

# Food affordability and safety

## Paper 4

## Food and You Waves 1-3 secondary analysis

## NatCen Social Research

Social Science Research Unit

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# NatCen

Social Research that works for society

# Food affordability and safety

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# Summary

- One of the main objectives of the Food Standards Agency (FSA) is to protect the interest of consumers in relation to food, and this includes ensuring that food is safe, that food is what it says it is, that consumers have access to an affordable healthy diet, and that they can make informed choices about what they eat, now and in the future. While responsibility for access to an affordable healthy diet is shared with others, such as industry, consumers, and other areas of government, the FSA is particularly interested in the relationship between an affordable diet and the FSA's core responsibility of food safety.
- This paper looks at whether people mitigate the impact of changes in affordability of food by adapting particular food-related activities that may increase levels of risk from foodborne illness such as eating food past its use-by date and re-heating leftovers. It uses data from the FSA's Food and You survey, which was carried out in 2010, 2012 and 2014, to look at possible changes in food safety activities over three survey waves. It also investigates whether those on the lowest incomes are most likely to be affected by changes in affordability of food, and that they are more likely to make changes to their food-related activities that could have implications for safety.
- Affordability of food (as measured by proportion of the household budget spent on food) fell in 2012. Looking at food safety activities over the three survey waves, the proportion of respondents who reported not eating leftovers more than two days after cooking dropped in 2012 as did the proportion who reported not re-heating their food more than once. Both these reflect a potential increase in risk from foodborne illness.
- When looking at these changes across the waves by income group, a significant change over time for the lowest income quintile was only observed for eating leftovers more than two days after cooking. This finding was complemented by respondents in the two lowest income quintiles being more likely to report keeping leftovers for longer before eating for financial reasons than those in the higher income groups.
- Those in the lowest income quintiles were more likely to say they always avoided throwing food away. Across all income groups, the proportion who said they always avoided throwing food away increased across the three waves despite food affordability increasing between Wave 2 and 3. This may reflect a greater general awareness of other issues related to food waste, such as the environmental impact.
- In the absence of more detailed research around the food-related activities people undertake and their motivations, it is difficult to draw clear conclusions about the relationship between income and food safety. However these findings do suggest there have been changes in practices over time, particularly among lower income groups.

## Introduction

The Food Standards Agency (FSA or ‘the Agency’) is an independent government department responsible for food safety and hygiene in England, Wales and Northern Ireland.<sup>1</sup> As part of the Agency’s responsibility for protecting consumer interests in relation to food, key priorities are ensuring that food is safe, that it is what it says it is, and that consumers have access to an affordable healthy diet. Improving understanding of the relationship between food affordability and safety is important to the successful delivery of these aims.

This paper, the fourth in a series based on secondary analysis of the Food Standards Agency’s (FSA’s) Food and You Survey,<sup>2</sup> focuses on food safety activities in relation to household income and food affordability.

Household food insecurity is a term used to describe the inability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways, or the uncertainty that one will be able to do so.<sup>3</sup> Whilst systematic data about household food

insecurity in the UK are lacking, it is widely believed to be sufficient to warrant concern.<sup>4 5</sup> Three major recent economic phenomena are thought to be linked to household food insecurity: a) the increase in food prices from 2007 to 2012 b) the financial crisis of 2008 that precipitated economic recession, unemployment and stagnant wage growth, and c) subsequent ‘austerity’ measures with reductions to social security benefits.<sup>6</sup>

In terms of relevance to the FSA, while many of the Agency’s core activities relate to the issue of food safety, a founding objective of the FSA was to “protect the interests of consumers in relation to food”, and the FSA’s 2015-2020 Strategic Plan adopts the following definition for consumers’ interests:

*Food is safe and what it says it is, and we have access to an affordable healthy diet, and can make informed choices about what we eat, now and in the future.<sup>7</sup>*

Access to an affordable, healthy diet is therefore an area of interest to the Agency, and while the FSA’s Strategic Plan notes that “affordability, choice, food security and sustainability are issues where others have much greater ability to make a difference”, the FSA recognises that it has a role in contributing “to the work that others do in these areas where we can to support the

<sup>1</sup> The FSA was previously the body for food safety across the UK. In April 2015, its responsibilities in Scotland were transferred to the new independent Scottish food safety body, Food Standards Scotland (FSS). This research was commissioned prior to this change, and is based on data from Waves 1-3 of the FSA’s Food and You survey, which was undertaken across the UK. For the purposes of this research, analysis and findings therefore relate to aggregate UK-level data.

<sup>2</sup> The topics of these papers were developed in consultation with leading academics in the fields of food and social science research, as well as with reference to the FSA’s own policy-, science- and consumer-engagement-related priorities.

<sup>3</sup> World Food Summit (1996) Rome Declaration on World Food Security. <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>

<sup>4</sup> Dowler E., Turner S., and Dobson B. (2001) Poverty bites: food, health and poor families. London: Child Poverty Action Group. For a useful discussion of the terminology see Appendix 1 in Tait C. (2015) Hungry for Change. The Fabian Society. <http://www.fabians.org.uk/wp-content/uploads/2015/10/Hungry-for-Change-web-27.10.pdf>

<sup>5</sup> Dowler E., and Lambie-Mumford H. (2015). Introduction: Hunger, Food and Social Policy in Austerity. *Social Policy and Society* 14(3): 411-415.

<sup>6</sup> Loopstra R., Reeves A., Taylor-Robinson D., Barr B., McKee M., Stuckler D. (2015) Austerity, sanctions, and the rise of food banks in the UK. *BMJ* 2015; 350: h1775.

<sup>7</sup> Food Standards Agency (2015) Strategic Plan 2015-20. [https://www.food.gov.uk/sites/default/files/FSA%20strategy%20document%202015-2020\\_April%202015\\_interactive%20%282%29.pdf](https://www.food.gov.uk/sites/default/files/FSA%20strategy%20document%202015-2020_April%202015_interactive%20%282%29.pdf)

best outcomes for consumers”. This paper considers the issues of food affordability and security in relation to the FSA’s core priority of food safety, by investigating the relationship between affordability of food, income, and the food-safety-related activities that people engage in.

