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Trends in alcohol-specific deaths in England, 2001–22: an observational study

Melissa Oldham, Sarah Jackson, Jamie Brown, Vera Buss, Gautam Mehta, Jennifer Beam Dowd, John Holmes, Colin Angus

Summary

Background Following the COVID-19 pandemic, many countries saw large increases in rates of alcohol-specific deaths, including England. This study aimed to examine whether there have been changes in the characteristics of those dying by specific cause of death, age, sex, and area-level deprivation.

Methods Using annual mortality data in England published by the Office for National Statistics, we describe the prevalence and 95% CI of age-standardised rates of alcohol-specific deaths overall and by age, sex, area-level deprivation measured by quintiles of the Index of Multiple Deprivation (IMD), and cause of death between 2001 and 2022. We also compared demographic profiles of those dying before the COVID-19 pandemic (2017–19) and after (2020–22); calculated crude absolute differences in rates and relative rate ratios across age, sex, and IMD; and used a multivariable Poisson regression model to calculate the rate ratio and adjusted absolute differences for deaths by IMD quintile for each period, adjusting for age and sex.

Findings Age-standardised rates of alcohol-specific deaths in England remained largely unchanged until 2019, before rising sharply by 19·4% in 2020 and continuing to rise by a further 13·5% to the highest level on record in 2022: 14·7 (95% CI 14·4–15·0) per 100 000 people. There were few relative demographic changes in alcohol-specific mortality between 2017–19 (pre-pandemic) and 2020–22 (after the start of the COVID-19 pandemic) because the largest absolute increases in alcohol-specific mortality were seen among groups that had the highest pre-pandemic rates, including men (absolute rate increase, 3·87; relative increase, 25·9%) and those from areas of higher deprivation (absolute rate increase, 4·72; relative increase, 22·5%). When examining causes of deaths, the largest absolute increase was in alcohol-related liver disease (2·37; relative increase, 27·2%), with the largest relative increase in acute causes (absolute rate increase, 0·49; relative increase, 35·4%), although these accounted for a smaller proportion of deaths compared to alcohol-related liver disease. There was little to no change in deaths from alcohol dependence syndrome (absolute rate increase, 0·02; relative increase, 5·8%).

Interpretation Alcohol-specific deaths in England remain high and increased after the COVID-19 pandemic. Policies should aim to reduce rates of alcohol consumption at the population level. Substantial investment is also required to facilitate early detection of liver disease and effective treatment.

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Introduction

Globally, alcohol is a leading risk factor for illness, disability, and premature death.[1] Following the onset of the COVID-19 pandemic in 2020, many countries have seen large increases in alcohol-related deaths. A study examining data from 19 European countries found an 18% increase in alcohol-attributable mortality (deaths wholly or partially caused by alcohol) between 2019 and 2021.[2] Studies have also found increases in rates of alcohol-specific deaths (deaths wholly caused by alcohol) in Germany[3] and the USA.[4] Estonia, Latvia, and Lithuania have had particularly large increases in alcohol-specific deaths.[5] In the UK, alcohol-specific deaths rose sharply in 2020 following the COVID-19 pandemic, and then rose again in 2021 and 2022, to their highest point on record. In 2022 there were 10 048 registered deaths from alcohol-specific causes in the UK, a 32·8% increase relative to 2019.[6] However, there is little understanding of how this rapid increase in deaths has changed the demographic characteristics of those dying. Examining these changes could inform targeted policies to reduce future excess deaths. Here, we characterise trends in alcohol-specific deaths in England between 2001 and 2022 and examine changes in the composition of those dying in terms of specific cause of death, and their age, sex, and area-level deprivation.

The COVID-19 pandemic and accompanying lockdown policies were associated with polarised drinking trends in many countries, with light drinkers reducing their drinking and heavy drinkers drinking more.[2,7] In England, about a quarter of drinkers reported increases in alcohol consumption in the early stages of the pandemic, with an equivalent proportion of drinkers drinking less. Increases in alcohol consumption seemed to be more

Research in context

Evidence before this study

We searched PubMed using the search terms ((“alcohol specific deaths”) OR (“alcohol attributable deaths”) OR (“alcohol-attributable deaths”) OR (“alcohol attributable mortality”) OR (“alcohol-attributable mortality”)) AND (“COVID-19”) for articles published from Jan 1, 2020, to Jan 21, 2025, restricting to publications written in English. This search returned 109 articles. These were mostly epidemiological studies, examining changes in health outcomes such as deaths due to alcohol or other substances, alongside overall incidences of cancer, liver disease, and coronary heart disease following the COVID-19 pandemic. Following the onset of the COVID-19 pandemic in 2020, many countries have seen large increases in rates of alcohol-specific deaths, including Germany, Estonia, Latvia, Bulgaria, Australia, the USA, and England. However, little is known about the demographic characteristics of those dying. Understanding who is most at risk and from which types of alcohol-specific deaths could inform targeted policies to reduce future excess deaths.

