

**Title: The effect of tobacco and alcohol consumption on poverty in the UK**

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**Running head:** Tobacco, alcohol and poverty in the UK

**Word count:** 3262

**Declarations of competing interests:** None.

## **ABSTRACT**

### Background and Aims

Tobacco and alcohol use are major risk factors for premature mortality and morbidity. Tobacco and alcohol expenditure may also exacerbate poverty. This study aimed to estimate the financial impact of tobacco and alcohol consumption in low income households in the UK.

### Design

Cross-sectional study.

### Setting

UK.

### Participants

A sample of 5,031 households participating in the 2016-17 Living Costs and Food Survey.

### Measurements

Weekly household income and expenditure on tobacco and alcohol; proportion of households with expenditure on tobacco and alcohol overall, by income decile and in households in relative poverty (below 60% of the median household income).

Estimates were extrapolated using population data to estimate the number of UK households, adults and children that would be classified as living in relative poverty on the basis of net income after subtracting tobacco or alcohol expenditure ('tobacco and alcohol expenditure-adjusted poverty').

### Findings

Spending on alcohol was more common in high income groups; 83% of households in the highest and 47% in the lowest income decile purchased alcohol. The reverse was true for tobacco, which was purchased by 8% and 24% of households in the highest and lowest income deciles respectively. Twenty-three percent of households in relative poverty purchased tobacco and 49% alcohol, with a median expenditure of £12.50 and £9.55 per week respectively. A total of 320,000 households comprising 590,000 adults and 175,000 children were in alcohol expenditure-adjusted poverty,

and 230,000 households, comprising 400,000 adults and 180,000 children in tobacco-expenditure adjusted poverty.

### Conclusions

Tobacco and alcohol expenditure appear to exacerbate poverty in low income households in the UK. Hundreds of thousands of additional households would be defined as living in relative poverty based on their income after subtracting their tobacco and alcohol expenditure.

## **Introduction**

Tobacco and alcohol use are the first and fourth most important causes of worldwide loss of Disability Adjusted Life Years (DALYs) respectively (1). Smoking and heavy alcohol consumption are also major contributors to health inequalities (2, 3), and cause significant harm to people other than their users. Passive exposure of children to tobacco smoke increases the risk of sudden infant death and of respiratory disease, and children whose parents smoke are twice as likely to become smokers themselves.(4, 5) Children whose parents consume alcohol are also more likely to drink heavily in adolescence.(6-8) Furthermore, alcohol consumption is a significant contributor to crime and public disorder.(9) Tobacco and alcohol use in England cost the NHS 2.5 (10, 11) and 3.5 billion pounds each year (12).

In addition to these well-recognised health and economic effects, tobacco and alcohol use place a burden on household budgets. Tobacco use is highly addictive and most smokers report that they would prefer to quit (13, 14), suggesting a loss of autonomy over continued tobacco use. Alcohol use is less addictive (13) and typically less frequent in low income populations (15); however, in England, one in five adults reports drinking above the recommended weekly limits and is defined as being at increased risk of alcohol-related harm.(16) Both are discretionary products whose use can crowd out expenditure on essential purchases, including healthy food and housing, thus potentially exacerbating the negative effects of poverty.(17-23)

The effect of this additional expenditure on poverty has received little attention in the UK. Moreover, tobacco and alcohol policies, such as those in the recently published UK government Green Paper on prevention (24) do not generally consider wider societal effects such as family poverty. It has previously been estimated that parental smoking exacerbates poverty in 1.1 million of the 2.3 million children living in

poverty in the UK (25), but that study was subject to several important data constraints including a lack of household level data on tobacco expenditure. The aim of this study was therefore to investigate the impact of tobacco and alcohol expenditure on poverty in the UK by estimating the number and proportion of households that spend on tobacco and alcohol; the quantity and proportion of disposable income allocated to these products, both overall and by income group; the number of households, adults and children living in poor households in which there is expenditure on tobacco and alcohol; and the number of households, adults and children living above the poverty line who fall below this threshold if disposable household income is assessed net of tobacco and alcohol expenditure.