### Changes in food prices

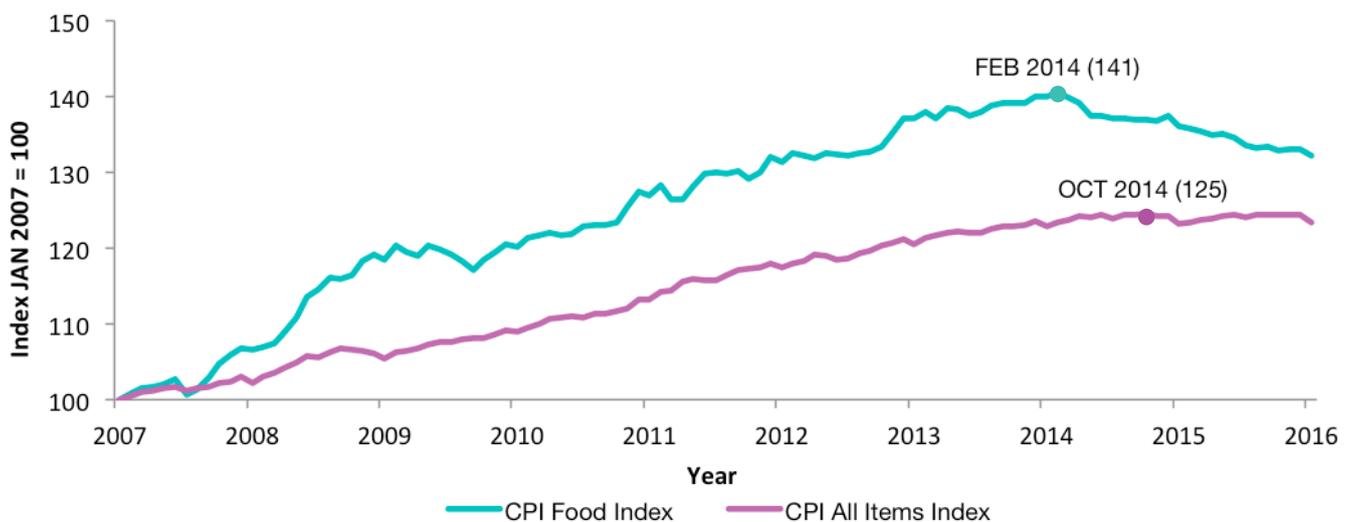
One indicator of relative change in food prices is a comparison of the food items Consumer Price Index (CPI) against the all items CPI (a commonly-used measure of consumer price inflation). Figure 1 shows monthly change in the two CPI measures between January 2007 and January 2016. In 2008 food prices increased significantly compared to general inflation, peaking in February 2014 (a 41% increase compared to January 2007). Since then, we can observe a decrease in food

prices, and stabilisation in general inflation, but food prices remain higher compared to consumer prices in general, with food prices in January 2016 32.2% higher than in January 2007, compared to general inflation at 23.4%.

### Food expenditure as a proportion of household spending

While CPI data provides a measure of food prices and how these relate to general inflation, it does not provide a robust measure of affordability of food, as it does not take into account other factors such as changes in income, or changes in household spending on other items. An alternative measure is household spending on food as a proportion of total household expenditure.<sup>9</sup> If the proportion increases over time, then food is placing a greater burden on spending. Figure 2 shows

**Figure 1 Consumer Price Index: Food and All Items (monthly, January 2007=100)**



Peaks of both measures are labelled on the chart.

Source: CPI Food Index (D7C8) and the CPI All Items Index (D7BT), monthly for period January 2007- January 2016, re-indexed to January 2007 = 100.<sup>8</sup>

<sup>8</sup> Office for National Statistics (2016) Consumer Price Inflation time series dataset (MM23), 19 July 2016. <https://www.ons.gov.uk/file?uri=/economy/inflationandpriceindices/datasets/consumerpriceindices/current/mm23.xlsx>

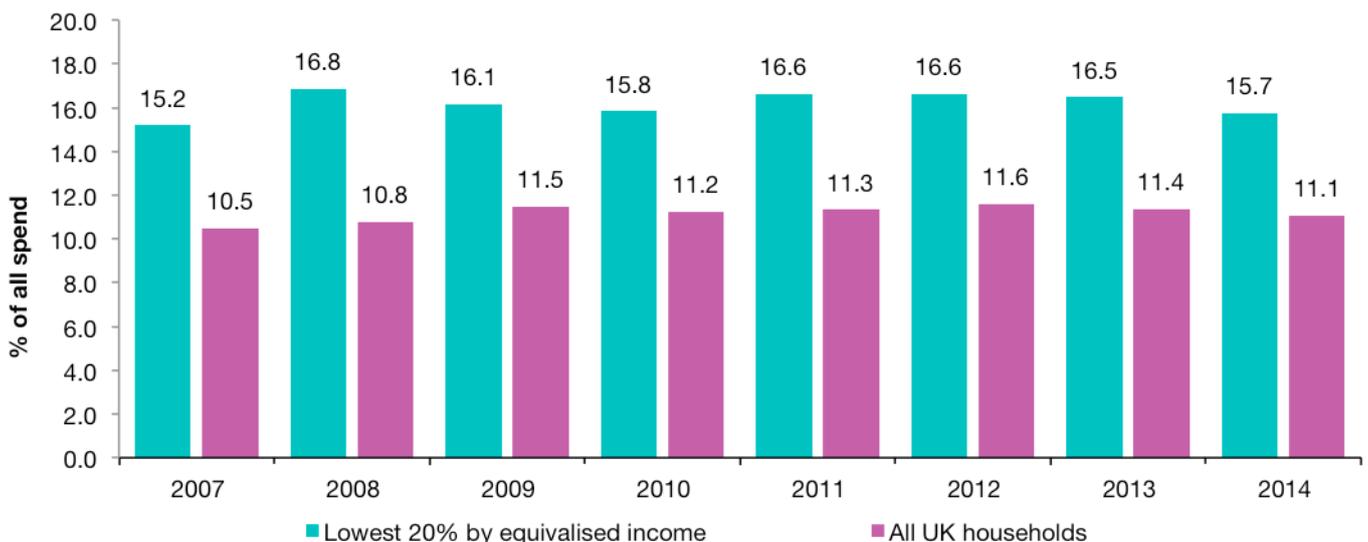
<sup>9</sup> As originally observed in the nineteenth century by the German statistician Engels, the proportion of household expenditure spent on food varies with household income such that food budget share increases with decreasing income, even if actual expenditure falls. This statistic has been used as an indicator of welfare and as an indicator of levels of household poverty.

