, it was claimed the study reporting reductions in alcohol-related deaths associated with increased minimum prices [7] only had data for 16 time periods. This was inaccurate - there were 32 time periods for each of 16 regions of British Columbia. The article also refers to statistical criticism from a mathematics professor that focuses on two contrary findings reported in a secondary analysis that investigated delayed effects. It failed, however, to mention there were 12 significant delayed effects in the expected direction i.e. finding significant negative associations between minimum prices and rates of alcohol-related death. It was also charged that the study ignored deaths from liver cirrhosis which was false.

4. Other criticisms of minimum pricing

Heavy drinkers will find ways to substitute with other sources of alcohol

One of the most frequently expressed arguments against MUP is that it will force heavy and problem drinkers into drinking various forms of illicit alcohol which might even increase the harms they experience. Such an outcome may of course occur for a very small number of the most severely dependent individuals. It has also been suggested that there may be substitution with homemade or duty-free alcohol. The experience in Canada, however, has indicated that if such outcomes did result, they must have occurred on a small-scale - if at all - otherwise the overall reductions in alcohol-related harm described above would not have been possible [7]. For example the significant reductions in wholly alcohol caused deaths and the deaths caused by chronic diseases attributable to alcohol use would be primarily experienced by heavy and dependent drinkers. Such reductions could not be observed if the majority of such drinkers substituted other sources of cheap alcohol when minimum prices were increased.

Alcohol price increases have adverse effects on the less well off

Another common worry is that increasing the price of the cheapest alcohol will place additional stress on vulnerable individuals with low incomes and this may have repercussions for children and spouses of problem drinkers. For example, it is suggested that there may be less money available for food if a greater proportion of the household budget is spent on alcohol. Recent careful analysis of this issue by the Institute for Fiscal Studies found only very small impacts on grocery

expenditure for households on low incomes, in the region of an increase of 0.5% [45]. To put this concern in perspective, it is important to consider how alcohol consumption and related harm is distributed across different income groups. In the UK, as in most economically developed countries, those in the lowest income brackets are more likely to be abstainers [e.g. 46, 47] and recent analysis by the HM Customs and Revenue shows that those who are drinkers from the lowest income brackets drink significantly lower amounts of alcohol overall [48]. There is also a greater likelihood that heavy and problem drinkers in the UK are single and therefore are less likely to harm their family members [49]. The available evidence also indicates that hazardous drinking impacts greatly on individuals, families and communities with low incomes and thereby contribute to social inequalities [50]. Recent Australian data also show that the economic burden from alcohol related harms to others (non-drinkers) is roughly equivalent to the harms experienced by drinkers themselves [51]. Benefits for families in low-income areas from increased minimum prices would for example include the following:

- Preventing the temporary or permanent loss of family income through death, injury, illness and/or long-term disability of the drinking family member;
- Reduced birth complications and risk of developmental disorders due to reduced exposure of the foetus to alcohol in the mother's blood stream during pregnancy;
- Reduced risk of being a victim of robbery or assault in a public place, especially in areas of with high crime rates;
- Reduced risk of being injured by a drunk driver;
- A reduction in alcohol related family violence which is primarily perpetrated by male drinkers and experienced by female family members or children [52];
- An increased likelihood that the drinker will seek treatment or find other ways to reduce their consumption [53, 54].

For the great majority of people on low incomes who are abstainers, light or moderate drinkers, the financial impacts of MUP are non-existent or negligible. At 45p per unit a male could drink up to the daily UK low risk drinking guidelines for as little as £1.80 and a female for just £1.35. In addition, the broader economic benefits to society as a whole from increased alcohol prices also need to be considered including reductions in direct health care and crime costs.

MUP would unfairly impact on the great majority of light and moderate drinkers

This problem has been investigated closely by the Sheffield team. As described above, the cheapest alcohol is principally consumed by the heaviest drinkers and best estimates are that on average a low risk drinker in the UK would spend less than 20p extra per week on alcohol under most MUP scenarios [3].

MUP is unpopular with the general public

A survey conducted by YouGov in June 2012 based on 2075 randomly selected respondents from a panel of 350,000 UK residents investigated concerns about alcohol-related problems and support

for different policy options [9]. The findings indicated high levels of public concern and many more people supporting than opposing minimum pricing policies. For example, four times as many respondents thought that alcohol prices in supermarkets were too low than thought they were too high. Many more respondents (between 40% and 46%) supported increased prices in line with a 50p minimum price per unit compared with those who opposed (25% to 31%) with the remainder being undecided or indifferent.

