

ANALYSIS

Effect of policy, economics, and the changing alcohol marketplace on alcohol related deaths in England and Wales

The economic downturn and rises in alcohol taxation seem to have stemmed the persistent rise in alcohol related deaths in England and Wales, but **Nick Sheron** and **Ian Gilmore** caution that changes to fiscal policy could see mortality increase once more

Nick Sheron *head of clinical hepatology*,¹, Ian Gilmore *professor*²

¹Clinical and Experimental Sciences Academic Unit, Faculty of Medicine, University of Southampton, Southampton SO16 6YD, UK; ²University of Liverpool, Liverpool, UK

The population consumption theory¹⁻³ links population level alcohol consumption to alcohol related harm, forming a theoretical basis for modern alcohol control policy. As the late Professor Griffith Edwards stated, other things being equal, “the overall level of a population’s drinking is significantly related to the level of alcohol related problems which that population will experience.”² The factors that drive alcohol consumption apply to harmful drinkers as well as low risk drinkers, and alcohol related harm is dose related, at both individual and population levels.

According to HMRC duty and tax receipts, UK alcohol sales increased from around 400 million litres in the early 1980s, peaking at 567 million litres in 2008, an increase of around 42%, since when they have declined (fig 1).⁴⁻⁶ During this time alcohol related deaths in England and Wales tripled from 2314 in 1980, to 7312 by 2008, with most deaths being liver related (fig 2). The way alcohol is sold and the types of alcohol consumed have also changed over this period.

Patterns of consumption are known to be related to price. Mathematical coefficients, termed “elasticities,” linking the consumption of alcohol to price and taxation are used by the Treasury to model fiscal policy¹¹ and by the drinks industry to lobby the Treasury.¹² Further coefficients link alcohol related mortality and morbidity to consumption and price, and are central to the modelling of alcohol policy by the Organisation for Economic Cooperation and Development (OECD), World Health Organization, and the UK government.¹³⁻¹⁷

The population consumption theory suggests that alcohol related deaths have increased as a direct result of an increase in alcohol consumption. We examine whether the changes in population level alcohol consumption and the trends in alcohol related deaths over the past few decades are consistent with the population consumption theory.

Economic cost of alcohol

The most recent systematic review quoted by the OECD¹⁸ estimated the economic cost for alcohol at 2.6% of gross domestic product (GDP) in high income countries. This equates to £50bn (€62bn; \$71bn) a year in the UK.¹⁹⁻²⁰ In 2004 the UK government estimated a cost of £20bn (1.3% of GDP),²¹ and the true value probably lies somewhere between the two estimates. Excise duties brought an income of £10.5bn in 2014-15²² and there were 29.7 million taxpayers,²³ giving an estimated net overall cost for alcohol related harm to each UK taxpayer of between £9 and £25 each week.

Changing nature of UK drinks industry

In marketing terminology sales of any product are driven by the four Ps—place, product, promotion, and price—and all these factors have changed considerably. Numbers of on-sales (pubs, etc) licences increased from 131 000 in 1980, to 148 000 in 2012; off licences increased from 42 000 to 56 000 and consumption shifted from pubs to alcohol bought to be consumed at home.⁴ The nature of the product changed as sales of weaker draught beers decreased and sales of strong lager and cider increased. Furthermore, as a wartime generation of whisky drinkers passed away, the spirits industry shifted its target demographic to a younger audience, introducing “alcopops.”²⁴⁻²⁶ Consumption of spirits and alcopops by children aged 10-15 increased fourfold, followed a few years later by a huge increase in sales of vodka and related spirits (fig 3).²⁹ Wine consumption also rose as a result of cultural globalisation and the increased marketing and availability as supermarkets became the major alcohol retailers.³⁰⁻³¹ Overall, the trends in alcohol related deaths coincide with trends in consumption of cider, wine, and to some extent white spirits and strong lager, and are consistent with the population consumption theory (fig 4).