that an average 11.1% of household budget was spent on food in 2014, 0.6 percentage points higher than the 2007 level.<sup>10</sup> Although an average household in the lowest 20% of equivalised income<sup>11</sup> will spend a lower amount on food in absolute terms, this represents a larger proportion of the household budget when compared to higher income households. In 2014, households in the lowest 20% of equivalised income spent 15.7% of their budget on food, with change over the time period more variable for these households than for the households across the UK as a whole. Figure 2 shows that during the 2007-2014 period, the largest annual change for the lowest-income households occurred at the beginning of the financial crisis, between 2007 and 2008, with an increase of 1.6 percentage points. This may reflect increases in food prices (see Figure 1), reduction in incomes, or a combination of both, along with other factors

such as an increase in energy costs.

Spending a larger proportion of the total budget on food makes households more sensitive to rises in food prices. The effects of food price changes on the lowest-income households have been examined on annual basis by Defra, who reported that although many households traded down (to cheaper versions of the same foods), following the marked rise in food prices between 2007 and 2013, the lowest income households traded down to a much lesser extent, possibly because they were already buying cheaper products.<sup>10</sup> In 2012, when the proportion of the budget spent on food for all households peaked, those in the lowest equivalised income decile spent 22% more on food compared to 2007, and, in quantity terms, purchased 5.7% less food.<sup>13</sup> Notably, these lower income household reported buying significantly

**Figure 2 Proportion of household budget spent on food (2007-2014)**



Source: Defra Family Food 2014<sup>12</sup>

<sup>10</sup> Defra (2015) Food statistics pocketbook 2014. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/423616/foodpocketbook-2014report-23apr15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/423616/foodpocketbook-2014report-23apr15.pdf)

<sup>11</sup> The income a household needs to attain a given standard of living depends on its size and composition. Equivalisation is a way of adjusting a household's income for size and composition so that the incomes of all households are on a comparable basis.

<sup>12</sup> Defra (2015) Family Food 2014 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/485982/familyfood-2014report-17dec15.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/485982/familyfood-2014report-17dec15.pdf)

<sup>13</sup> Defra (2013) Family Food 2012 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/265243/familyfood-2012report-12dec13.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265243/familyfood-2012report-12dec13.pdf)

fewer portions of fruit and vegetables than previously.<sup>14</sup> These findings are supported by recent analyses using data from the Living Costs and Food Surveys 2005–11 and Kantar Worldpanel,<sup>15</sup> which also show that all household types reduced purchases of fruit and vegetables and increased the share of calories purchased as processed foods.

Qualitative studies tell us more about how households manage food when the cost of living rises, with the food budget being somewhere people can and do economise. The food strategies that people describe include making use of price promotions and offers. Other reported strategies involve simply buying what is needed for that day or even for a particular meal, resulting from having insufficient money to do anything other than live ‘hand-to-mouth’. Of potential relevance to the FSA’s core concern of food safety, people also often say they have become very resourceful in avoiding food waste.<sup>16</sup> For example a qualitative longitudinal study of families’ food practices, conducted in the context of rising food prices, found that in addition to trading down and ‘shopping around’, parents reported throwing less food away and eating more leftovers.<sup>17</sup> A study in the US of wider food management practices in the context of food insecurity also found reports of many people using out-of-date foods and spoiled leftovers.<sup>18</sup>

This paper sets out to investigate the hypothesis that people mitigate the impact of changes in affordability of food by adapting

particular food-related activities. Some of these changes, such as eating food past its use-by date and re-heating leftovers, may have implications for food safety, exposing people to greater levels of risk from foodborne illness. The investigation is based on data from the FSA’s Food and You survey, which was carried out in 2010, 2012 and 2014. As Figure 2 shows, food unaffordability (as measured by the proportion of the household budget spent on food for the population as a whole) coinciding with Wave 2 of the survey. This paper therefore looks at possible changes in food safety activities over the three survey waves and also investigates the hypothesis that, as those on the lowest incomes are most likely to be affected by changes in affordability of food, they are more likely to make changes to their food-related activities that could have implications for safety.

## Research questions

- Is food affordability associated with particular food safety behaviours?
- Are changes in food affordability associated with changes in food safety behaviours?
- Are income groups which are most sensitive to changes in affordability of food also more likely to make changes to food-related activities with implications for food safety?

<sup>14</sup> Defra (2013) Food Statistics Pocketbook 2012 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/183302/foodpocketbook-2012edition-09apr2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/183302/foodpocketbook-2012edition-09apr2013.pdf)

<sup>15</sup> Griffith R., O’Connell M., Smith K. (2013) Food expenditure and nutritional quality over the Great Recession. Briefing note, Institute for Fiscal Studies.

<sup>16</sup> Dowler E. and Lambie-Mumford H. (2015) How can households eat in austerity? Challenges for social policy in the UK. *Social Policy and Society* 14(3): 417-428.

<sup>17</sup> O’Connell R. and Brannen J. (2016) *Food, Families and Work*. London: Bloomsbury.

<sup>18</sup> Kempson K.M., Palmer Keenan D., Sadani P.S., Ridlen S., Scotto Rosato N. (2002) Food management practices used by people with limited resources to maintain sufficiency as reported by nutrition educators. *Journal of the American Dietetic Association* 102: 1795-1799.

## Food safety activities and affordability

Food and You participants were asked a series of questions about food safety activities in the home. For this analysis we considered four activities which we hypothesised could be related to affordability of food and avoidance of food waste. Responses to these questions were categorised as in line (or not in line) with FSA recommendations (Table 1).