Added value of this study

Few previous studies examined changes in the characteristics of those dying post-pandemic, and no studies we are aware of presented these data for England. The age, sex, and area-level deprivation of those dying from alcohol-specific causes showed few relative changes between 2017 and 2022 in England. The largest absolute increases occurred in groups experiencing the most harm pre-pandemic, including men and those from areas of high deprivation. This pattern of changes means there have been absolute increases in inequalities in alcohol-specific deaths, while relative inequalities remain entrenched. Increases in alcohol-specific deaths seemed to be driven by large absolute increases in deaths caused by alcohol-related liver disease. There was also a relative increase in acute causes, with little to no change in deaths attributed to alcohol dependence syndrome.

Implications of all the available evidence

Together, these studies show there is an acute crisis of alcohol-specific deaths in many countries following the COVID-19 pandemic, which appears to be particularly acute and sustained in England and the USA. Urgent policy action is required to prevent further excess deaths and address inequalities. Effective policy intervention is required to reduce rates of alcohol consumption at a population level and particularly among groups at greater risk. Given that increases in deaths in England are driven mostly by alcohol-related liver disease, substantial investment is also required to increase and improve service provision for patients with alcohol-related liver disease.

likely among those with other risk factors, including socioeconomic disadvantage and poor mental health.[7,8] Increased alcohol use can lead to elevated short-term mortality in patients with established alcohol-attributable conditions.[9] Patients with alcohol-related liver disease in particular have a markedly increased risk of death with any ongoing alcohol consumption.[10] Moreover, this already elevated risk of mortality due to increased drinking might have been amplified by reduced treatment seeking and reduced access to health, alcohol, and mental health support services throughout the pandemic.[11]

There were also demographic differences in changes in alcohol consumption observed throughout the COVID-19 pandemic. In the early stages of the pandemic in 2020, increased alcohol consumption was associated with being younger,[12] female,[12] and experiencing financial stress.[7] Furthermore, increases in alcohol consumption that occurred in 2020 have been largely maintained until at least 2023 among less socioeconomically advantaged drinkers, while mean weekly consumption has declined among more advantaged drinkers since the increase in the early stages of the pandemic.[13] This discrepancy in trends led to convergence in 2023 in terms of weekly alcohol consumption among both more and less advantaged drinkers, when this was previously higher among more advantaged drinkers.[13] This is particularly important as people from less advantaged social grades were more likely to experience alcohol-related harm and mortality before the pandemic, despite drinking less.[14]

Most studies of changes in alcohol-related outcomes during the COVID-19 pandemic have primarily examined alcohol consumption. Consequently, there is little knowledge about changes in the specific groups experiencing increased alcohol-specific mortality. Given consumption trends[13] during and following the pandemic we might expect alcohol-specific deaths to have become more concentrated in those from areas of high deprivation, further widening pre-existing inequalities.

This study first aimed to describe time trends between 2001 and 2022 in age-standardised rates of alcohol-specific deaths, overall and by cause of death, age, sex, and area-level deprivation. The second aim was to examine absolute and relative changes in the demographic profile of those dying immediately before the COVID-19 pandemic (2017–19; pre-pandemic period) and those dying after the onset of the pandemic (2020–22; post-pandemic period). Those dying in the pre-pandemic and post-pandemic periods were compared in terms of age, sex, and area-level deprivation.

Methods

Study design and participants

In this observational study, we analysed population mortality rates in England between 2001 and 2022. The protocol was pre-registered on the Open Science Framework repository. We used annual mortality data for England published by the Office for National Statistics (ONS).[6] These data are derived from the information

For the **trial protocol** see https://osf.io/tmvkc

provided when deaths are certified and registered. Ethics approval and informed consent from participants was not required for this study, as we used publicly available death rates from national statistics and no individual-level data.

