

Alcohol Outlet Availability and Harm in Dundee City

April 2018

This document sets out the findings from research by Alcohol Focus Scotland (AFS) and the Centre for Research on Environment, Society and Health (CRESH), which investigated whether alcohol-related health harm (hospitalisations and deaths) and crime rates across Scotland were related to the local availability of alcohol outlets. The relationship between income deprivation and alcohol outlet availability was also examined.

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Key findings

- Dundee City is **ranked 4th out of 30 local authority areas for alcohol outlet availability** in Scotland.
- **Alcohol-related death rates in the neighbourhoods with the most alcohol outlets were 4.9 times higher** than in neighbourhoods with the least.
- **Alcohol-related hospitalisation rates in the neighbourhoods with the most off-sales outlets were 2.3 times higher** than in neighbourhoods with the least.
- **Crime rates in the neighbourhoods with the most alcohol outlets were 5.2 times higher** than in neighbourhoods with the least.
- The link between alcohol outlet availability and harm was **found even when other possible explanatory factors**, such as age, sex, urban/rural status and levels of income deprivation, **had been taken into account**.
- **The most deprived neighbourhoods had 3 times the number of off-sales outlets** than the least deprived neighbourhoods.
- The **total number of alcohol outlets in Dundee City increased by 10 (2.4%)** from 423 in 2012 to 433 in 2016.

Introduction

Alcohol availability refers to the ease of access to alcohol, whether to drink on the premises (e.g. pubs, clubs or restaurants) or to drink off the premises (e.g. shops and supermarkets). Alcohol availability includes the number, capacity and opening hours of alcohol outlets. Studies from other countries have consistently found an association between alcohol availability and alcohol-related problems, particularly outlet availability (the number of alcohol outlets in a given area). [Previous research](#) carried out in 2014 by this research team (the Centre for Research on Environment, Society and Health at the Universities of Edinburgh and Glasgow) suggests that this relationship is also true for Scotland. This profile provides a summary of the updated analysis for Dundee City. A Scotland profile is also [available](#).

Information was gathered on the number of places selling alcohol, health harms and crime rates within neighbourhoods across the whole of Scotland and for each local authority area. Researchers compared data zones (small areas representing neighbourhoods that have between 500 and 1000 residents) to see if there was a relationship between the number of alcohol outlets in a neighbourhood and the rates of alcohol-related deaths and hospitalisations. The profiles also consider, for the first time, the relationships between alcohol outlet availability and crime and deprivation rates.

Alcohol Outlet Availability in Dundee City

Alcohol outlet availability within neighbourhoods

Alcohol outlet availability was calculated by measuring the number of outlets within 800m (approximately a ten minute walk) of each data zone (neighbourhood)'s population centre. There are 188 neighbourhoods in Dundee City. The average number of outlets for each neighbourhood was calculated to obtain ranks for outlet availability for all local authority areas within Scotland (with the area ranked 1st having the highest availability and 30th the lowest availability).

Dundee City is **ranked 4th out of 30 local authority areas for alcohol outlet availability** in Scotland. In Dundee City, in 2016:

