
Final report

Down the Drain



Quantification and exploration of food and drink waste disposed of to the sewer by households in the UK

WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

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Front cover photography: Milk being added to a hot drink

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Executive summary

Food and drink disposed by households via household drains has to date been unquantified in the UK. The best estimates to date come from water industry research. This report presents the findings from a weeklong diary-keeping exercise where householders were asked to record quantities of food and drink that they were disposing down the drain, along with an assessment of the reasons for that disposal on each occasion. The quantities found have proved much larger than expected and have taken the researchers, food waste campaigners, and the water industry by surprise.

The total quantity of food and drink disposed to the sewer by UK households each year is estimated in this report to be 1.8 million tonnes. This excludes a further 1.7 million tonnes of added water. 1.5 million tonnes of the food and drink disposed could have been avoided had it been better stored in the home or with better planning or preparation. The cost to the consumer, based on the retail purchase price of this food and drink, is estimated at £2.7 billion. Approximately 4.6 million tonnes of CO₂ equivalent greenhouse gas emissions are released as a result of the avoidable (i.e. edible) food and drink disposed via the sewer by UK households.

The estimates contained in this report feed into overall food and drink waste estimates for the UK covering all disposal routes. The research conducted here has enabled a more accurate picture of total disposal of food and drink from UK households than was previously possible across all disposal routes.

Food groups

The key food groups disposed via the sink and sewer by UK households were found to be:

- drink;
- dairy and eggs;
- meals;
- condiments, sauces, herbs & spices;
- staple foods;
- meat and fish; and
- processed vegetables and salad.

All other food and drink were grouped together in an 'other' category during this report.

Drink was disposed in by far the greatest quantity of these groups, at 740,000 tonnes per annum, with dairy and eggs appearing in the next greatest quantity, including a large amount of milk.

The vast majority of food and drink is disposed via the sink and sewer by households in the UK because of too much having been cooked, prepared or served (i.e. leftovers) and occasionally because of mistakes made during preparation resulting in the food being ruined. Very little food and drink is poured away having gone off or out of date; this is most likely to be the case is for dairy and eggs which are likely to have shorter shelf lives than other types of food and drink that figure highly in this report.

Food types

Individual types of food and drink that are disposed in the greatest quantities are milk, then carbonated soft drinks, then fruit juice and smoothies. Of the 1.5 million tonnes of avoidable food and drink waste disposed via the sewer in the UK each year by households, these three types of food and drink alone account for 710,000 tonnes, or nearly half of the total. Wine is the most costly single food or drink type disposed via the sewer at £450 million, with the next costly at £250 million.

Reasons for sink disposal of food and drink

The majority of food and drink is disposed because too much has been prepared or served. Leftovers account for most of this. Exceptions are fruit juice and smoothies and milk where there is an increased likelihood that they will be left over having gone off or past the date on the label.

Small quantities of food and drink being disposed during, for example, washing up, were found to account for only a small proportion of the total amounts being disposed overall. These 'dregs' also made up only a small number of the occasions on which participants were using household drains to dispose of food and drink.

Attitudes and perceptions

Householders' self-perception in terms of quantities of food and drink disposed via the sewer did not change a great deal during the course of the diary-keeping week. Overall householders tended to feel that disposal of liquids, particularly drink, via the sink is not a problem, though some felt that there might be alternatives. There was a belief in general, that it is better to dispose of liquids via the sewerage system than to put them in the household bin. Many respondents to the questionnaires (who all also took part in the diary exercise) felt at the start of the week that they 'never' dispose of a variety of food and drink via the sewer. Hot drinks were most likely to be disposed in this way, and soup and gravy, as well as cold drinks and milk were also claimed, although with less frequency.

Conclusions

Understanding the reasons for disposal of different types of food and drink is important to inform future work to reduce food and drink waste. Diary participants recorded the reason on each occasion for using the sink and sewer. Most occasions were found to relate to too much having been prepared or served. This would seem to suggest that future work may be best targeted at finding ways to help householders use their leftovers, as well as to use methods to prepare and serve correct sized portions. Recipes as well as ideas for storing leftovers such as freezing leftover wine may also help. Different interventions and suggestions will be appropriate, however, for different types of food and drink. Milk and fruit juice appear to be more likely than other types of food to be disposed due to going off or out of date.

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Glossary

- Avoidable waste – a classification used in the report relating to food and drink thrown away that was, at some point prior to disposal, edible, e.g. slice of bread, apples, meat; may be compared to possibly avoidable and unavoidable waste.
- Cooked, prepared or served too much – a classification used in the report relating to the reason for disposal; it includes food and drink that has been cooked, prepared or served in the home and subsequently disposed of; in the vast majority of cases, this is because too much food or drink was ‘processed’ in the home, but it would also cover cases where food or drink was damaged (or ‘ruined’) during this processing (e.g. burning).
- Disposal route – the method by which household food and drink waste is collected or removed from the home; in the case of this report, the disposal route in question is through the sewerage system.
- Drain – refers to outlets from single properties, for this report household residences, which join up with the sewerage system.
- Dregs – a classification used in this report to refer to small quantities of food and drink (less than 50 grams per occasion) left over after preparation or serving and subsequently disposed of by the householder.
- LFHW – Love Food Hate Waste
- Macerator – sink waste disposer
- Not used in time – a classification used in the report relating to the reason for disposal; it includes food and drink that has been disposed of because it has passed a date label (e.g. use by, or best before date), that has gone mouldy or rotten, looked, smelt or tasted bad.
- Possibly avoidable waste – a classification used in the report relating to food and drink that some people eat and others do not, e.g. bread crusts, or that can be eaten when a food is prepared in one way but not in another, e.g. potato skins; c.f. avoidable and unavoidable waste.
- Unavoidable waste – a classification used in the report relating to waste arising from food or drink preparation that is not, and has not been, edible under normal circumstances, e.g. meat bones, egg shells, citrus peel, tea bags; as opposed to avoidable and possibly avoidable waste.
- Sewer disposal – one of the major household disposal routes of food and drink waste considered in the report, including material disposed of via the sink, toilet or other inlet to the sewerage system.
- Sewerage system – the network of sewers which conveys wastewater to treatment facilities.
- WRAP – Waste & Resources Action Programme

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1.0 Introduction

The issue of food and drink waste has moved up the social and political agenda in the UK during 2008 and 2009. This ascent was spurred by the publication of *The Food We Waste* report in May 2008, which described the amount and types of household food and drink waste in the UK for the first time. This quantitative research underpinned the activities associated with increasing awareness of food and drink waste and helping people to reduce the amount of waste generated. In a short space of time, the benefits of cutting food and drink waste have become more widely understood: decreasing the amount of waste sent to landfill, and reducing the resources used to produce, transport and process products that are not consumed.

1.1 Rationale

WRAP (Waste & Resources Action Programme) has been actively engaging with consumers to reduce household food waste since 2007 following a programme of research into food waste, by engaging with the retail supply chain and by encouraging consumers to save money and help the environment using a variety of approaches to reduce their food waste. Understanding the scale of food and drink waste is important to the success of food and drink waste reduction initiatives, making it possible to better understand the kinds and quantities of food and drink being disposed by consumers, where they are spending the most money unnecessarily and having to dispose of greatest amount of waste. Improved information on waste disposed by households via the sewer would enable WRAP's food and drink waste reduction work to be better targeted at food stuffs of greatest concern and to address the main reasons which cause householders to dispose of food and drink via the sewer. Those most likely to be able to use the findings from quantifying this waste include the UK Governments, water companies who provide the sewerage services and wastewater treatment which are affected by it, as well as the food, beverage and retail industries supplying householders, environment agencies and WRAP.

1.2 Context and related research

1.2.1 WRAP's work on food waste

The wider context of this project is WRAP's promotion and support of a programme to reduce the amount of food that is purchased and subsequently thrown away uneaten. WRAP works closely with retailers and the food and drinks industry and has developed the Courtauld Commitment with over 40 signatories committed to working to reduce both household packaging and food waste. Examples of industry initiatives can be found at: http://www.wrap.org.uk/retail/courtauld_commitment/index.html

Local authorities also have an interest in food waste because it makes up between 17 and 19% of the household waste that they collect, though the proportion of food in residual waste collected from households is much higher (approximately 30% by weight). Because councils are trying to reduce the amount of biodegradable waste going to landfill, backed by a system of financial penalties if they fail to meet targets, many local authorities have started introducing food waste collection schemes as a means of meeting their commitments under the Landfill Allowances Trading Scheme and as a contribution towards improved recycling rates. However, these collection schemes have an environmental impact and represent a cost to the council – and therefore the taxpayer – so it is much more desirable to reduce the amount of food waste produced in the first place. WRAP has also produced guidance to help local authorities improve the efficiency of collection schemes for food waste.

To help us all waste less food, WRAP has developed a national campaign that aims to raise awareness of the amounts of food we are all wasting and provide simple tips, tools and techniques for reducing it. The role of the advertising and PR campaign is to make us aware that food waste is a significant issue both in terms of its environmental impact and cost to us as consumers and to prompt us to take positive action toward reducing food waste. The campaign, which launched in November 2007, is branded Love Food Hate Waste (www.lovefoodhatewaste.com), and is being supported by many Local Authorities and Retailers.

Other ways that WRAP has worked to reduce the burden of food waste on the environment include the sale and support of home compost bins (of which over 2 million have been sold during the lifetime of the campaign); as well as work to increase commercial composting and composting of food waste by increasing markets for products and also be funding and supporting treatment and composting infrastructure.

1.2.2 Related research

When WRAP started working on food waste in 2004 there was very limited information about the amounts and types of food waste produced. Good information on this, along with reasons why the waste is produced, is crucial in working with the food industry on reducing household food waste and for the development and targeting of Love Food Hate Waste. In order to address the knowledge gap, WRAP launched a major research programme in 2006, involving a range of qualitative and quantitative studies which can be found at: www.wrap.org.uk/retail/case_studies_research/index.html

The research culminated in the publication of quantitative research in May 2008. *The Food We Waste* described the amount and types of household food waste in the UK for the first time using compositional analysis to establish the amount of food waste collected by councils. This generally included only a small amount of drink waste (thrown away in packaging) and research to measure quantities disposed of via the sewerage system had not been carried out. Whilst *The Food We Waste* provided an estimate of likely quantities disposed in this way (and also via other routes such as home composting), it was felt both necessary and desirable to check these estimates and examine quantities in more detail.

WRAP are also engaged with research quantifying elements of non-household food and drink waste: from both the hospitality sector and from food manufacturers, distributors and retailers.

1.3 Research objectives

The key objectives of this research project were as follows:

- To produce robust estimates of the amount (kg) and cost (£) of food and drink disposed to the sewer by UK households per week and per year.
- To produce robust estimates of sewer disposal as a proportion of the major types of food and drink purchased.
- To investigate different reasons for using the sink and sewer to dispose of food and drink waste, and attitudes and perceptions to this activity.

1.4 Scope of the research

The research carried out to establish food and drink waste disposed of via the sewerage system focussed exclusively on waste from UK households, and items disposed of using the sink, toilet and drain, at home. A diary-keeping methodology was used to collect the data, and the nature of food or drink disposed on each occasion recorded with a reason for disposal. Subsequent analysis converted volumetric quantities to weights and broke down the results to show whether food and drink waste could be classed as unavoidable (e.g. coffee grounds) or could have been avoided if consumers had managed the food differently (e.g. mashed potato that could have been portioned more accurately or frozen if not needed), the quantities of waste disposal with and without water added in the home as a part of preparation, and to convert units to monetary value in terms of cost to the consumer. The environmental impact of the production, distribution and storage in the home of food and drink was also considered.

1.5 Structure of the report

The report on food and drink waste disposed via the sewer by UK households provides analysis of the major types of product disposed in this way. Chapter 2 sets out the methodology used for data collection and deals with issues of robustness in the data and subsequent analysis. Chapter 3 gives figures for total quantities of food and drink disposed via the sewer by weight and cost with an additional section on the environmental consequences and matters of interest to those dealing with the waste. Chapter 4 describes the major food groups found to be disposed via the sewer by households, in terms of overall quantity and proportion, as well as dealing with householders' reasons for disposal. Chapter 5 describes quantities of the specific, major types of food and drink

disposed in the greatest quantities and considers the overall amount contributed to by dregs and plate scrapings. Chapter 6 reports on attitudes and perceptions of those taking part in the research to the use of the sink as a means of disposing of food and drink.

2.0 Methodology

This section sets out the methodology used to collect data and to analyse it, including assumptions relating to scaling up factors and reporting conventions. The methodologies chosen for dealing with different aspects of the data are reflected in the presentation of findings through the rest of the report.

2.1 Method of data collection

For material disposed of via the sewer, it is often not possible to determine the type of food waste once it has been poured down the sink. Diary research is one method of capturing quantitative information on food waste disposed of via these routes. This method of data collection involves individuals in a household recording, in these cases, the food waste that they generate, including the type, the amount (weight or volume), and reason for disposal.

Diary research does have limitations, relating to:

- participants forgetting to record items;
- participants choosing not to record items; and
- participants changing behaviour during the diary recording period, often towards those that they perceive as more positive (e.g. generating less food waste than usual).

The effect of these issues can be reduced via good briefing of participants, clear instructions and a well designed recording system. With regard to food and drink waste, it is likely that limitations will result in an underestimate of food waste generated, although it is not possible to determine the scale of any systematic error in the results. These limitations should be borne in mind when interpreting the results.

Research to produce this report was carried out using a self-completion paper diary, backed up by telephone support for the recruited households. An alternative methodology was considered which involved providing storage for items that would be normally thrown away via the sewer and measuring the liquids and food waste centrally. This was rejected as the storage space, smells and inconvenience to the participant would have adversely influenced involvement and therefore the reliability of the findings.

The diary-keeping exercise started on Wednesday 12 March 2008 and lasted for seven days. The reason for starting midweek was to mitigate any respondents losing interest in the project towards the end and therefore not capturing data accurately at weekends. All participants were contacted before and after the diary exercise to obtain their views and perceptions on a range of food and drinks waste issues (see Appendix B for the pre-diary questionnaire and Appendix C for the post-diary questionnaire). They were also each contacted at least three times during the week to ensure that they were happy with what they had been asked to do and that they were actively participating. The questionnaires also enable capture of demographic information on participating households (including, gender, type of residence, number of people resident in the house, occupation, age of main respondent, household composition, tenure and ethnicity).

Participating householders were asked to make a diary entry each time a liquid or food item was disposed of via the sink, drain or toilet. The diary was completed over a one-week period. The advantage of this short timescale for data collection is that participants are more likely to keep up with record-keeping and a low rate of drop-out is achieved. There are disadvantages to do with the fact that the data are only a snapshot of sink disposal, and that this means seasonality is not accounted for. It was considered that for food waste, seasonality was unlikely to have great influence on disposal. However this constraint of the research does mean that events such as holidays or major sporting events are not accounted for in the results, which might lead to slight under-reporting. The fieldwork was carried out in spring, close to the Easter weekend. Care was taken to ensure that no data collection was going on during the course of that weekend as it was felt that this would skew the results. It is possible that warm weather might also have an effect on disposal occurrences and mild temperatures during March mean that the potential for hot weather to increase disposal is also not accounted for. Although it is possible that some seasonal fluctuations occur with food and drink wastage via the sewer, overall it is unlikely that the period of data collection differs substantially from the year as a whole.

The process of recording required the participants to measure liquid and food (by type) each time they disposed of these via the sink, drain or toilet. A set of three measuring vessels (one for small teacup measurements, a medium sized jug and a larger one with two pints capacity) was provided with simple, easy to read and consistent measurements. The participants were able to keep these on satisfactory completion of the project and after completing the week, also received an incentive payment for their time and trouble in participating in the

diary exercise and the pre-/ post-diary questionnaires. Where a measuring jug was not appropriate for measuring waste respondents were asked to provide an estimate in (for example) teaspoons, handfuls or cupfuls. The data analysis team converted these estimates to standard units of volume and then weight at a later stage in the process.

In addition to measuring how much they were throwing away, participants were asked to record the source and description of items. This aids estimates of costs, in that a premium brand will cost more to purchase than a budget product of similar type.

2.2 Capturing attitudes and perceptions

Questionnaires were administered to participating households before and after the diary-keeping exercise. The questionnaires were designed to capture attitudes and perceptions among the participants related to food waste and disposing of it generally, as well as specifically the use of the sink, toilet and outside drain as means to dispose of food and drink waste. Participants' perceptions of their own food waste behaviour were asked before the exercise as well as questions about the desirability and necessity of using the sink as a means to pour away drinks and liquid food waste. The post-diary questionnaire asked participants whether their views of the amounts that they dispose in this way had changed during the week. It was also used to check whether the week had been broadly typical, as a way of checking that results were reliable.

The questionnaires are available in Appendices B and C. The results of the surveys are in Chapter 6 on attitudes and perceptions.