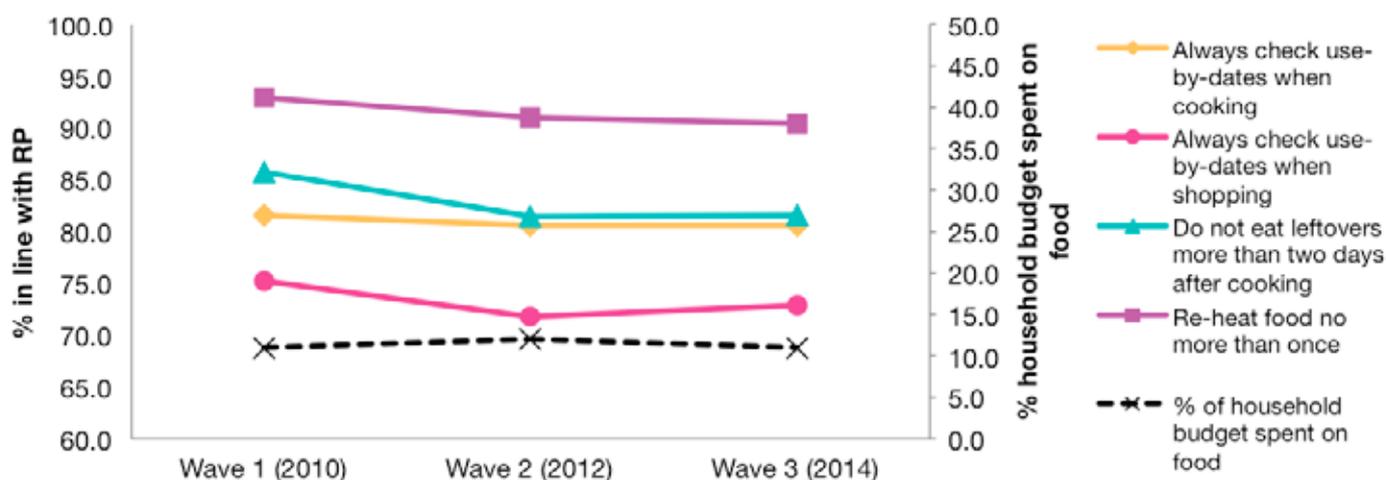
Figure 3 shows the proportion of participants reporting activities in line with FSA

recommendations (thereby helping to minimise potential risks from foodborne illness) across the three waves. A statistically significant drop in the proportion of respondents following recommended practice was observed in Wave 2 (2012) for all activities except checking use by dates when cooking. As noted earlier, affordability of food (as measured by proportion of the budget spent on food) fell in Wave 2 (2012).

**Table 1 Food safety activities and hypothesised association with affordability**

Food safety activity	FSA recommendation	Hypothesis
How many times people consider reheating food	Re-heat food no more than once after it has been cooked for the first time.	People would re-heat food more than once with reduced affordability so <b>less</b> likely to be in line with FSA recommendations
How long after cooking a meal people would consider eating leftovers	No more than two days	People would eat leftovers after more than two days with reduced affordability so <b>less</b> likely to be in line with FSA recommendations
Do people check use by dates when buying food	Always check use by dates	People would be more likely to check labels with reduced affordability so <b>more</b> likely to be in line with FSA recommendations
Do people check use by dates before cooking	Always check use by dates	People would be more likely to check labels with reduced affordability so <b>more</b> likely to be in line with FSA recommendations

**Figure 3 Proportion reporting activities in line with recommended practice across Waves 1-3 of the Food and You survey, and the percentage of household budget spent on food (ONS)**



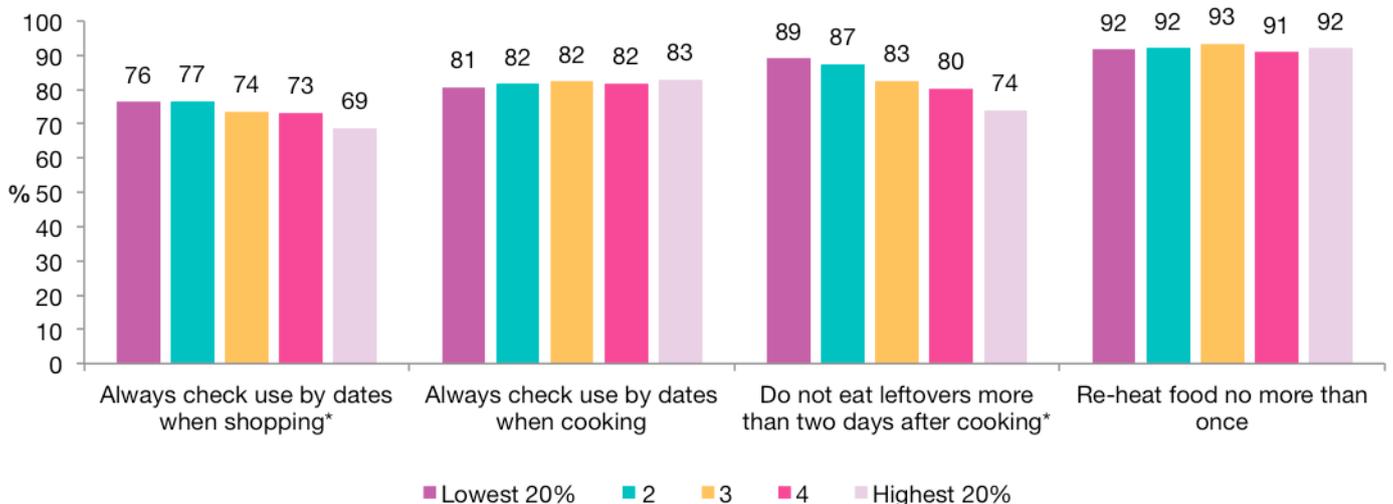
In the introduction, we suggested that those in lower income groups may be more likely to make changes to their food-related activities. First we looked at whether there was any difference in reporting of activities in line with FSA recommendations across equivalised income quintiles using combined data from Waves 1-3. We found a statistically significant difference for two of the four activities: checking use-by-dates when shopping and eating leftovers. In both cases, respondents in the lower income households were more likely to report activities in line with recommended practice, while respondents from the highest income group were the least likely (Figure 4).

We then looked at these two activities in more detail over the three survey waves (Figures 5

and 6). Although all income groups showed some decrease at Wave 2 in the percentage reporting recommended practice for checking use-by-dates, the decrease was statistically significant only for the highest income group. This group may therefore have been largely responsible for the lower proportions seen in Figure 3.

