ORIGINAL ARTICLE

Relationship Between Price Paid for Off-Trade Alcohol, Alcohol Consumption and Income in England: A Cross-Sectional Survey

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(Received 3 April 2012; in revised form 29 June 2012; accepted 13 July 2012)

Abstract — Aims: In order to examine the potential impact of an increase in the minimum price per unit of alcohol to 50 pence ($0.78), we examined drinking patterns and household incomes of people who purchase alcohol in England at above and below this price. Methods: Cross-sectional survey of 515 members of the public in seven towns and cities in the south of England. The primary outcome was whether the participant had purchased alcohol at <50 p/unit. The main exposures were annual household income and alcohol consumption, measured using the Alcohol Use Disorders Identification Test-Consumption (AUDIT-C). Results: The median price paid per unit of alcohol was 53.1 pence (range 16.4–297.0 pence). Those buying alcohol at <50 p/unit had a mean AUDIT-C score of 6.2 compared with 5.5 among those buying alcohol at above this price. The odds ratio (OR) of a person on low income with high-risk drinking purchasing alcohol at <50 p/unit was 1.29 [95% confidence interval (CI) = 0.82–1.97] compared with all other study participants. The OR of a person on low income with low-risk drinking purchasing alcohol below this price was 0.51 (95% CI = 0.30–0.87) compared with all other participants. Conclusions: These data suggest that an increase in the minimum price of alcohol to 50 pence per unit is only likely to disproportionately affect people on low incomes if their alcohol consumption is excessive.

INTRODUCTION

Concerns have repeatedly been expressed about the impact of excessive alcohol consumption on public health (Rehm et al., 2009; Casswell, 2011). While the levels of alcohol consumption in the UK have fallen slightly in recent years (British Beer and Pub Association, 2010), the average amount consumed per person more than doubled during the second half of the last century (The Academy of Medical Sciences, 2004). Previous studies have repeatedly shown that the relative cost of alcohol and average alcohol consumption are closely linked (Booth et al., 2008). Observational studies have also shown that when the price of alcohol is increased, the levels of consumption fall (Anderson et al., 2009). This has led to the calls from a number of public health organizations and professional bodies for an increase in the price of alcohol to no less than 50 pence ($0.78) per unit (in Britain, one ‘unit’ of alcohol is defined as 10 ml of pure alcohol) (Donaldson, 2009; WHO Regional Office for Europe, 2009; National Institute for Health and Clinical Excellence, 2010; NHS Confederation and Royal College of Physicians, 2010). In response to these calls, the Scottish Government will legislate a minimum price per unit of alcohol at 50 pence (Scottish Government, 2012).

Those opposed to such an increase have argued that raising the price of alcohol would be unfair to people who drink at a level which is not harmful to their health, and have a disproportionate effect on those on low incomes (Poley, 2009; Department of Health, 2010). However, the relationship between alcohol consumption, income and price paid per unit of alcohol has not been fully examined. While it is known that people in households with lower income tend to pay less for the alcohol they buy (Ludbrook, 2010; Leicester, 2011), individual-level data on the relationship between alcohol consumption, income and the amount that people pay for alcohol has not been reported in the British general population.

We therefore conducted a cross-sectional survey of members of the public to examine the relationship between income, alcohol consumption and price paid for off-trade alcohol. We decided to focus on off-trade alcohol bought in shops, as opposed to bars and other on-trade venues, as the off-trade in UK is the main source of low-priced alcohol and the focus of the greatest concern about alcohol pricing (Purshouse et al., 2010). Our primary hypothesis was that people who consumed excessive alcohol would be more likely to pay <50 p/unit for off-trade alcohol than those who do not drink excessively. We selected this price per unit of alcohol to enable us to test the possible impact of UK public health and professional bodies’ recommendation.

METHODS

Study setting

During the first 6 months of 2011, we conducted a cross-sectional survey of members of the public who had recently bought alcohol in a shop for their own consumption, approaching a consecutive sample of people in commercial areas of London, Bristol, Bath, Milton Keynes and three other towns in the South of England. We interviewed them shopping centres, high streets and in the vicinity of supermarkets, off-licences and other shops where alcohol is sold. Interviews were conducted at a range of different times of the day including evenings and weekends. Ethical approval for the study was provided by Imperial College London.

Data collection

Researchers attempted to ask all those who passed them if they would be willing to take part in a short survey of their...
'shopping habits and health'. We interviewed only people who had purchased alcohol for their own use during the previous 7 days, asking about the amount of alcohol and fresh fruit they had bought, the price they paid for these items and whether they considered that the price they had paid was a fair one. Questions on fresh fruit were included in the survey so that we could approach people about ‘shopping habits’ and lifestyle rather than ‘alcohol’ at the point of trying to engage them in the study.