2.3 Sampling framework

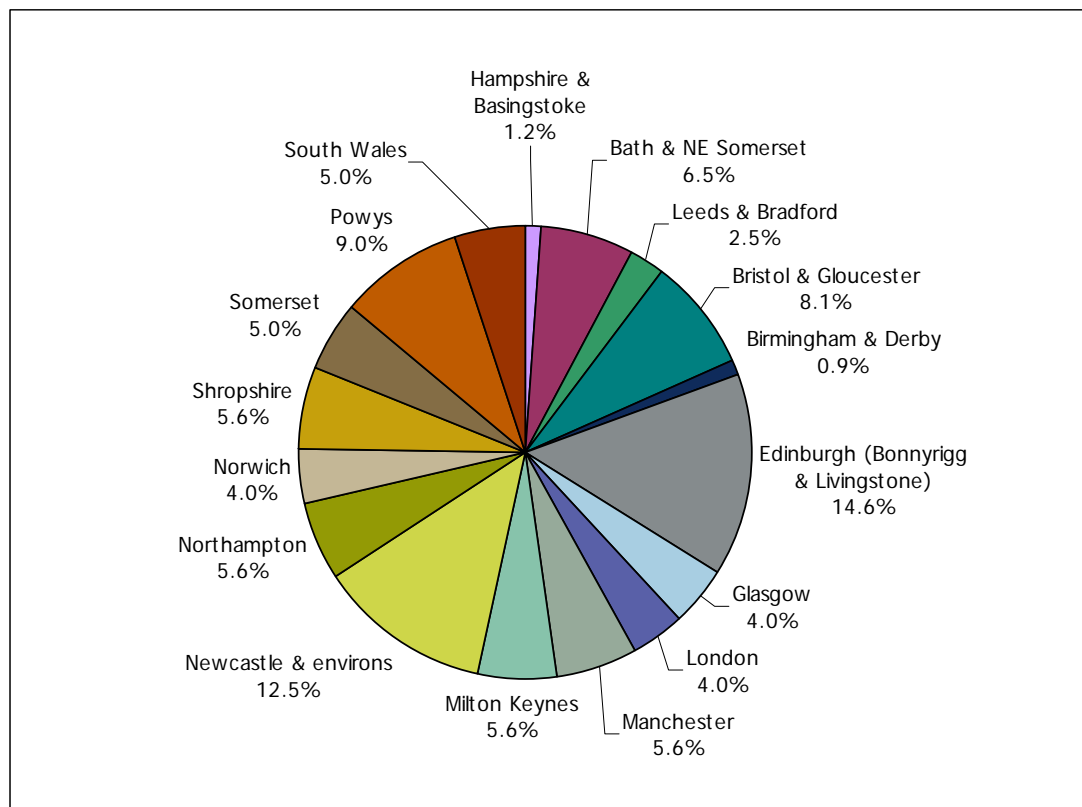
The sample size for the purpose of this project was chosen to achieve a balance between the interests of precision in being able to report the results and the cost involved in delivering research of this labour-intensive nature. A larger sample would have made greater precision possible, but also increased the cost of carrying out the research greatly.

In total 355 respondents were recruited across England, Scotland and Wales¹ and each participated in the pre-diary questionnaire. 336 respondents took part in the post-diary questionnaire and from these households a total of 319 completed diaries were returned. This means that 34 households, just over 10%, dropped out of the process.

The recruitment process broadly utilised a stratified random sampling methodology which was designed to achieve a reasonably representative sample at household level in respect of geographical location, age, household composition, housing type and tenure, employment status and ethnic origin. Exodus Research had for several years built a large database of households willing to participate in future research for WRAP – these households having been approached in previous random sample surveys and this formed the basis for the sampling on this occasion. In addition, householders were recruited via a 'door-knocking' phase (i.e. 'cold' recruitment of householders not on the source database) to ensure that all key demographics were adequately represented. It may be argued that the advantages of using an existing database of diarists who had previously taken part in similar research should be counterbalanced by concerns that this would not be a true random sample and possible bias. It was also desirable to recruit participants so as to achieve a balance between representativeness and a good response rate. Householders occupying the source database were supplemented by an additional recruitment process for this exercise filling demographic quotas and had originally themselves been recruited randomly.

¹ The Northern Ireland Government has not directly funded WRAP for food waste work but to maintain consistency with previous estimates it is important that results are scaled to this level. There is currently no evidence to suggest that households in Northern Ireland behave differently with respect to food waste than households in other parts of the UK.

Figure 1: Location of diarists



2.4 Representativeness of sample

The profile of households participating determines the extent to which results can be generalised to all households. The households were selected to provide a good cross-section of Great Britain to enable statistically valid interpretation of the findings and in particular in extrapolating the data to represent this larger population and the UK at large.

A total of 355 households completed the pre-diary questionnaire; 336 completed responses to the post-diary questionnaire; a total of 319 diaries were returned at the end of the week. The sample was selected to reflect certain demographic characteristics of households in Great Britain using Census 2001 data for comparison. The characteristics deemed relevant, in that they might affect quantities of food waste, were household size, household composition, the employment status and occupational grouping of the head of the household, type and tenure of property and the ethnic origin of respondents. Details of the profile and how respondents compare in terms of each of these characteristics to census profiles can be found in Appendix D.

One household characteristic which may be particularly significant in relation to amounts of food and drink wasted via the sink is the ownership and use of macerators. Approximately 5% of UK households are thought to own macerators (or kitchen food waste disposers) but the proportion of these which make use of them on a regular basis is not certain. Within the sample for this research, only 8 complete responses were returned by households with macerators. This may be a possible cause of underreporting, since households with macerators are likely to dispose of a great deal more food in this way. In terms of scaling up results it also means that the sample of households with macerators is too small to make generalisations to the whole UK population.

2.5 Accuracy of findings

Given the sample size, it was important to consider issues around accuracy of what would be reported. A 95% confidence interval was calculated for the mean waste per household per week for each food group and each food type, based on quantities being disposed by all participants. The number of households disposing of each food group and type was also computed as a measure of the commonness of each when being disposed. The

results of these calculations focus the reporting below, so that only food and drink groups and types that achieved a confidence interval of $\pm 50\%$ are included in the rest of the report.

This confidence interval represents a greater margin of error than that allowed for in reporting for Household Food and Drink Waste in the UK (being published at the same time as this report). Accepting the increased likelihood of error around the mean was felt reasonable given that a smaller sample was necessitated by the data collection approach and the potential high costs of running a similar exercise with a large enough number of households to allow for much greater precision. A lower level of error would have been desirable. The $\pm 50\%$ threshold has been applied, however, to allow us to report a greater number of food types and groups. The resulting reported food and drink types are those for which estimates of the mean are at least a reasonable representation of what might be expected for all types of household. The error involved does mean that these values are an approximation rather than a precise estimate.

The small sample size, however, does mean that breaking down results into great detail for all food groups and types, and for different types of household, has not been possible.

2.6 Whether food waste was avoidable

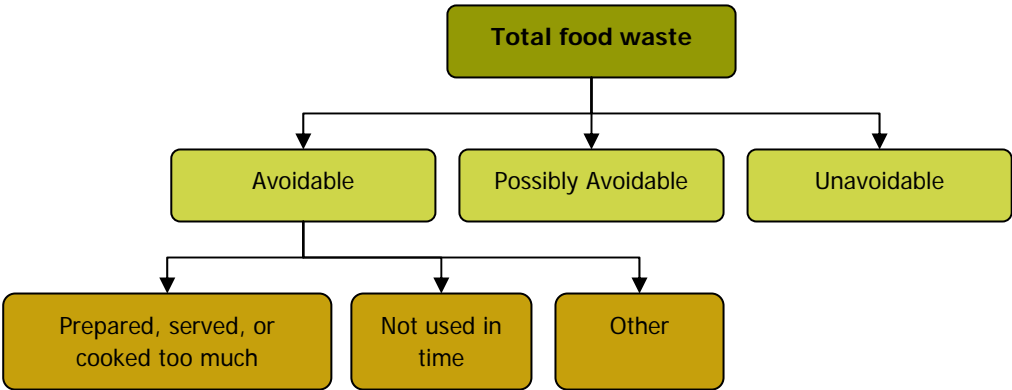
The research categorises food and drink waste by how avoidable the waste was.

- **Avoidable** – food and drink thrown away that was, at some point prior to disposal, edible (e.g. milk that has gone off; drinks poured away because there was too much in a serving)
- **Possibly avoidable** – food and drink that some people eat and others do not (e.g. syrup from canned fruit), or that can be eaten when a food is prepared in one way but not in another (e.g. potato skins)
- **Unavoidable** – waste arising from food or drink preparation that is not, and has not been, edible under normal circumstances (e.g. tea leaves and coffee grounds)

Avoidable food and drink waste is further split by the reason for disposal:

- **Cooked, prepared or served too much** – food and drink that has been cooked, prepared or served in the home and subsequently disposed of; in the vast majority of cases, this is because too much food or drink was ‘processed’ in the home, but it would also cover cases where food or drink was damaged during this processing (e.g. burning)
- **Not used in time** – food and drink that has been disposed of because it has passed a date label (e.g. use by, or best before date), that has gone mouldy or rotten, looked, smelt or tasted bad
- **Other** – any other reasons or waste for which it is not possible to discern the reason for disposal

Figure 2: Broad classification of food and drink waste



2.7 Calculating weight

To make recording of quantities easier for participants, measurements were taken by volume. This afforded a straightforward system at the time for completing the diary which participants could readily use for the types of liquid and semi-liquid food and drink that was mainly disposed of.

Liquids and other items that were measured by volume by participants were converted to mass values using factors reflecting their density. A list of conversion factors and explanation of methods used to convert from volume to mass can be found at Appendix A.

Reporting quantities disposed in volume units was considered. However, for the purposes of converting food wasted to cost, and in the interests of being able to compare results with other research, weight conversions were necessary. Cost conversions for drinks were still made on the basis of volume while for food items, weights for products were able to be used. Overall tonnes wasted are reported following conversion, for both food and drink.

2.8 Excluding added water

Some waste disposed of via the sewer consisted of water that had been added to the item purchased, for example, tea, coffee, powdered drinks and some soup. While completing their diaries, participants provided measurements of what they were pouring away including the added water in what they recorded. In producing estimates of what was disposed the figures excluding water were of main interest, in terms of the cost and original weight of food and drink purchased. The cost of added (tap) water to the consumer has been found to be on average 0.001p per litre. This was felt to be a negligible value from the consumers' point of view and therefore this cost has been excluded from cost estimates. In Chapter 3, Figure 3 shows the total weights of food and drink disposed with and without the water added in preparation. Other estimates of weight do not include this additional water element.

2.9 Calculating cost

During the diary-keeping exercise, respondents were asked to record as much detail as possible on the items that they were disposing. This included information such as the brand of the items so that cost estimates could be as accurate as possible. Where possible, therefore, average prices from a variety of supermarkets for each item of a particular brand were applied to the quantity reported to have been disposed. Where items were recorded without a brand being specified, an average price list was compiled. This was done by producing a list of different brands across a range (from more to less expensive) for that type of food and taking the average from the items on the list. The prices were estimated in 2008.

With the disposal of unavoidable waste or possibly avoidable waste, cost is harder to quantify. It can be argued that the consumer pays for this type of waste, such as tea bags, potato peelings or brine from a tin of tuna, in that they purchase the food with those incorporated in what they buy. Given that the consumer does not buy a tin of tuna for the brine, or tea for consumption of the actual tea bags or leaves themselves, this unavoidable or potentially avoidable waste has not been included in the estimates of cost provided in the report.

For many of the items of food and drink poured down the drain, assumptions were made as part of the process about how much, proportionately, of different ingredients were included in each typical serving. For example, milk puddings (such as custard and rice pudding) assume proportions of milk, sugar and other ingredients in estimates of cost. Information about what these proportions were is contained in the list in Appendix E along with further information on cost calculations and average prices used to make them.

2.10 Rounding in tables

Given the relative uncertainty around estimates of the waste of some individual food groups and food types, all information in the following chapters is reported to two significant figures. It should be noted that, for estimates where the relative error is close to $\pm 50\%$, these estimates are more uncertain than the two significant figures imply.

In tables and figures reporting food and drink waste, the sum of certain columns can be inconsistent with the total quoted in the final row; this should be ascribed to the rounding convention adopted.

All amounts of less than 1,000 tonnes have been denoted as '<1,000' in the tables. This includes categories for which no waste was found in the research; given that the surveys covered a sample of households – rather than all households in the UK – absence from the survey does not necessarily imply that the arisings in the UK are zero, only that they are likely to be low.

2.11 Calculating environmental impact

The methodology for calculating the greenhouse gas emissions associated with food and drink waste is presented in Appendix F. The emissions cover the relevant elements of the life-cycle of food and drink including: agriculture, manufacture, packaging, distribution, retail, transport to the home, storage and preparation in the home and waste disposal.

In addition to the greenhouse gas emissions, there are other environmental impacts and resource issues relating to food and drink waste including land and water use, eutrophication of water bodies and the depletion of soils. Although important considerations, these do not contribute to the calculations made for this report. However, the information on the different types of food and drink wasted via the sewer in the UK could be used as the basis for such calculations. Furthermore, a calculation on the nutrients, including energy, within the food and drink waste could also be made.

2.12 Categorising food and drink waste disposed via the sewer.

In *Household Food and Drink Waste in the UK*, previous categories assigned to different types of food were reassessed and the groupings of foodstuffs changed from previous reporting by WRAP. This report adopts the new categorisation. Food is broken down into key food groups; drink appears as one separate group and for all groups of food and drink disposed via the sewer is by far the largest single grouping. As with *Household Food and Drink Waste in the UK* there are 15 different food groups broken down into 150 possible types of food. Major food groups are those listed below which achieved a confidence interval above the $\pm 50\%$ threshold as described above. Seven food groups appeared in sufficient quantity to be included in this report. Major food types likewise are those reported with enough confidence ($> \pm 50\%$ error) in the estimates to be included separately in this report. A large number of other types of food were also recorded during the diary-keeping exercise but were disposed during that week by the sampled households that they do not appear in detail in this report. They do, however, combine into an 'other' category and are included in the figures for total food and drink waste.

2.13 Timing of the report

While the primary research phase for this report took place in spring of 2008, the release of the final report was delayed until late 2009. This was for a number of reasons. The findings were surprising in terms of the scale of food and drink disposed to the sewer. This meant, first, that relevant stakeholders were contacted to gain their views on the implications of the research. It also meant that WRAP's previous estimates of food waste in total warranted updating. The decision to revisit previous work published in *The Food We Waste* to update and improve the estimates provided at the time, with new data relating to sewer disposal meant that it was not desirable to release the work on sewer disposal itself until a full understanding of food and drink waste had been developed.

2.14 Chapter Summary

This chapter has explained in detail the methodologies used in this report for calculating various estimates relating to food and drink disposal using the sink and the method used for collecting the data. A diary method was used with a sample of households in Great Britain, and figures from these households scaled up to provide estimates for the whole UK, which are presented in the chapters below.

3.0 Total quantity of food and drink disposed via the sewer

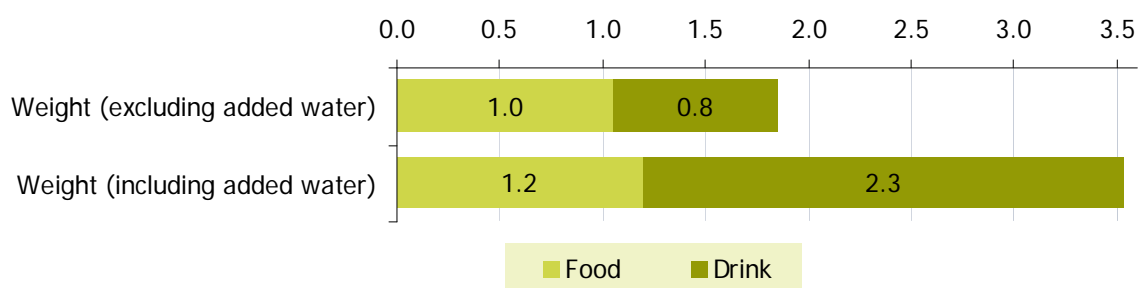
This section provides information of total quantities of food and drink poured down the drain in the UK, estimating quantities for all UK households by weight and cost. The environmental impact of this method of disposal of household food and drink is also considered and an estimate of greenhouse gas emissions resulting presented.

3.1 Total weight of food and drink

Overall, 1.8 million tonnes of food and drink were estimated to be disposed via the sewer in the UK in one year. Including water that is added during preparation, then this amount increases to 3.5 million tonnes per annum.

Figure 3 shows that most of the food and drink by weight that is poured away once water has been removed is food, though a large proportion of this is made up of dairy ingredients, in particular milk, as well as sauces such as cook-in sauce. Not all of it is solid. With added water included in the totals, drink makes up the greater part by weight, most of which was tea.

Figure 3: The amount of food and drink waste disposed of via the sewer in the UK (million tonnes per annum)



The majority of food and drink poured away in the UK is avoidable, as can be seen from Figure 4, below. 1.5 million tonnes of food and drink combined that is poured down the sink or drain each year in the UK is avoidable, meaning that had it been better stored or managed in the home, it need not have gone to waste. 270,000 tonnes of food and drink is possibly avoidable and a further 70,000 is unavoidable.

Looking at Figure 4, it is also possible to see that the category the vast majority of drinks waste (92%) and most food waste (78%) is avoidable. Food contains a higher proportion of possibly avoidable waste, such as drainings from tins and meat juice, compared with drink, although hardly any of the food wasted is unavoidable food waste, such as egg shells. With over 80%, therefore, of food and drink wasted being avoidable, there is clearly an opportunity to save money by wasting less.

Figure 4: The amount of food and drink waste disposed of via the sewer in the UK – excluding added water – split to show whether the waste could have been avoided (million tonnes per annum)

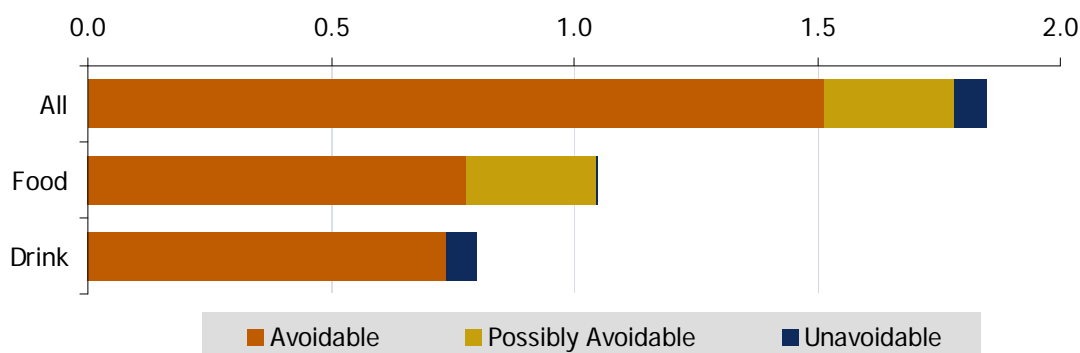
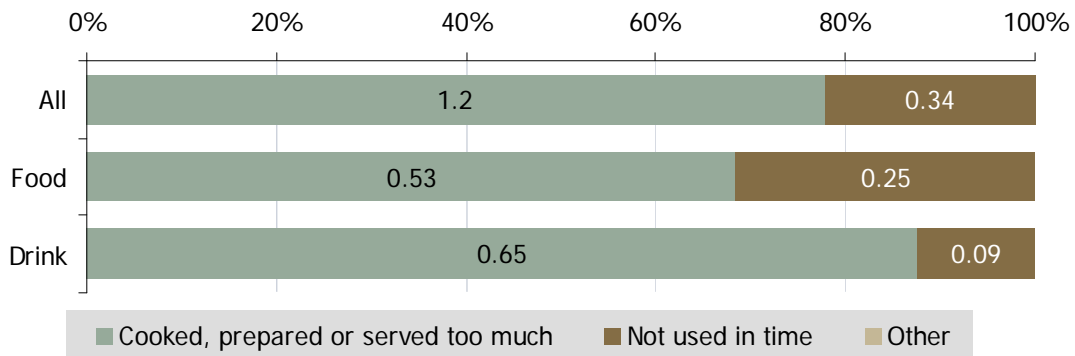


Figure 5, below, shows the main reasons for disposal from diary participants for all food and drink and for food and drink separately. Food is more likely to be disposed of because it has not been used in time than drink though for both categories, the primary reason given is that too much had been cooked, prepared or served. 'Not used in time' denotes food or drink that has gone off before being consumed, or which has gone past date on the

label and is therefore deemed by the consumer as not suitable to consume. Such a small number of other reasons were given during the diary-keeping exercise that these do not appear in the results.