Procedures

We used the standard definition of alcohol-specific deaths, as used by the ONS. This is defined as deaths registered on the death certificate as having an underlying cause that is wholly attributable to alcohol. Causes of death were defined using ICD-10 codes.[15]

We initially described trends in overall alcohol-specific deaths before categorising alcohol-specific deaths into cause of death, sex, age, and area-level deprivation. Cause of death was categorised as chronic causes (further differentiating between alcohol-related liver disease [ICD-10: K70], alcohol dependence syndrome [ICD-10: F10.2], and acute causes [ICD-10: F10.0, R78.0 X45, X65, Y15]). This categorisation was used in a previous examination of the effect of minimum unit pricing on alcohol deaths in Scotland.[16] Sex was categorised as male versus female. For age, we used 10-year age bands, from 20–29 years to 90 years and older. Area-level deprivation was measured using quintiles of the English Index of Multiple Deprivation (IMD),[17] a small-area composite measure of deprivation, defined on the basis of the home postcode of the deceased.

To calculate rates, population denominators were taken from the relevant mid-year population estimate (matched to each year of data) published by the ONS. Age-standardised rates were calculated using direct standardisation and the 2013 European Standardised Population.[18] Age-specific and sex-specific population estimates for each IMD quintile were derived by mapping Lower layer Super Output Area (LSOA)-level population estimates to the IMD rank of each LSOA and aggregating up to IMD quintiles across the whole of England. IMD scores are revised every 3–5 years and population estimates for each year were therefore mapped to the nearest available IMD iteration (appendix p 2).

Outcomes

Outcomes were time trends in alcohol-specific deaths between 2001 and 2022 and the demographic characteristics of those dying pre-pandemic and post-pandemic.

Statistical analysis

Regarding time trends in alcohol-specific deaths, we plotted and tabulated age-standardised rates of alcohol-specific deaths (with 95% CIs) in each year between 2001 and 2022, overall and separately by age, sex, IMD quintile, and cause of death. We then compared the demographic profiles of those dying of alcohol-specific causes in the UK in the pre-pandemic period (2017–19) and post-pandemic period (2020–22). We selected the period immediately before the pandemic to examine changes, as opposed to using data from 2001, as it is possible that changes occurred between 2001 and 2017. Before undertaking this analysis, we plotted the proportion of deaths within each demographic group by year to establish whether there was variation within the pre-pandemic and post-pandemic periods, as pre-registered. Given there were no large variations within the pre-pandemic and post-pandemic periods (appendix pp 2–4), this classification was applied.

We report absolute (rate difference) and relative (rate ratios) changes in death rates by age, sex, and area-level deprivation between the pre-pandemic and post-pandemic periods (pooled within periods) defined above. We calculated crude absolute and relative differences in rates across IMD quintiles, sex, and age groups. We used a negative binomial model (due to overdispersion of data) for each period to calculate the rate ratio and adjusted absolute differences for deaths by IMD quintile, adjusting for age and sex. All analysis was performed using R statistical software, version 4.2.0, with the risk Communicator package used to obtain the adjusted absolute differences.

In an additional unplanned, exploratory analysis, we used joinpoint regression to identify significant changes in trends in alcohol-specific deaths. Models were fitted separately by cause, age, sex, and IMD quintiles, with the optimal number of joinpoints identified by selecting the model with the lowest weighted Bayesian Information Criterion value. This analysis was undertaken using Joinpoint Regression Programme version 5.3.0.0.

For more on **Joinpoint trend analysis software** see https://surveillance.cancer.gov/joinpoint/

We conducted a sensitivity analysis using 2017–19 as the pre-pandemic period and 2021–22 as the post-pandemic period to exclude the acute impact of the early pandemic in 2020 and to assess whether there were differences in the pattern of absolute and relative changes. We also undertook an additional sensitivity analysis using a broader definition of alcohol-attributable liver deaths than is captured by the ONS definition of alcohol-specific deaths. The ONS definition includes only ICD-10 codes for which 100% of deaths are caused by alcohol. Previous research has shown that about 70% of deaths from ICD-10 codes K73–74 (chronic hepatitis not otherwise specified and fibrosis and cirrhosis of liver) are also attributable to alcohol.[19] These codes were included in an older version of the ONS' definition of alcohol-specific deaths until 2015[20] and several previous studies on alcohol-specific deaths. Furthermore, it is possible that some genuine cases of alcohol-related liver disease are miscoded as other liver diseases due to the stigma associated with alcohol. We therefore explored the effect of including these codes and broader definition in our analysis.