If respondents had bought alcohol on more than one occasion in the last week, we asked for details about their most recent purchase. We used online data on percentage alcohol by volume of beverage products to calculate the number of units of alcohol each participant had purchased. In almost all instances people were able to give detailed information about the drinks they had bought and in most instances they were able to tell us how much they had paid. Some were able to refer to a till receipt for an item they had bought on the same day that the interview took place. In instances when people were not able to give us detailed information about the price paid for alcohol, we asked them to tell us the type of alcohol they bought and the location they had bought it and we then visited these shops to collect these data.

We assessed respondents’ self-reported alcohol consumption using the three-item Alcohol Use Disorder Identification Test-Consumption (AUDIT-C) with a score of five or more indicating excessive alcohol consumption and a score of 10 or more indicating probable alcohol dependence (Bush et al., 1998; Dawson et al., 2005). We concluded by asking each participant about their health, age (by age-band), gender and annual gross household income. We used flash cards for questions about age and income to aid accurate recording on these potentially sensitive matters (Jordan et al., 1980). Annual household income was grouped into £5000 bands below £30,000 per year and in £10,000 bands above this amount.

Sample size and data analysis
When people had bought more than one type of alcoholic drink at the same time, we divided the total number of units purchased by the total amount they spent on that occasion. Our key parameters were whether the participant had paid <50 p/unit of alcohol and whether they consumed excessive alcohol according to the AUDIT-C. We used a cut-off point of £15,000 per annum to indicate those on low incomes, a threshold that has been used in previous studies and government policies (Chouhan et al., 2011; HM Revenues and Customs, 2011).

We estimated that one in four study participants would be drinking excessively (National Institute for Health and Clinical Excellence, 2010) and that 40% of alcohol bought by people who do not drink excessively would be priced at <50 p/unit (Ludbrook, 2010). Using a significance level of 0.05, we estimated that 404 people (101 who drink excessively and 303 who do not) would be required to have 80% power to detect a difference in the proportion of people who bought alcohol at <50 p/unit equivalent to a prevalence ratio of 1.4.

Data were analysed using Statistical Package for the Social Sciences (Version 18) (SPSS, 2006). We used univariate statistics to compare the age, gender, AUDIT-C score and average annual household income of people who bought alcohol at an average of <50 p/unit or an average of 50 pence or more. Next we calculated the median price per unit of alcohol paid by people according to their AUDIT-C score and median annual household income. Finally, we used binary logistic regression to calculate the odds ratio (OR) with 95% confidence intervals (95% CI) of a person purchasing alcohol at <50 p/unit on the basis of AUDIT-C score and annual household income adjusted for age and gender. We used block entry of independent variables to examine whether high-risk drinking (versus low risk), household income (above or below £15,000 per annum), age (above or <30 years old) and gender were associated with purchasing alcohol at <50 p/unit.

RESULTS

Seven researchers collected data from 515 people at 37 sites in London (n = 252, 48.9%), the south-east of England (n = 127, 24.7%) and the south-west of England (n = 136, 26.4%). Two-hundred and fifteen (41.7%) interviews were conducted during working hours and 300 (58.3%) in the evenings or at weekends. Detailed information was not collected from people who agreed to take part in the interview but had not bought alcohol for their own consumption within the previous week. However, we estimate that approximately 4 out of every 10 people asked to take part in the study had bought alcohol for their own use during the last 7 days (see Fig. 1).

The median age band of respondents was 31–40 years; 293 (57.0%) were male (gender of one study participant was not recorded). Twenty-one participants (4.1%) declined to provide information about their annual household income. Of those who gave income information, median annual household income ranged from below £5000 to over £90,000 per annum; 165 (33.4%) reported an annual household income of £15,000 or less. Of the 513 (99.6%) participants who provided complete AUDIT-C data, total scores ranged from 1 to 12; the mean score was 5.8 (SD = 2.6). Higher risk drinkers were more likely to be male than female (72.6% compared with 56.4%, P < 0.001); differences in median age and household income were not found.

A total of 337 (65.7%) respondents were categorized as excessive consumers of alcohol; 49 (9.6%) had an AUDIT-C score of 10 or more indicating probable alcohol dependence. Of the 293 men, 212 (72.6%) were categorized as excessive consumers compared with 124 (56.4%) of the 221 women respondents. The highest rate of excessive consumers was among younger people in the study: 80 (76.2%) were under the age 25. Data from those interviewed in different sites were similar, but differences were seen between those interviewed during and outside normal working hours, with a trend for the latter to report higher levels of alcohol consumption.