Figure 5: The amount of avoidable food and drink waste disposed of via the sewer in the UK – excluding added water – split by reason for disposal (million tonnes per annum)

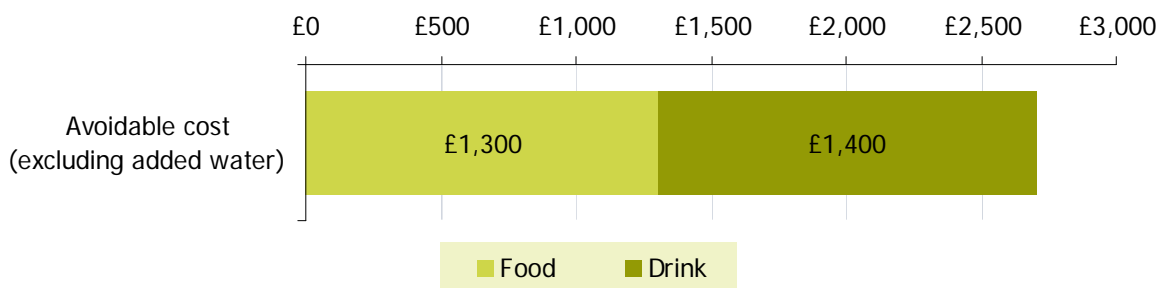


3.2 Total cost of avoidable food and drink

The combined cost of avoidable food and drink disposed via the sewer is £2.7 billion per annum by households in the UK. This consists of £1.3 billion of food and £1.4 billion of drink disposed each year by households.

The cost to the consumer of additional water disposed was removed from estimates of cost, as the unit cost was deemed negligible (see Section 2.9 on Calculating Cost for more detail). The split below between food and drink in terms of cost therefore shows only how much is poured away excluding water added, for example, to tea and coffee. Wasted food and drink appear to be almost equal in terms of cost to the consumer. Comparing Figure 6, here, to Figure 3, above, indicates a clear difference between what is disposed broken down by weight and cost. By weight, avoidable food waste is proportionately the greater. By cost as below, avoidable drink waste costs the consumer more.

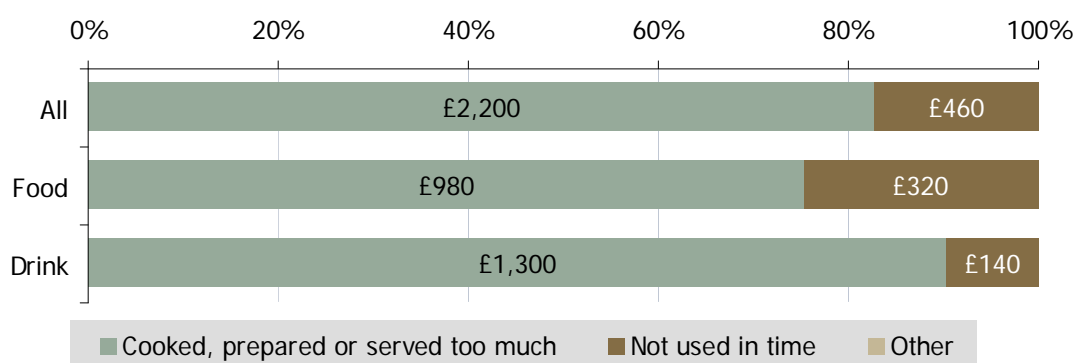
Figure 6: The cost of avoidable food and drink waste disposed of via the sewer in the UK (£ million per annum)



As with the weight of food and drink poured away, reasons for disposal tend to be about food or drink having been cooked, prepared or served in too great a quantity to be consumed. Again, a smaller proportion is wasted because it has not been used in time.

Comparing Figure 7, below, with Figure 5, above, there seems to be very little difference between weight and cost affecting why householders are disposing of food and drink. So preparing or serving too much remains the most likely cause when cost is the factor, as over-purchasing.

Figure 7: The amount of avoidable food and drink waste disposed of via the sewer in the UK – excluding added water – split by reason for disposal (million tonnes per annum)



3.3 Environmental impact of food and drink waste

3.3.1 Greenhouse gas emissions

The greenhouse gas emissions associated with avoidable food and drink waste disposed to the sewer in the UK account for approximately 4.6 million tonnes of CO₂ equivalent per year. This figure includes contributions from the production, manufacture and distribution of the food and drink but do not include emissions related to preparation and consumption in the home; Appendix F details the methodology. This can be compared to approximately 20 million tonnes of CO₂ equivalent per year for all food and drink waste in the UK. Figure 8, below, illustrates the resource flows for food and drink showing inputs of energy, fuel and water and outputs in terms of emissions from the production, storage, distribution and consumption of food and drink.

To put these figures in context, the total greenhouse gas emissions relating to consumption in the UK (as opposed to territorial or UK production-only emissions) amount to around 850 million tonnes per year². Thus, avoidable food and drink waste accounts for approximately 2.4% of this total. This percentage may appear small; however, there is the potential to substantially reduce the amount of avoidable waste. If realised, these reductions would have an important contribution to reductions in the UK's greenhouse gas emissions.

3.3.2 Household water consumption

The water that is added to food and drink items and then discarded is an obvious waste of a resource. Producing drinking water requires water abstraction, treatment and distribution, all of which have energy requirements which in turn have greenhouse gas emissions associated with them. When we waste the water these impacts become pointless and so, in a way, even more wasteful.

From the estimates made in this research, more than 1.7 million tonnes (1.7 billion litres) of water is added to drinks which are not finished, including tea, coffee, squash and baby milk. Overall this represents a small proportion of household water consumption.

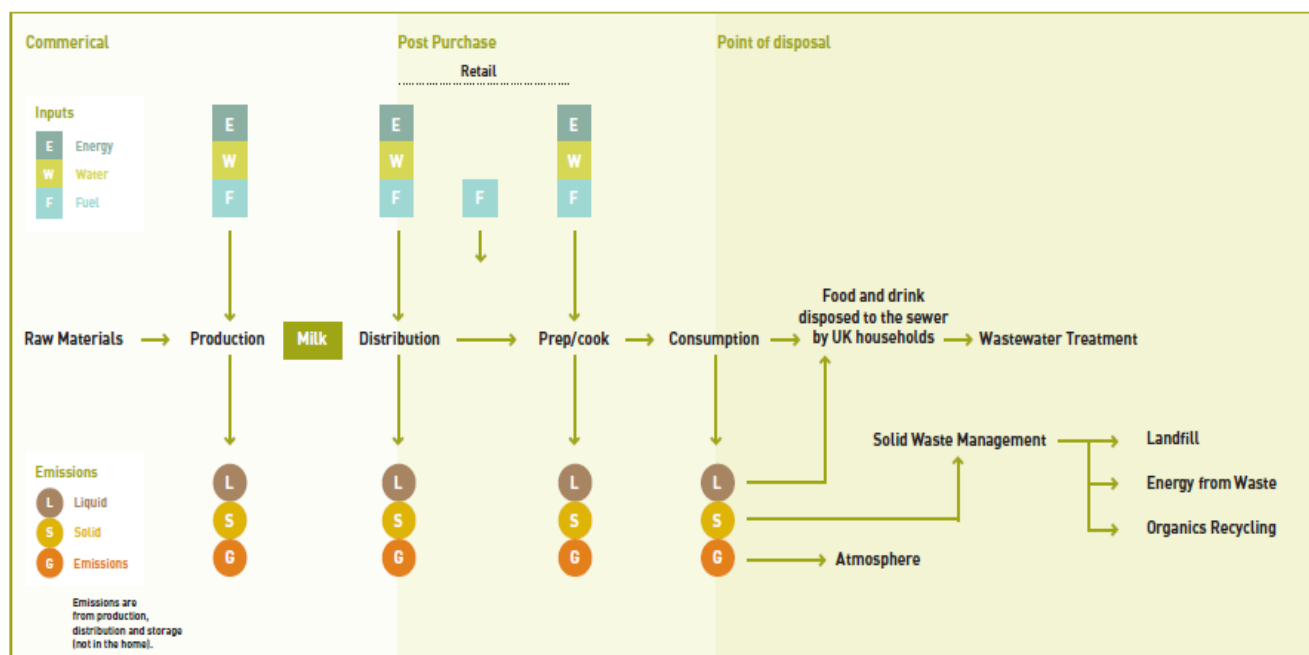
3.3.3 Treatment of sewer waste

When food and drink is thrown down the sink, drain or toilet it ends up in the sewerage system. Amounts of sewage sludge have been increasing in recent years, mainly as a result of more stringent treatment requirements. In England and Wales, for example, sewage sludge production rose from around 1 million tonnes dry solids in 1998 to 1.3 million tonnes in 2005 and is expected to be 1.6 million tonnes by 2010³. The sewage sludge needs to be treated, disposed or sent for beneficial use. Final treatment occurs by a variety of means. Some, such as landfill, incineration and cement manufacture, are themselves responsible for additional greenhouse gas emissions. In addition approximately 60% of UK sewage sludge is processed through anaerobic digestion plants which enable energy to be recovered from the sludge before final treatment.

² For example, Development of an embedded carbon emissions indicator (Defra, July 2008) quotes a value of 851.7 million tonnes for 2004, the most recent year reported.

³ Water UK

Figure 8: Resource flows for food and drink



The addition of food and drink waste to the sewer in addition to normal sewerage causes additional work for sewage treatment plants. Food waste in particular increases the level of suspended solids in the sewerage which results in greater quantities of sewage sludge. Based on a typical water content of 70%⁴, we estimate that the food disposed of via the sewer creates 250,000 tonnes of sewage sludge per year (dry solids), approximately 15% of current total sewage sludge arisings.

Potential environmental impacts associated with disposing of food and drink via sewer systems depend upon the type of treatment facility, and there are several such impacts. The first of these is the additional load of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Total Suspended Solids (TSS) caused by adding this material. These pollutants must be dealt with at the Waste Water Treatment Plant. In addition, foodstuffs by their nature contain nitrogen and phosphorous, which add value in digestate when used on soils, but within sewage are water pollutants, thereby adding to the work required by Waste Water Treatment Works to meet legal standards for the eventual discharge to water courses.

3.4 Chapter summary

This chapter has summarised the total weight and cost of disposing of food and drink via the sewer to UK households per year. The estimates made have also been considered in light of their environmental impact, helping to understand, in particular, the effects of production, storage and distribution in the supply chain of food and drink that is then wasted. By weight rather than volume, 1.8 million tonnes of food and drink are disposed to the sewer by UK households each year. This excludes added water. 1.5 million tonnes of this food and drink is avoidable waste. The cost to the consumer, based on purchase price of this avoidable food and drink waste, is estimated at £2.7 billion. Approximately 4.6 million tonnes of CO₂ equivalent greenhouse gas emissions are released as a result of the avoidable food and drink disposed via the sewer by UK households.

⁴ Diggleman, C. and Ham, R.K., Household food waste to wastewater or to solid waste, *Waste Management Research*, 2003

4.0 Food Group

This section sets out quantitative findings of food and drink disposed via the sewer by UK households each year, breaking the results down into the major food groups that are most commonly disposed in this way.

4.1 Major groups of food and drink

Food that was analysed from the diary-keeping exercise for this research report was categorised into groups according to broad category, to aid understanding of the nature of what was most likely to be waste via the sink. Of the 15 categories adopted, only seven were recorded by diarists in sufficient quantities to be included in analysis. These are summarised in Table 1.

Table 1: Major food groups in this report with examples of food types that apply to each

Food and drink group	Examples of food types in this report	Other examples
Drink	Tea, coffee, carbonated soft drinks, fruit juice and smoothies, squash, wine	Other alcohol, milkshake and milk drink etc.
Dairy and eggs	Milk	Yoghurt / yoghurt drink, cream, crème fraiche, egg etc.
Meals	Soup	Sandwiches, composite meals, savoury products
Condiments, sauces, herbs & spices	Cook-in sauce, gravy	Mayonnaise / salad cream, dips, ketchup, salt, pepper, herbs etc.
Staple foods	Breakfast cereal	Flour, pasta, rice etc.
Meat and fish	N/A	Pork / ham / bacon, fish and shellfish, beef, lamb, poultry, bone etc.
Processed vegetables and salad	N/A	Broccoli, cabbage, carrot, coleslaw and hummus, potato, tomato etc.

All other food groups have been combined in this report into one category, or food group for the purposes of this report so that only results with reasonable accuracy are included separately in the results. Fats and oils were analysed as a separate group but did not get disposed in sufficient quantity to be reported separately with any real certainty about the results and therefore are included in the 'other' category.

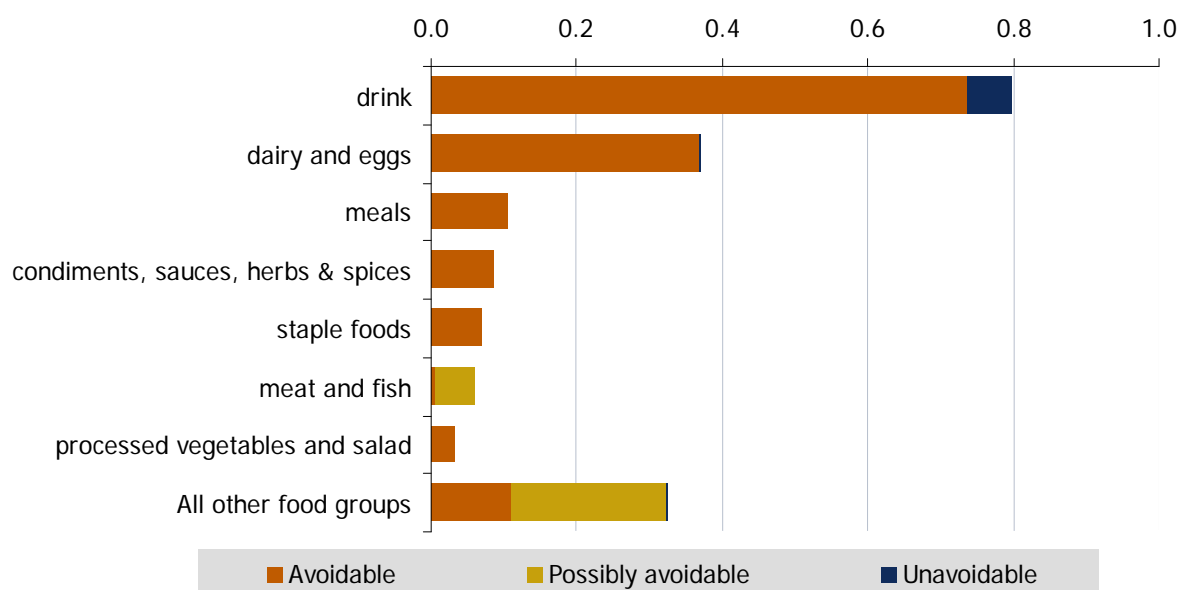
4.2 Weight and cost of food and drink by group

Figure 9, below, shows quantities (by weight) of each of the major food groups being disposed. Drink in general is disposed of in by far the greatest quantity. A small proportion of this is unavoidable waste from tea and coffee. 740,000 tonnes of drink that could have avoided being wasted are poured away by UK households per annum. This is the weight with added water excluded and so the total quantity with this water would have been far greater. Dairy and eggs are also disposed of in large quantity, as a group, with 370,000 tonnes being disposed via the sewer. Much of this is milk on its own and almost all dairy and eggs are avoidable waste. A tiny amount of this is thought to be unavoidable.

Prepared meals; condiments, sauces, herbs and spices; and staple foods are all major food groups, in that they are poured away in larger quantities than other groups. When disposed, they all included only avoidable waste. Meat and fish appear next on the list but only a small amount of these food types were avoidable. The majority, 53,000 tonnes, were deemed 'possibly avoidable', likely to be made up in the main of fat and juices left over during cooking and preparation.

In comparison to findings for Meat and Fish in *Household Food and Drink Waste in the UK*, the high proportion of this category that is possibly avoidable is an interesting finding. In the other report, the majority of meat and fish disposed through all routes is avoidable. The possibly avoidable fraction is much greater when looking at disposal via the sewer alone. This greater likelihood of finding meat waste that might have been avoidable in sewer disposal is largely accounted for by disposal of meat fat and other juices, via the sewer.

Figure 9: The amount of food and drink waste disposed of via the sewer in the UK – excluding added water – split to show whether disposal was avoidable, by food group (million tonnes per annum)



Cost of avoidable food and drink waste is included in Table 2, below, at £2.7 billion to the UK consumer each year of pouring food and drink down the drain that could have avoided being wasted. Also looking at quantities of food disposed by groups, the table shows the tonnes per annum of food and drink disposed and how much of each could have been avoided. The cost is provided only for avoidable waste. This shows the potential for large financial savings for households by reducing their food and drink waste disposal to the sewer.

As is the case for weight comparisons, the largest amount disposed by cost is also made up of drinks waste. With cost as the measure rather than weight, the difference in amounts between drinks and other groups is even greater. This indicates that drinks tend to be of higher value or cost to purchase than other types of comestible disposed via the sewer.