Who drinks the alcohol—the Pareto principle

The corporate global drinks industry likes to frame alcohol related harm as a minority problem affecting a small group of “alcoholics” who are unable to control their drinking. The population consumption theory represents an inconvenient truth and on the whole the industry refuses to accept the evidence that links price to consumption and harm.^{34 35} But another economic fundamental is relevant to the alcohol marketplace—the Pareto principle or 80:20 rule,³⁶ which states that 20% of highest consumers consume around 80% of any product. Combined data from the 2011-13 Health Surveys for England show how the principle applies to the alcohol market (table 1⇓).

Harmful and extreme drinkers comprise a tiny minority, 4.4% of the population, but consume one third of all alcohol sold; the combination of hazardous, harmful, and extreme drinkers provides almost 70% of drinks industry sales by volume. The drinks industry uses its influence on government to protect this market.^{12 34} This has brought about remarkable changes in affordability—as the '90s economy boomed and wages increased, taxation of alcohol was reduced in real terms. By 2008 it was possible to buy almost four bottles of vodka for the price of one bottle in 1980—and four bottles represents the weekly alcohol consumption of an average patient presenting with alcohol related liver cirrhosis.³⁸ As the affordability of stronger alcohol increased, so did liver and related mortality (fig 5⇓).

Coincident trends cannot prove a causal link between alcohol affordability, consumption, and mortality, but they are entirely consistent with the consumption theory and suggest how the epidemic of alcohol related harm is likely to have come about. There is a wealth of other evidence for such a causal relation—most recently brought together by the 2015 OECD report.¹⁸ It also seems likely that the shift to stronger alcohol favoured by heavy drinkers may have amplified the effect on mortality. Most governments recognise this and tax alcohol differentially, with higher tax levies for stronger alcohol. Specific drinks preferences are strongly linked to culture, drinking patterns, and other confounders, and international evidence provides no clear verdict on the link between stronger alcohol and harmful consequences.^{40 41}

Changing economic environment and peak in alcohol related deaths

The Lancet Liver Commission identified alcohol consumption as the main factor behind the increase in liver disease mortality and set a goal to bring deaths back down to 1980s levels by 2030.⁴² If the ongoing year on year increase in alcohol related deaths had continued, linear extrapolation of the trend suggests there would have been 11 400 deaths a year by 2030, with a cumulative total of 150 000 deaths from 2016 onwards.⁴³ But alcohol related deaths peaked in 2008 (fig 5⇓), and if current patterns continue there may be around 50 000 fewer deaths than expected.

The inflexion in deaths and subsequent levelling off coincided with the banking collapse and worldwide economic recession, and this together with the new mood of austerity may have affected drinking behaviours. Another potentially important factor was a 2% above inflation escalator in alcohol duty introduced by the Treasury in 2008. This policy went largely unnoticed by the general public, perhaps because budgets have generally been associated with increases in duty on cigarettes

and alcohol.⁴⁴ The escalator survived a change in government and the economic downturn and has had a substantial effect on the affordability of alcohol. From 2007-08 onwards the affordability of wine fell by 54%, spirits 50%, cider 27%, and beer 22%, whereas household incomes fell by only 9.5%, suggesting that of the various economic factors influencing alcohol consumption, the 2% duty escalator had the greatest effect (fig 5⇓).

It may be surprising that changes in alcohol affordability could have a rapid effect on alcohol related deaths; it can take 10 years or more of very heavy drinking to develop liver cirrhosis. But this is exactly what would be predicted from experience in other countries. When the minimum price of alcohol increased by 10% in a Canadian province, a 32% decrease in directly attributable alcohol related mortality occurred within 12 months, and most deaths were from liver disease.⁴⁵ Similarly, when Mikhail Gorbachev introduced alcohol reform in Russia in the 1980s, the maximum impact on mortality occurred within 18 months, including for liver disease.⁴⁶ Alcohol related liver deaths occur from acute-on-chronic liver failure related to the severity of recent drinking.

Directly attributable deaths are easily measured but comprise only around one third of total alcohol related mortality—the remaining partially attributable deaths occur as a result of hypertension, stroke, cancer, and other causes and cannot be directly tracked. So although directly attributable deaths decreased by around 600 each year, the fall in total alcohol related deaths may have been nearer 2400 each year.^{47 48} The proportion of this decrease that might be related to the 2% duty escalator compared with other factors is not known.