## **Methods**

### ***Data***

We used the 2016/17 wave of the Living Costs and Food Survey (LCF) (26-29), an annual repeated cross-sectional survey which collects information on the cost of living and spending patterns of families in the UK. Our sample included 5031 households. Population data on households were used to extrapolate the results to the national level.(30) LCF data are collected at the household level, with study participants selected through a multi-stage stratified random sample. Sample and population-based weighting are applied. The data are collected through two face-to-face interviews and participant diaries. Household-level information is recorded via a household questionnaire typically answered by the household reference person (HRP), who is usually the person who owns or rents the house. The household questionnaire includes information on the composition of household, family relationships, ethnicity and employment status. An income questionnaire is completed by individual members of the household aged 16 years or older, providing

information on individual level earnings from employment, benefits and assets.

Individual expenditure is recorded over two weeks in an expenditure diary. As the LCF data are publicly available, ethical approval was not required for this study. All data are anonymised in the publicly available datasets.

#### *Tobacco and alcohol expenditure data*

Individual tobacco and alcohol expenditure are derived from data from the expenditure diary. For this study, variables identifying households' weekly expenditure on different tobacco and alcohol products were combined to create single variables capturing total weekly expenditure on tobacco and alcohol respectively.

#### *Income data and definition of poverty*

In the LCF dataset normal weekly disposable household income is derived by summing each household members' disposable income. We used the OECD equivalence scale (31) to rescale normal weekly disposable household income to account for household composition, to allow comparisons between households of different sizes (using a single-adult household as a reference point). We used the weekly disposable equivalised income variable to categorise households into deciles of equivalised weekly disposable income. In accordance with the United Kingdom definition of relative poverty, we classified households as living in poverty if their equivalised net household disposable income before housing costs (BHC) fell below 60% of the median equivalised net household income (32).

#### ***Analysis***

Analyses were carried out using STATA-15. Baseline characteristics of the households and household reference persons were summarised using descriptive statistics, after excluding households with missing disposable household income

data (10 households). Analyses of spending on tobacco and alcohol were undertaken for tobacco and alcohol separately, and for tobacco and alcohol combined. The analysis was not pre-registered and the results should be considered exploratory.

### *Households' spending on tobacco and alcohol*

Spending on tobacco and alcohol per household was expressed as the median spend and median proportion of total income spent. We also estimated the proportion of households spending money on tobacco and alcohol overall and by decile of income group, and combined these proportions with national population data (30) to estimate the number of households in the UK spending on tobacco and alcohol. We then estimated the proportion of households, adults and children living in poverty who were living in households with expenditure on tobacco and alcohol, and combined these proportions with national population data to estimate the number of poor households, adults and children in the UK spending on tobacco and alcohol.

### *Tobacco and alcohol expenditure-adjusted poverty*

We estimated the proportion of UK households that would be defined as living in poverty after allowing for spending on alcohol and tobacco by identifying households whose equivalised income was above the poverty threshold but fell below this threshold after subtracting expenditure on tobacco and alcohol (from here on defined as 'tobacco and alcohol expenditure-adjusted income' – TAEA income). These proportions were applied to national population data to estimate the number of adults and children aged under two years, 2-5 and 5-18 years who were living in tobacco and alcohol expenditure-adjusted poverty (TAEA poverty) as a result of household expenditure on tobacco, alcohol and both combined.(30)

### *Sensitivity analysis*

To check the robustness of the poverty rate estimates we derived from the LCF dataset, which were based the proportion of households below 60% of the median income as estimated within the dataset, we carried out sensitivity analysis using poverty rates published by the Office for National Statistics (33). The number of households living in poverty, as well as households moved into poverty as a result of spending on tobacco and alcohol were determined.