See **Online** for appendix

Role of the funding source

The funder had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

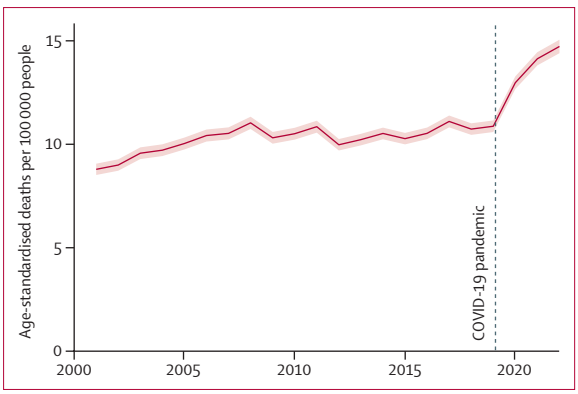

Figure 1: **Trends in age-standardised alcohol-specific deaths in 2001–22**
The shaded area represents the 95% CI.

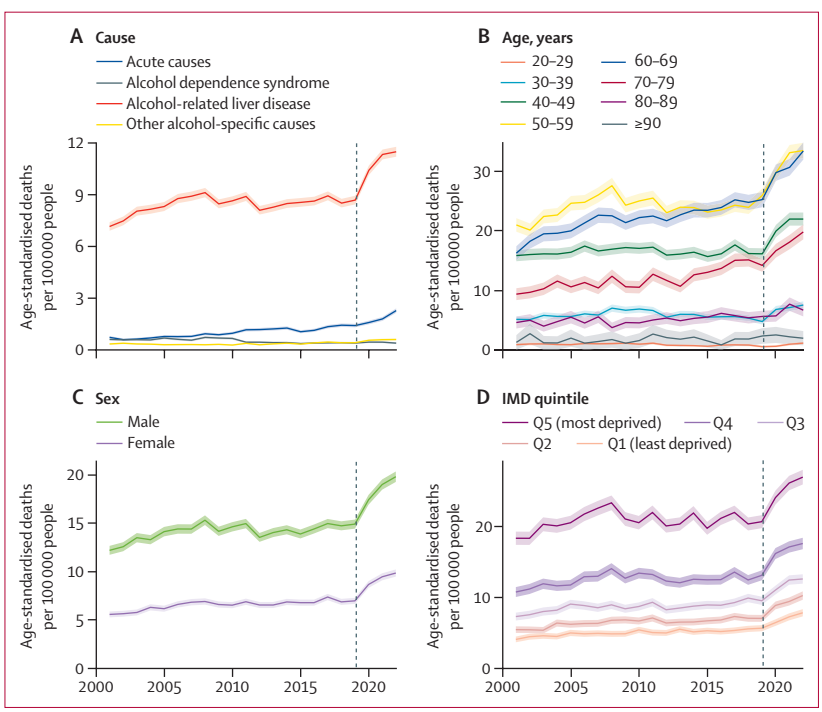

Figure 2: **Trends in alcohol-specific deaths in 2001–22**
IMD=Index of Multiple Deprivation. Q=quintile.

Results

Age-standardised rates of alcohol-specific deaths in England rose gradually by between 1·0% (an absolute increase of 0·15 in the rate per 100 000 people) and 6·3% (an increase of 0·57 per 100 000 people) per year between 2001 and 2008, then remained largely unchanged until 2019, before rising sharply by 19·4% (increase of 2·10 per 100 000 people) in 2020 and continuing to rise by a further 13·5% (1·73 per 100 000 people) to the highest level on record in 2022 (14·7 [95% CI 14·4–15·0] per 100 000 people), an increase of 35·5% (increase of 4·24 per 100 000) since 2019. These longer-term trends are illustrated in figure 1.

These trends are presented by cause, age, sex, and IMD quintile in figure 2. Most alcohol-specific deaths across the study period were from alcohol-related liver disease, and a sharp rise in deaths from this cause appeared to drive the overall rise since 2019. A rise in deaths from acute causes also had a role in this increase (representing 22·3% of the increase in age-standardised deaths since 2019, 0·49 out of the absolute increase of 3·04 per 100 000) compared with 73·1% (an increase of 2·37 per 100 000 people) for alcohol-related liver disease. There was little change in deaths from alcohol dependence syndrome and other alcohol-specific causes from 2019. Alcohol-specific mortality rates were highest for ages 50–69 years across the full study period, and the increase in deaths since 2020 was visible mainly across ages 40–79 years, with less pronounced changes in younger and older age groups. Across the full study period, alcohol-specific mortality was consistently approximately twice as high among males than females, with a relatively similar increase in both males and females from after 2019. There were similar trends across IMD quintiles. Across the full study period there were higher rates of alcohol-specific deaths among people living in more deprived areas, with relatively similar increases across groups after 2019 (figure 2).