Though the causative link between this changing trajectory of alcohol related deaths and economic factors remains unproved, the deaths are clearly alcohol related (fig 2⇓) and occur in people drinking very large quantities of the cheapest alcohol available; the median alcohol consumption of patients with alcohol related cirrhosis is around 120 units/week, and in other dependent drinkers it is even higher.^{38 49} There have been no important developments in treatment or disease coding over this period, and we are not aware of any clinical or environmental factor that could account for the change in 2008. In any natural experiment there are always potential confounders and unknown factors, but on balance, we believe that economic factors are the most likely cause of the change.

Testing the theory

Our hypothesis is testable because the economic factors no longer operate. Incomes are starting to rise, and following a fierce campaign of lobbying by the Wine and Spirits Trade Association (WSTA) the duty escalator was dropped in 2014. In the budget of March 2015 alcohol duty was cut by a further 2% for spirits and cheap cider.³⁸ An influential Ernst and Young impact analysis commissioned by WSTA omitted to mention any of the economic costs of alcohol related harm outlined by the OECD¹² but appeared to persuade the Treasury that the health of the drinks industry was more important than that of alcohol consumers. Support for the “drop the duty” campaign came from unlikely sources; Jane Ellison, undersecretary of state for public health, was featured on the front page of drinks industry website Harpers.co.uk stating that she had forwarded a “drop the duty” email in support of the duty reduction to the chancellor of the exchequer.⁵⁰

Threshold or minimum unit pricing is a fiscal policy that is exquisitely targeted at heavy problem drinkers who consume large quantities of the cheapest alcohol.³⁸ Although the

legislation was passed by the Scottish government and the bill signed by the Queen, it was held up by a legal challenge from the drinks industry. A recent verdict from the European Court of Justice ruled in favour of minimum pricing provided that the Scottish government can show that it is more effective than fiscal alternatives.^{51 52} This could lead to an interesting and unusual situation whereby cheap alcohol is constrained by minimum pricing in Scotland, perhaps swiftly followed by the Ireland, Northern Ireland, and Wales, all of which have unveiled plans for minimum unit pricing legislation.⁵³⁻⁵⁵ but remains unrestrained in England, where incomes are likely to outstrip changes in alcohol taxation. If the population consumption theory holds we predict that alcohol related deaths will decrease in the devolved nations, but in England the relentless rise is likely to resume as incomes outstrip rises in taxation.

Contributors and sources: NS and IG are academic hepatologists who have studied and published extensively on public health aspects of alcohol related harm and liver disease. The rationale for this article was to put the trends in alcohol related harm in the context of changes in the alcohol marketplace which in turn have been driven by changes in fiscal policy. All data sources are in the public domain.

Competing interests: We have read and understood BMJ policy on declaration of interests and declare SH has received research grants from British Liver Trust, Alcohol Education Research Council, and various other funding bodies. He has undertaken paid consultancy work and received travelling expenses from pharmaceutical companies developing drugs for the treatment of inflammatory bowel disease, liver disease, and viral hepatitis and been paid for medicolegal work in the area of hepatitis C and alcohol related liver disease. He is a clinical adviser to Public Health England, a scientific adviser to European Public Health Alliance, and Royal College of Physicians representative on EU Alcohol Policies, EU Alcohol Forum, Alcohol Health Alliance UK, UK Department of Health, Home Office, Department of Transport, NICE, Southampton City Council, British Liver Trust, EASL, BASL, and BSG. IG is chair of the Alcohol Health Alliance UK.

Provenance and peer review: Not commissioned; externally peer reviewed.