### **Results**

The LCF study provided relevant data from 5031 households; 10 households were excluded due to missing income data. The median equivalised weekly household income per household was £357.91, and 18.8% of households reported an equivalised weekly net household income less than 60% of this figure (£214.75 per week) and were therefore defined as living in relative poverty. The mean age of HRP's was 54.2 years; 61.6% HRP's were male, 92.2% were of white ethnicity and 49.7% were married (Table 1).

*TABLE 1 HERE*

### ***Household spending on alcohol and tobacco in the UK***

The proportion of households spending money on alcohol and tobacco and the amount they spent was estimated from the LCF data, and the proportions extrapolated to the total UK population using population estimates. An estimated 18 million UK households (67.4%) purchased alcohol, spending a median of £14.63 (2.4% of weekly disposable income) per week (Table 2). An estimated 4.5 million households (16.6%) purchased tobacco, spending a median of £15.60 (3.2% of weekly disposable income) per week. An estimated 3.2 million households (11.8%) spent on both tobacco and alcohol, with a median expenditure of £38.30 a week.



## TABLE 2 HERE

### *Household spending on tobacco and alcohol by equivalised income decile*

The proportion of households spending on alcohol increased in relation to income decile, from around 50% in the lowest to 80% in the highest. For tobacco, the proportion was highest in the lower income deciles; 24% of households in the lowest and 8% in the highest (Figure 1a). This pattern was also observed for households that were spending on both tobacco and alcohol with the proportion in relation to income decile falling from 15% of households in the lowest to 7% in the highest (Figure 1a).

The median weekly expenditure on alcohol increased with increasing equivalised income decile, from £8.73 in the lowest income group to £22.79 in the highest (Figure 1b). Expenditure on tobacco and combined expenditure on tobacco and alcohol also increased with increasing equivalised income decile. The median weekly expenditure in households spending on both tobacco and alcohol ranged from £25.00 in the lowest income decile to £58.00 in the highest.

The proportion of weekly disposable income spent on alcohol, tobacco and tobacco and alcohol declined with increasing equivalised income decile (Figure 1c). The proportion was highest for combined tobacco and alcohol spending among the lowest income decile, at 15%.

### *Spending on alcohol and tobacco in poor households*

Of the estimated 5.1 million households with an income of less than £214.75 per week, 2.49 million (48.8%) purchased alcohol, spending a median of £9.55 (4.2% of weekly disposable income) per week. Around 1.2 million poor households (23.3%) purchased tobacco, spending a median of £12.50 (5.6% of weekly disposable

income). Around 690 000 of poor households (%) purchased both alcohol and tobacco each week, spending a median of £30.70 (12.8% of the weekly disposable income, Table 3).

#### *Households in tobacco and alcohol expenditure-adjusted poverty*

Following extrapolation of the LCF estimates to the total population, around 320,000 households (containing an estimated 590,000 adults and 175,000 children) were estimated to be living in alcohol expenditure-adjusted poverty when weekly alcohol expenditure was taken into account, spending a median of £27.72 (8.9% of weekly disposable income) per week (Table 3). 230,000 households (400,000 adults and 180,000 children) were living in tobacco expenditure-adjusted poverty, spending a median of £40.24 (12.4% of weekly disposable income) per week. There were an estimated 220,000 households (400,000 adults and 180,000 children) were living in TAEA poverty due to combined household spending on alcohol and tobacco, with a median combined weekly expenditure of £63.82 (19.6% of weekly disposable income).

#### ***Sensitivity analysis***

Results obtained from the sensitivity analysis are reported in appendix 1. The national poverty rate published in national data was 16%. Therefore, the results did not vary considerably from those obtained using the LCF datasets.