Table 2: Estimate of food and drink waste disposed of via the sewer, split to show where disposal was avoidable, by food group and purchase price of the avoidable fraction

Food group	Weight generated (tonnes / year)				Annual cost of avoidable waste in UK (£ million)
	Total weight	Unavoidable	Possibly avoidable	Avoidable	
drink	800,000	61,000	<1,000	740,000	£1,400
dairy and eggs	370,000	<1,000	<1,000	370,000	£380
meals	110,000	<1,000	<1,000	110,000	£230
condiments, sauces, herbs & spices	85,000	<1,000	<1,000	85,000	£220
staple foods	70,000	<1,000	<1,000	70,000	£150
meat and fish	60,000	1,500	53,000	5,600	£25
processed vegetables and salad	33,000	<1,000	<1,000	33,000	£48
all other food groups	330,000	3,300	210,000	110,000	£250
Total	1,850,000	66,000	270,000	1,510,000	£2,700

Figure 10 illustrates the split of all food and drink waste disposed by the sewer between the food groups. Drinks and dairy and eggs clearly appear in much greater quantities than other groups by weight. This figure shows food and drink in all states (i.e. irrespective of whether or not wasting it could have been avoided).

Figure 10: Proportions of food and drink waste – excluding added water – by weight, split by food group, of all food and drink waste

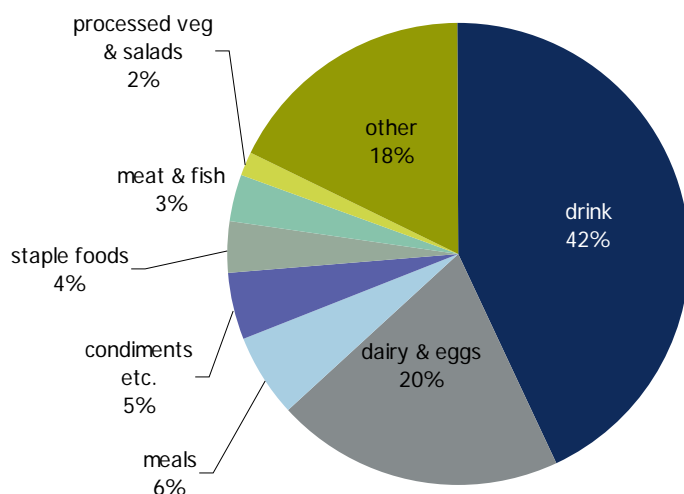
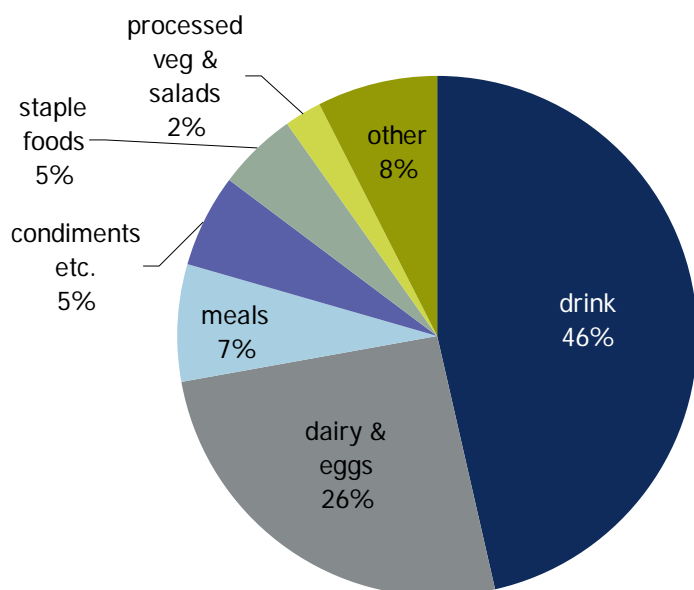


Figure 11 shows the proportionate weight of food and drink disposed split by groups, with avoidable waste only. When comparing Figure 11 with Figure 10, the proportion disposed of that is drinks waste has increased; dairy has also increased as a proportion. Meat and fish are no longer included as only a small proportion of this group was avoidable. A small amount of most types of meat and fish by food type are disposed via the sink but this tends not to be made up of food stuffs that would or could otherwise have been eaten. The category of 'other' food types makes up a smaller proportion of the whole in Figure 11 compared to Figure 10. This is because, showing only avoidable waste, Figure 11 does not include drainings from cans which are included in Figure 10. The avoidable 'other' foods likely to be disposed of in this way include baby food and baby milk but these appear in small quantities and are not major food types for this report.

Meat and fish are the only group that stand out as a major food group when just looking at waste via the sewer that could potentially have been avoided. This shows the predominance of food in this category which some might consume while others would choose not to and in this case is made up in large part by fats and juices from meat preparation. The 'other' group in this case includes a large amount of drainings from cans, such as tinned vegetables and fruit.

Taking just unavoidable food and drink waste, the groups of food and drink that appear in meaningful quantities are meat and fish, and drinks. The proportion of drink waste that is disposed that is unavoidable is high. This all comes from tea and coffee where a certain amount of tea waste, such as actual tea leaves and coffee grounds escape down the drain when emptying tea pots, for example. It appears that more coffee grounds escape via the sewer than tea leaves and grounds make up a higher proportion of coffee waste than tea leaves do of overall tea waste being disposed; this is with additional water taken out of estimates but assumed proportions of milk and sugar for poured cups left in.

Figure 11: Proportions of food and drink waste – excluding added water – by weight, split by food group, of all avoidable food and drink waste

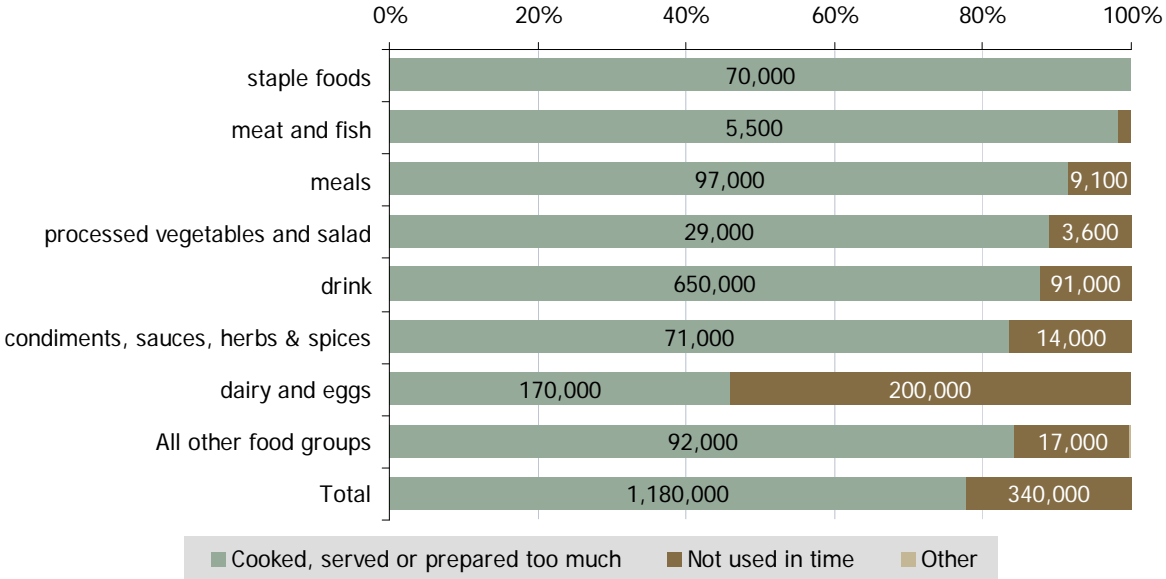


4.3 Reasons for disposing of different groups

In most cases, food and drink is poured down the drain because too much has been cooked, served or prepared. It is less likely to be disposed of having gone off or gone past the date on a label. Staple foods, in particular, do not appear to be disposed for that type of reason at all. For almost all food groups there is a clear difference between reasons for disposal for all disposal routes, compared to sewer waste disposal of food and drink specifically. Here, they are most likely to be thrown away having not been used in time. In clear contrast, Figure 12 shows a greater likelihood for food and drink to be disposed via the sewer due to too much having been cooked, served or prepared. Dairy and eggs are the exception in terms of sewer waste, in that they are more likely to go out of date or go off and be disposed for that reason. Shorter shelf life of such products may partly account for this.

The high levels of food and drink disposed in this report due to leftovers being discarded might suggest that disposal via the sewer includes a lot of food and drink being cleared up during or after cooking and eating. Much may be poured away just before or even as a part of the washing up process. However, for drinks as a group this seems less likely. A more detailed analysis of reasons for disposal of some of these food groups was therefore desirable. This analysis can be found in Appendix G in more detail and is broken down by food type. However it should be noted here that the anticipated high quantities of food disposed during washing up were not, in the event, discovered during this research. It is unclear whether this is partly because respondents did not record the relatively small quantities disposed at such times on all occasions, but this is a possibility. However, the analysis in Section 5.2 on dregs show that the overall contribution of 'dregs' and 'plate scrapings' to food and drink waste disposed via the sink is fairly small, both in terms of total quantity and also the numbers of occasions that such disposal takes place.

Figure 12: Weight of avoidable waste – excluding added water - split by reason for disposal (tonnes per annum)



4.4 Chapter Summary

The key food types disposed via the sink and sewer by UK households were found to be:

- drink;
- dairy and eggs;
- meals;
- condiments, sauces, herbs & spices;
- staple foods;
- meat and fish; and
- processed vegetables and salad.

All other food and drink were grouped together in an 'other' category during this report.

Drink was disposed in by far the greatest quantity of these groups, at 740,000 tonnes per annum, with dairy and eggs appearing in the next greatest quantity, including a large amount of milk.

The vast majority of food and drink is disposed via the sink and sewer by households in the UK because of too much having been cooked, prepared or served (i.e. leftovers) and occasionally because of mistakes made during preparation resulting in the food being ruined. Very little food and drink is poured away having gone off or out of date; where this is most likely to be the case is with dairy and eggs which are likely to have shorter shelf lives than other types of food and drink that figure highly in this report.

5.0 Food Type

In this chapter, food and drink being disposed via the sewer is further broken down into separate types of food and drink. This has only been done where the threshold in terms of accuracy means that the mean is likely to be within $\pm 50\%$ of the figure reported for each type and so the list below is relatively short compared to the much longer list of categories of food and drink types analysed. The results are further analysed to provide a better understanding of the reasons for the disposal of the different types of food and drink and a separate section on the disposal of small quantities, termed 'dregs' of food and drink is provided since it was considered that the results relating to avoidable food might be inflated by the reporting of great numbers of occurrences of individually insignificant amounts of food and drink.

5.1 Major types of food and drink

The 'major' food and drink types, that is, those disposed of in greater quantities and for which the results are more certain, are listed in Table 3 with the group within which they fall alongside. Most types listed are drinks.

Table 3: Major food types and their corresponding groups

Group	Major types
Drink	Carbonated soft drinks; fruit juice and smoothies; lager, beer and cider; (bottled) water; wine; squash; and tea
Dairy and eggs	Milk
Desserts and cakes	Milk puddings (e.g. custard)
Meals	Soup
Condiments, sauces, herbs & spices	Cook-in sauce; and gravy
Staple foods	Breakfast cereal
Other	Drainings from canned food

5.1.1 Milk

The greatest single food type, at 330,000 tonnes per year, poured down the sink and drain by households in the UK is milk, as can be seen in Figure 13 and Table 4, below. All of this milk waste could have been avoided had it been better managed or stored in the home. Milk in this category does not include milk in cups of prepared tea and coffee when that is disposed, nor does it include milk that was served as part of breakfast cereal. It is listed in the group of dairy and eggs and makes up the majority of this group on its own.

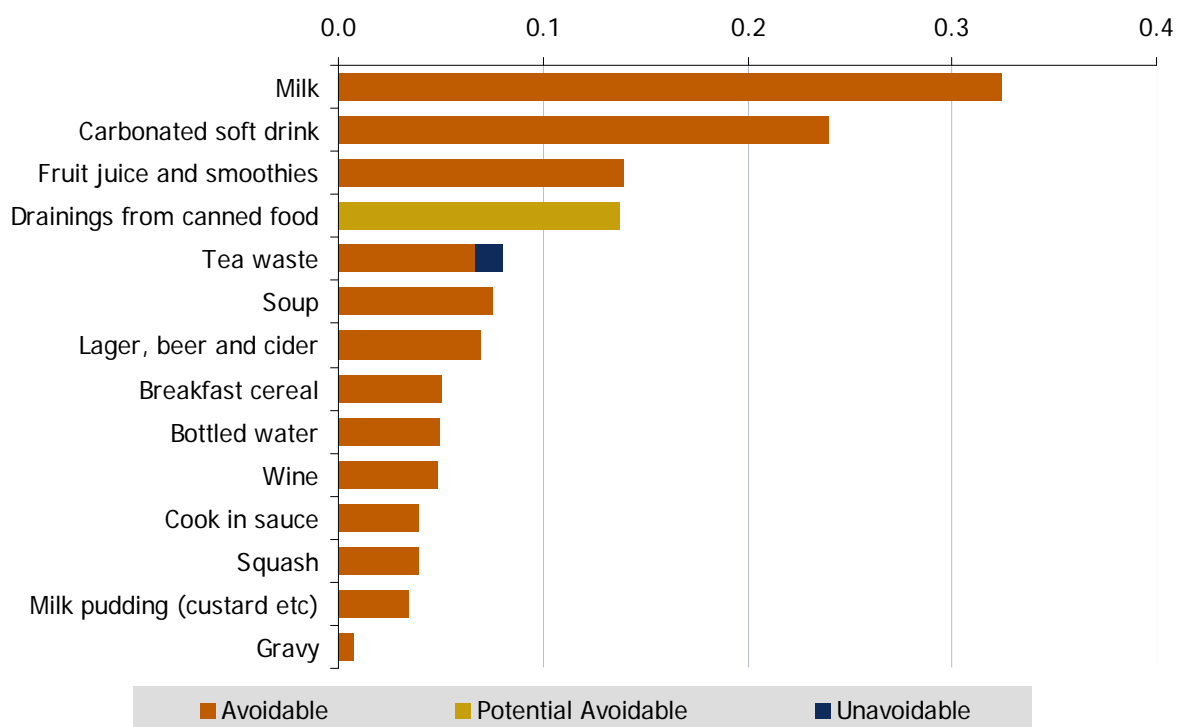
The total cost to the consumer of pouring milk away is approximately £250 million each year. Milk does not seem particularly expensive to the consumer per unit purchased, it is typically thrown away in fairly small quantities (<200g) on each occasion. It is the cumulative effect of this disposal, over the course of a year that might be of concern with greater awareness of the issue.

Milk is unusual in that it is more likely to be disposed of having gone off or past date rather than after serving. Partly this is likely to be due to its nature – it is not often served on its own but more likely to be included in other drinks and cooking and it is perishable, typically with a shorter shelf life than most other types of food and drink. Where it is prepared with other food or added to hot drinks the milk appears in these categories rather than on its own. The fact that milk tends to be disposed on its own having gone off, means that there is a strong case for persuading householders to buy less in the first place, or for making it more possible for them to do so, as well as for finding storage options and advice that will make it easier to keep fresh.

5.1.2 Carbonated soft drinks

240,000 tonnes of carbonated soft drinks are also disposed of via household drains and again all of this waste could be avoided. Figure 14, below, shows that almost all of this waste is due to drinks being served but not consumed. £190 million is spent by UK households on carbonated soft drinks each year that are then poured away. It also seems that larger quantities of carbonated soft drinks tend to be thrown away on each occasion than for other food and drink which may suggest that the amounts sold in terms of pack sizes and numbers of cartons per purchase may be greater than are able to be consumed.

Figure 13: Weight of food and drink waste disposed of via the sewer in the UK – excluding added water – split to show whether waste was avoidable and by food type (million tonnes per annum)



5.1.3 Fruit juice and smoothies

Avoidable fruit juice and smoothies are poured away in large quantities. The total spending by UK households on fruit juice and smoothies that go to waste via the sink and sewer each year is £160 million. These are more likely than other items, except milk, to be poured away because they have not been used (or drunk) in time. This indicates that the problem is more likely to be due to storage in the home (e.g. fridge temperatures not low enough; cartons and bottles left out rather than refrigerated) or perhaps due to confusion over date labels.

5.1.4 Drainings

Drainings from canned food are all potentially avoidable. This is because it may be argued that they could have been consumed, mainly by incorporating into cooking, though also syrup from tinned fruit, for example, is eaten by some but not others. Categorising drainings as 'possibly avoidable' rather than 'unavoidable' might be a debatable approach since there are relatively few who would cook with vegetable juice from a can, for example, yet it remains the case that this sort of waste could have been consumed. The cost of the drainings is not included in the results since it is not definitely avoidable waste, as explained in Section 2.9.

5.1.5 Meals

The only foodstuff in the 'meals' group that is poured away in sufficient quantities to be split out in this report is soup. Other meals, clearly being mainly mostly solid, and including composite meals such as shepherd's pie, stews etc. appear in small quantities as plate scrapings. Soup reported here, includes both soup bought ready-made both in tins and fresh soup, as well as home-made soup and soup bought as powder with water added.

5.1.6 Lager, beer and cider

Lager, beer and cider have been grouped together and as such form the type of alcoholic drink thrown away in the greatest quantity. On almost all occasions, these drinks are poured away following too much being served or from cans being opened but not finished.

Table 4: Estimate of food and drink waste disposed of via the sewer, split to show whether waste was avoidable, by food type and purchase price of the avoidable fraction

Food type	Weight generated (tonnes / year)			Annual cost of avoidable waste in UK (£ million)	
	Total	Unavoidable	Possibly avoidable		
Milk	330,000	<1,000	<1,000	330,000	£250
Carbonated soft drink	240,000	<1,000	<1,000	240,000	£190
Fruit juice and smoothies	140,000	<1,000	<1,000	140,000	£160
Drainings from canned food	140,000	<1,000	140,000	<1,000	0
Tea waste	80,000	13,000	<1,000	67,000	£100
Soup	76,000	<1,000	<1,000	76,000	£120
Lager, beer and cider	70,000	<1,000	<1,000	70,000	£120
Breakfast cereal	51,000	<1,000	<1,000	51,000	£130
Bottled water	50,000	<1,000	<1,000	50,000	£35
Wine	48,000	<1,000	<1,000	48,000	£470
Cook in sauce	39,000	<1,000	<1,000	39,000	£100
Squash	39,000	<1,000	<1,000	39,000	£50
Milk pudding (custard etc)	34,000	<1,000	<1,000	34,000	£28
Gravy	7,800	<1,000	<1,000	7,800	£46

5.1.7 Breakfast cereal

Breakfast cereal is only disposed via the sink and drain due to excess serving. This staple food has a long shelf life. On some occasions the waste appears in relatively small quantities which simply result from the plate not being cleared. It could be argued that these dregs of cereal represent waste that could not easily be avoided. A further analysis of the quantities of food thrown away on each occasion has been carried out to examine this problem, however, and the conclusion drawn that only a very small amount of total food and drink waste comprises dregs. Further information on this is in Section 5.2.