The effect of the pandemic on crude alcohol-specific mortality rates, comparing the pre-pandemic and post-pandemic periods, is presented in table 1, with the relative changes visualised in figure 3. Overall, alcohol-specific deaths increased by 27·8% in the post-pandemic period compared with the previous 3 years, which was equivalent to an additional three deaths per 100 000 people per year. By far the largest absolute increase was from alcohol-related liver disease deaths, although there were larger relative increases in acute causes and other alcohol-specific causes, while deaths from alcohol dependence syndrome increased to a lesser extent.

Across age, sex and IMD groups, there was a broadly similar relative increase in alcohol-specific deaths of approximately 20–35%, except for the oldest adults, among whom absolute alcoholic-specific mortality rates were low.

The largest absolute increases in alcohol-specific mortality occurred in age groups with pre-existing high rates (50–69 years), thus the relative increases were more evenly distributed across ages. There was an age gradient in relative changes, with a 36·9% increase in deaths in 30–39-year-olds, falling to an 11·2% rise in those older than 90 years. Regarding sex, the largest absolute increase was among males, while deaths among females increased more in relative terms (31·9% in females *vs* 25·9% in males). Finally, although there was a clear deprivation gradient in terms of absolute increases, with almost three times as many additional alcohol-specific deaths in the most deprived areas compared with the least deprived, this gradient is less pronounced in relative terms (table 1).

Within each period, 2017–19 and 2020–2022, the adjusted rate ratios and the adjusted absolute rate

differences of alcohol-specific deaths across age, sex, and IMD quintile are shown in table 2. These showed a similar pattern to the unadjusted rates, with little change in the relative age, sex, and area-level deprivation in deaths during the pandemic, despite rising absolute inequality.

The joinpoint analysis corroborates our main findings (appendix pp 5–9). For all causes except alcohol dependence syndrome, both sexes, all ages under 70 years, and all IMD quintiles, there was a significant increase in the annual trend in mortality rates after, or very close to, 2019. These results suggest that there have been 3911 additional alcohol-specific deaths in England since 2019 compared with the continuation of the pre-pandemic trend. Sensitivity analyses using only data from 2021–22 for the post-pandemic comparison and a broader definition of alcohol-specific deaths do not materially change our findings (appendix pp 10–19).

Discussion

This study examined whether the profile of those dying due to alcohol-specific causes before and after the start of the COVID-19 pandemic had changed in terms of age, sex, area-level deprivation, and specific cause of death. The principal finding was few relative changes in the age, sex, and socioeconomic position of those dying from alcohol-specific causes between 2017 and 2022, with sharp increases in alcohol-specific deaths across most age groups, all IMD quintiles, and in both sexes. However, the largest absolute increases occurred in groups experiencing the most harm pre-pandemic, including men and those from the most deprived areas. The dominant cause was a steep rise in deaths from alcohol-related liver disease and, to a lesser extent, acute causes. An unplanned, exploratory joinpoint analysis showed that for all causes except alcohol dependence syndrome, both sexes, all ages under 70 years, and all IMD quintiles, there was a significant increase in the annual trend in mortality rates in, or very close to, 2019. Furthermore, forecasting pre-pandemic trends and comparing these with the observed changes post-pandemic showed that there have been 3911 additional alcohol-specific deaths in England since 2019 compared with if the pre-pandemic trend had continued.

Data from 2023[6] show a further 3·4% increase (0·5 per 100 000 people) in alcohol-specific deaths in England from 2022. At the time of writing, these data are not yet available broken down by subgroups. The broadly comparable relative increases in alcohol-specific deaths across age, sex, and IMD quintile, suggest that the COVID-19 pandemic has entrenched pre-existing inequalities rather than created new ones. This is in line with findings from Germany and the USA.[3,4] Alcohol-specific deaths have increased in many countries since 2020,[2–5] even when per-capita consumption[2] or alcohol sales[5] were falling. One explanation for this is that there was polarisation in drinking trends with some groups