- Bruun K. Alcohol control policies in public health perspective. Alcohol Research Documentation, 1975.
- Edwards G. Alcohol policy and the public good. *Addiction* 1997;92(Suppl 1):S73-9. doi: 10.1111/j.1360-0443.1997.tb03399.x pmid:9167291.
- Academy of Medical Sciences. Calling time—the nation's drinking as a major health issue. AMS, 2004.
- British Beer and Pub Association. Statistical handbook. BPPA, 2013.
- British Beer and Pub Association. Statistical handbook. BPPA, 2009.
- HMRCA. Alcohol clearance data. 2015. <https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutyBulletins.aspx>
- ONS. Defining alcohol related deaths. 2006. <http://www.ons.gov.uk/ons/about-ons/get-involved/consultations/user-surveys/defining-alcohol-related-deaths---discussion-document.pdf>
- Office for National Statistics. 20th century mortality files. 2016. <http://www.ons.gov.uk/ons/re/subnational-health/1/the-20th-century-mortality-files/index.html>
- Office for National Statistics. Recent trends in alcohol related mortality and the impact of ICD-10 on the monitoring of these deaths in England and Wales. *Health Stat Q* 2003;17.
- Office for National Statistics. Reference tables. 2016.
- Huang CD. Econometric models of alcohol demand in the United Kingdom. Government Economic Service Working Paper 2003;140:1-51.
- Ernst and Young. The Wine and Spirit Trade Association economic impact assessment December 2013. Ernst and Young, 2015.
- OECD. Tackling harmful alcohol use: economics and public health policy. 2015.
- Chisholm D, Doran C, Shibuya K, Rehm J. Comparative cost-effectiveness of policy instruments for reducing the global burden of alcohol, tobacco and illicit drug use. *Drug Alcohol Rev* 2006;25:553-65. doi:10.1080/09595230600944487 pmid:17132573.
- Holmes J, Meng Y, Meier PS, et al. Effects of minimum unit pricing for alcohol on different income and socioeconomic groups: a modelling study. *Lancet* 2014;383:1655-64. doi:10.1016/S0140-6736(13)62417-4 pmid:24522180.
- Holmes J, Guo Y, Maheswaran R, Nicholls J, Meier PS, Brennan A. The impact of spatial and temporal availability of alcohol on its consumption and related harms: a critical review in the context of UK licensing policies. *Drug Alcohol Rev* 2014;33:515-25. doi:10.1111/dar.12191 pmid:25186193.
- Meng Y, Brennan A, Holmes J, Hill-McManus D, Angus C, Purshouse R. Modelled income group—specific impacts of alcohol minimum unit pricing in England 2014/15: policy appraisals using new developments to the Sheffield alcohol policy model (v2.5). University of Sheffield, 2013.
- OECD. Tackling harmful alcohol use: economics and public health policy. OECD, 2015.
- Rehm J, Mathers C, Popova S, Thavorncharoensap M, Teerawattananon Y, Patra J. Global burden of disease and injury and economic cost attributable to alcohol use and alcohol-use disorders. *Lancet* 2009;373:2223-33. doi:10.1016/S0140-6736(09)60746-7 pmid:19560604.
- International Monetary Fund. World economic outlook database. 2016. <http://www.imf.org/external/pubs/ft/weo/2015/01/weodata/index.aspx>
- Prime Minister's Strategy Unit. Alcohol harm reduction strategy. 2004.
- HM Revenue and Customs. Alcohol duty bulletin. 2016 <https://www.uktradeinfo.com/Statistics/Pages/TaxAndDutyBulletins.aspx>
- HM Revenue and Customs. Number of individual income taxpayers. 2015. <https://www.gov.uk/government/statistics/number-of-individual-income-taxpayers-by-marginal-rate-gender-and-age>
- Hastings G, Sheron N. Alcohol marketing to children. *BMJ* 2011;342:d1767.
- Hastings G, Sheron N. Alcohol marketing: grooming the next generation: children are more exposed than adults and need much stronger protection. *BMJ* 2013;346:f1227. doi: 10.1136/bmj.f1227 pmid:23449659.
- Hastings G, Anderson S, Cooke E, Gordon R. Alcohol marketing and young people's drinking: a review of the research. *J Public Health Policy* 2005;26:296-311. doi:10.1057/palgrave.jph.3200039 pmid:16167558.
- Health and Social Care Information Centre. Smoking, drinking and drug use among young people in England. 2015. <http://www.hscic.gov.uk/searchcatalogue?q=title%3A%22smoking+drinking+and+drug+use%22&area=&size=10&sort=Relevance>
- British Beer and Pub Association. Statistical handbook. BPPA, 2008.
- Moshier JF. Joe Camel in a bottle: Diageo, the Smirnoff brand, and the transformation of the youth alcohol market. *Am J Public Health* 2012;102:56-63. doi:10.2105/AJPH.2011.300387 pmid:22095339.
- Anderson K, Norman D. *Global wine production, consumption and trade; a statistical compendium*. Centre for International Economic Studies, 2001.
- Anderson K. *The world's wine markets: globalization at work*. Edward Elgar, 2004;doi:10.4337/9781845420765.
