Evaluating the impact of Minimum Unit Pricing (MUP) on alcohol-specific deaths in Wales: a controlled interrupted time series analysis

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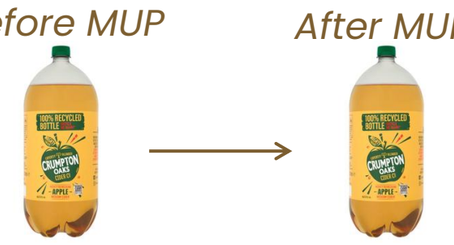
BACKGROUND

Wales introduced a **Minimum Unit Pricing (MUP)** policy on 2 March 2020 MUP which made it an offence to sell alcohol for under 50p per unit with the aim of reducing alcohol consumption, particularly among **harmful drinkers in deprived** communities. [1]

Scotland implemented MUP in May 2018, resulting in **156 fewer deaths and 411 hospitalisations** wholly attributable to alcohol per year. [2]

In 2023, alcohol-specific deaths in Wales reached a peak of 562, a **60% rise** over the past decade, highlighting the need for evaluation of the policy. [3]

Before MUP → *After MUP*



2.5L Cider
18.5 Units
£4.50

2.5L Cider
18.5 Units
Now: £9.38

OBJECTIVES

To assess the impact of Minimum Unit Pricing (MUP) on alcohol-specific **deaths** in Wales.

(1) Analyse trends before and after MUP (Jan 2016-Dec 2023).

(2) Compare trends with North East (NE) England (due to its comparable socioeconomic and alcohol harm profile). [4]

METHODS

Study Design: Natural experiment using a controlled interrupted time series (CITS) analysis.

Data Sources: **Mortality data** for Wales and NE England (2016-2023) from **ONS** datasets via the Digital Health and Care Wales Data Warehouse

ICD-10 codes for alcohol-specific conditions were used to define cases e.g., K70 – alcoholic liver disease.

Outcome: Monthly rates of alcohol-specific deaths in Wales and NE England per 100,000 population.

Statistical Analysis:

- Stationarity tests (KPSS) and autocorrelation plots were used to test the stationarity assumption and model choice.
- **SARIMAX** models were fit to Welsh and NE England time series guided by statistical tests (e.g., AIC, BIC and Ljung-Box tests). [5]

SARIMAX: Seasonal Autoregressive (AR) Integrated Moving Average (MA) with Exogenous Regressors.

- A **binary variable** was assigned to the intervention (0 = pre-intervention period, 1 = post-intervention).
- **Sensitivity analyses:** excluding the pandemic period (Apr 2020-Mar 2021) and the post-intervention period.

Software: Python was used for data processing and analysis.

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RESULTS

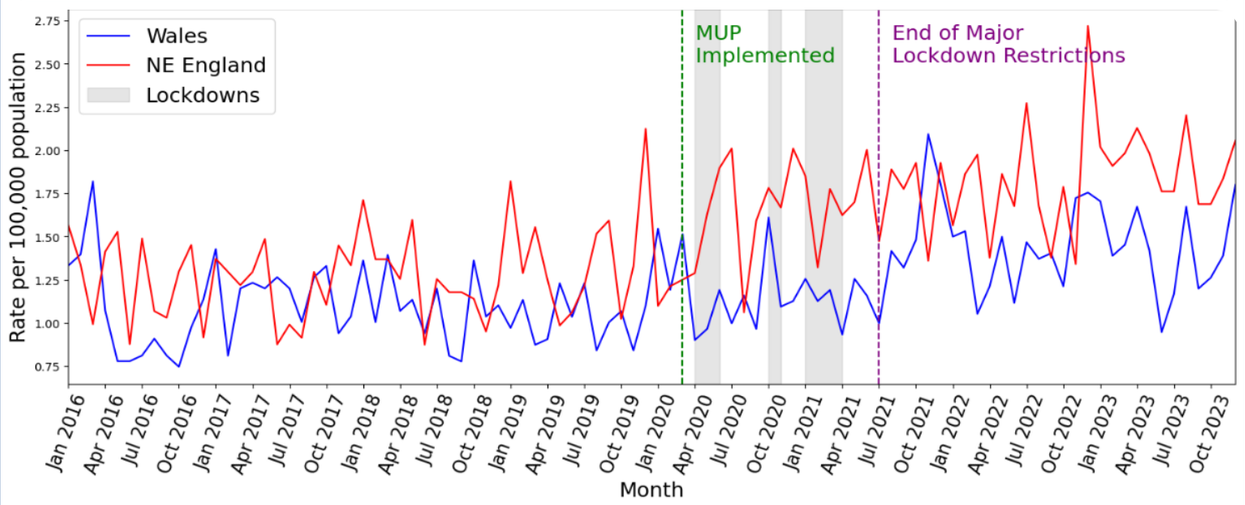

Figure 1. Monthly rates of alcohol-specific deaths in Wales and North East England per 100,000 population.

- Monthly alcohol-specific death rates showed an **upwards** trend in both regions, with yearly peaks in winter months.
- Highest rates were seen in **males** and those aged **60-74** years.

Table 1. Change in rates of alcohol-specific deaths in Wales and North East England following MUP implementation.

Region	% Change (95% CI)	Annual absolute change (95% CI)	Model Used
Wales	4.45 (-11.9-23.9)	18 (-49 to 97)	SARIMAX(1, 1, [1, 12])
NE England	16.7 (4.37-30.5)	67 (18 to 124)	SARIMAX(0, 1, [1, 12])

- First differencing was used to achieve stationarity and models included AR, MA and seasonal terms (**Table 1**).
- **No significant change** in deaths in Wales after MUP, while NE England showed a significant increase.
- Exclusion of the pandemic period **increased estimates** to +98 deaths/year in Wales and +134 deaths/year in NE England.

CONCLUSION

- Mortality rates **continued to rise** in both regions, though less so in Wales, suggesting a dampening effect from MUP.
- The significant **overlap with the pandemic** likely confounded trends due to increases in alcohol consumption. [6]
- Hospital admission data was explored and suggested **stronger effects** but was excluded due to data limitations and time constraints.
- Policy discussions are ongoing to raise Wales' MUP from **50p to 65p** to counter inflation and maintain its intended effect. [1]

1. Welsh Government. New modelling of alcohol pricing policies, alcohol consumption and harm in Wales. 2025 Jul.
2. Wyper GMA et al. Lancet. 2023;401:1361–70.
3. Public Health Wales. Record high alcohol related deaths in Wales highlight urgent public health concerns. 2025 Mar 12.
4. Office for National Statistics. Understanding towns in England and Wales: spatial analysis. 2020 Dec 7.
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6. Holloway K, Buhociu M, Murray S, Livingston W, Perkins A. Assessing the early influence of COVID-19 in an analysis of the immediate implementation of Minimum Pricing for Alcohol on drinkers in Wales. 2024;41(1):57-74.