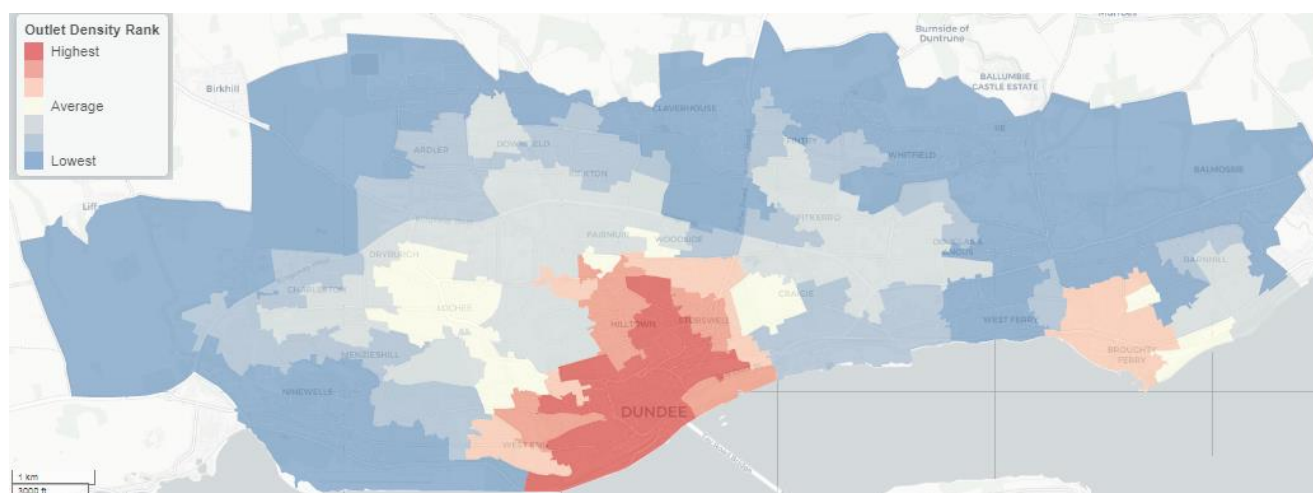
- There were **433 alcohol outlets: 308 on-sales** and **125 off-sales outlets**.
- Neighbourhoods had **between 0 and 145** alcohol outlets within 800m of the population centre.
- Neighbourhoods had an average of **21.1 alcohol outlets** within 800m of the population centre, compared to the Scottish average of 16.8 outlets. **35% of neighbourhoods had total outlet availability higher than the Scottish average.**
- Neighbourhoods had an **average of 14.3 on-sales outlets** within 800m of the population centre, compared to the Scottish average of 11.4 outlets. **32% of neighbourhoods had on-sales outlet availability higher than the Scottish average.**
- Neighbourhoods had an **average of 6.8 off-sales outlets** within 800m of the population centre, compared to the Scottish average of 5.4 outlets. **47% of neighbourhoods had off-sales outlet availability higher than the Scottish average.**

Dundee City has an **alcohol outlet availability higher than Scotland as a whole**. For a more complete picture, it is also useful to compare alcohol outlet availability between neighbourhoods *within* the local authority. This can be done by using the [CRESH WebMap](#), as demonstrated in the next section.

Dundee City Outlet Availability Map

Using the WebMap available at <https://creshmap.com/shiny/alcoholtobacco/>, alcohol and outlet availability (or 'density') can be mapped for data zones across Scotland. This can be done for on-sales, off-sales, and total outlets. Options are to compare against the Scottish average, the rural/urban average, local authority average or deprivation average for each data zone.

The map below shows the total alcohol outlet availability within 800m of the data zone population centre for each neighbourhood within Dundee City. The areas are colour-coded depending on how they compared with the average outlet availability for neighbourhoods within Dundee City.



Data on each neighbourhood's alcohol availability can also be downloaded from the WebMap, alongside information on alcohol-related mortality, alcohol-related hospitalisations, crime rate and income deprivation.

Alcohol outlet availability in Dundee City from 2012 to 2016

The change in the number of alcohol outlets within the local authority area was examined.

- The **total number** of alcohol outlets **increased by 10 (2.4%)** from 423 in 2012 to 433 in 2016. This is **similar to the 2.9% increase found across Scotland as a whole**.
- The **number of on-sales outlets increased by 8 (2.7%)** from 300 in 2012 to 308 in 2016. This is a **larger increase than that found across Scotland as a whole (1.5%)**.
- The **number of off-sales outlets increased by 2 (1.6%)** from 123 in 2012 to 125 in 2016. This is a **smaller increase than that found across Scotland as a whole (6.4%)**.

To take account of any changes in population over time, changes in alcohol outlet availability were calculated per 10,000 adult population:

- The **total number** of alcohol outlets per adult population **increased by 1.8%**. This is a **larger increase than that found across Scotland as a whole (0.6%)**.
- The **number of on-sales outlets per adult population increased by 2.1%**. This is **in contrast to the 0.8% decrease found across Scotland as a whole**.
- The **number of off-sales outlets per adult population increased by 1.1%**. This is a **smaller increase than that found across Scotland as a whole (4%)**.