- Office for National Statistics. Mortality statistics: deaths registered in England and Wales (Series DR). ONS, 2012.
- Williams R, Aspinall R, Bellis M, et al. Addressing liver disease in the UK: a blueprint for attaining excellence in health care and reducing premature mortality from lifestyle issues of excess consumption of alcohol, obesity, and viral hepatitis. *Lancet* 2014;384:1953-97. doi:10.1016/S0140-6736(14)61838-9 pmid:25433429.
- House of Commons Health Committee. Alcohol—written evidence 2010. <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmhealth/151/15119.htm>.
- Moodie R, Stuckler D, Monteiro C, et al. Lancet NCD Action Group. Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries. *Lancet* 2013;381:670-9. doi:10.1016/S0140-6736(12)62089-3 pmid:23410611.
- Habel C, Rungie C, Lockshin L, Spawton T. The Pareto effect (80:20 rule) in consumption of beer, wine and spirits: a preliminary discussion. Wine Marketing Research Group, 2008.
- National Centre for Social Research, University College London, Department of Epidemiology and Public Health. Health Survey for England, 2011-13 [data collection]. UK Data Service. SN:7260.
- Sheron N, Chilcott F, Matthews L, Challoner B, Thomas M. Impact of minimum price per unit of alcohol on patients with liver disease in the UK. *Clin Med (Lond)* 2014;14:396-403. doi:10.7861/clinmedicine.14-4-396 pmid:25099842.
- Health and Social Care Information Centre. Statistics on alcohol. 2012. <http://www.hscic.gov.uk/pubs/alcohol12>
- Kerr WC, Fillmore KM, Marvy P. Beverage-specific alcohol consumption and cirrhosis mortality in a group of English-speaking beer-drinking countries. *Addiction* 2000;95:339-46. doi:10.1046/j.1360-0443.2000.9533394.x pmid:10795350.
- Rehm J, Gmel G, Sempos CT, Trevisan M. Alcohol-related morbidity and mortality. *Alcohol Res Health* 2003;27:39-51. pmid:15301399.
- Williams R, Aspinall R, Bellis M, et al. Addressing liver disease in the UK: a blueprint for attaining excellence in health care and reducing premature mortality from lifestyle issues of excess consumption of alcohol, obesity, and viral hepatitis. *Lancet* 2014;384:1953-97. doi:10.1016/S0140-6736(14)61838-9 pmid:25433429.
- Sheron N, Hawkey C, Gilmore I. Projections of alcohol deaths—a wake-up call. *Lancet* 2011;377:1297-9. doi:10.1016/S0140-6736(11)60022-6 pmid:21334738.
- House of Commons Health Committee. Alcohol: first report of session 2009-10. Stationery Office, 2010.
- Zhao J, Stockwell T, Martin G, et al. The relationship between minimum alcohol prices, outlet densities and alcohol-attributable deaths in British Columbia, 2002-09. *Addiction* 2013;108:1059-69. doi:10.1111/add.12139 pmid:23398533.
- Nemtsov AV. Alcohol-related human losses in Russia in the 1980s and 1990s. *Addiction* 2002;97:1413-25. doi:10.1046/j.1360-0443.2002.00262.x pmid:12410782.
- Jones L, Bellis MA, Dedman D, Sumnall H, Toque K. Alcohol attributable fractions for England; alcohol attributable mortality and hospital admissions. North-West Public Health Observatory and Department of Health, 2008.
- Jones L, Bellis MA. Updating England-specific alcohol-attributable fractions. Centre for Public Health, John Moores University, 2013.
- Black H, Gill J, Chick J. The price of a drink: levels of consumption and price paid per unit of alcohol by Edinburgh's ill drinkers with a comparison to wider alcohol sales in Scotland. *Addiction* 2011;106:729-36. doi:10.1111/j.1360-0443.2010.03225.x pmid:21134019.
- Siddle R. MPs back Drop the Duty campaign by taking trade's duty call to Chancellor. *Harpers* 2015 Feb 11. <http://www.harpers.co.uk/news/mps-back-drop-the-duty-campaign-by-taking-trades-duty-call-to-the-chancellor/513472-article>
- European Court of Justice. The Scotch Whisky Association and Others v The Lord Advocate, The Advocate General for Scotland. 2015.
- Judgement in case C-333/14 Scotch Whisky Association and Others v Lord Advocate. 2016. <http://curia.europa.eu/jcms/upload/docs/application/pdf/2015-12/cp150155en.pdf>.
- Ireland unveils minimum alcohol price plan to reduce drinking. 10 Dec 2015. <https://www.euractiv.com/section/health-consumers/news/ireland-unveils-minimum-alcohol-price-plan-to-reduce-drinking>.
- Moriarty G. Minimum alcohol pricing planned for the North. *Irish Times* 2014 Dec 3. www.irishtimes.com/news/ireland/irish-news/minimum-alcohol-pricing-planned-for-the-north-1.2023349.
- Welsh Government. New plans for a minimum unit price for alcohol in Wales will save lives—Vaughan Gething, 15 Jul 2015. <http://gov.wales/newsroom/healthandsocialcare/2015/alcohol/?lang=en>