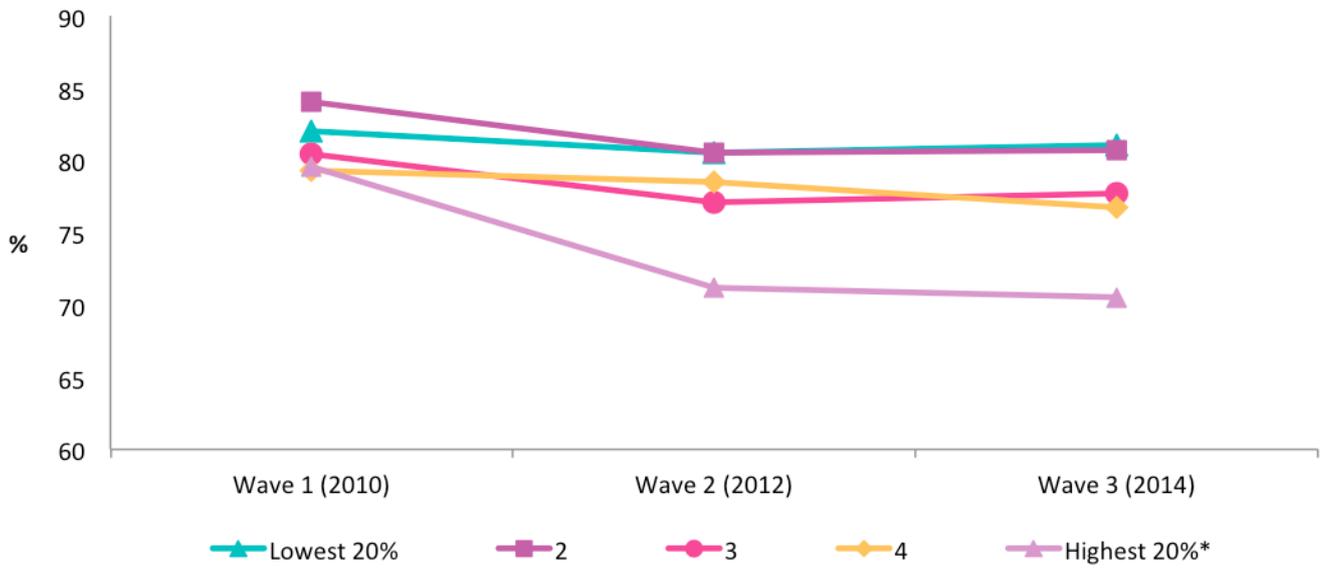
For eating leftovers, a general downward trend in reporting activity in line with recommended practice was observed across all income groups between Waves 1 and 2, although most differences were too small to be statistically detectable. The only statistically significant change was detected for the lowest income group, which saw a decrease from 91% to 87% between Waves 1 and 3.

**Figure 4 Proportion reporting activities in line with recommended practice, by equivalised income quintiles**



\*significant difference at 0.05 level

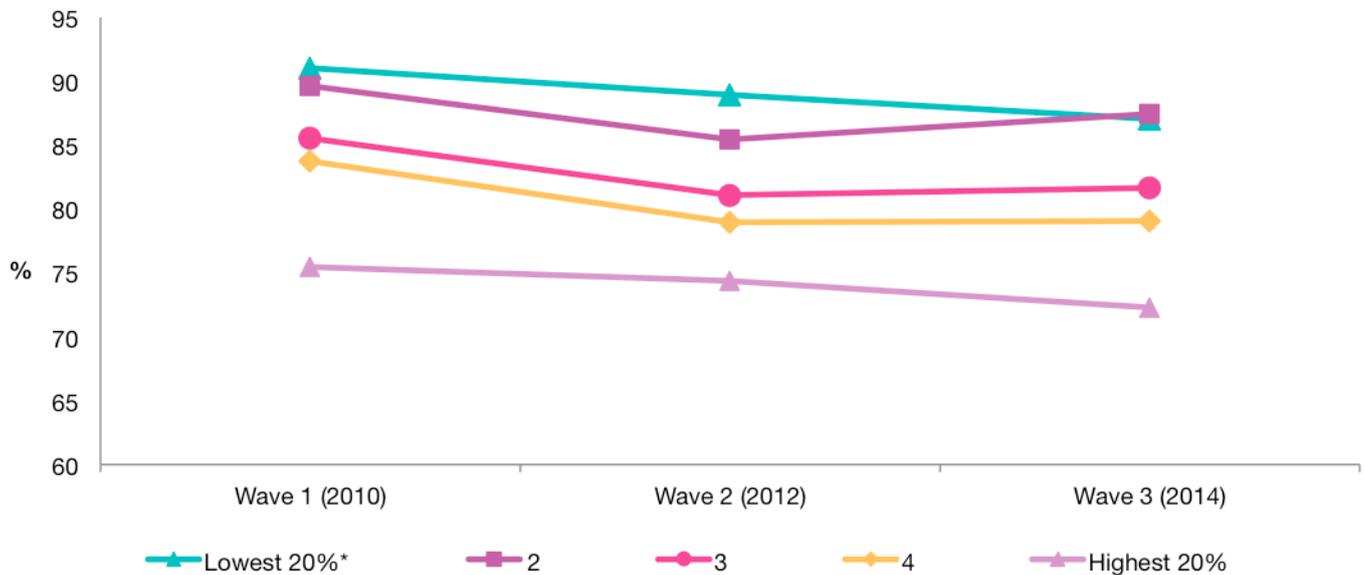
**Figure 5 Proportion reporting activity in line with recommended practice for checking use-by dates when shopping, by equivalised income quintiles and wave**



\*significant difference at 0.05 level

**Appendix Table A3**

**Figure 6 Proportion of respondents reporting activity in line with recommended practice for eating leftovers, by equivalised income quintiles and survey wave**