	2017–19	2020–22	Absolute change	Relative change
Overall	10·90	13·94	3·04	27·8%
Cause				
Acute causes	1·39	1·88	0·49	35·4%
Alcohol dependence syndrome	0·40	0·42	0·02	5·8%
Alcohol-related liver disease	8·71	11·07	2·37	27·2%
Other alcohol-specific causes	0·42	0·57	0·16	37·2%
Age, years				
20–29	0·71	0·87	0·16	21·8%
30–39	5·21	7·14	1·92	36·9%
40–49	16·67	21·31	4·64	27·9%
50–59	24·76	32·15	7·39	29·8%
60–69	25·10	31·34	6·23	24·8%
70–79	14·78	18·21	3·43	23·2%
80–89	5·58	6·67	1·10	19·7%
≥90	1·98	2·21	0·22	11·2%
Sex				
Female	7·10	9·36	2·26	31·9%
Male	14·92	18·79	3·87	25·9%
IMD quintile				
Q1 (least deprived)	5·53	7·19	1·65	29·9%
Q2	7·15	9·52	2·37	33·2%
Q3	9·59	12·05	2·46	25·6%
Q4	13·06	16·98	3·92	30·0%
Q5 (most deprived)	21·03	25·75	4·72	22·5%

Data are age-standardised alcohol-specific mortality rates per 100 000 people, unless otherwise specified. IMD=Index of Multiple Deprivation. Q=quintile.

Table 1: **Crude changes in age-standardised alcohol-specific mortality rates per 100 000 people before (2017–19) and after (2020–22) the start of the COVID-19 pandemic**

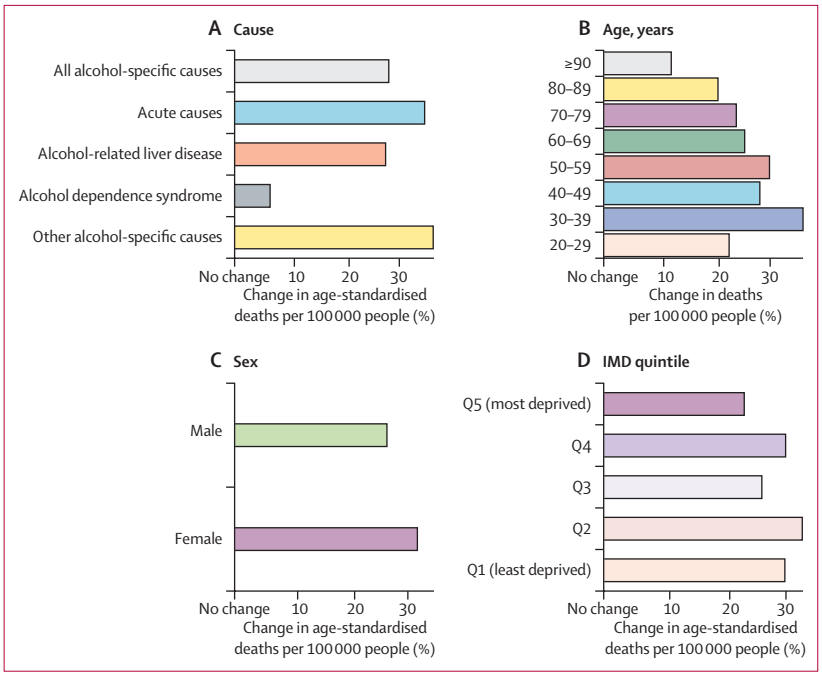

Figure 3: **Relative changes in alcohol-specific death rates between 2017–19 and 2020–22**
IMD=Index of Multiple Deprivation. Q=quintile.

	Absolute rate difference (per 100 000 people)		Rate ratio	
	2017–19	2020–22	2017–19	2020–22
Age, years				
20–29	(1 ref)	(1 ref)	(1 ref)	(1 ref)
30–39	4·25 (3·43–5·35)	5·97 (5·1–6·85)	7·39 (5·88–9·28)	8·25 (6·76–10·26)
40–49	16·05 (13·53–19·73)	20·07 (16·81–23·23)	25·12 (20·42–30·77)	25·36 (20·21–31·70)
50–59	24·42 (20·67–29·22)	31·95 (27·62– 37·38)	37·69 (31·54– 46·01)	39·77 (32·54– 48·57)
60–69	25·88 (22·49–30·64)	32·37 (28·48–37·49)	39·88 (33·43– 48·65)	40·28 (33·29– 50·14)
70–79	15·67 (13·09–18·81)	19·63 (16·51– 23·28)	24·55 (20·68– 29·27)	24·82 (20·23–31·54)
80–89	5·86 (4·27–7·60)	6·89 (4·64–8·57)	9·80 (7·33–13·23)	9·37 (6·43–12·23)
≥90	1·84 (0·91–2·73)	1·94 (0·99–2·90)	3·76 (2·42–5·7)	3·36 (2·17–4·93)
Sex				
Female	(1 ref)	(1 ref)	(1 ref)	(1 ref)
Male	8·82 (6·51–11·26)	10·64 (8·21–13·05)	2·10 (1·93–2·3)	2·03 (1·89–2·18)
IMD quintile				
Q1 (least deprived)	(1 ref)	(1 ref)	(1 ref)	(1 ref)
Q2	1·63 (0·59–2·69)	2·23 (0·96–3·73)	1·25 (1·09–1·44)	1·26 (1·10–1·45)
Q3	3·98 (2·58–5·29)	4·77 (3·38–6·31)	1·6 (1·37–1·82)	1·57 (1·40–1·80)
Q4	7·51 (5·65–9·61)	10 (7·68–12·67)	2·14 (1·86–2·48)	2·18 (1·92–2·49)
Q5 (most deprived)	15·97 (11·82– 19·91)	19·16 (14·39– 24·50)	3·42 (2·83–4·07)	3·27 (2·84–3·76)