Accepted: 29 03 2016

Key messages

Alcohol related deaths between 1980 and 2008 in England and Wales increased threefold, probably driven by the increased affordability and availability of strong alcohol

Harmful and hazardous drinkers consume around 70% of all alcohol sold

Alcohol related deaths peaked in 2008 and have declined slightly since

This change is likely to be due to economic factors affecting alcohol consumption of heavy drinkers— the recession and 2% duty escalator

Published by the BMJ Publishing Group Limited. For permission to use (where not already granted under a licence) please go to <http://group.bmj.com/group/rights-licensing/> permissions

Table

Table 1| Alcohol consumption recorded in 2011-13 Health Surveys for England³⁷

	Alcohol risk grade (cut-off weekly units for women/men)					Total
	None	Low risk ≤14/21	Hazardous >14/21	Harmful >35/50	Extreme ≥75	
No (%) of respondents	4488 (18)	15 583 (62)	3899 (16)	787 (3.1)	317 (1.3)	25 074 (100)
Total (%) weekly consumption (units)						
Normal cider/lager/beer	—	33 661 (33.1)	39 470 (38.8)	15 096 (14.8)	13 438 (13.2)	101 666
Strong cider/lager/beer	—	2 173 (18)	3 356 (27.8)	2 527 (20.9)	4 022 (33.3)	12 079
Spirits	—	12 773 (34.4)	14 173 (38.2)	5 255 (14.2)	4 894 (13.2)	37 096
Sherry	—	1 252 (57.6)	564 (25.9)	203 (9.4)	154 (7.1)	2 173
Wine	—	33004 (28.4)	46 937 (40.5)	19 000 (16.4)	17 079 (14.7)	116 021
Alcopops	—	1 481 (41.3)	1 134 (31.6)	546 (15.2)	422 (11.8)	3 584
All alcohol	—	84 345 (30.9)	10 5634 (38.7)	42 629 (15.6)	40 010 (14.7)	272 618

Figures

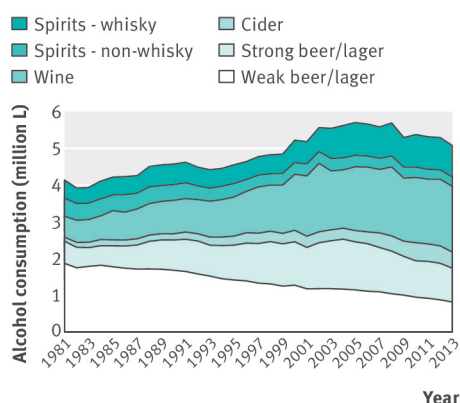


Fig 1 Cumulative consumption of alcohol in England and Wales. Consumption of beer and lager is split between weak and strong beverages with a cut-off around 4.2^{4,5}