The median total spent on alcohol per person in that purchase was £10.00 (range £1.00–£142.31). Three-hundred and eighty-six (75.2%) of 513 people told us that they paid a fair price for the alcohol they had bought. The median price paid per unit of alcohol was 53.1 pence (range 16.4–297.0 pence). Two-hundred and fifteen (41.7%) participants paid an average of <50 p/unit for the alcohol they bought. Characteristics of those paying more or <50 p/unit are
presented in Table 1. The proportion of people buying alcohol at above and <50 p/unit according to household income and AUDIT-C score is illustrated in Fig. 2.

The median price paid per unit for those purchasing alcohol <50 p/unit was 40.0 pence, and the median price paid by those purchasing alcohol at above 50 p/unit was 65.6 pence. The median price per unit paid by higher risk drinkers on low income was 47.8 pence, compared with 55.7 pence among people on low income with lower-risk drinking ($P = 0.003$). The median price per unit paid per unit of alcohol by higher-risk drinkers on more than £15,000 per annum was 53.2 pence, compared with 52.8 pence among people on this level of household income with lower risk drinking (Mann–Whitney two-tailed test $P = 0.75$).

Statistically significant associations between our key parameter (purchasing at <50 p/unit) and household income were not found (see Table 2). However, there was a statistically significant interaction between average annual household income and alcohol consumption ($P = 0.035$), such that the OR of a person on low income (below £15,000 per annum) with high-risk drinking (AUDIT-C score of 5 or more) purchasing alcohol at <50 p/unit adjusted for age and gender was 1.29 (95% CI = 0.82–1.79). The OR of a person on low income with low-risk drinking purchasing alcohol at <50 p/unit was 0.51 (95% CI = 0.30–0.87).

**DISCUSSION**

In this survey of over 500 members of the public in England, we found that people on low incomes who were low-risk drinkers were less likely to purchase off-trade alcohol at <50 p/unit than other study participants. Previous research have used routine data on shopping habits combined with data on alcohol consumption to estimate the impact of policies aimed at increasing the minimum price per unit of alcohol (Meier et al., 2010). Such studies have concluded that such an increase would have the greatest impact on high-risk drinkers who are on lower incomes. However, a lack of individual-level data from people about their income, amount of alcohol they consume, and the price they pay for this has meant that it has not been possible to get a complete picture of who would be most affected by such a policy (Purshouse et al., 2010).

Few previous studies have obtained information from individuals about the price they pay for alcohol for their own consumption. A notable exception to this was the survey conducted by Black et al. (2010) who interviewed 377 people with serious alcohol-related problems in two hospitals in Edinburgh in 2008/2009. People taking part in this survey reported paying an average of 43 pence per unit of alcohol, and an inverse relationship was found between the price paid per unit of alcohol and the total number of units of alcohol consumed per week. The proportion of their purchases that were bought at <50 p/unit was 83%. While this study provided information about the relationship between levels of

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**Table 1. Characteristics of participants purchasing off-trade alcohol at above or <50 p/unit**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Less than 50p (%)</th>
<th>50p or more (%)</th>
<th>Difference in means/ proportions (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: 20 and below</td>
<td>11 (5.1)</td>
<td>16 (5.3)</td>
<td>0.2 (−4.1 to 4.1)</td>
</tr>
<tr>
<td>21–30</td>
<td>53 (24.7)</td>
<td>108 (36.0)</td>
<td>11.3 (3.3–19.0)*</td>
</tr>
<tr>
<td>31–40</td>
<td>38 (17.7)</td>
<td>66 (22.0)</td>
<td>4.3 (−2.8 to 11.0)</td>
</tr>
<tr>
<td>41–50</td>
<td>37 (17.2)</td>
<td>49 (16.3)</td>
<td>−0.9 (−7.6 to 5.5)</td>
</tr>
<tr>
<td>51–60</td>
<td>31 (14.4)</td>
<td>30 (10.0)</td>
<td>−4.4 (−10.5 to 1.2)</td>
</tr>
<tr>
<td>61–70</td>
<td>27 (12.6)</td>
<td>15 (5.0)</td>
<td>−7.6 (−13.0 to 2.7)*</td>
</tr>
<tr>
<td>71 or older</td>
<td>18 (8.4)</td>
<td>16 (5.3)</td>
<td>−3.0 (−7.9 to 1.3)</td>
</tr>
<tr>
<td>Gender: Male (n = 514)</td>
<td>126 (58.9)</td>
<td>167 (55.7)</td>
<td>−3.2 (−11.7 to 5.5)</td>
</tr>
<tr>
<td>Median annual household income (£)</td>
<td>20,000 and 25,000</td>
<td>25,000 and 30,000</td>
<td>5000*</td>
</tr>
<tr>
<td>Proportion on less than £15,000 per annum</td>
<td>77 (37.4)</td>
<td>88 (30.6)</td>
<td>−6.8 (−15.3 to 1.6)</td>
</tr>
<tr>
<td>Mean total AUDIT-C score—mean (SD)</td>
<td>6.2 (2.7)</td>
<td>5.5 (2.5)</td>
<td>0.7*</td>
</tr>
<tr>
<td>Proportion with higher risk drinking</td>
<td>149 (69.3)</td>
<td>188 (63.1)</td>
<td>−6.2 (−14.3 to 2.1)</td>
</tr>
</tbody>
</table>