IMD=Index of Multiple Deprivation. Q=quintile.

Table 2: **Adjusted relative and absolute age, sex, and IMD differences in alcohol-specific mortality before (2017–19) and after (2020–22) the start of the COVID-19 pandemic**

drinking more and some less,[2] as seen throughout the pandemic.[7] Recent data up to January, 2024, from England suggest that increases in consumption at the start of the pandemic have been maintained by more socioeconomically disadvantaged but not more advantaged drinkers;[13] this could explain why the largest absolute increases in alcohol-specific deaths were among those from areas of higher deprivation. US data from 2020 has shown a relative increase in alcohol-related liver disease deaths in young women during the pandemic; these trends need to be further explored in England since this group might merit targeted interventions.[21]

Ongoing alcohol consumption among those with established alcohol-related liver disease increases the likelihood of death[10] and heavy episodic drinking is associated with alcohol-related cirrhosis and alcohol-related hepatitis.[22] As such, increases in consumption among heavier drinkers[7] and increases in the incidence of heavy episodic drinking[8] throughout the COVID-19 pandemic might partially explain the increases in deaths from alcohol-related liver disease. Increases in deaths from this cause might also have been affected by comorbid conditions. COVID-19 is associated with a 2–3 fold increased risk of death among patients with established cirrhosis.[23] For some adults in England, increases in alcohol consumption were accompanied by sedentariness and weight gain in 2020, increasing the risk of obesity.[24] Obesity increases the likelihood of alcohol-related liver disease mortality.[25] Furthermore, relative increases in acute causes of death could have been driven by poorer mental health. Rates of severe psychological distress increased at a population level between 2020 and 2022 in England.[26] Alcohol-related liver disease deaths and acute deaths were probably further exacerbated by reduced treatment seeking and reduced access to health support services throughout the pandemic. Primary care contacts for a range of acute physical and mental conditions were reduced following population wide lockdown restrictions in the UK in 2020, resulting in substantial unmet needs.[11]

There is an acute crisis of alcohol-specific deaths in England. These findings suggest urgent policy action is required to prevent further excess deaths and address inequalities. In the short term, policy needs to be targeted at earlier detection of liver disease and more effective treatment. Pilot studies of liver blood test pathways or portable transient elastography are promising in improving rates of earlier diagnosis in primary care.[27,28] Furthermore, having lead and deputy lead clinicians with a special interest in liver disease in acute hospitals[29] and accelerating the 2019 NHS Long Term Plan to roll out alcohol care teams operating 7 days per week could improve screening and treatment.[30]

In the longer term, effective preventive policies are required to reduce rates of alcohol consumption at a population level, including the introduction of policies that affect the affordability of alcohol consumption, such as minimum unit pricing, those that affect the accessibility of alcohol, and those that restrict advertising.[31] These would fit with the UK Government's

priority for health to move from sickness to prevention[32] and with the NHS Long Term Plan that emphasises prevention.[30] Substantial investment is required to increase and improve service provision for patients with alcohol-related liver disease. Existing liver services are inadequate,[29] with substantial geographical variation in both service provision and outcomes in the UK.[33] Services are particularly required in the North of England where the incidence of alcohol-related liver disease is higher than in other regions of England,[33] as distance to a liver transplant unit affects the likelihood of receiving a transplant and outcomes.[34] It is also important to develop new treatments for patients with liver disease. New therapies for alcohol-related hepatitis and decompensated cirrhosis are needed, and existing clinical trials in this area are not representative geographically of liver disease patients.[33] Future trials should be designed with patient-centric trial protocols, specifically with flexible eligibility criteria and visit schedules, including remote data collection processes.[33]