5.1.8 Bottled water

Bottled water is poured down the sink almost entirely because it has been served to excess although a small amount is disposed having gone past date. All of this waste could have been avoided.

5.1.9 Wine

Wine is the most costly drink poured down the sink; although overall disposed in smaller quantity the overall cost of pouring it down the sink to the householder is high at £470 million per year. Wine is likely to be wasted because too much has been served; only a very small amount was recorded as having gone off.

5.1.10 Cook-in sauce

Cook-in sauce is disposed most often because too much of it has been cooked, prepared or served. It is included here where what was being poured has been clearly identified in diaries as sauce and so sits in the condiments, sauces and spices group rather than under 'meals'. This food type refers to ready-made sauces for pasta and casserole dishes, for example.

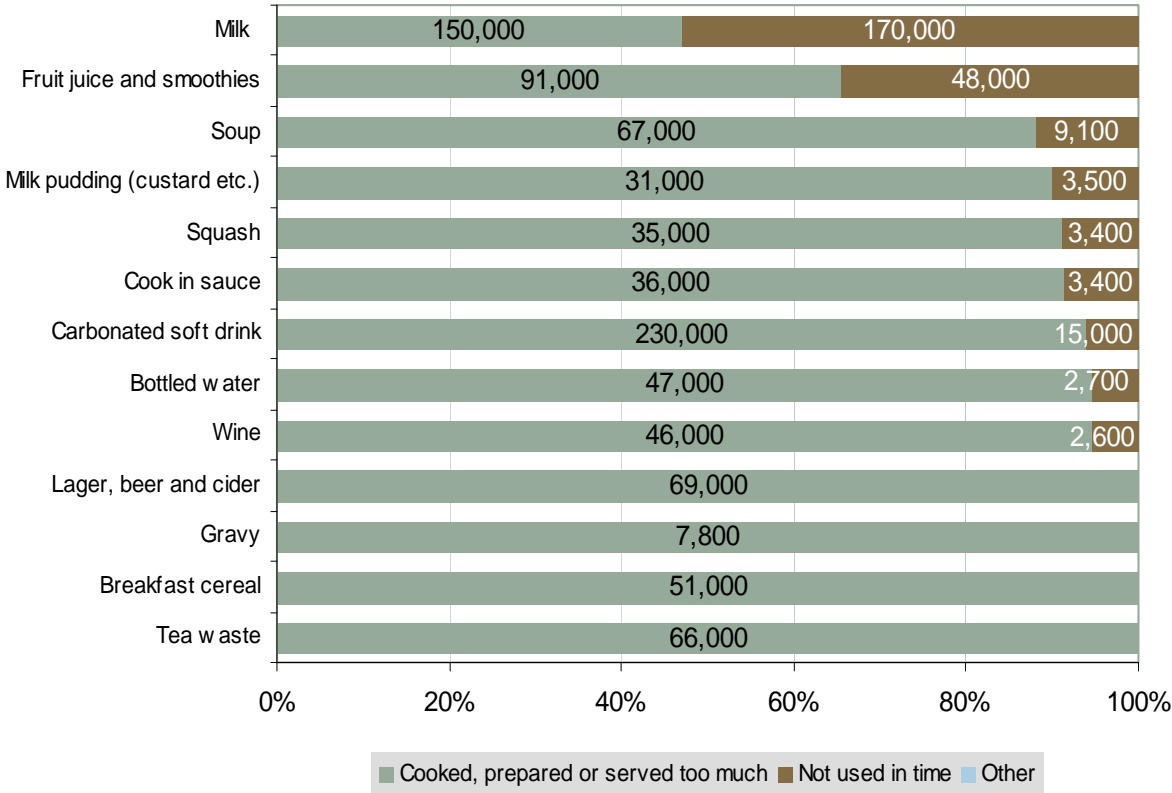
5.1.11 Squash

Squash is also almost always wasted due to too much being prepared or served. However, given that this is an estimate of the amount of squash being disposed of excluding water added to serve; this is a large amount (39,000 tonnes) of an already concentrated product.

5.1.12 Milk puddings

Milk puddings include rice pudding and custard. It is not pre-prepared, fresh custard, or similar, being purchased in too great quantities that seem to be the problem here. Again, too much of various milk puddings tend to be prepared or served leading to disposal, rather than problems with storage or going out of date.

Figure 14: Weight of avoidable food and drink waste disposed of via the sewer in the UK – excluding added water – split by reason for disposal food type (million tonnes per annum)



5.1.13 Tea waste

Tea waste consists of tea that is poured away because it has not been drunk but after preparation or serving. For tea that is poured away having been served, participants recorded whether or not they had added milk and / or sugar. Assumptions were made about the amounts of milk and sugar that had then been included and applied to the results. Some of the tea waste shows large quantities being poured away in one go, and often tea is poured away without milk or sugar. This suggests a number of occasions when pots of tea are disposed only partially, if at all, drunk. If this is a result of 'topping up the pot' with additional hot water after the original serving then the additional water was unnecessary. However, the tea waste itself would have been caused with or without the pot being topped up. The cost estimates do not include any actual tea leaves, bags (these are unavoidable) or added water (since this costs consumers very little). Figure 14, above, also leaves out the added water and covers only avoidable waste, therefore excluding both added water and tea leaves. This means that approximately 66,000 tonnes of tea waste, made up of milk and sugar, are poured away by UK households after too much has been made. The issue of costing dregs, mentioned above in the Breakfast Cereal section, Section 5.1.7, is dealt with in more detail in Section 5.2, below.

5.1.14 Gravy

Gravy is disposed in relatively small quantities as a foodstuff, almost exclusively due to too much being cooked or prepared. It is grouped under condiments and sauces and includes both gravy made from granules and powder, as well as home-made gravy.

5.2 Dregs

Some of the food and drink disposed via the sewer occurred in small quantities on individual occasions. It was important to the report to understand how great a part of the total was made up by the disposal of dregs, which would help understand the actions that would be best designed to reduce food and drink waste and also to check whether the total figures for food and drink disposed include large amounts of food and drink waste caused due to people not quite finishing their drinks, or leaving just a very small amount on the plate. These dregs and plate scrapings have different causes to food and drink disposed because they have gone off, for example.

An analysis of the disposal of dregs was carried out to determine how often very small amounts of food and drink were poured down household drains, and what their contribution to the total amounts poured away is, by food type. Different food types mostly exhibited the same pattern, with the smaller quantities being disposed both less often and so contributing much smaller amounts to total disposal. Two food types are slightly unusual in that disposal of dregs is more common. These two types are breakfast cereal and cook-in sauce.

Figure 15: Disposal of quantities per occasion, by food type, as a percentage

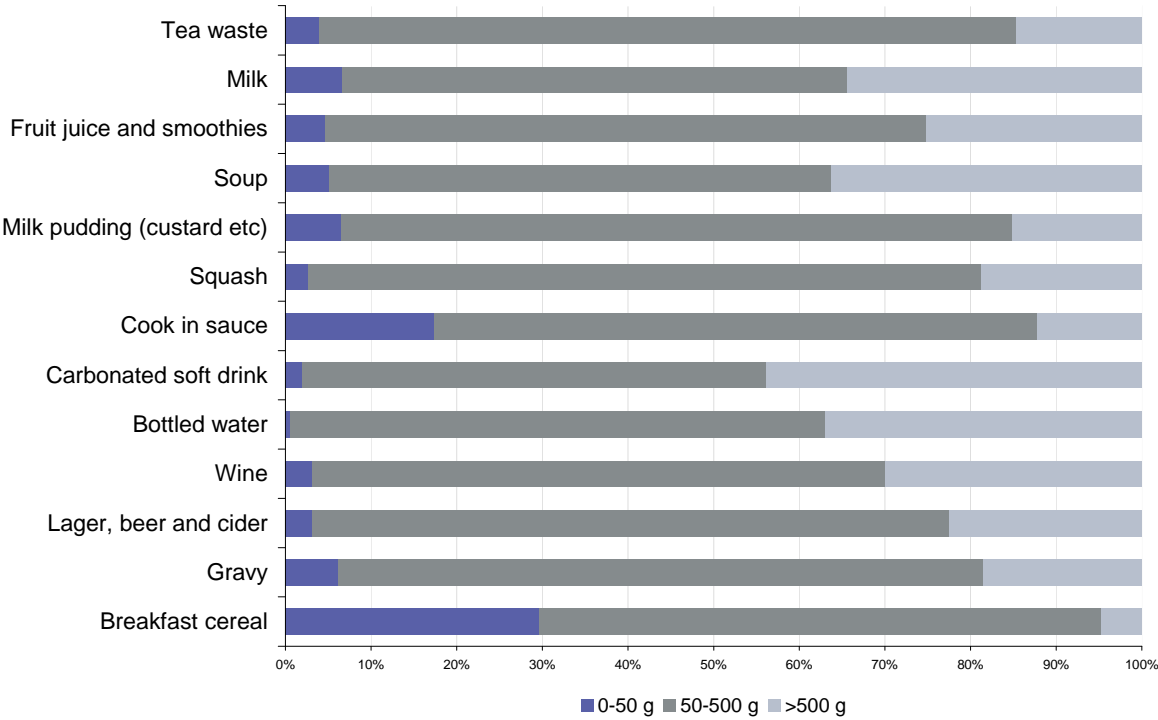


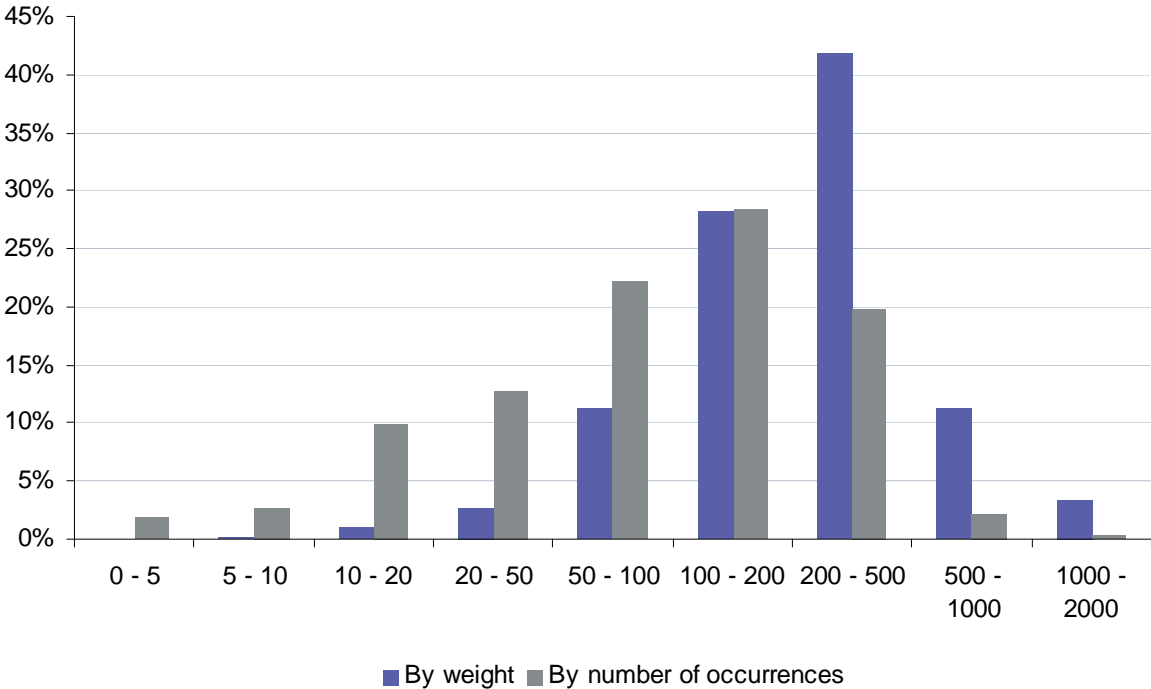
Figure 15, above, shows how much of total disposal of food and drink of different types via household drains was made up by different quantities. Food and drink disposed to the sewer was analysed in quantities of 0-50 grams per occasion, 50-500 grams per occasion and over 500 grams. The different coloured bars show how much, by percentage, of the total amounts of each type of food (or drink) were made up by amounts disposed within each weight bracket, on each individual occasion that food or drink was poured away.

The 0-50 gram contribution never makes up more than 30% of the total disposed for any one food type and for the majority of food and drinks the disposal of dregs makes up 5% or less of the total being poured away. The majority of food and drink poured down the drain is disposed in quantities of between 50 and 500 grams. Carbonated soft drinks, milk, bottled water and soup are all more likely to be poured away in even larger quantities than other food types of over 500 grams per occasion.

A more detailed examination of patterns of quantities of tea disposed via household drains goes to show that smaller amounts being poured away contribute less to the total and happen less often. Quantities peak for tea at between 200 grams and 500 grams per occasion. The quantities most often thrown away, however, were 100 – 200 grams, showing that smaller quantities may add up to less overall even though they are poured away more often. The chart for tea in Figure 16, below, is fairly typical in shape as for other food types. For this chart the horizontal axis shows how much in grams was being disposed on each separate occasion. The vertical axis shows the percentage contribution that each amount makes to total disposal and also the proportion of occasions on which disposal of each amount takes place.

The main conclusion from this is that the disposal of dregs of food and drink contributes only a very small amount to total disposal via the sink. In particular, for the largest single type, milk, the total by weight of dregs represents 6% of all milk waste disposed via the sewer. For fruit juice and smoothies it is 4%. This is supported by the finding that only very small quantities are recorded through washing up, when plate scrapings for example, would be likely to add to the total, as can be seen in Appendix G.

Figure 16: Disposal of tea, shown by weight and frequency



5.3 Chapter Summary

The individual types of food and drink that are disposed in the greatest quantities, looking just at avoidable waste without added water, are milk, then carbonated soft drinks, then fruit juice and smoothies. Of the 1.5 million tonnes of avoidable food and drink waste disposed via the sewer in the UK each year by households, these three types of food and drink alone account for 710,000 tonnes, or nearly half of the total. Wine is the most costly single food or drink type disposed via the sewer at £450 million, with the next costly at £250 million.

The majority of food and drink is disposed because too much has been prepared or served. Leftovers account for most of this. Exceptions are fruit juice and smoothies and milk where there is an increased likelihood that they will be left over having gone off or past the date on the label.

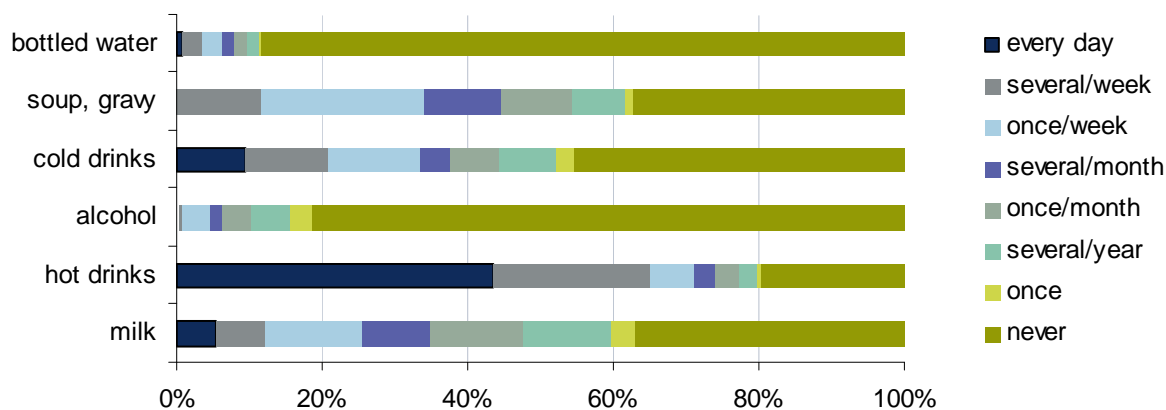
Small quantities of food and drink being disposed during, for example, washing up, were found to account for only a small proportion of both the total food and drink disposed and the number of occurrences of disposal recorded in the diaries.

6.0 Attitudes and perceptions

6.1 Questionnaire responses

Before and after the diary-keeping exercise, questionnaires were given to each participating household to find out about their attitudes to disposing of food and drink via the sink and drain. The questionnaires, which can be found in Appendices A and B, asked questions about how much of a problem participants felt that sink disposal was and how much having to get rid of food and drink in this way was a concern. Socio-demographics have not been split out in the analysis since a break down by socio-economic status, household size, tenure etc. would lead to uncertainty in the results, due to the size of the overall sample.

Figure 17: Claimed frequency, prior to diary exercise, among participants for disposing of various food types via the sink



The questionnaire prior to the diary-keeping exercise asked participating householders about the frequency with which they dispose of a variety of drinks and liquid food-types using the sink. The results can be seen in Figure 17. A large proportion of householders claimed to 'never' dispose of each type of food and drink listed. This was particularly the case for alcoholic drinks and bottled water where over 80% of respondents claimed to never pour them away via the sink. Hot drinks were least likely to 'never' be poured away with just under 20% of households ruling out this possibility.

Hot drinks were most likely to be poured away every day. Soup and gravy were not disposed every day by any of the respondents. This may be because they are consumed less frequently, but as the questionnaire did not ask about how often each food type is actually consumed, it is not possible to be certain about this. Alcohol and bottled water were rarely reported to be disposed every day, and milk and cold drinks were rarely disposed this frequently.

Soup and gravy, cold drinks, hot drinks and milk were all reported to be disposed via the sink at least once per month by over 40% of respondents. Again, looking at the results in this way, hot drinks are the most frequently items thrown away, while the spread of frequencies for the other three food and drink types is more even. Some households pour them away more often than others.