*P < 0.05 (P-value indicates the statistical significance of differences in mean/median values between those purchasing alcohol at above or <50 p/unit).
drinking and the price paid per unit of alcohol among those with harmful drinking, information on income was not collected. In this new survey of members of the public, participants paid on average 10 pence more per unit of alcohol than those ill drinkers, which despite slight overall price rises in alcohol beverages in the UK from 2008/2009 to 2011, further supports the suggestion that the people who drink the most tend to pay the least for the alcohol they consume (Kerr and Greenfield, 2007). While our data support the view that people on low incomes generally pay less per unit than people on higher incomes, this is seen in heavier, not in lighter, drinkers.

Strengths and weaknesses of the study

This study is the first to collect UK data on price paid for alcohol together with contemporaneous information about alcohol consumption and household income. We examined the impact of an increase the minimum price of alcohol to 50 p/unit, a change which has since been adopted by the Scottish Government (2012). We used a valid and reliable measure of alcohol consumption and were able to collect data from a wide range of people in a large number of different locations and times of the day. However, the study has a number of limitations which need to be considered when interpreting the findings. Firstly, all our data were collected in southern England and we do not know whether these findings would be replicated in other parts of Britain or in other countries. While we attempted to recruit a consecutive sample of members of the public, limited resources meant that many people who could have been included on the days we collected data were not approached. All those collecting data received clear instructions to avoid bias when approaching potential study participants. However, we do not have data on non-participants and cannot rule out the possibility that the way the participants were recruited had an impact on our findings. The level of alcohol use reported by study participants is higher than that reported in epidemiological studies (National Statistics, 2009). The most likely explanation for this is that we restricted our survey to people who had bought alcohol for their own use during the previous 7 days. Most people we approached told us they had not bought alcohol during this period (and so were not included) and it seems likely that such people had lower overall levels of alcohol consumption.

Conclusions and future research

While increasing the price of alcohol is only one of a number of strategies that may help reduce the impact of excessive drinking on public health, available evidence suggests that it may be among the most effective (Room et al., 2005; National Institute for Health and Clinical Excellence, 2010). In the UK, the levels of alcohol consumption may have fallen in recent recession (British Beer and Pub Association, 2010). In addition to reductions in the level of health-related harm that may be associated with this, there are also reports from outside the UK of increasing production of alcohol substitutes and illicit alcohol, which may itself be associated with negative health consequences (Nuzny, 2004; McKee et al., 2005). Although there is little evidence for this phenomena in Britain to date (e.g. Black et al., 2010), prospective studies are needed to examine the impact that rises in price of alcohol may have on all aspects of the health of people on low incomes.

As our data were collected from a convenience sample of members of the public future research should investigate if the relationship between income, alcohol consumption and price paid for alcohol found in this sample is seen in the population as a whole. Nonetheless, these data suggest that concerns that raising the minimum unit price of alcohol would disadvantage people on lower incomes who do not misuse alcohol have been overstated. People on low incomes spend a greater proportion of their income on food and drink (Holcomb et al., 1995), but those on low incomes who already spend 50 pence or more per unit of alcohol would not be affected by an increasing the minimum price of alcohol to this level.

Like politicians, members of the public appear to be divided about whether the price of alcohol should be
increased (Banerjee et al., 2011). Greater public understanding of the health-related harms associated with excessive alcohol use and better information about who buys alcohol at below 50 p/unit may help change attitudes to this potentially powerful public health measure.

Acknowledgements — We are grateful to Prof. Richard Watt for his comments on an early draft of this paper.

AUTHORS’ ROLES

M.J.C. is the principal investigator of the study, had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. M.J.C., R.S. and A.M.H.P. designed the study and together with D.S., A.R.W.W., M.Z.-T., P.M. and A.H. collected study data. B.N., M.J.C., D.S. and M.Z.-T. analysed study data. All study authors contributed to the preparation of this report.

Funding — The project was funded by an educational grant from an Imperial College London.

Conflict of interest statement. None declared.

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