There are also implications for future research. It is unclear why changes in consumption at the beginning of the COVID-19 pandemic during national lockdowns have persisted,[13] when for most people day-to-day life has returned to pre-pandemic routines. It could be that socioeconomic pressures[35] and declining mental health[26] at the start of the pandemic have been further exacerbated. Since late 2021, there has been a cost-of-living crisis in the UK.[36] Inflation has caused the cost of food, energy, and other household bills to increase faster than average household incomes. Since 2022, there has also been distressing global coverage of trauma and violence in Ukraine and Gaza.[37] These ongoing events might in part explain population increases in severe psychological distress reported in England between 2020 and 2022.[26] A study examining the causes of maintained changes in patterns of alcohol consumption among heavier drinkers post-pandemic would be of value.

This is the first study characterising the profile of the recent increases in alcohol-specific deaths in England. It uses national-level data and presents data on long-term trends alongside evaluating the impact of the COVID-19 pandemic on alcohol-specific deaths. It highlights entrenched inequalities in England and has strong implications for policy and practice. The fact that our conclusions remain unchanged in our sensitivity analyses suggests our results are robust to alternative assumptions. However, our study is not without limitations. The analysis is descriptive in nature, so we are not able to draw conclusions about the causes of changes in alcohol-specific deaths pre-pandemic and post-pandemic. Due to limitations in the available data, we are unable to control for potential confounding variables which would likely affect the risk of mortality, such as smoking status, other drug use, mental health conditions, and metabolic risk factors. Furthermore, we look at patterns in mortality, but research examining the longer-term impact of the pandemic on individual drinking practices (eg, frequency, volume) would be of value, both to guide efforts to address the current post-pandemic alcohol deaths crisis and to inform policy responses to future pandemics. We rely on registry data, but studies have shown that alcohol might be under-reported on death certificates.[38] This under-reporting might be, in part, due to social stigma, but our finding that the rates of other liver disease deaths were stable during the pandemic suggests that this is unlikely to be a substantial issue in England. However, increasing delays in the registration of deaths since the start of the pandemic might make our estimates of increases in deaths since 2019 conservative or lagging, as the proportion of deaths being registered within 12 months has fallen. Furthermore, we were unable to explore changes in the ethnic profile of those dying, a limitation as ethnicity moderated changes in drinking behaviour throughout the pandemic.[39] Similarly, this study was focused on England and, given differences in their structural and demographic makeup, these results are likely not generalisable to other countries. We did not examine geographical differences in deaths. Doing so could guide future investment in liver services. Finally, throughout this study, we only focus on alcohol-specific deaths, which makes up only a proportion of alcohol-attributable deaths, so our study might underestimate the increase in alcohol-related mortality post-pandemic.

Between 2001 and 2019, alcohol-specific deaths remained largely stable, followed by a sharp increase in 2020 and further increases in 2021 and 2022. The largest absolute increases occurred in groups experiencing the most harm before the COVID-19 pandemic, including men and those from areas of high deprivation. As such, there were few relative demographic changes in those dying after the start of the pandemic. There have been absolute increases in inequalities in alcohol-specific deaths, while relative inequalities remain entrenched. Increases in alcohol-specific deaths seemed to be driven mostly by large increases in rates of deaths attributed to alcohol-related liver disease. Urgent policy action is required to reduce alcohol consumption at the population level and investment in liver disease services is required to prevent further excess deaths.

Contributors

MO was involved in conceptualisation, methodology, project administration, validation, writing of the original draft (lead), and reviewing and editing. SJ, JB, VB, GM, JBD, and JH were involved in conceptualisation, methodology, and reviewing and editing. CA was involved in conceptualisation, data curation, formal analysis, methodology, validation, visualisation, writing of the original draft, and reviewing and editing. CA and MO directly accessed and verified the underlying study data reported in the manuscript. All authors confirm that they had full access to all the data in the study and accept responsibility for the decision to submit for publication.

Declaration of interests

MO's salary is funded by the Society for the Study of Addiction and MO has previously done paid consultancy work for the behaviour change

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Data sharing

For the **code** see https://github.com/VictimOfMaths/Publications/blob/master/AlcoholSpecificDeathsEWPaper/AnalysisCode.R

The data are publicly available, and the code can be accessed.

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