Alcohol-Related Health Harm and Crime in Dundee City

The study looked at the relationship between alcohol outlet availability and alcohol-related deaths, alcohol-related hospitalisations and crime.

- Dundee City has an **annual average of 39.7 alcohol-related deaths** for those aged 20 and over (from 2011-2016). This is equivalent to **26.8 deaths per 100,000 adults**, which is **23% higher than the Scottish rate** of 21.8 deaths per 100,000 adults.
- The local authority has an **average hospitalisation rate ratio for neighbourhoods of 100.4**, which is **around the same as the ratio for Scotland** of 100.
- Dundee City's **average neighbourhood crime rate is 397.5 crimes per 10,000 population**, which is **20% higher than the Scottish average** of 331.2 per 10,000 population.

Alcohol-Related Death Rates and Alcohol Outlet Availability

In Dundee City, a statistically significant relationship was found between alcohol outlet availability and alcohol-related deaths: neighbourhoods with more places to buy alcohol had higher alcohol-related death rates.

Alcohol-related death rates were associated with the number of total and on-sales outlets:

- Alcohol-related death rates in the **neighbourhoods with the most alcohol outlets were 4.9 times higher** than in neighbourhoods with the least.
- Alcohol-related death rates in the **neighbourhoods with the most on-sales outlets were 4.4 times higher** than in neighbourhoods with the least.

The above relationships were found even when other explanatory factors were accounted for, namely income deprivation, urban/rural status and the age and sex demographics of the population. This means that **the association between outlet availability and alcohol-related deaths is not explained by the level of income deprivation, how urban or rural an area is, or the demographics of those living in an area.**

Alcohol-Related Hospitalisation Rates and Alcohol Outlet Availability

In Dundee City, a statistically significant relationship was found between alcohol outlet availability and alcohol-related hospitalisations: neighbourhoods with more places to buy alcohol had higher alcohol-related hospitalisation rates.

Alcohol-related hospitalisation rates were associated with the number of off-sales outlets:

- Alcohol-related hospitalisation rates in the **neighbourhoods with the most off-sales outlets were 2.3 times higher** than in neighbourhoods with the least.

The above relationship was found even when other explanatory factors were accounted for, namely income deprivation, urban/rural status and the age and sex demographics of the population. This means that **the association between outlet availability and alcohol-related hospitalisations is not explained by the level of income deprivation, how populated an area is, or the demographics of those living in an area.**

Crime Rates and Alcohol Outlet Availability

In Dundee City, a **statistically significant relationship was found between alcohol outlet availability and crime rates**: neighbourhoods with more places to buy alcohol had higher crime rates than neighbourhoods with the least.

The data used was from the Crime Domain of the Scottish Index of Multiple Deprivation, which includes crimes of violence, sexual offences, domestic house breaking, vandalism, drug offences and common assault. The data however does not record whether the perpetrators of crime had consumed alcohol and excludes some offences which are commonly associated with alcohol consumption, such as breach of the peace, or anti-social behaviour.

Crime rates were associated with the number of all types of alcohol outlets (total, on-sales and off-sales):

- Crime rates in the **neighbourhoods with the most alcohol outlets were 5.2 times higher** than in neighbourhoods with the least.
- Crime rates in the **neighbourhoods with the most on-sales outlets were 4.1 times higher** than in neighbourhoods with the least.
- Crime rates in the **neighbourhoods with the most off-sales outlets were 3 times higher** than in neighbourhoods with the least.

The above relationships were found even when other explanatory factors were accounted for, namely urban/rural status of the neighbourhoods and level of income deprivation. This means that **the association between outlet availability and crime rate is not explained by more crime being committed in more urban or deprived areas**.