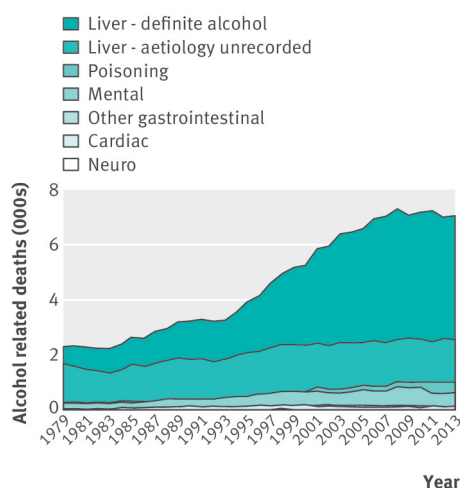


Fig 2 Cumulative alcohol related deaths for England and Wales⁷⁻¹⁰

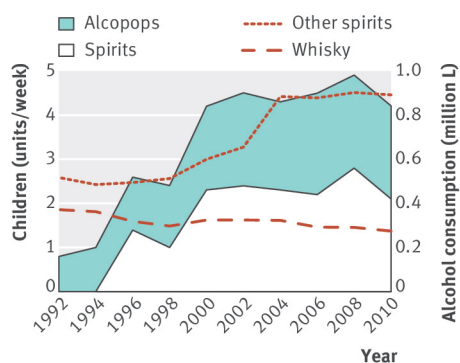


Fig 3 Mean weekly consumption of spirits and alcopops by children aged 10-15 (cumulative) and overall UK sales of spirits after introduction of alcopops in 1994^{4,28}

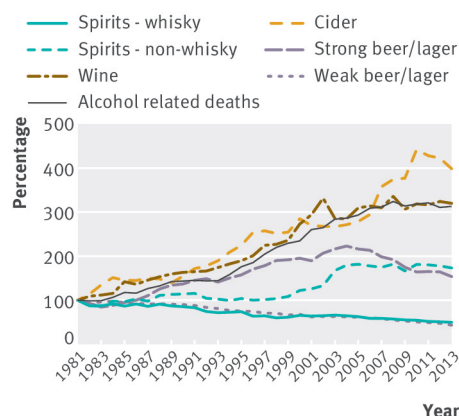


Fig 4 Alcohol related deaths in England and Wales and consumption of specific types of alcohol (UK HMRC receipts) normalised to 100% in 1980. Consumption of beer and lager is split between weak and strong beverages with a cut-off around 4.2%. Consumption of wine, cider, strong beer/lager, and other spirits was independently associated with alcohol related mortality in a linear regression model (R^2 0.99, $P < 0.001$)⁴⁻³³

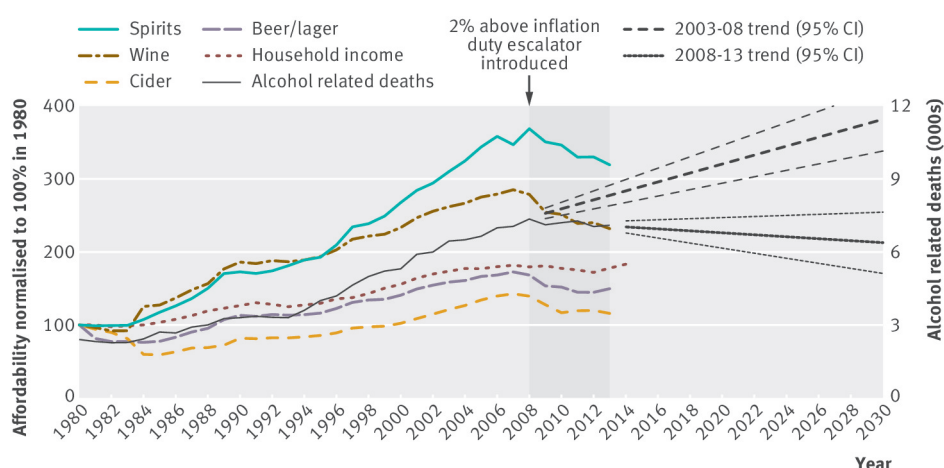


Fig 5 Alcohol related deaths in England and Wales, household income, and affordability of different alcohol types (income and affordability normalised to 100% in 1980), with two mortality extrapolations to 2030⁶⁻³⁹