MUP would increase profits for some alcohol retailers

Both the Sheffield group and Institute for Fiscal Studies estimate that MUP would make drinking in pubs and clubs relatively more attractive and would also yield increased profits for off premise retailers [3, 45]. By contrast, an approach which relies on increasing excise duties alone would have no such effects [45] though it would of course increase government revenues. There is no doubt from a public health and safety perspective that there is a case for reforming the way excise duties are collected in the UK so that they give consumers more incentives to select lower alcohol content products [45]. We respectfully suggest that the health and safety benefits that would flow to the UK from introducing MUP would not be devalued by increased profits for some sectors of the alcohol industry and indeed these might be seen as an additional benefit. The on premise trade in the UK has suffered in recent times losing considerable custom by virtue of the current system of allowing large supermarket chains to sell very cheap alcohol for off premise consumption [45].

5. Conclusions

Minimum unit pricing in the UK would have immediate and also delayed health, crime and economic benefits. The Sheffield model's estimates of the extent of these benefits have been criticised but recent Canadian research confirms the Sheffield model has produced highly conservative estimates of changes in consumption and alcohol-related harm. Benefits would be experienced most by those population groups and in regions of the country where rates of hazardous and harmful drinking are the highest. Much of the harm associated with alcohol use is experienced by family members of heavy drinkers and they too would experience health and safety benefits from MUP. Substitution of cheap alternative sources of alcohol would only occur to a small degree and only slightly offset the larger population wide benefits. The broad social and economic benefits from reduced health and crime costs mean that many stand to gain from the introduction of MUP.

About the authors

Dr Tim Stockwell is the Director of the Centre for Addictions Research of BC and Professor in the Department of Psychology at University of Victoria, British Columbia, Canada. He obtained degrees in Psychology and Philosophy from the University of Oxford, a Ph.D. from the Institute of Psychiatry, University of London and is a Fellow of the Canadian Academy of Health Sciences. He has worked as a researcher and psychologist in the UK, Australia and now Canada. His main research interests concern policies to prevent and reduce harms from the use of psychoactive substances. He has over 300 publications, has authored several books and holds editorial positions with the journals *Addiction* and the *Drug and Alcohol Review*. He is the principal investigator on a grant from the Canadian Institutes for Health Research entitled "Does minimum pricing reduce the burden of injury and illness attributable to alcohol?". He was also a member of the scientific advisory board for the first University of Sheffield alcohol policy modelling project.

Dr Gerald Thomas is a Collaborating Scientist with the Centre for Addictions Research of BC. He received his Ph.D. in political science from Colorado State University in 1998 and has worked in the area of Canadian alcohol policy since 2004. He served on the secretariat of the National Alcohol Strategy Working Group which created Canada's first national alcohol strategy in 2007, and collaborated with the Chief Medical Officer of Health in BC, Perry Kendall and others at CARBC on A Public Health Approach to Alcohol Policy for British Columbia (2008). See: http://okanaganresearch.com/People.html.

References

1. Scottish Parliament. *Alcohol minimum pricing (Scotland) bill*. 2011.
2. Home Office (2012) *We will introduce a minimum unit price for alcohol*. Home Office, London, UK. See: Http://www.homeoffice.gov.uk/drugs/alcohol/alcohol-pricing/
3. Purshouse R, Brennan A, Latimer N, Meng Y, Rafia R and Jackson R. (2009) Modelling to assess the effectiveness and cost-effectiveness of public health related strategies and interventions to reduce alcohol attributable harm in England using the Sheffield Alcohol Policy Model version 2.0: Report to the NICE Public Health Programme Development Group. Sheffield: University of Sheffield.
4. Meng Y, Hill-MacManus D, Brennan A, and Meier P. (2012) Model-based appraisal of alcohol minimum pricing and off-licensed trade discount bans in Scotland using the Sheffield Alcohol Policy Model (v 2): Second update based on newly available data. ScHARR, University of Sheffield.
5. Stockwell T, Auld MC, Zhao JH, Martin G. (2012) Does minimum pricing reduce alcohol consumption? The experience of a Canadian province. *Addiction*, **107**(5): 912-20.
6. Stockwell T, Zhao J, Giesbrecht N, Macdonald S, Thomas G, Wettlaufer A. The raising of minimum alcohol prices in Saskatchewan, Canada: impacts on consumption and implications for public health. *American Journal of Public Health*. 2012; **102**(12): e103-10.