*TABLE 3 HERE*

## **DISCUSSION**

This study demonstrates that expenditure on tobacco and alcohol significantly exacerbate poverty among disadvantaged groups in the UK, with an additional 300,000 households (encompassing over half a million adults and 175,000 children)

classified as living in poverty when household income is adjusted for alcohol expenditure, and 230,000 households (400 000 adults and 160 000 children) when the same is done for tobacco. Almost a quarter of a million households were living in TAEA poverty due to combined expenditure on both these products.

Our findings are in line with national estimates on the prevalence of tobacco use, which indicate an adult smoking prevalence of 15% (34), with use concentrated predominantly in low income groups. Similarly, our findings reflect that alcohol use is higher in less deprived populations (35); however the proportion income spent on alcohol is highest in the most deprived. Our estimate of the number of children living in a poor household with expenditure on smoking is comparable to a previous estimate of the number of children in poor households with a smoking parent.(25)

Our estimate of the number of children in tobacco expenditure-adjusted poverty is more modest, but nevertheless demonstrates the significant financial impact of tobacco use in low-income households. Unlike our previous study, which combined data from several data sources and made a number of assumptions, the current study uses a single on a single data source to identify expenditure on tobacco and alcohol and income, which were directly reported, with national population estimates used to extrapolate estimates to the full population. This is the first UK study to estimate the impact of expenditure in adults as well as children, and to investigate the expenditure on alcohol consumption in these households.

Our study used data from a single nationally representative dataset. The data collected in the LCF are self-reported and may therefore be subject to reporting bias. In particular, the expenditure data may be underestimated if participants did not consistently complete the expenditure diary. Similarly, income may have been inaccurately reported; if income was overestimated, this may have led to and

underestimate of the number of households in poverty. Inaccuracies in reporting may also have differed by income decile. Furthermore, we have extrapolated estimates from the LCF to population-level estimates, and our population-level estimates are therefore also prone to error. However, the survey is reported to provide the best quality expenditure data for most reporting categories and is a valuable source of income data.(36) To our knowledge the LCF is the only population-level survey in the UK to collect detailed data on tobacco and alcohol expenditure data, and is therefore likely to represent the most accurate estimates in relation to expenditure on smoking. Our findings support the idea that expenditure on tobacco and alcohol generates opportunity costs, in that scarce resources are spent on these products that might be better spent elsewhere.(37) Most of existing studies on expenditure on tobacco have been conducted in low-income countries; however they have found that households spending money on tobacco allocate less money to food, clothing, housing, education, energy, and transportation, communication and medical care.(22, 38-42) Our study demonstrates that a high level of expenditure on of tobacco within households is not restricted to low-income countries, and echoes previous studies in high income countries, including the UK, which find that smoking induced-deprivation (defined as spending money on cigarettes resulting on not having enough money for essential items) is common.(43, 44)

There has been limited research into the impact of alcohol expenditure; spending on healthy and unhealthy food as a proportion of the food budget in UK households has been found to decrease with increasing expenditure on alcohol (45). There is also evidence from Taiwan that alcohol crowds out expenditure on other items, even when expenditure on alcohol is low.(23) One study has highlighted a longitudinal association between financial strain and alcohol use (as well as smoking) (46), which

reflects that alcohol may be used to relieve stress. Given the financial strain that alcohol use may place on households, it is conceivable that there is a self-perpetuating cycle whereby households consume alcohol to relieve the stress caused by financial strain, which in turn may augment this financial strain. As demonstrated by our study, in many low-income households both tobacco and alcohol are purchased, thus exacerbating the impact of addictive substances on resources available for essential items.