\*significant difference at 0.05 level

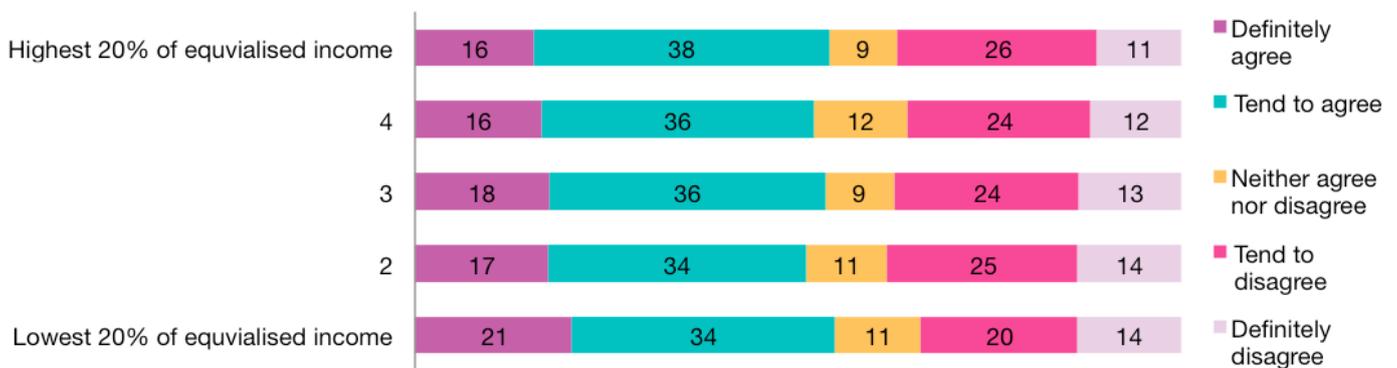
**Appendix Table A3**

## Attitudes to waste

Given that a possible strategy for mitigating the impact of changes in food affordability is minimising food waste, we also looked at whether attitudes towards wasting food differed by income groups. Participants in all three waves of Food and You were asked whether they agreed or disagreed with the statement “**I always avoid throwing food away**”. Figure 7 shows responses to this question about food waste by equivalised income quintiles. Participants in the lowest income households were more likely to definitely agree with the statement (21% compared with between 16% and 18% for other income groups). There were no other significant differences between income groups.

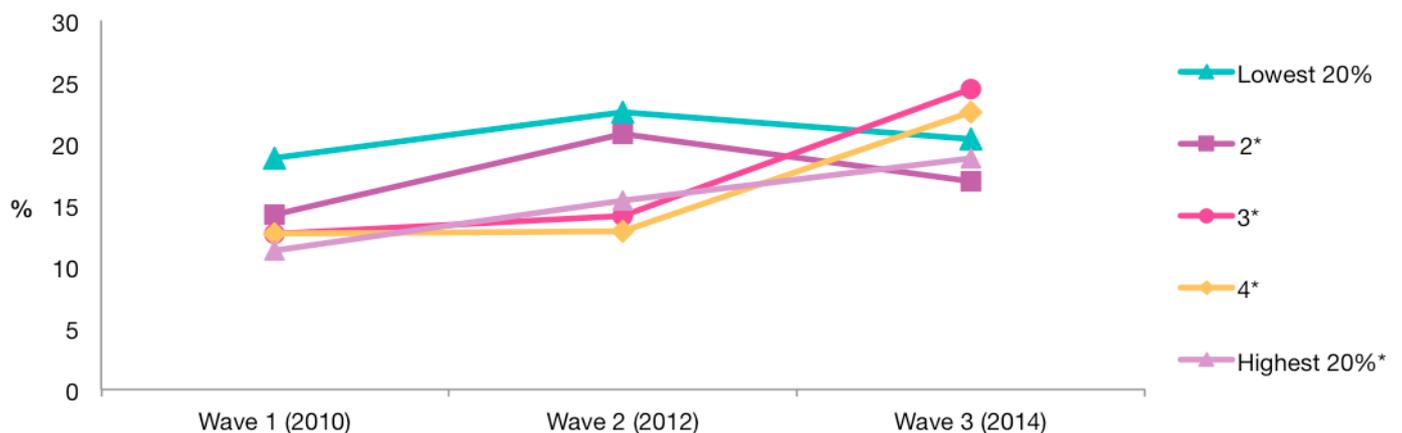
Looking at trends over time, the proportion of people who definitely agreed with the avoiding waste statement increased from 15% at Wave 1 to 21% at Wave 3. However, the timing of changes in attitude varied by income group (Figure 8). For the two lowest income groups combined, there was a statistically significant increase between Waves 1 and 2 in the proportion avoiding food waste (from 17% to 22%), which then decreased to 19% at Wave 3 (not statistically significant). For the higher income groups combined the change came later - there was a statistically significant increase in the proportion avoiding food waste only between Wave 2 and Wave 3 (from 14% to 22%).

**Figure 7 Response to ‘I always avoid throwing food away’ by equivalised income groups**



**Appendix Table A4**

**Figure 8 Proportion definitely agreeing with statement ‘I always avoid throwing food away’ by equivalised income quintiles and wave**



**Appendix Table A5**

## Other demographic and socio-economic factors

Bivariate analysis showed that the proportion of respondents reporting activities in line with food safety recommendations across equivalised income quintiles was different for checking use-by-dates when shopping, and for eating leftovers. We ran multiple logistic regression models for all four food safety activities to test whether the differences between income groups in terms of reporting activities in line with recommendations could be explained by other demographic and socio-economic factors. We also looked at whether attitudes to throwing food away were associated with food safety activities. We first ran the models with equivalised income quintiles and then, if no statistically significant differences were found, with income deciles, to see whether inclusion of more extreme income groups had any impact on the results. Variables included in the model are listed in the appendix (Table A6). The key findings are:

- For checking use-by-dates when shopping, the odds<sup>19</sup> of always checking use-by-dates for those in the lowest income quintile were 1.4 times higher than for those in the highest quintile.
- For eating leftovers, the odds of reporting behaviour in line with recommended practice were 1.6 times higher for the lowest income decile and 1.3 times for the middle 80% compared to the highest income decile.<sup>20</sup>

### Appendix Table A7 & A8

Attitudes to food waste proved to be associated with all four food safety activities. The odds of reporting behaviour in line with recommended practice were lower for people who definitely agreed with the statement 'I always avoid throwing food away' compared to those who definitely disagreed, meaning they were more likely to eat leftovers more than two days after cooking, not always check use-by-dates when shopping and cooking and more likely to re-heat food more than once.