Given that the diary exercise ran to only one week, it is only possible to compare the claims made here to the results of the diary to a limited extent. However, the actual disposal frequencies for most households do appear to be higher than they expected to be the case.

Respondents to the pre-diary questionnaire were also asked how much they agree with a series of statements relating to disposing of food and drink via the sewer. The results for these statements can be found in Table 6. Note that responses were coded one to four, with one being 'strongly agree' and four being 'strongly disagree'. An overall agreement level, the mean of responses, is shown in the right hand column in the table, with a lower number therefore representing higher levels of agreement, and the central tendency sitting at a mean of 2.5.

From this it appears that there is some agreement that 'it's ok to pour liquid down the sink'. Respondents were most likely to agree that they would prefer to use the sink or the bin to dispose of their liquid waste. They were

undecided, looking across responses, on whether using the sink to dispose of liquid food waste is unavoidable. The statement that 'putting waste down the sink is less of a problem than putting it in the regular waste bin' was generally disagreed with.

The statement that 'I prefer to buy resealable bottles of soda and fizzy drinks rather than cans so they can be kept after opening' was most strongly agreed with of the statements offered, perhaps suggesting that respondents were already inclined to seek out ways to reduce their food and drink waste, including using the sink, at the time of keeping the diary. A number of respondents stated that questions relating to fizzy drinks, and also the question relating to liquid food waste, did not apply to them, suggesting that many respondents only currently use the sink to pour drinks away and did not see it as a way to get rid of food waste at all, prior to keeping the diary.

Table 6: Levels of agreement with statements about disposing of food and drink via the sewerage system

Statement	Average (mean) agreement
I prefer to buy resealable bottles of sodas and fizzy drinks rather than cans so they can be kept after opening	1.7
Bottled fizzy drinks have a tendency to go flat before I can finish them	2.7
Putting waste down the sink is less of a problem than putting it in the regular waste bin	3.1
Pouring liquid food waste down the sink is unavoidable	2.5
It's ok to pour liquid down the sink	2.2
I would rather put liquids down the sink than in the bin	2.1
There is no alternative to disposing of most liquids or drinks than to pour them down the sink	2.4

How much people think they pour away before and after, in general – hardly increases. A question was asked about how much, in general terms, respondents feel that they pour down the sink in both the pre- and post-diary questionnaires with responses offered ranging from 'quite a lot' to 'none', where 1 is a lot and 6 is none. A higher number therefore represents a smaller quantity of food or drink waste. Using the same method as for Table 6 above, the mean response to all answers was calculated for both the before and after responses. Very little change was found in how much people think they pour away, with only a very small decrease in the mean, from 4.0 before to 3.9 afterwards. Overall, both before and after keeping diaries, householders felt that they did not use the sink a lot to dispose of food and drink waste.

6.2 Chapter Summary

Householders' self-perception in terms of quantities of food and drink disposed via the sewer did not change a great deal during the course of the diary-keeping week. Overall householders tended to feel that disposal of liquids, particularly drink, via the sink is not a problem, though some felt that there might be alternatives. There was a belief in general, that it is better to dispose of liquids via the sewerage system than to put them in the household bin. Many respondents to the questionnaires (who all also took part in the diary exercise) felt at the start of the week that they 'never' dispose of a variety of food and drink via the sewer. Hot drinks were most likely to be disposed in this way, and soup and gravy, as well as cold drinks and milk were also claimed, although with less frequency.

7.0 Conclusions

This report has set out the quantities of food and drink disposed via the sewerage system by households in the UK each year. The large amounts found through this research were greater than expected and add up to a high cost to the consumer in terms of purchase price of food and drink where the waste could potentially be avoided.

The total quantity of food and drink disposed to the sewer by UK households each year is estimated in this report to be 1.8 million tonnes. This excludes a further 1.7 million tonnes of added water. 1.5 million tonnes of the food and drink disposed could have been avoided had it been better stored in the home or with better planning or preparation. The cost to the consumer, based on the retail purchase price of this food and drink, is estimated at £2.7 billion. Approximately 4.6 million tonnes of CO₂ equivalent greenhouse gas emissions are released as a result of the avoidable (i.e. edible) food and drink disposed via the sewer by UK households.

The estimates contained in this report feed into overall food and drink waste estimates for the UK covering all disposal routes. The research conducted here has enabled a more accurate picture of total disposal of food and drink from UK households than was previously possible across all disposal routes.

The research contained in this report is intended to help inform both the general public and those seeking to find ways to reduce food and drink waste, including manufacturers and retailers, as well as those who may wish to campaign to increase awareness of the problems of food and drink waste and help consumers reduce their waste.

Traditionally the main concern of the water industry related to reducing food and drink waste disposal using the sewerage system has been to reduce the disposal of fatty foods with a view to reducing blockages. Compared to other types of food and drink, however, fat and oil are disposed in relatively small quantities and were not found in significant enough amounts to be reported separately here. Meat and fish disposal is included, however, and much of this is thought to be from juices from cooking and preparation of meat including fat.

Understanding the reasons for disposal of different types of food and drink is important to inform future work to reduce food waste. Diary participants recorded the reason on each occasion for using the sink and sewer. Most occasions were found to relate to too much having been prepared or served. This would seem to suggest that future work may be best targeted at finding ways to help householders use their leftovers, as well as to use methods to prepare and serve correct sized portions to reduce the amounts of food and drink left over. Recipes as well as ideas for storing leftovers such as freezing leftover wine may also help.

Food and drink going off or past the “use by” date on the label are less common reasons for disposal via household drains than is the case for food and drink waste generally. Exceptions to this are milk and fruit juice and smoothies where dates on labels and also the food or drink appearing to have gone off are more likely to cause householders to pour them away. In such cases, better storage in the home may be able to help consumers find ways to keep drinks for longer.

The diary exercise did make it possible for people to record behaviour and reasons on a number of occasions. Particular food and drink types are now able to be chosen as the focus for future work, due to their environmental impact, or because they are types of food and drink where householders may be better able to adopt cost saving practices.

Appendix A: Mass to volume conversion

A list of conversions was obtained from a variety of internet sources and a selection of these was verified by scientific analysis conducted by WRc plc on behalf of WRAP.

Food type	Specific	ml	g
Batter		1	1.02
Cake mix		1	0.998
Sliced wholemeal bread		1	1.08
Sliced white bread		1	0.80
Sliced granary bread		1	0.78
Icing		1	0.998
Coconut milk		1	0.96
Gravy	Prepared	1	1
	Canned	1	1.01
	Unspecified / average	1	1.005
Honey		1	1.43
Jam		1	0.998
Ketchup		1	1.07
Mayonnaise	Low calorie	1	0.95
Mustard		1	1.06
Oil	Olive	1	0.91
	Vegetable	1	0.92
	Sunflower	1	0.92
	Unspecified	1	0.9166
Salad dressing		1	1.06
Sauce	Bottled tomato	1	1.15
	Cheese	1	1.07
	Homemade white	1	1.06
	Pasta/curry	1	1.06
	Unspecified / average	1	1.085
Vinegar		1	1.01
Butter	Salted	1	0.96
	Unsalted	1	0.96
Cream	Heavy whipping	1	1.05
	Light whipping	1	0.998
	Half and half	1	1.02
	Unspecified / average	1	1.023
	Crème fraîche		1
Eggs	Whole, raw	1	0.998
	Egg white	1	1.03
Margarine	Fat free	1	0.98
	Unsalted	1	0.96
	Unspecified / average	1	0.97
Milk	Full fat	1	1.03
	Low fat	1	1.03
	Skimmed	1	1.04
	Unspecified / average	1	1.0333
Whey, sweet, fluid		1	1.04
Yoghurt	Non-fat, fruit	1	0.998
	Greek	1	0.88
	Unspecified/average	1	0.939
Yoghurt drinks		1	1.02
Custard		1	0.97
Ice cream	Chocolate	1	1.16

Food type	Specific	ml	g
	Strawberry	1	1.16
Rice pudding		1	0.998
Baby milk		1	1.03
Beer	Regular	1	1.05
Coffee	Ground	1	1.04
	Instant	1	1.05
	Unspecified	1	1.045
Fruit juice	Orange	1	1.05
	Apple	1	1.01
	Unspecified/average	1	1.03
Hot chocolate	Homemade with milk	1	1.06
Lager	Light	1	1.04
Milkshake	Thick chocolate	1	1
	Thick vanilla	1	1
Smoothie		1	0.96
Carbonated drinks	Lemon and lime	1	1.08
	Cream	1	1.09
	Unspecified/average	1	1.085
Spirits	Vodka, gin, rum, whiskey	1	0.98
Squash		1	1.05
Tea	Brewed, prepared with tap water	1	1.04
	Brewed, herbal	1	1.04
	Unspecified	1	1.04
Water	Bottled	1	1.04
	Tap	1	1
Wine	Red	1	1.04
	White	1	1.04
Apple stewed		1	1.18
Liquid from tin - sweet	Syrup	1	1.03
Grapefruit		1	0.998
Lemon juice		1	1.03
Mixed fruit in syrup		1	1.08
Strawberries, tinned		1	1.07
Drained from tin - savoury	Oil	1	0.84
	Brine	1	0.9
	Unspecified/average	1	0.87
Soup	Beef broth	1	1.01
	Chicken noodle	1	1.01
	Onion	1	1.02
	Split pea and ham (chunky)	1	1.01
	Average	1	1.0125
Stew		1	1.04
Baby food		1	0.998
Tinned tomatoes		1	1.01
Baked beans		1	1.07
Potato (mashed)		1	0.89
Potato peelings (peeler)		1	0.79
Potato peelings (knife)		1	0.84
Spaghetti, cooked		1	1.04
Penne, cooked		1	1.15
Cous cous		1	1.10
Porridge oats, cooked		1	1.03

Internet sources used were:

www.onlineconversion.com

www.e-rcps.com

www.gourmetsleuth.com

The WRc testing was conducted on specific product types for which internet sources appeared unreliable. These were:

- potato peelings;
- bread;
- cous cous;
- pasta; and
- porridge oats.

The figures used from this testing process in the table above, and for the conversions used in estimates in this report, were derived from bulk density testing from water displacement where a known volume of water is poured into a test container, a sample placed inside the test container and pushed under the surface of the water. The amount of water displaced is then measured and recorded. The bulk density is calculated from the known weight of the sample (g) and the volume of water displaced (ml).

Appendix B: Pre-diary questionnaire

SINK AND DRAIN DIARY: PRE-DIARY QUESTIONNAIRE

Respondent name

SPSS number

Telephone number

Date

CHECK RESPONDENT HAS RECEIVED DIARY AND UNDERSTANDS WHAT THEY NEED TO DO – ESPECIALLY WITH RESPECT TO MEASUREMENTS AND RECORDING ITEMS THROWN AWAY IN ANY HOUSEHOLD SINK, DRAIN OR TOILET FOR ALL MEMBERS OF HOUSEHOLD

QA. Are you responsible for the food shopping in this household? READ OUT. SINGLE CODE	responsibility for all or most	<input type="checkbox"/> ₁
	responsibility for about half	<input type="checkbox"/> ₂
	responsibility for less than half	<input type="checkbox"/> ₃
	not responsible for any	<input type="checkbox"/> ₄

QB. Are you responsible for the cooking and preparation of food in this household? READ OUT. SINGLE CODE	responsibility for all or most	<input type="checkbox"/> ₁
	responsibility for about half	<input type="checkbox"/> ₂
	responsibility for less than half	<input type="checkbox"/> ₃
	not responsible for any	<input type="checkbox"/> ₄

Q3. Thinking generally, how much of the following food items – whether prepared/cooked or not - do you throw away into the bin?	Quite a lot	A reasonable amount	Some	A small amount	Hardly any	None	Don't have/eat
Inedible food waste like peelings or bones	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Fruit, vegetables or salad	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Processed meat and fish (e.g. sandwich meats)	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Bread and cakes	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Food left on the plate after a meal	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Food that you cooked or prepared too much of but did not serve up	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Raw or home cooked meat and fish	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Ready meals or convenience foods	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Cheese and yoghurt	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Milk	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇
Other drinks	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆	<input type="checkbox"/> ₇

Q4. Thinking about the different types of food waste we have just discussed, how much uneaten food – overall- would you say you throw away in general? Would you say...? SINGLE CODE ONLY	Quite a lot	<input type="checkbox"/> ₁	A reasonable amount	<input type="checkbox"/> ₂
	Some	<input type="checkbox"/> ₃	A small amount	<input type="checkbox"/> ₄
	Hardly any	<input type="checkbox"/> ₅	None	<input type="checkbox"/> ₆

Q5. Thinking about when you have to throw food items away, to what extent, if at all, does it bother you? SINGLE CODE ONLY	A great deal	<input type="checkbox"/> ₁	A fair amount	<input type="checkbox"/> ₂
	A little	<input type="checkbox"/> ₃	Not very much	<input type="checkbox"/> ₄
	Not at all	<input type="checkbox"/> ₅		

Q6. How much effort do you and your household go to in order to minimise the amount of uneaten food	A great deal	<input type="checkbox"/> ₁	A fair amount	<input type="checkbox"/> ₂
	A little	<input type="checkbox"/> ₃	Not very much	<input type="checkbox"/> ₄

you throw away? SINGLE CODE ONLY	None at all	<input type="checkbox"/> 5
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Q7. Thinking about the drink, liquid and food waste for your household, overall how much would you say you throw away down the sink, toilet or drain?	Quite a lot	<input type="checkbox"/> 1	A reasonable amount	<input type="checkbox"/> 2
	Some	<input type="checkbox"/> 3	A small amount	<input type="checkbox"/> 4
	Hardly any	<input type="checkbox"/> 5	None	<input type="checkbox"/> 6

Q8. I am going to read out different types of foods or drinks that some people may get rid of by pouring down the sink or drain. Please tell me how often you dispose of each down the sink, toilet or drain.									
	Every day	Several times a week	Once a week	Several times a month	Once a month	Several times a year	Once a year	Never	N/A
Milk	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Hot drinks like tea, coffee or hot chocolate	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Alcohol like wine, spirits or beer	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Cold drinks like soda, squash or juice	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Soup, gravy or sauces	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Bottled water	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Oil or fat	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Plate scrapings	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Brine, oil or syrup when draining a can	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Yoghurts, creams and custard	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Food left in saucepans (e.g. mashed potato, rice)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9

Q9. I am going to read out different types of liquids that some people may get rid of by pouring down the sink or drain. Please tell me how often you dispose of each types of liquid down the sink, toilet or drain.									
	Every day	Several times a week	Once a week	Several times a month	Once a month	Several times a year	Once a year	Never	N/A
Paint (e.g. children's paints, home improvement paint, artists' paint etc)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Detergents (e.g. car washing cleaner, clothes / dish washing detergents not being used for the intended application)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Pesticides and other chemicals (e.g. liquid fertilizer, plant-grow, pet shampoo, animal dips)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Non kitchen oils (e.g. motor oil, petrol, personal care oils like body oils & creams)	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9
Personal cleaning items (liquid soap, bath salts, bubble bath, shampoo, conditioner) not being used for the intended application	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input type="checkbox"/> 6	<input type="checkbox"/> 7	<input type="checkbox"/> 8	<input type="checkbox"/> 9

Q10. Do you have a dishwasher?	Yes	<input type="checkbox"/> 1	Go to Q11
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	No	<input type="checkbox"/> ₂	Go to Q13
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Q11. How often do you use the dishwasher when you need to wash-up glasses and plates?	Every time	<input type="checkbox"/> ₁	Most times	<input type="checkbox"/> ₂
	Some times	<input type="checkbox"/> ₃	Hardly ever	<input type="checkbox"/> ₄
	Not at all	<input type="checkbox"/> ₅	N/A (no glasses/plates)	<input type="checkbox"/> ₆

Q12. How often do you use the dishwasher when you need to wash-up saucepans and fry-pans?	Every time	<input type="checkbox"/> ₁	Most times	<input type="checkbox"/> ₂
	Some times	<input type="checkbox"/> ₃	Hardly ever	<input type="checkbox"/> ₄
	Not at all	<input type="checkbox"/> ₅	N/A (no pans)	<input type="checkbox"/> ₆

Q13. Do you have a sink macerator?	Yes	<input type="checkbox"/> ₁	Go to Q14
	No	<input type="checkbox"/> ₂	Go to Q15

Q14. How often do you use the sink macerator to dispose of food waste?	Every time	<input type="checkbox"/> ₁	Most times	<input type="checkbox"/> ₂
	Some times	<input type="checkbox"/> ₃	Hardly ever	<input type="checkbox"/> ₄
	Not at all	<input type="checkbox"/> ₅	N/A (no food waste)	<input type="checkbox"/> ₆

Q15. How frequently do you take the following measures which could prevent food waste from going down the drain?						
	Every time	Most times	Some times	Hardly ever	Not at all	Not applicable
Use a sink strainer when emptying washing up water	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Use a sink strainer that collects waste when rinsing plates off	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Use a sink strainer that collects waste when draining tins of oil, brine or syrup	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Use a sink strainer or colander when draining vegetable, pasta or rice	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆
Use a washing up bowl to collect waste when washing up	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅	<input type="checkbox"/> ₆

Q16. Please tell me the extent to which you agree or disagree with the following statements?					
	Strongly agree	Agree	Disagree	Strongly disagree	N/A
I never or rarely have to throw drinks away because they have gone off, flat or cold	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I buy sauces and gravies in resealable packs so they can be kept after opening	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I buy milk in resealable containers so it will stay fresh after opening	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I use wine that is past its best in cooking	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I prefer to buy resealable bottles of sodas and fizzy drinks rather than cans so they can be kept after opening	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Bottled fizzy drinks have a tendency to go flat before I can finish them	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Putting waste down the sink is less of a problem than putting it in the regular waste bin	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Pouring liquid food waste down the sink is unavoidable	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
Drinks like beer and wine are so cheap that it's not that much of a concern if I have to throw them away	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
It's OK to throw away liquids down the sink, toilet or drain	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
I would rather put liquids down the sink, toilet or drain than put them in the regular waste bin	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅
There is no alternative to disposing of most liquids or drinks than to pour them down the sink, toilet or drain	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄	<input type="checkbox"/> ₅