Income Deprivation and Alcohol Outlet Availability

Dundee City has an **average income deprivation rate for neighbourhoods of 16.6%**. This is **33% higher than the Scottish average** of 12.5%. Data for income deprivation were obtained from the Scottish Index of Multiple Deprivation 2016 Income Domain, which is represented as a percentage of the total population in receipt of benefits. More information on this measure is available in the [Methodology](#) section.

In Dundee City, a **statistically significant relationship was found between alcohol outlet availability and degree of income deprivation**: the most deprived neighbourhoods had more places to buy alcohol than the least deprived neighbourhoods.

A difference in the number of off-sales outlets was found between the most deprived and least deprived neighbourhoods:

- **The most deprived neighbourhoods had 3 times the number of off-sales outlets** than the least deprived neighbourhoods.

The above relationship was found even when other explanatory factors were accounted for, namely population levels. This means that **the association between outlet availability and income deprivation is not explained by the size of populations in a neighbourhood**.

Interpreting the Findings

The relationship between alcohol outlet availability and health and social harms

The strong relationship found in Scotland between the number of alcohol outlets, crime rates and alcohol-related health outcomes suggests that the local availability of alcohol may influence drinking behaviours and associated alcohol-related problems. This relationship meets the criteria of statistical tests and is termed **statistically significant**. Judgements as to statistical significance of each result were made throughout by applying a 95% significance level ($p < 0.05$).

These results agree with findings from other studies in Scotland and beyond showing that there is an association between alcohol outlet availability and many types of health and social harms, such as violence, hospital attendance, underage drinking, and drink driving. See Section 5 of the [Alcohol Focus Scotland Licensing Resource Pack](#) for more detailed evidence.

A relationship was found between outlet availability and harm in both urban and rural areas

There is a significant relationship between outlet availability and harm in both the urban and the rural areas of Scotland. However, in some very rural local authorities (e.g. Orkney Islands, Shetland Islands and Eilean Siar) no statistically significant relationship between alcohol outlet availability and alcohol-related health harm was found. These areas have relatively low population and fewer data zones, which can make it difficult to find a statistical relationship between any two factors.

Other explanatory factors were taken into account

When assessing whether there is a relationship between alcohol outlet availability and harm, a number of other factors that may explain the results were taken into account in the analysis. When looking at whether alcohol outlet availability was related to alcohol-related deaths, alcohol-related hospitalisations and crime, the degree of income deprivation and the rural/urban status of the area were taken into account. For alcohol-related deaths and hospitalisations, the analysis also took into account the age and sex demographics of the population. This means that the relationships found are not explained by levels of deprivation, how populated an area is, or the demographics of the population. When looking at the relationship between income deprivation and outlet availability, population levels were taken in account. This means that the relationships found are not explained by the size of populations in a neighbourhood.

Factors affecting whether a statistically significant relationship can be found

When looking at areas smaller than the whole of Scotland a number of factors can influence if a statistically significant relationship is found. Being able to assess whether there is a relationship depends on the ability to compare areas of high alcohol outlet availability with areas of low availability. At a national level, there is sufficient variation in the number of alcohol outlets across the country to be able to make this comparison. However, within some local authorities, where the alcohol outlet availability is more evenly spread across the area, there may not be enough variation in exposure to outlet availability to enable a comparison. In addition, if the whole area is over-supplied then it will not be possible to detect a difference between one locality and another.

For the smaller local authority areas it can be difficult to find a statistical relationship between outlet availability and harm if there are too few neighbourhoods. For example, both Clackmannanshire and the Islands authority areas have less than 100 neighbourhood areas. In addition, outlet availability tells us something about the amount of alcohol available in an area but there are also other factors such as the size of the premises, level of alcohol sales, the opening hours and how far people travel to buy alcohol.

Deaths in particular are rare events that are especially difficult to analyse in areas with relatively small populations. In addition to this, mortality data was only available for a 6 year period, compared to the 10 year period available for the previous analysis; the boundaries of data zones changed between 2012 and 2016, limiting the number of years of death data that could be included. For this reason, coupled with falling mortality in general, the number of deaths analysed are small in some local authorities.

Whilst taking all of these factors into account, not finding a statistically significant relationship between alcohol outlet availability and harm may simply be because there is no relationship within that area.