7. Zhao, J., Stockwell, T., Martin, G., Macdonald, S., Valance, K., Treno, A., Ponicki, W., Tu, A. and Buxton, J. 2013. The relationship between changes to minimum alcohol price, outlet densities and alcohol-related death in British Columbia, 2002-2009. *Addiction*. URL: http://onlinelibrary.wiley.com/doi/10.1111/add.12139/pdf. Accessed: 2013-02-27. (Archived by WebCite® at http://www.webcitation.org/6EkhrCmAX) .

8. Stockwell, T., Zhao, J., Martin, G., Macdonald, S., Valance, K., Treno, A., Ponicki, W., Tu, A. and Buxton, J. (2013) Minimum alcohol prices and outlet densities in British Columbia, Canada: Estimated impacts on alcohol attributable hospital admissions. *American Journal of Public Health*, URL: http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2013.301289.

9. Gilmore, I., Anderson, W., Bauld, L., Bellis M., Brown, K., Drummond, C. et al (2013) *Health First: an evidence-based alcohol strategy for the UK.* Published by the University of Stirling, Scotland, UK. A report published in association with the British Liver Trust and the Alcohol Health Alliance UK. ISBN 978-1-908063-12-0. See: http://www.stir.ac.uk/media/schools/management/documents/Alcoholstrategy-updated.pdf

10. Shield, K., Rylett, M,. Gmel, G., Gmel, G., Kehoe-Chan, T and Rehm, J. (2013) Global alcohol exposure estimates by country, territory and region – a contribution to the Comparative Risk Assessment for the 2010 Global Burden of Disease Study. *Addiction*. DOI: 10.1111/add.12112.

11. Rehm, J., Mathers, C., Popova, S., Thavorncharoensap, M., Teerawattananon, Y. and Patra, J. (2009). Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet*; 373, 2223-33.

12. Office for National Statistics (2013) *Alcohol-related deaths in the UK, 2011*. ONS, Newport, Gwent, UK. 29 January, 2013. See: http://www.ons.gov.uk/ons/dcp171778_254061.pdf .

13. UK Alcohol Health Alliance (2013) Alcohol and Cancer. Royal College of Physicians, London, UK.

14. National Health Service (2013) Alcohol units and guidelines: the low risk daily guidelines. NHS, UK. See: http://www.nhs.uk/change4life/Pages/alcohol-lower-risk-guidelines-units.aspx

15. Baumberg, B. (2006) *Conflict of interest in the alcoholic drinks industry: how important are 'unhealthy drinkers' in total UK consumption?* Institute for Alcohol Studies, London, UK.

16. Stockwell, T. Zhao, J., Chikritzhs, T., & Greenfield, T. (2008). What Did you Drink Yesterday? Public Health Relevance of A Recent Recall Method Used in the 2004 Australian National Drug Strategy Household Survey. *Addiction*, 103(6), 919-928.

17. Home Office (2012) *A minimum unit price for alcohol: impact assessment 1A*. Home Office, London, UK.

18. Competition Commission (2008) *The supply of groceries in the UK market investigation*. London, UK, 30 April, 2008. See: http://www.competition-commission.org.uk/our-work/directory-of-all-inquiries/groceries-market-investigation-and-remittal/final-report-and-appendices-glossary-inquiry .