Q16. Please tell me the extent to which you agree or disagree with the following statements?					
	Strongly agree	Agree	Disagree	Strongly disagree	N/A
Verbatim comments					

Q17. How much milk do you usually buy each week? <i>Write in amount – tick measurement used. If a different time (e.g. monthly) write this in</i>	None	<input type="checkbox"/> _0	THANK & END		
	Litres <input type="checkbox"/>		Pints <input type="checkbox"/>		

Q18. What brand of milk do you normally buy? <i>Write in</i>	IF NONE - CLOSE
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Q19. What type of milk do you normally buy?	Fresh	<input type="checkbox"/> _1	Long life	<input type="checkbox"/> _2
	Dried / powdered	<input type="checkbox"/> _3		

Additional comments

Appendix C: Post-diary questionnaire

SINK AND DRAIN DIARY: POST-DIARY QUESTIONNAIRE

Respondent name

SPSS number

Telephone number

Date

Researcher

-
- 1. Before you started completing the diary, how much food and liquid waste did you think your household was throwing away down the sink, toilet or drain? Please tick one box**
- | | | |
|---------------------|--------------------------|---|
| Quite a lot | <input type="checkbox"/> | 1 |
| A reasonable amount | <input type="checkbox"/> | 2 |
| Some | <input type="checkbox"/> | 3 |
| A small amount | <input type="checkbox"/> | 4 |
| Hardly any | <input type="checkbox"/> | 5 |
| None | <input type="checkbox"/> | 6 |
- 2. Now that the diary is completed, has your view on the amount of this waste changed? Please tick one box**
- | | | | |
|-----|--------------------------|---|----------|
| Yes | <input type="checkbox"/> | 1 | Go to Q3 |
| No | <input type="checkbox"/> | 2 | Go to Q4 |
- 3. How much food and liquid waste would you now say your household throws away down the sink, toilet or drain? Please tick one box**
- | | | |
|---------------------|--------------------------|---|
| Quite a lot | <input type="checkbox"/> | 1 |
| A reasonable amount | <input type="checkbox"/> | 2 |
| Some | <input type="checkbox"/> | 3 |
| A small amount | <input type="checkbox"/> | 4 |
| Hardly any | <input type="checkbox"/> | 5 |
| None | <input type="checkbox"/> | 6 |
- 4. To what extent would you say that the week for which you filled in the diary is a typical week for your household? Tick one box**
- | | | | |
|--------------------------|--------------------------|---|----------|
| Very much a typical week | <input type="checkbox"/> | 1 | Go to Q6 |
| Quite typical | <input type="checkbox"/> | 2 | Go to Q6 |
| Not a typical week | <input type="checkbox"/> | 3 | Go to Q5 |
- 5. Thinking about the amount you throw away, in a typical week would you throw more or less food and liquid waste down the sink, toilet or drain than you did in the diary week? Please tick one box**
- | | | |
|----------------|--------------------------|---|
| A lot more | <input type="checkbox"/> | 1 |
| A little more | <input type="checkbox"/> | 2 |
| About the same | <input type="checkbox"/> | 3 |
| A little less | <input type="checkbox"/> | 4 |
| A lot less | <input type="checkbox"/> | 5 |
| Don't know | <input type="checkbox"/> | 6 |
- 6. During the week of the diary, were there any types of waste thrown away down the sink, toilet or drain that were very unusual? Write in types of waste and why thrown away down sewer**

7. To what extent are you concerned or bothered about the amount of food and liquid waste that your household throws away down the sink, toilet or drain?
Please tick one box

A great deal
 A fair amount
 A little
 Not very much
 Not at all

1
 2
 3
 4
 5

8. Generally speaking, what would you say are the main occasions for your household getting rid of food or liquid waste down the sink, toilet or drain? Prompt but do not read out – write out verbatim

Kids not finishing their drinks
 Washing off dirty plates
 Milk going off / past its food date
 Foods or liquids going past their food date
 Bottled drinks (e.g. wine) not tasting nice
 Bottled drinks going flat
 Hot drinks going cold
 Draining foods like pasta or vegetables
 Draining canned foods in brine or oil
 Dregs of cups / glasses
 Leftovers from a meal
 Prepared too much
 Spoilt, burnt or ruined food or drinks
 Washing out leftover pet bowls
 Other (write in)

1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15

9. What is the reason for getting rid of food or liquid waste down the sink, toilet or drain rather than any other method of disposal? Write in verbatim – probe for full answers on different circumstances

10. What do you think householders like yours can do to minimise the amount of waste going down the sink, toilet or drain?

11. Have you received or seen any information (e.g. from the council or water company) about what waste can or cannot be disposed of down the sink, toilet or drain? Please tick one box

Yes (specify in detail below; type of information, what it said and whether they adhere to this advice)

 1

No

 2

12. What is the sewerage system for your house? Please tick one box

Mains sewer

 1

Septic tank

 2

Soak away

 3

Don't know

 4

Other (specify)

 5

13. Any further comments

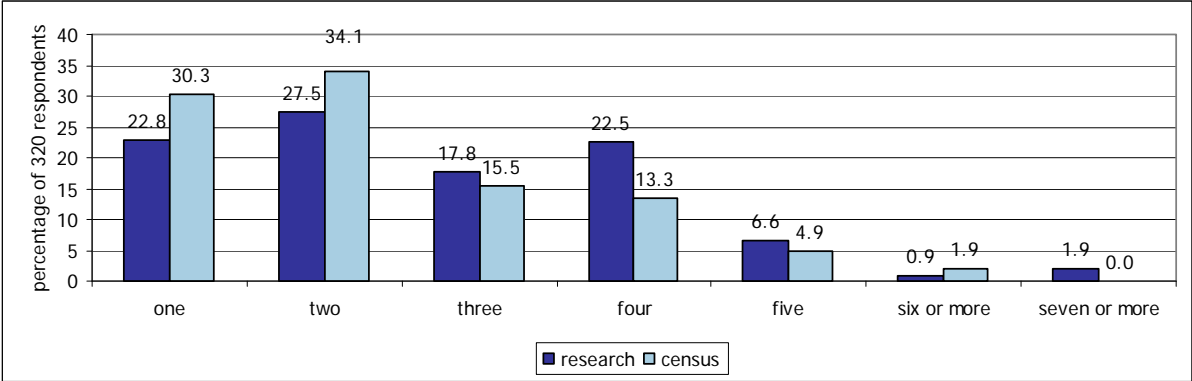
Appendix D: Profile of participating respondents

Introduction

The profile of the households included in the research affects the accuracy with which results can be generalised to the whole UK. The households taking part in the diary exercise were selected to provide a good cross-section of the British population to enable statistically valid interpretation of the findings and in particular in extrapolating the data to represent a larger population. The findings were eventually weighted by household size to obtain data representative for the whole UK, as household size has been found to be a key factor in amounts of food waste disposed in previous research. Additional information on this weighting process for the scaling up of data to the whole UK can be found in Appendix A of the report *Household Food and Drink Waste in the UK*, (WRAP, 2009).

Number of occupants in household

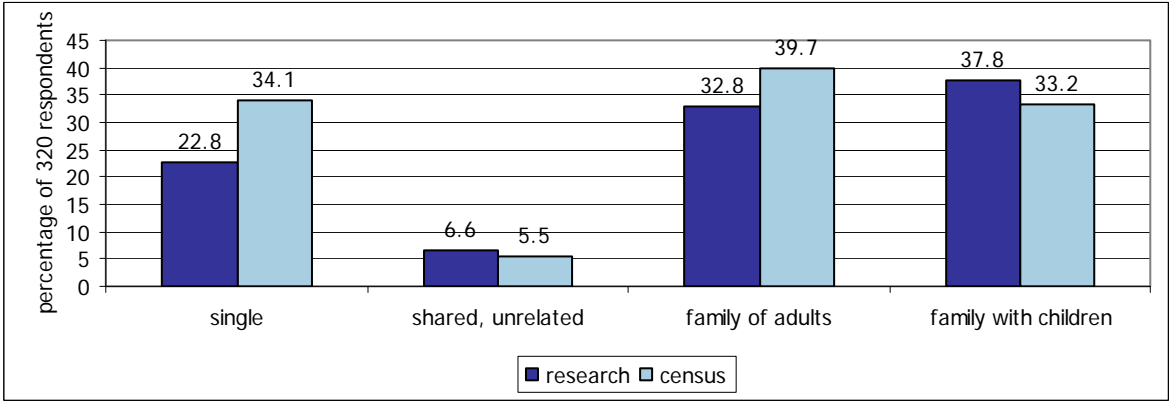
Figure D1 Proportion of respondents within households of different sizes



The chart above illustrates the number of occupants within the diary households and that of households within England, Scotland and Wales according to the 2001 census (source ONS/SCROL). This shows that smaller (one and two person) occupancy households are slightly under-represented in this study.

Household composition

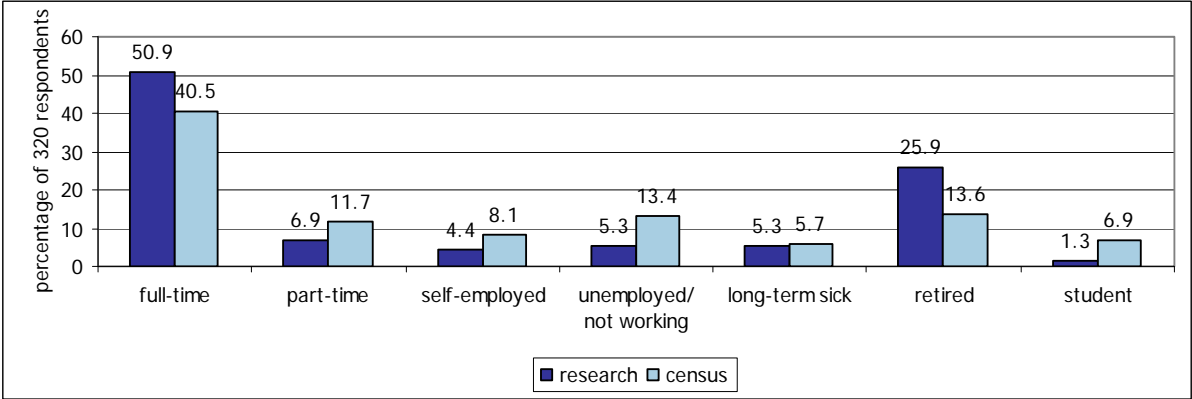
Figure D2 Proportion of respondents within different household compositions



The above chart illustrates the household composition of respondents and composition of households within England, Scotland and Wales according to the 2001 census (source ONS/SCROL). It shows that single-occupancy households are under-represented whilst families with children are slightly over-represented.

Employment status of head of household

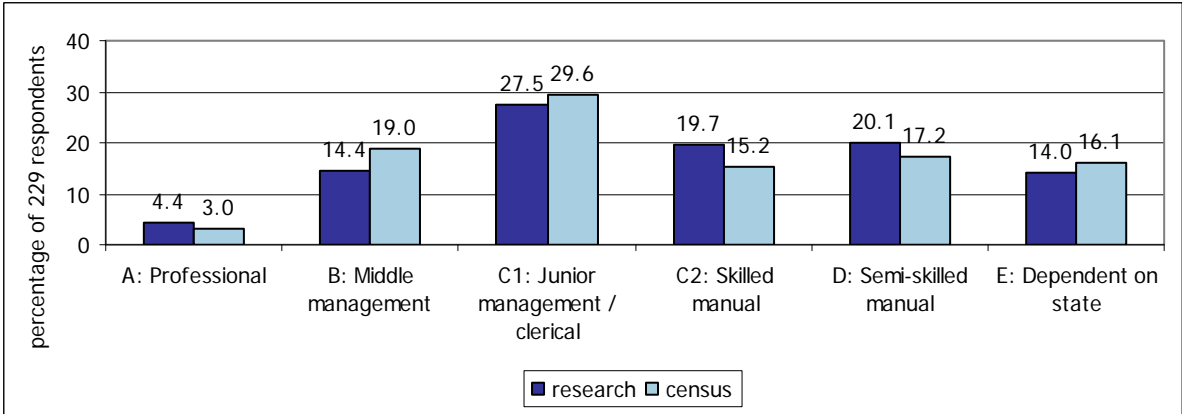
Figure D3 Proportion of respondents according to the main earner's job status



The above chart illustrates the employment status of the head of the household and the employment status of head of households within England, Scotland and Wales according to the 2001 census (source ONS/SCROL). The profile of research participants shows that full-time and retired workers are over-represented whilst unemployed and student households are under-represented. This may reflect the relative scarcity of some groups in the population (students, for example); the sample size for the research meant it was not possible to cover every group adequately.

Occupational group of head of household

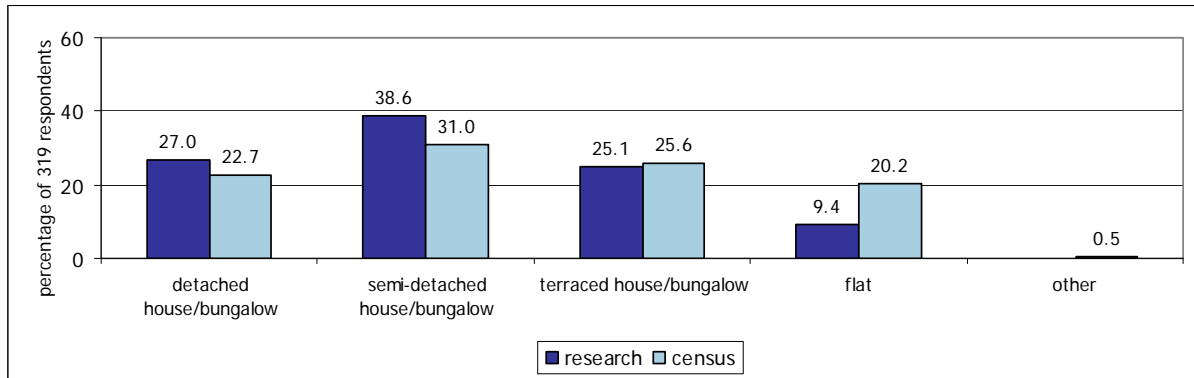
Figure D4 Proportion of respondents according to the main earner's occupational group



The above chart illustrates the occupational grouping of the head of the household (source MRS Occupational Groupings, 5th Edition) and social grade of households within England and Wales according to the 2001 Census (source ONS, comparable information not available for Scotland). Where the head of the household is now retired, the grouping is based on their previous occupation. The profile of the research participants broadly reflects the census data. However, C2: skilled manual workers are slightly over-represented whilst B: middle management households are slightly under-represented.

Type of property

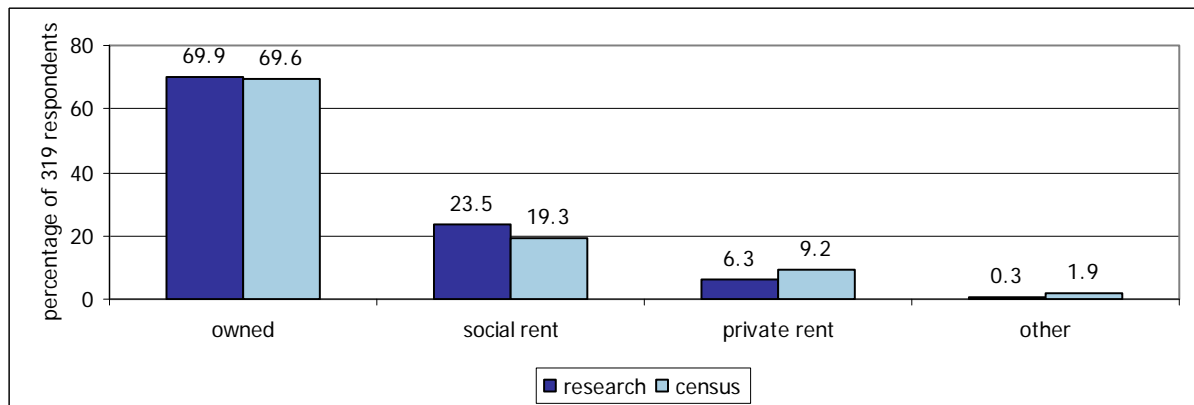
Figure D5 Proportion of respondents within households living in different types of property



The chart above illustrates the type of the property lived in by the respondents and the types of properties in England, Scotland and Wales according to the 2011 Census (source ONS / SCROL). The profile of the research participants broadly reflects the census data although the sample is slightly biased towards semi-detached houses in lieu of flats.

Tenure of property

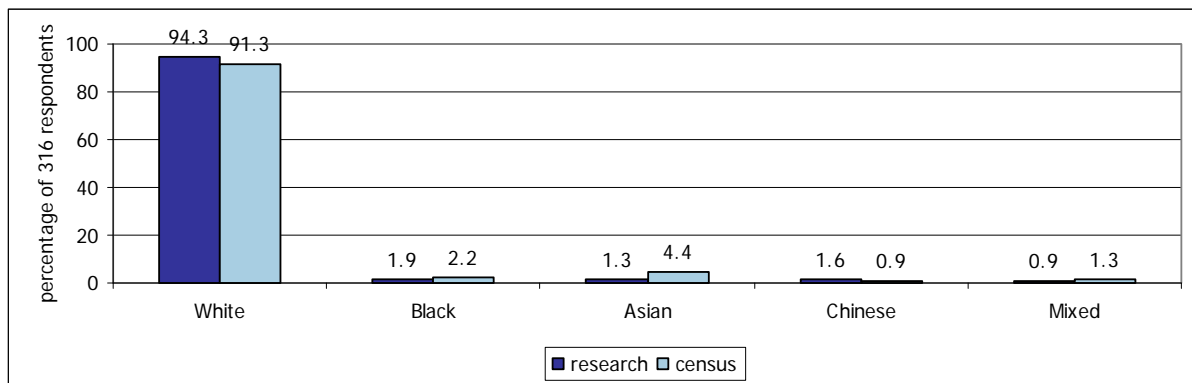
Figure D6 Proportion of respondents by tenure



The above chart illustrates the tenure of the property of the respondents and the tenure of households within England, Scotland and Wales according to the 2011 Census (source ONS / SCROL). The profile of the research participants closely reflects the census data.