Our findings suggest that the cessation or reduction of tobacco and alcohol use may alleviate household financial insecurity by increasing disposable income; however, our study was not able to show how households would reallocate these resources if so released. Longitudinal studies examining changes in expenditure patterns following cessation of either product are extremely limited; one US study has found that households that quit tobacco reduce expenditure on items that may facilitate or complement smoking cessation, such as alcohol, food, entertainment and transport.<sup>(37)</sup> This may mean that when households quit in the midst of (or due to) financial strain, they are unable to, or choose not to, reallocate spending to other areas. Nevertheless, the financial effect of reduced expenditures may still be important: longitudinal data from Australia suggest that quitting smoking reduces financial stress and improves material well-being (47). The reduction in expenditure on alcohol following smoking cessation identified by Rogers et al. suggests that the expenditure on these products can to some extent be addressed jointly. These studies highlight the need to understand how resources are reallocated when households stop or cut down tobacco and alcohol consumption, but also whether cessation may alleviate financial strain.

The harms of tobacco and alcohol use are typically framed in terms of the health consequences of their use, and the economic costs in terms of related health care costs and productivity costs. Our study adds to the evidence base which suggests that consumption of these products may generate harms through reduced availability of resources for essential items such as food and housing (37) and highlights the need to tackle the problem of smoking and drinking for reasons beyond than their direct health effects. While our analysis relates to tobacco and alcohol in the UK, tobacco and alcohol use are highly prevalent in many other high income countries, and our findings are therefore also of relevance outside of the UK.

Establishing the practical implications of our findings for policy and practice is challenging, in part due to the ethical implications of viewing such expenditure as an unnecessary exacerbation of poverty which could be mitigated by alternative spending decisions. Moderate alcohol consumption (up to 100g/week), while not risk free, presents a relatively low risk to health, (48) and may be regarded as desirable in households where alcohol use provides enjoyment and supports social cohesion. However, a relatively small reallocation of resources spent on through quitting or cutting down consumption, particularly in households on low incomes, could have a significant positive impact on these households.(49) By contrast, there is no safe level of smoking (50), and most smokers state that they would prefer not to continue smoking; our findings further support the duty of the government to do more to protect low income groups from tobacco addiction.

Our findings may appear to be at odds with recommendations to reduce affordability as a means to reduce consumption of tobacco and alcohol products, since this approach may compound the negative economic impact among individuals that are unable to quit or cut down. However, reducing the affordability of tobacco and

alcohol is essential as a means of discouraging consumption, and tax increases can increase government tax revenue and reduce the health costs associated with their use.(51, 52) Tobacco tax currently accounts for around 75% of the weighted average price of tobacco products in the UK (53), but low socioeconomic groups are highly responsive to tobacco price increases, and tax increases which reduce affordability remain key to reducing the health and economic effects of these products.(52, 54, 55) For smokers who continue to smoke in the context of tax increases, however, it is essential that additional support to quit tobacco use is provided. Given the persistently high rates of tobacco use among low-income groups, efforts must focus on novel interventions which are effective in helping low-income smokers to quit. Furthermore, given recent in reductions in funding for effective tobacco control interventions, new ways of generating resources for tobacco control measures may be needed. For example, a tobacco industry levy could be considered as a means to finance effective measures such as mass media campaigns or smoking cessation interventions.(56) Enabling affordable access to e-cigarettes for smokers who are unable to quit via traditional methods, for example through free provision, favourable tax structures or financial incentives, may also help to alleviate both the health and financial effects of tobacco use on poor smokers.

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**Table 1: LCF demographic data for household reference persons**

<b>Characteristic</b>	<b>Number (%)</b>
<b>Participants</b>	5031
<b>Gender</b>	
Female N	1931 (38.38)
Male N	3100 (61.62)
<b>Ethnic group</b>	
White	4637 (92.17)
Mixed race	46 (0.91)
Asian or Asian British	191 (3.80)
Black or Black British	95 (1.89)
Other ethnic group	62 (1.23)
<b>Marital Status</b>	
Married	2502 (49.73)
Cohabitee	588 (11.69)
Single	716 (14.23)
Widowed	501 (9.96)
Divorced	525 (10.44)
Separated	172 (3.42)
Civil Partner	27 (0.54)
<b>Socio-Economic Group</b>	
Large employers and higher managerial occupations	189 (3.76)
Higher Professional occupations	519 (10.32)
Lower managerial and professional occupations	949 (18.86)
Intermediate occupations	310 (6.16)
Small employers and own account workers	330 (6.56)
Lower supervisory and technical occupations	273 (5.43)
Semi-routine occupations	399 (7.93)
Routine occupations	332 (6.60)
Never worked and long-term unemployed	77 (1.53)
Students	46 (0.91)
Occupation not stated	21 (0.42)
Not classified for other reasons	1586 (31.52)
<b>Family Size</b>	
Mean (SD)	2.37 (1.26)
<b>Number of workers in household</b>	
Mean (SD)	1.11 (0.98)
Number of households with workers	3061 (60.9)
<b>Number of households living in poverty</b>	948 (18.84)