19. MySupermarket (2013) http://www.mysupermarket.co.uk/shelves/. Accessed 21 March, 2013.

20. Anderson, P., Chisholm, D. and Fuhr, D. (2009) Alcohol and Global Health 2: Effectiveness and cost-effectiveness of policies and programmes to reduce the harm caused by alcohol. *Lancet,* 373: 2234–46.
21. Gallet CA. (2007) The demand for alcohol: a meta-analysis of elasticities. *Austalian Journal of Agriculture and Resource Economics*, 51(2):121-35.
22. Wagenaar AC, Salois MJ, and Komro KA (2009) Effects of beverage alcohol price and tax levels on drinking: a meta-analysis of 1003 estimates from 112 studies. *Addiction*, 104(2):179-90.
23. Wagenaar, A., Tobler, A., & Komro, K. (2010). Effects of alcohol tax and price policies on morbidity and mortality: A systematic review. *American Journal of Public Health*, published online September 23, 2010 at: http://ajph.aphapublications.org/cgi/content/abstract/AJPH.2009.186007v1
24. Wagenaar, A., Maldonado-Molina M., & Wagenaar, B. (2009). Effects of alcohol tax increases on alcohol-related disease mortality in Alaska: Time-series analyses from 1976 to 2004. *American journal of Public Health,* 99:1464-1470. doi:10.2105/AJPH.2007.131326
25. Kerr, W. C. and T. K. Greenfield (2007). "Distribution of alcohol consumption and expenditures and the impact of improved measurement on coverage of alcohol sales in the 2000 National Alcohol Survey." *Alcoholism: Clinical and Experimental Research*, 31(10): 1714-1722.
26. Meier S, Purshouse R, and Brennan A. (2010) Policy options for alcohol price regulation: the importance of modelling population heterogeneity. *Addiction*, 105(3):383-393.
27. Gruenewald, P., Ponicki, W., Holder, H., & Romelsjo, A. (2006). Alcohol prices, beverage quality, and the demand for alcohol: Quality substitutions and price elasticities. *Alcoholism: Clinical and Experimental Research*, 30(1), 96–105.
28. Meier, P., Brennan, A., Purshouse, R., Taylor, K., Raffia, R., Booth, A., O'Reilly, D., Stockwell, T., Sutton, A., Wilkinson, A. and Wong, R. (2008) *Independent review of the effects of alcohol pricing and promotion, Part B. Modelling the Potential Impact of Pricing and Promotion Policies for Alcohol in England: Results from the Sheffield Alcohol Policy Model, Version 2008(1-1)*. University of Sheffield, Sheffield, UK. Report commissioned by the UK Department of Health.
29. Hill-McManus, D., Brennan, A., Stockwell, T., Giesbrecht, N., Thomas, G., Zhao, J., Martin, G. and Wettlaufer, A. (2012) *Model-based appraisal of alcohol minimum pricing in Ontario and British Columbia: A Canadian adaptation of the Sheffield Alcohol Policy Model Version 2*. Technical Report, Centre for Addictions Research of BC, University of Victoria, British Columbia, Canada. See: http://www.carbc.ca/Portals/0/PropertyAgent/558/Files/240/AlcMinPricingOntBC.pdf
30. Murphy, J. and McKillop, J. (2006) Relative Reinforcing Efficacy of Alcohol Among College Student Drinkers. *Experimental and Clinical Psychopharmacology,* 14, No. 2, 219–227.
31. Manning, W.G., Blumberg, L., & Moulton, L.H. (1995). The demand for alcohol – the differential response to price. *Journal of Health Economics*, 14(2), 123-148.
32. Babor, T., Caetano, R., Casswell, S., Edwards, G., Giesbrecht, N., Graham, K., Grube, J., Gruenewald, P., Hill, L., Holder, H., Homel, R., Osterberg, E., Rehm, R., Room R. and Rossow, I. (2010) *Alcohol: no ordinary commodity. Research and public policy*. Revised edition. Oxford (UK): Oxford University Press.

33. Duffy, J. and Cohen, G. (2012) Statistical critique of "Model-based appraisal of alcohol minimum pricing and off-licensed trade discount bans in Scotland using the Sheffield alcohol policy model
(v 2):- second update based on newly available data". Report commissioned by Scotch Whisky Association, Edinburgh, Scotland.

34. Brennan, A., Purshouse, R., Holmes, J. and Meng, Y. (2013) *A public response to the Adam Smith Institute's critique of the Sheffield Alcohol Policy Model*. Sheffield Alcohol Research Group, see: http://www.sheffield.ac.uk/polopoly_fs/1.247802!/file/sargrespadamsmith.pdf .

35. HM Treasury. The Green Book: Appraisal and Evaluation in Central Government. London: TSO; 2011.

36. Stockwell T, Donath S, Cooper-Stanbury M, Chikritzhs T, Catalano P, Mateo C. (2004) Under-reporting of alcohol consumption in household surveys: a comparison of quantity-frequency, graduated-frequency and recent recall. *Addiction*, 99(8):1024-33.

37. Carragher, N. and Chalmers, J. and (2012) *Which way forward? Weighing up the evidence base of pricing and taxation levers to redress alcohol-related harms in Australia*. Drug Policy Modelling Program, National Drug and Alcohol Research Centre, University of New South Wales, Sydney.