Ethnic origin

Figure D7 Proportion of respondents living within households by ethnicity



The chart above illustrates the ethnic origin of the participants in the research and the ethnic origin of all individuals aged 16 years and over living in England and Wales according to the 2001 Census (source ONS). There is a slightly lower proportion of Asian householders within the research sample and slightly more White households when compared to the census data.

Implications

There are several factors for which the profile of the respondents does not fully represent the national profile. The significant ones are listed below.

- Number of occupants and household composition, with smaller households being under-represented.
- Employment status, with part-time, self-employed, unemployed and student households being under-represented.
- Type of property, with flats being under-represented.
- Ethnic origin with Asian households being under-represented.

The influence of different factors on the findings in the report was examined further, to see which household characteristics might be most likely to affect sewer disposal of food and drink waste. The additional analysis discovered that factors varied for different food types and that few had a significant effect on the results.

Appendix E: Costing food and drink

The food pricing averages file was put together by searching for common items on a number of supermarket websites such as the Tesco price-check site in the last quarter of 2007. To cost items that were not branded, a range of prices were collected in order to calculate an average cost that reflects the variation and availability of each item. An example with costing double cream follows.

Table E1 Example of costing double cream

	Explanation	Example
Food Group	Group to which the food waste belongs	Dairy
Food Type	Type of food waste	Cream
Quantity	Quantity or unit of item being costed	Per 100ml
Brand 1	Example of food of brand 1	Tesco
Brand 1 price	Price of item (per 100ml) of brand 1	£0.32
Brand 2	Example of food of brand 2	Asda fresh
Brand 2 price	Price of item (per 100ml) of brand 2	£0.28
Brand 3	Example of food of brand 3	Elmlea
Brand 3 price	Price of item (per 100 ml) of brand 3	£0.26
Average price per 100ml	Unit price in £ per 100ml	£0.286

The following table provides examples of the pricing used for different types of key food and drink waste. It is important to remember that the cost of the waste was established using the weight or measurement provided by the diarist. It should also be noted that food and drink waste that was classified as 'unavoidable' was costed as a proportion of the whole food item. Avoidable food and drink waste was costed for the whole item (as purchased) and will for some foods include an element of costing for the unavoidable part. Note also that it is 'cost to the consumer' that is covered but not necessarily 'value', which may have been more or less depending upon the exact nature of the items being disposed of. For example tea leaves/teabags may not be consumed but carry an unarguable cost – and have value in that they are essential to make the tea that may then be disposed of.

Table E2 Example of costing of key food and drink items

Food Type	Composition	Average Price	Price Per Unit	Price per 100ml
Tea with milk and sugar	1 teabag 1 tsp (5g) sugar 25ml milk 300ml water	1 teabag = £0.0148 5g sugar = £0.0049 25ml milk = £0.0191	£0.0387 per cup	£0.0129
Black Coffee without sugar	1tsp (5g) coffee granules 300ml water	5g coffee = £0.103	£0.103 per cup	£0.03433
Coffee grounds		100ml = £0.8523		£0.8523
Hot chocolate	40g powder 300ml milk	40g powder = £0.2445 300ml milk = £0.2289	£0.4734 per cup	£0.1578
Squash	1 part in 5 e.g. 20ml squash to 80ml water	100ml concentrate = £0.1297	£0.1297 per 500ml	£0.0259
Orange juice		100ml = £0.1283		£0.1283
Gin and tonic	20ml gin	20ml gin = £0.39	£0.599 per glass	£0.2995

Food Type	Composition	Average Price	Price Per Unit	Price per 100ml
	200ml tonic	200ml tonic = £0.209		
Smoothie		100ml = £0.2603		£0.2603
Lemonade		100ml = £0.046		£0.046
Formula Milk	10ml formula 30ml water	10ml formula = £0.068733	£0.068733 per fl oz	£0.22911
Cows milk		100ml = £0.0763		£0.0763
Soya milk		100ml = £0.116		£0.116
Double cream		100ml = £0.2867		£0.2867
Single cream		100ml = £0.229		£0.229
Yoghurt		100g = £0.2643		£0.2643
Yoghurt drink		100ml = £0.4607		£0.4607
Vegetable oil		100ml = £0.07967		£0.07967
Olive oil		100ml = £0.604		£0.604
Gravy	20g granules 300ml water	20g granules = £0.10962	£0.10962 per 300ml	£0.03654
Cheese Sauce	25g butter 25g flour ½ pint milk 50g cheese	25g butter = £0.05908 25g flour = 0.02525 ½ pint milk = 0.2168 50g cheese = £0.388	£0.68912 per ½ pint	£0.2426
Jarred pasta sauce		100ml = £0.2183		£0.2183
Tomato ketchup		100ml = £0.206		£0.206
Tinned peas		100g = £0.1213		£0.1213
Potatoes		100g = £0.08253		£0.08253
Baked beans		100g = £0.102		£0.102
Kidney beans		100g = £0.076		£0.076
Tinned sweetcorn		100g = £0.13467		£0.13467
Tinned chickpeas		100g = £0.0693		£0.0693
Tinned tuna		100g = £0.45567		£0.45567
Tinned salmon		100g = £0.46967		£0.46967
Bacon fat		100g = £0.83		£0.83
Chicken juices		100g = £0.4093		£0.4093
Mincemeat		100g = £0.3553		£0.3553
Tinned hot dogs		100g = £0.167		£0.167
Soup		100ml = £0.152		£0.152
Ready Meal		100g = £0.41889		£0.41889
Cooked pasta	50g dried pasta weighs 100g when cooked	100g = £0.1163		£0.1163
Cooked rice		100g = £0.09883		£0.09883
Rice Krispies		100g = £0.357		£0.357
Weetabix		100g = £0.349		£0.349
Cup-a-soup	1 sachet (25g) 300ml water	1 sachet = £0.19598	£0.19598 per mug (300ml)	£0.065327
Porridge	50g oats 250ml milk	50g oats = £0.096 250ml milk = £0.1908	£0.2868 per 300ml	£0.0956
Apples		100g = £0.139		£0.139
Tinned peaches		100g = £0.09867		£0.09867
Tinned pineapple		100g = £0.095		£0.095
Tinned fruit cocktail		100g = £0.0873		£0.0873
Bananas		100g = £0.0956		£0.0956
Tinned apricots		100g = £0.12		£0.12
Custard	30g custard powder 20g sugar 600ml milk	30g custard powder = £0.067 20g sugar = £0.0196 600ml milk = £0.458	£0.5446 per 650g	£0.08378
Ice Cream		100g = £0.3927		£0.3927
Rice Pudding	100g pudding rice	100g pudding rice =	£0.69933 per	£0.06993

Food Type	Composition	Average Price	Price Per Unit	Price per 100ml
	50g sugar 700ml milk	£0.116 50g sugar = £0.049 700ml milk = £0.53433	1000ml	
Jelly	135g jelly 1 pint water	135g jelly = £0.374625	£0.374625 per pint	£0.05276
Ice lolly		100g = £0.602		£0.602
Apples		100g = £0.139		£0.139
Tinned peaches		100g = £0.09867		£0.09867
Tinned pineapple		100g = £0.095		£0.095
Tinned fruit cocktail		100g = £0.0873		£0.0873
Bananas		100g = £0.0956		£0.0956
Tinned apricots		100g = £0.12		£0.12
Tinned tomatoes		100g = £0.17367		£0.17367
Tinned beetroot		100g = £0.17267		£0.17267
Lettuce		100g = £0.14273		£0.14273
Coleslaw		100g = £0.16733		£0.16733
Mixed salad		100g = £0.74267		£0.74267
Batter	115g flour 300ml milk 1 egg	115g flour = £0.11615 300ml milk = £0.229 1 egg = £0.191	£0.5361 per 475ml	£0. 0.11287
Cake mixture	100g butter 100g flour 100g sugar 2 eggs	100g butter = £0.23633 100g flour = £0.101 100g sugar = £0.098 2 eggs = £0.382	£0.8173 per 420ml	£0.1946
Bread		100g = £0.12267		£0.12267
Bread rolls			£0.138 per roll (65g)	£0.2123
Chocolate		100g = £0.6		£0.6
Baby food		100g = £0.365		£0.365

Appendix F: Greenhouse gas emissions relating to avoidable food and drink waste

Greenhouse gas emissions were estimated associated with the disposal of avoidable food and drink waste via the sewer.

The analysis covers contributions to emissions from agriculture, food manufacture, packaging, distribution and transport, retail, storage and preparation in the home and disposal for all food and drink. For food and drink disposed via the sewer, the emissions associated with storage and preparation in the home have been omitted due to insufficient data. The figures do not take into account for changes to land-use resulting from demand for food stuffs. Furthermore, contributions from a range of greenhouse gases are incorporated into the estimate including:

- CO₂ (e.g. burning of fossil fuels for transportation);
- N₂O (e.g. from use of nitrogen fertiliser in agriculture); and
- CH₄ (e.g. emissions from cattle).

The emissions of each greenhouse gas are converted into the equivalent global-warming potential of CO₂. For the majority of sources used, the information has come from peer reviewed publications that have followed ISO14040.

Other environmental metrics would be useful indications of the impact of avoidable food waste, e.g. eutrophication, use of resources such as water, land, and energy. However, for reasons of brevity, these are **not** covered in this section.

The underlying principle behind this assessment is that if the avoidable waste were not generated, then the resources used for e.g. production, transportation, cooking, etc. would not have been consumed, or would be available for other purposes.

Further details on the methodology adopted and sources of information used for all food and drink disposal, including that used for this report, are provided in Appendix E of the report *Household Food and Drink in the UK*, which is published alongside this report.

Appendix G: Reasons for disposal

In diary-keeping research, it is possible to record in greater detail and with less need to make assumptions, the reasons why participants are disposing of different items, compared to assessments made when carrying out waste analysis. There may be a slight effect related to participant bias. If participants do not want to admit to having bought too much, they may be more likely to put this down to serving large portions, or people not finishing all of a meal, rather than admitting that something has gone off in the fridge. However, since there is unlikely to be a lesser or greater stigma attached to either reason, it seems unlikely for bias to have had a large effect in this research. Unfortunately it is not possible with this research method to verify the self-reporting behaviour by checking the state of the food once disposed. For example, assessing whether whole packs of food or drink have been disposed without any being first consumed is not possible by visually assessing what is found. The information recorded by participants has therefore been taken to be a true and accurate reflection of their actual actions and reasons for disposal are assumed to be correctly recorded.

A detailed range of possible reasons was recorded by participants in this exercise. For this report, they have been grouped to be consistent with other food waste analyses. The results broken down in more detail may still be of interest, though, for informing behaviour attached to sewer disposal and potential actions to reduce food wasted in this way.

Reasons offered in the diaries map onto reasons for disposal used in the main analysis for this report, as set out in Table G1.

Table G1: Mapping of original reasons for disposal during diary-keeping to the broader categories used in the analysis for the final report

Original reason (from diary)	Reason used in current research
Leftover - unspecified type	Prepared or served too much
Leftover - unspecified type – baby	Prepared or served too much
Leftover - preparation and cooking	Prepared or served too much
Leftover - after serving	Prepared or served too much
Leftover - after serving – baby	Prepared or served too much
Leftover - after serving – adult	Prepared or served too much
Ruined	Prepared or served too much
Cleaning / washing	Prepared or served too much
Gone off	Not used in time
Clearing out / replaced	Not used in time
Out of date	Not used in time
Unspecified	Other

Prepared or served too much

The category of cooked, prepared or served too much has been used to encompass a range of reasons for disposal and was reported most often as the reason for disposal. It includes here, leftovers for various reasons, as set out in Table G1, as well as food that has been cooked badly or prepared in such a way as to be ‘ruined’. Leftovers captured as part of washing up are also included in this category.

Leftovers of baby food were captured separately as it was thought that this might result in a greater proportion of sink disposal of food waste than for many other kinds of disposal, given that baby food tends to be pureed or liquidized. In addition, feeding small children may have resulted in food being left over after meal times. In practice during the diary-keeping much of the leftovers were of unspecified type. Combining the categories therefore made more sense. Ruined food and food being disposed during washing up also all seemed to fall within this category.

The distinction between food and drink that had been served, compared to food and drink that had been cooked or prepared is clear for some foods, but less so for others. It is possible that, despite instructions and support for diary-keepers, that it was not always obvious when to record some food and drink as ‘left over after serving’ and

when to record it as 'left over after cooking'. The problem of overlap between types of reason seemed to be greater for cold drinks and food than hot since cold food and drinks, such as squash, do not require cooking, although there is some preparation involved. While such instances should have been recorded as 'left over after serving', it is possible that this fine distinction may have accounted for the frequency with which the reason for food and drink being left over was not specified in diary records. This was a further reason for combining reasons in the final analysis used in the body of the report.

For the more detailed analysis presented here, the different categories of leftovers have also been combined. Looking at drinks in more detail, as in Figure G1, the great majority of disposal due to too much being prepared or served is put down to leftovers. A small amount is ruined during preparation. This is most likely to be the case, for drinks, with fruit juice and smoothies. Cleaning and washing up seems to account for hardly any drinks waste at all. Wine (14%), as well as fruit juice (19%), seems more likely than other drinks to have been recorded as ruined. Food and drink were recorded as ruined when they became inedible during the cooking or preparation process but storing incorrectly could also be applied to this category.

Figure G1: Reasons for drinks based on original reasons

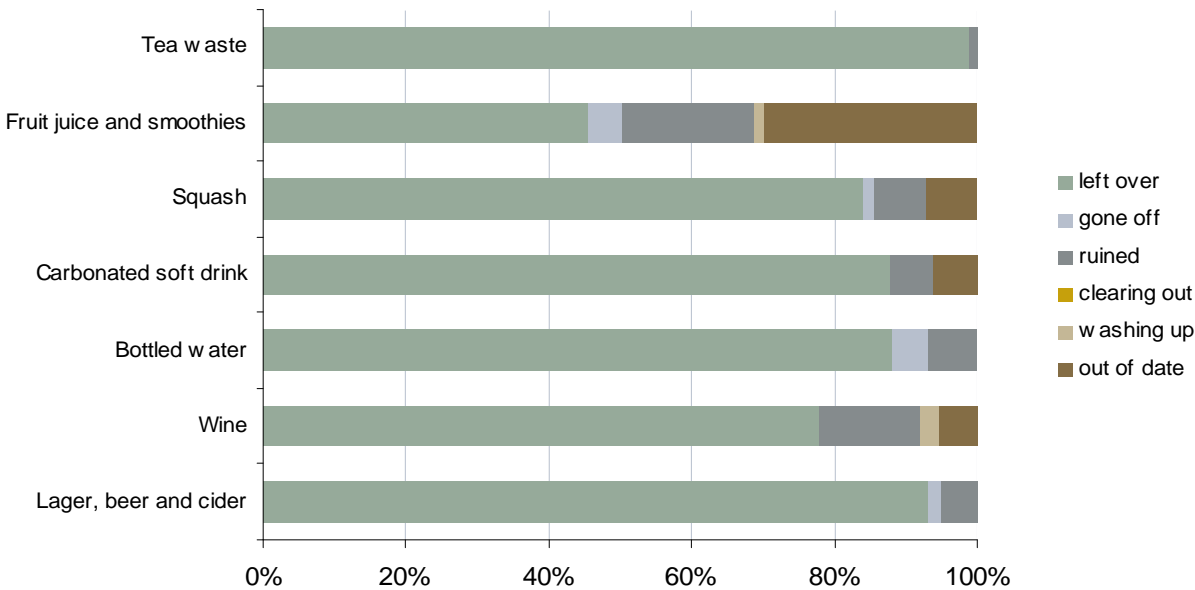
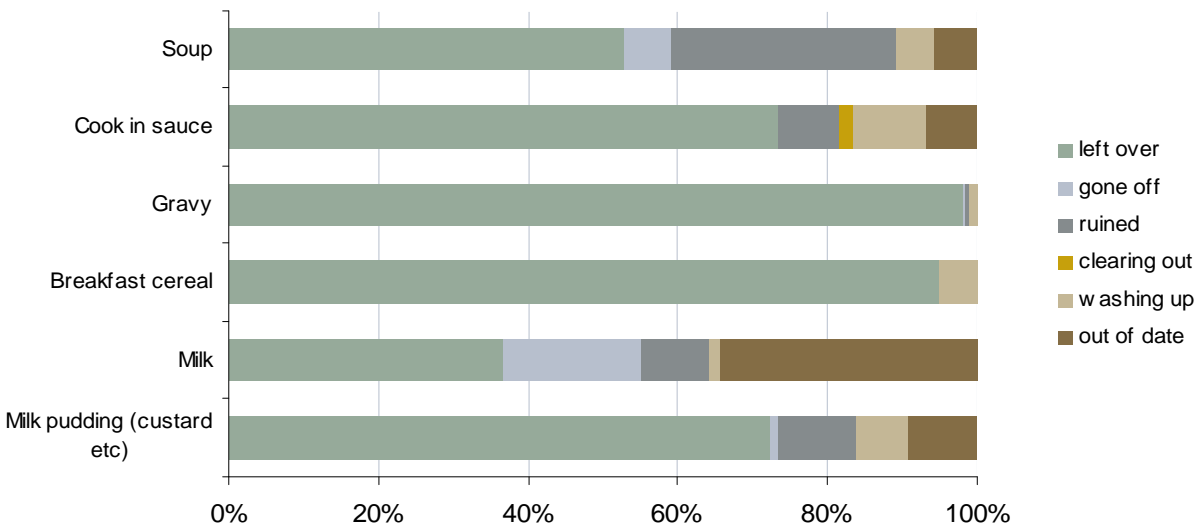


Figure G2: Reasons for other food types using original reasons



Not used in time

Food that has gone off in the view of the participant, as well as food and drink being thrown out during clearouts or when being replaced, as well as food and drink that has gone out of date, are all captured as 'not used in time'.

Most drinks that were not used in time were disposed due to having gone out of date, as can be seen in Figure G1, above. This is particularly likely to be so for fruit juice and smoothies. It also applies to milk as can be seen in Figure G2, and also, though to a lesser extent, milk puddings such as custard. Milk is also more likely to be poured away because it has gone off, but is not out of date. Householders therefore appear to be more likely with milk, to choose to use their discretion over whether it has to be disposed than they are for other food types. A small amount of fruit juice and smoothies and bottled water is disposed because it is considered to have gone off.

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