### Appendix Table A9-A12

<sup>19</sup> Odds ratios are used to compare the relative odds of reporting recommended practice for a given subgroup, indicated by a category of independent variable, e.g. women as compared to men. If the value is greater than 1 then it indicates that as the predictor increases/ changes, the odds of the outcome occurring increase. Conversely, a value less than 1 indicates that as the predictor increases/ changes, the odds of the outcome occurring decrease.

<sup>20</sup> Significant differences were not found for the quintiles, therefore regression was run to investigate any differences between the deciles of equivalised income. Significant differences were found between the highest 10% group and all other decile groups.

## Changes in behaviour for financial reasons

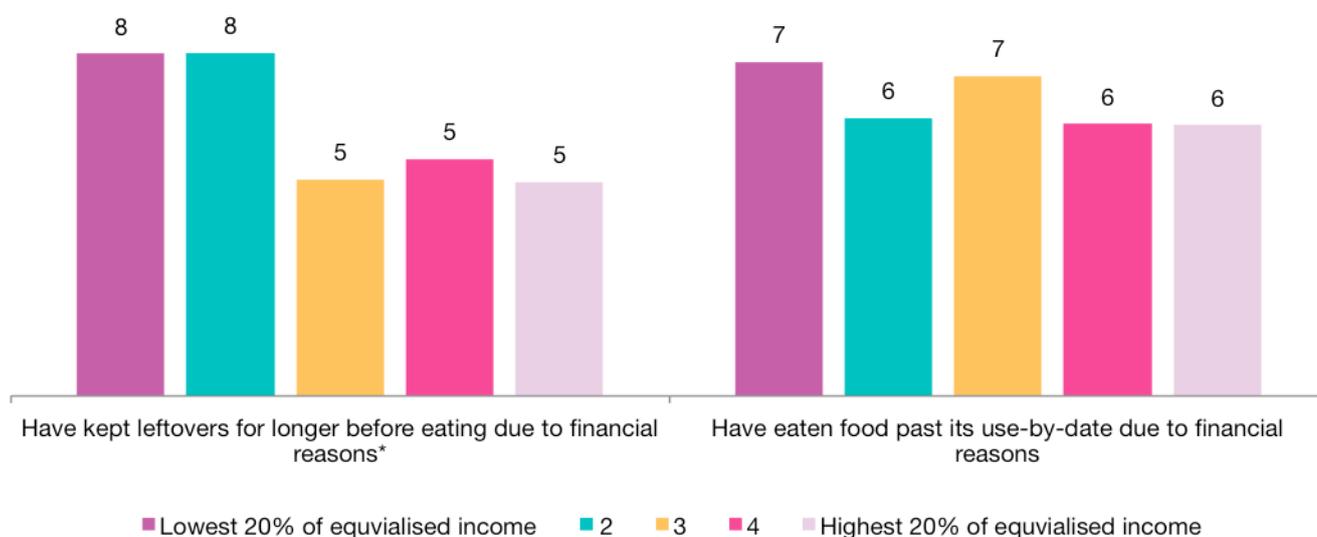
Although we found associations between changes in food safety activities and income across the waves in previous sections, we cannot be certain that the changes were *caused* by changes in food affordability. To provide additional context, we also looked at a question that asks participants directly about changes made for financial reasons. Participants in Waves 2 and 3 of Food and You were shown a list of possible changes they might have made in the previous 6 months for financial reasons. For this analysis we selected those responses that we hypothesised could have food safety implications, in terms of increased risk of foodborne disease: “Kept leftovers for longer before eating for financial reasons” and “Eaten food past its use-by-date more for financial reasons”. There was no difference by equivalised income quintile

for eating food past its use-by-date more, but those in the lowest two income quintiles were more likely than the rest of the sample to report keeping leftovers for longer before eating them due to financial reasons (8% vs 5%) (Figure 9).

As food unaffordability reached its peak at the same time of Wave 2 of the survey (in 2012), we also looked at whether there was any change in the proportion who said they kept leftovers for longer before eating, in response to the question about changes in behaviour due to financial reasons. Overall there was no significant difference between the proportion who said they kept leftovers for longer before eating due to financial reasons by wave. Looking across the income groups, there was a small but significant decrease from 6% to 4% for the two highest income groups.

Appendix Table A14

Figure 9 Proportion of respondents who said they had made changes for financial reason by equivalised income quintiles (2012 and 2014 combined)



\*significant difference at 0.05 level.

Appendix Table A13

## Discussion

The series of economic developments from 2007 onwards that have affected the price of food and its relative affordability are complex, and the findings of this analysis suggest a similarly complex relationship between food affordability, income and food safety activities.

Our hypotheses around likelihood of certain activities being in line with recommendations (in the interests of minimising food wastage) were generally supported by the data, but there was variation between the different activities. When comparing across income groups, a significantly higher proportion of respondents in the lowest quintile reported always checking use-by-dates when shopping, but a higher proportion also reported not eating leftovers more than two days after cooking. This was in spite of the lowest income group being more likely to report that they always avoid throwing food away, which suggests that minimising food wastage is indeed an important factor in maximising the efficiency of food expenditure. We can only infer potential motivations relating to particular activities, for example, lower income households may be more likely to check use-by-dates when shopping, in order to better plan meal preparation and maximise food longevity, thus minimising wastage. This could also be a factor in the lower income group being less likely to report eating leftovers more than two days after cooking, again due to better planning of meal preparation, with a lower likelihood of leftovers and thus potential wastage. However, in the absence of more detailed quantitative or qualitative research around the activities people undertake and their motivations, it is difficult to draw clear

conclusions about the relationship between income and food safety.

In terms of looking at changes over time, the analysis did find, as hypothesised, a significant decline in the proportion of respondents reporting re-heating food and eating leftovers at Wave 2. This corresponded with the drop in affordability of food (as measured by proportion of budget spent on food) in 2012. There was also a drop in the proportion of respondents reporting checking use-by dates when shopping where we might have expected to see a rise (which appeared to be mainly due to this occurring in the highest income group). On the other hand, a significant change over time was observed for eating leftovers more than two days after cooking for the lowest income group only, with a reduction in the proportion reporting recommended practice. The latter finding is complemented by the analysis of reported changes in behaviour for financial reasons across Waves 2 and 3, with respondents in the two lowest income quintiles being more likely to report keeping leftovers for longer before eating for financial reasons (8%), compared to the rest of the sample (5%). This finding reflects the US research mentioned earlier<sup>18</sup> and, given implications for food safety and foodborne illness, is important.