38. Thomas G. (2012) *Price policies to reduce alcohol-related harms in Canada: Current context and recommendations for targeted policies*. Ottawa, Ontario: Canadian Centre on Substance Abuse.

39. Stockwell, T., Zhao, J., Macdonald, S., Vallance, K., Gruenewald, P., Ponick, W., Holder, H., & Treno, A. (2011). Impact on alcohol-related mortality of a rapid rise in the density of private liquor outlets in British Columbia: A local area multi-level analysis. *Addiction*, 106(4), 768-776.

40. Stockwell, T., Zhao, J., Martin, G., Macdonald, S., Valance, K., Treno, A., Ponicki, W., Tu, A. and Buxton, J. (2013). Misleading UK alcohol industry criticism of Canadian research on minimum pricing. *Addiction*. http://onlinelibrary.wiley.com/doi/10.1111/add.12178/pdf .

41. Wilmore, J. (2012) UK/CANADA: SWA rejects new report on Canada minimum pricing. Just Drinks, 19 October 2012. See: http://www.just-drinks.com/news/swa-rejects-new-report-on-canada-minimum-pricing_id108497.aspx . Accessed 21 March 2013.

42. Beale, M. (2013) Flawed Measures, 8 February 2013. *The Scotsman* . 2013-02-27. URL:http://www.scotsman.com/news/letters/flawed-measures-1-2779754. Accessed: 2013-02-27. (Archived by WebCite® at http://www.webcitation.org/6EkgkAAVX).

43. The Caterer, Licensee and Hotelier News Group (2013). *New Claims That Increasing The Cost Of Alcohol Saves Lives Are Misleading*. Caterer, Licensee & Hotelier News Group. 2013-02-27. URL:http://catererlicensee.com/new-claims-that-increasing-the-cost-of-alcohol-saves-lives-are-misleading/. Accessed: 2013-02-27. (Archived by WebCite® at http://www.webcitation.org/6EkhBWLFP).

44. Butterworth, T. (2013) *Minimum Pricing, Maximum Confusion: Should Governments Fix The Price Of Booze?* Forbes Magazine, 6 March 2013. See : http://www.forbes.com/sites/trevorbutterworth/2013/03/06/minimum-pricing-maximum-confusion-should-governments-fix-the-price-of-booze/.

45. Griffith, R., Leicester A. and O'Connell, M. (2013) Price-based measures to reduce alcohol consumption. Institute for Fiscal Studies Briefing Note BN 138, March 2013, London, UK, ISBN: 978-1-909463-06-6

46. Ng Fat, L. and Shelton, N. (2012) Associations between self-reported illness and non-drinking in young adults. *Addiction*, doi:10.1111/j.1360-0443.2012.03878.x.

47. Ludbrook A., Petrie D., McKenzie L., Farrar S. Tackling Alcohol Misuse: Purchasing Patterns Affected by Minimum Pricing for Alcohol. *Applied Health Economics and Health Policy* 2012; **10:** 51-63.

48. Collis, J., Grayson, A. & Johal, S. (2010) Econometric Analysis of Alcohol Consumption in the UK. HM Revenue & Customs, London, UK.

49. Power, C., Rodgers , B. And Hope, S. (2002) Heavy alcohol consumption and marital status: disentangling the relationship in a national study of young adults. *Addiction*, 94 (10), 1477-1487.

50. Room, R. (2005) Stigma, social inequality and alcohol and drug use. *Drug and Alcohol Review*, 24 (2), 143-155.

51. Laslett, A., Room, R., Ferris, I., Wilkinson, C., Livingstone, M. and Mugavin, J. (2011) Surveying the range and magnitude of alcohol's harm to others. Addiction, 106, 1603-1611.

52. Graham, K., Plant, M. and Plant, M. (2004) Alcohol, gender and partner aggression: a general population study of British adults. *Addiction Research and Theory,* 12 (4) , 385-401, doi:10.1080/16066350410001717165) .

53. Raistrick, D., Heather, N. and Godfrey, C. (2006) *Review of the effectiveness of treatment for alcohol problems.* National Treatment Agency for Substance Use, London, UK.

54. Stockwell T, Williams N, Pauly B. (2012) Working and waiting: Homeless drinkers responses to less affordable alcohol. *Drug and Alcohol Review*, **31**(6): 823-4.

Institute of Alcohol Studies