Developing the most accurate picture of alcohol availability

The number of alcohol outlets in an area tells us something about the amount of alcohol available in an area but there are other factors that affect how readily accessible alcohol is. For example, the size of the premises (a supermarket will provide a greater volume and variety of alcohol than a small corner shop), the opening hours of the premises and how far people travel to buy alcohol. Currently, the number of alcohol outlets is the only information available for the whole of Scotland.

If more detailed information on the alcohol capacity of premises, their opening hours, alcohol sales and the catchment of the customers were collected this would enable further improvements in our understanding of the relationship between alcohol outlet availability and alcohol-related harm. Even without this more detailed information, a clear and statistically significant relationship between the availability of alcohol outlets and alcohol-related harm was found for Scotland as a whole.

Methodology

Summary

We investigated whether alcohol outlet availability was associated with alcohol-related health outcomes (hospitalisations and deaths) and overall crime rates for Scottish data zones. This analysis builds on [previous research](#), updating analysis of the relationship between alcohol outlet availability and harm in Scotland using more recent outlet availability, mortality and hospitalisation data. It also expands the analysis of alcohol-related harms to include crime data, and assesses whether the availability of alcohol outlets found in Scottish neighbourhoods is related to the degree of income deprivation in these areas. This builds upon [analysis published in 2015](#), using a similar methodology.

Geographical units

The data zone is the key small-area (neighbourhood) geographical unit used by the Scottish Government in the dissemination of official statistics, with populations of between 500 and 1000. There are 6,976 data zones in Scotland; the data zones used were devised for the 2011 census. Differences for data zones were compared across Scotland as a whole, and within 30 local authority areas. Twenty-nine of the local authority areas in place since 1996 were used. The three island local authorities (Shetland Islands, Orkney Islands and Eilean Siar) were grouped together as separately they have too few data zones to be able to carry out these analyses.

Alcohol outlet availability

The locations of outlets licensed to sell alcohol for consumption on the premises (on-sales) and off the premises (off-sales) were obtained in 2016 from each local licensing board. The datasets were checked for errors (e.g. duplications), resulting in verified locations for 11,522 on-sales alcohol outlets and 5,107 off-sales outlets. Outlets selling alcohol for consumption both on and off the premises were counted as on-sales outlets. The resulting dataset corresponds closely with official figures (counts by local authority) from the Scottish Liquor Licensing Statistics 2015-16.

Alcohol outlet availability was measured for each data zone as the number of on-sales, off-sales, or total outlets within 800m of the population centre of the data zone (800m represents a 10-minute walk at average pace). This 800m zone (area 2.0 km²) was assumed to represent the typical neighbourhood experienced by the population of a data zone.

The example in Figure 5 shows that a circle with a radius of 800m around this data zone's population centre (red star) contains 73 on-sales outlets: including a number within neighbouring data zones. Data zones were grouped into five availability groups, from lowest (group 1) to highest (group 5). The highest availability group contains the 5% of data zones with the greatest outlet availability. Groups 2-4 were defined by dividing the remaining data zones into four groups containing equal numbers of neighbourhoods based on rank of outlet availability.