**Table 2:** Levels of expenditure on tobacco and alcohol for 2016/17 in all households

<b>All households</b>				
<b>Expenditure Category</b>	<b>Proportion spending on alcohol or tobacco (%)</b>	<b>Number spending on alcohol or tobacco in general population</b>	<b>Median spend per household (£) (IQR)*</b>	<b>Median proportion of total income spent (%) (IQR)*</b>
Alcohol	67.4	18 300 000	14.63 (6.10 - 30.85)	2.38 (1.02 - 4.88)
Tobacco	16.6	4 500 000	15.60 (6.50 - 34.20)	3.24 (1.32 - 7.12)
Tobacco and alcohol	11.8	3 200 000	38.30 (22.14 - 70.21)	6.98 (3.77 - 13.23)

\*In households spending on these products

**Table 3:** Numbers (percentages)\* of households, adults and children living in poverty and tobacco and alcohol-adjusted poverty, and median and proportion of income spent (LCF estimates extrapolated to total population)

<b>Households in Poverty</b>								
<b>Expenditure Category</b>	<b>Households</b>	<b>Adults</b>	<b>Children</b>	<b>Children aged &lt;2</b>	<b>Children aged 2 - 5</b>	<b>Children aged 5 - 18</b>	<b>Median spend per household (£)(IQR)</b>	<b>Median proportion of total income spent (IQR) (%)</b>
Alcohol	2 493 997 (48.84)	4 182 216 (51.10)	1 521 081 (44.70)	164 999 (39.51)	221 717 (33.33)	1 134 366 (48.89)	9.55 (4.49 - 21.41)	4.22 (1.88 - 9.69)
Tobacco	1 190 439 (23.31)	2 135 958 (26.10)	1 103 428 (32.42)	128 905 (30.86)	216 561 (32.56)	757 963 (32.67)	12.50 (6.00 - 26.68)	5.61 (2.30 - 12.58)
Tobacco and alcohol	689 485 (13.50)	1 283 817 (15.68)	582 651 (17.12)	77 343 (18.52)	103 124 (15.50)	402 184 (17.33)	30.70 (17.97 - 59.97)	12.76 (6.88 - 26.51)
<b>Households in tobacco and alcohol-adjusted poverty</b>								
Alcohol	323 196 (6.33)	588 649 (7.19)	175 311 (5.15)	5 156 (1.23)	5 156 (0.78)	164 999 (7.11)	27.72 (17.51 - 54.62)	8.94 (4.92 - 15.95)
Tobacco	226 237 (4.43)	398 039 (4.86)	159 842 (4.70)	10 312 (2.47)	25 781 (3.88)	123 749 (5.33)	40.24 (24.39 - 59.72)	12.44 (6.15 - 17.76)
Tobacco and alcohol	220 851 (4.32)	403 646 (4.93)	180 467 (5.30)	15 469 (3.70)	25 781 (3.88)	139 217 (6.00)	63.82 (40.13 - 92.08)	19.46 (11.87 - 21.12)

\*of those spending on alcohol or tobacco

**Figure 1. Figure 1: Household spending on tobacco and alcohol by equivalised income decile**



