Report on the Estimation of Fly-tipping Cost Savings due to Freegle

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# Introduction

This statement describes how cost savings in fly tipping due to Freegle were estimated.

# Method

The broad estimation method applied here was:

1. Determine what percentage of people fly-tip, then assume that this percentage of people who Freegle’d items in 2019 would otherwise have fly-tipped them
2. Identify a random sample of Freeglers that make up this percentage of the total and determine how many Freegles they carried out in 2019
3. Determine the cost of a single fly tipping event
4. Multiply this cost by the number of Freegles carried out in 2019 by the selected Freeglers
5. Sensitivity analysis over percentage of people who fly tip and cost of fly tipping to get a range as a result

This analysis was carried out in an R script called Freegle\_fly\_tipping.R. The R packages dplyr and openxlsx were used.

Table 1 gives details of the data sources used in this analysis.

Table 1 Data sources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data | Source | Geography | Year | Notes |
| Fly tipping percentage | <https://www.keepbritaintidy.org/sites/default/files/resources/Understanding-and-Tackling-Fly-Tipping-in-London-Final-Report.pdf> | London | 2018 |  |
| Fly tipping costs | <https://www.gov.uk/government/statistical-data-sets/env24-fly-tipping-incidents-and-actions-taken-in-england> | England | 2003-2006 | In the notes tab of the workbook cost estimates based on 2003-2006 are provided |
| Freegle’d items and non-identifiable ID of Freegle user | Freegle | UK | 2019 |  |

## Fly tipping percentage

The estimated fly tipping percentage was derived from a 2018 survey by the London Environment Director’s Network and Keep Britain Tidy’s Centre for Social Innovation. This was a survey of 1000 people from London. Ideally other studies would have been found and an average taken, but no other studies of the proportion of people that fly tip seem to exist. Further findings from the survey can help give a feel for how accurate it is to extrapolate the London findings across the UK.

Firstly, it was found the younger people fly tip more than older people, but this difference was much lower for bulky waste (ie the kinds of things that could be Freegle’d) as opposed to black bags/cardboard. In the case of bulky waste 35-44 year olds are more likely than 25-34 year olds to fly tip. 55+ year olds are still the least likely to do so, however. London has a younger population than elsewhere in the UK (median age of 35.6 compared to 40.3 for the UK overall)[[1]](#footnote-1), however this does not necessarily mean less fly tipping occurs elsewhere in the UK due to the fact that 25-34 year olds fly tip less than 35-44 year olds.

Secondly, it was found that unemployed people are more likely to fly tip than people of other working statuses. London has a middling level of unemployment for the UK[[2]](#footnote-2) therefore this suggests it is acceptable to extrapolate to other regions based on this consideration.

Finally, having access to a car and personal connection to a local area did not appear to affect levels of fly tipping according to the survey, which again suggests that extrapolating to all of the UK from London is acceptable.

Sensitivity analysis was carried out on the percentage of people who fly tip figure to take into account the fact that there is some uncertainty about the appropriateness of extrapolating it beyond London, in particular due to differences in the age distribution of the population of London compared to the UK as a whole.

## Fly tipping cost

It is difficult to determine the current cost of fly tipping, as Defra has not made estimates since 2016/17. Figures are available per item for 2003-06 and these are used here, but it is recommended that these be replaced with better estimates if they can be obtained. It is recommended that these cost figures be kept up to date, as it is likely that the cost rises over time due to inflation.

The fly tipping cost per item was taken to be the average of the cost of ‘other single item’ and ‘car boot load or less’ as these were assumed to be the most similar to a single Freegle’d object.

## Calculation

The R code used for the calculation was:

*number <- percentage\*Freeglers\_2019\_number*

*rows <- runif(number,min = 1, max = Freeglers\_2019\_number)*

*Freeglers\_selected <- Freeglers\_2019[rows,]*

*Freegles <- Freegle\_data[which(Freegle\_data$X1 %in% Freeglers\_selected),]*

*saving <- cost\*nrow(Freegles)*

Where:

percentage = percentage of people who fly-tip

Freeglers\_2019\_number = number of people who Freegle’d in 2019

Freeglers\_2019 = a list of the people of non-identifiable ids representing the people who Freegle’d in 2019

Freegle\_data = a dataframe of all Freegle’d items in 2019 including the id of the person who Freegle’d the item

cost = the cost per item of fly tipping

## Sensitivity Analysis

The sensitivity analysis was carried out using a Monte Carlo analysis assuming that both the percentage of people who fly-tip and the cost of fly-tipping can be represented by a uniform distribution whose maximum and minimum are +/- 10% the estimated values for these parameters. 100 samples from each of these distributions were taken, meaning that overall the Monte Carlo analysis ran 10 000 times. The R code for this was:

*percentages <- runif(100, min = percentage\*0.9, max = percentage\*1.1)*

*costs <- runif(100, min = cost\*0.9, max = cost\*1.1)*

*results = NULL*

*for ( i in percentages) {*

*for (j in costs) {*

*number <- i\*Freeglers\_2019\_number*

*rows <- runif(number,min = 1, max = Freeglers\_2019\_number)*

*Freeglers\_selected <- Freeglers\_2019[rows,]*

*Freegles <- Freegle\_data[which(Freegle\_data$X1 %in% Freeglers\_selected),]*

*saving <- j\*nrow(Freegles)*

*results <- rbind(results, saving)*

*}*

}

# Results

This analysis found that the fly tipping cost saving in 2019 due to Freegle’d items was £167,910. This value will vary when the script is rerun as a random sample of Freeglers was used to calculate it as described above. The Monte Carlo analysis looking at a uniform distribution for the percentage of people who fly tip between 17.55%-21.45% and a uniform distribution for the cost per fly tip between £26.1-£31.9 gave a range of cost savings of £112,444-£234,571 with a mean of £162,697.

1. See MYE 6 in the data provided here and filter by Geography = Region for mid-2019 median age estimates: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland> [↑](#footnote-ref-1)
2. <https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp=> [↑](#footnote-ref-2)