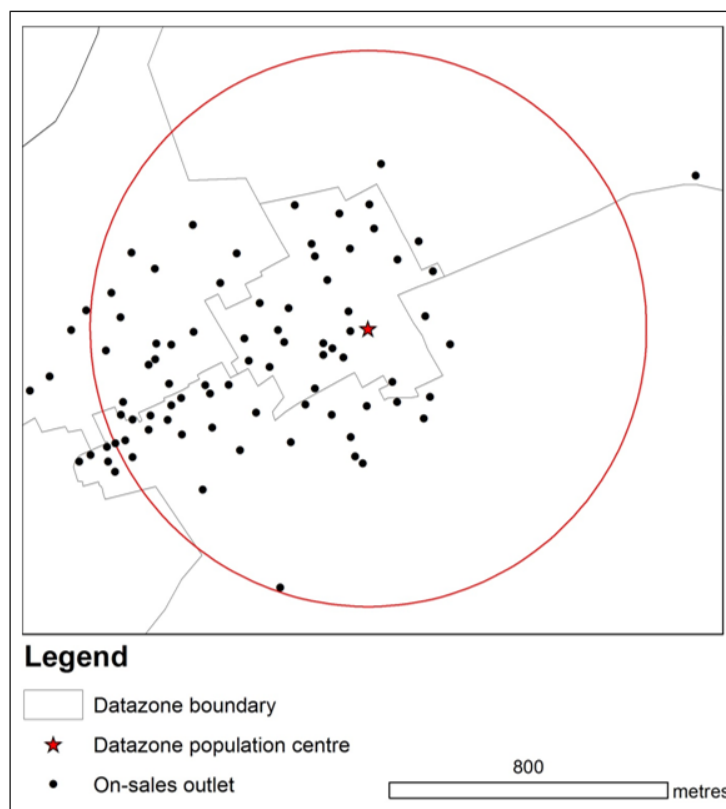


Figure 7. Calculating alcohol outlet availability for a data zone

For very rural areas, where the population is widely dispersed across the data zone, this measure might be a less accurate representation of numbers of outlets that are easily accessible.

Analysis

Multivariate regression models were used to assess whether alcohol outlet availability was related to alcohol-related deaths, alcohol-related hospitalisations and crime within data zones, independent of the degree of income deprivation in the areas and their rural/urban status. For both alcohol-related deaths and hospitalisations, the analysis also took into account the age and sex structure of the population. The models estimated the risk of alcohol-related harms in each of the outlet availability groups relative to a reference group, the group containing the neighbourhoods with the lowest outlet availability.

In testing the relationship between outlet availability and income deprivation, a bivariate analysis was used to compare the mean alcohol outlet availability rates per 10,000 population over 18 years old in groups of data zones with different levels of income deprivation. The 'high' and 'low' income deprivation groups of areas compared in the analysis contained the fifth of data zone areas with the greatest and least income deprivation.

Population

Data zone population data was used in the analysis of the relationship between outlet availability and income deprivation, and between outlet availability and alcohol-related deaths. Population data from the National Records of Scotland was used to describe data zone populations from 2011-2016.

Mortality

The mortality data were supplied by the National Records of Scotland. These data were given for data zones for the period 2011-2016 combined. The time period was set due to the availability of population estimates at 2011 data zone level. The definition of an alcohol-related death is based on [International Classification of Diseases codes](#), and the [2006 National Statistics definition](#) of alcohol-related deaths.

Hospitalisations

The hospitalisations data were extracted from the [Scottish Index of Multiple Deprivation 2016](#) Health Domain. SIMD alcohol-related hospitalisation was based upon the number of continuous inpatient stays, 2011-2014, with a diagnosis of an alcohol-related condition. Hospitalisations are represented for each data zone as a ratio of the number of hospitalisations recorded in the data zone relative to the number that would have been 'expected' based upon the average rates for Scotland, standardised by age and sex.

Crime

The crime data were extracted from the [Scottish Index of Multiple Deprivation 2016](#) Crime Domain. Crimes included in the domain are crimes of violence, sexual offences, domestic house breaking, vandalism, drug offences and common assault recorded during 2014-15, per 10,000 population.

Income Deprivation

Data for income deprivation were obtained from the [Scottish Index of Multiple Deprivation 2016](#) Income Domain. The Income Domain is a count of the number of people claiming selected means-tested benefits in 2013-14 and 2015 divided by the total population in 2014. It is therefore a percentage of the total population in receipt of benefits. The benefit data originates from the Department of Work and Pensions and HMRC.

Urban/Rural

The urban/rural status of data zones were defined using the [Scottish Government 6 Fold Urban Rural Classification](#). In this analysis the six classifications were combined into three categories 'urban' (combining 'large urban areas' and 'other urban areas'), 'small towns' (combining 'accessible small towns' and 'remote small town') and 'rural' (combining 'accessible rural' and 'remote rural').

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