As hypothesised, the analysis also found that lower income groups were more likely to report avoiding wasting food as food affordability decreased, but across all income groups the proportion reporting avoidance of food waste increased from Waves 1 to 3, despite affordability of food increasing between Waves 2 and 3. This suggests that avoiding throwing food away is not only motivated by financial concerns, but could be due to greater awareness of other relevant issues, such as environment impact.

The findings reported here do not provide definitive evidence of increased risk of foodborne illness due to changes in food-related activities in response to the series of economic events since 2007, but they do suggest that some income groups, and particularly low income groups, have altered some practices. This broad finding is in accord with some other recent research<sup>21</sup> that has found a complex pattern of mitigation measures adopted by households since the onset of the 2008 financial crisis, varying by household type and income level. Qualitative research with low income households has also found that these households have adopted 'food coping strategies' in response to reduced food affordability,<sup>22</sup> including changes in food purchasing and preparation.

Whilst it is not possible to identify causal links between recent economic phenomena and observed changes in food safety activities over time among different income groups, it is clear that questions remain about the longer term ability for households to cope in this way, with possible implications for health and safety due to foodborne illness. Future waves of Food and You should thus continue to monitor this and possibly also explore reasons for avoiding food waste.

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<sup>21</sup> For example, Defra's analysis of food purchasing in low income households, referenced in footnote 10.

<sup>22</sup> Dowler E. (2014) Food Banks and Food Justice in Austerity Britain, in Riches G. and Silvasti T. (eds). *First World Hunger Revisited: Food Charity or the Right to Food?* Basingstoke: Palgrave MacMillan: 160-175.

# Appendix

**Table A1 Proportion following recommended practice by wave**

	Survey wave		
	Wave 1 (2010)	Wave 2 (2012)	Wave 3 (2014)
	%	%	%
<b>Always check use-by-dates when cooking</b>	81.6	80.6	80.6
<b>Always check use-by-dates when shopping</b>	75.2	71.7	72.9
<b>Do not eat leftovers more than two days after cooking</b>	85.8	81.5	81.6
<b>Re-heat food no more than once</b>	92.9	91.0	90.4
<i>Bases</i>	<b>3163</b>	<b>3231</b>	<b>3453</b>
<i>Bases excluding those who answered NA to reheating food</i>	<b>2937</b>	<b>2948</b>	<b>3171</b>

**Table A2 Food safety activities by equivalised income quintiles**

	Income quintiles				
	Lowest 20%	2	3	4	Highest 20%
	%	%	%	%	%
<b>If you made a meal on Sunday, What is the last day that you would consider eating the leftovers?</b>					
Not following recommended practice	10.9	12.5	17.5	19.7	26.1
Following recommended practice	89.1	87.5	82.5	80.3	73.9*
<b>Bases</b>	<b>1897</b>	<b>1134</b>	<b>1679</b>	<b>1417</b>	<b>1448</b>
<b>How many times would you consider re-heating food after it was cooked for the first times?</b>					
Not following recommended practice	8.3	7.9	6.6	9.0	7.9
Following recommended practice	91.7	92.1	93.4	91.0	92.1
<b>Bases excluding those who answered NA to reheating food</b>	<b>1697</b>	<b>1050</b>	<b>1547</b>	<b>1333</b>	<b>1370</b>
<b>Do you check use by dates when you are about to cook or prepare food?*</b>					
Not following recommended practice	19.4	18.4	17.6	18.2	17.0
Following recommended practice	80.6	81.6	82.4	81.8	83.0
<b>Bases</b>	<b>1897</b>	<b>1134</b>	<b>1679</b>	<b>1417</b>	<b>1448</b>
<b>Do you check use by dates when you are buying food?</b>					
Not following recommended practice	23.6	23.4	26.5	26.7	31.3
Following recommended practice	76.4	76.6	73.6	73.3	68.7*
<b>Bases</b>	<b>1897</b>	<b>1134</b>	<b>1679</b>	<b>1417</b>	<b>1448</b>

**Table A3 Proportion following recommended practice by equivalised income quintiles and wave**

	Income quintiles				
	Lowest 20%	2	3	4	Highest 20%
	%	%	%	%	%
<b>Always check use by dates when buying food</b>					
Wave 1	82.0	84.1	80.5	79.3	79.6
Wave 2	80.5	80.5	77.1	78.5	71.2
Wave 3	81.1	80.7	77.7	76.7	70.5
<b>Never eat leftovers more than two days after cooking</b>					
Wave 1	91.0	89.6	85.5	83.8	75.5
Wave 2	89.0	85.4	81.1	78.9	74.4
Wave 3	87.1	87.5	81.7	79.1	72.3
<i>Bases</i>	<i>1897</i>	<i>1134</i>	<i>1679</i>	<i>1417</i>	<i>1448</i>

**Table A4 Response to statement ‘I definitely avoid throwing food away’ by equivalised income quintiles**

	Income quintiles				
	1 (Lowest 20%)	2	3	4	5 (Highest 20%)
	%	%	%	%	%
<b>Definitely agree</b>	20.5	17.4	17.5	16.5	15.6
<b>Tend to agree</b>	34.3	33.6	36.1	35.6	38.5
<b>Neither agree nor disagree</b>	11.1	10.6	8.9	12.1	8.9
<b>Tend to disagree</b>	20.4	24.8	24.1	24.0	26.1
<b>Definitely disagree</b>	13.6	13.6	13.4	11.8	11.0
<i>Bases</i>	<i>1897</i>	<i>1134</i>	<i>1679</i>	<i>1417</i>	<i>1448</i>

**Table A5 Proportion who definitely agree with statement 'I definitely avoid throwing food away' by equivalised income quintiles and wave**

	Income quintiles				
	1 (Lowest 20%)	2	3	4	5 (Highest 20%)
	%	%	%	%	%
<b>Wave 1</b>	18.8	14.2	12.6	12.7	11.3
<b>Wave 2</b>	22.5	20.8	14.1	12.9	15.3
<b>Wave 3</b>	20.3	17.0	24.4	22.6	18.8
<b>Bases</b>	<b>1897</b>	<b>1134</b>	<b>1679</b>	<b>1417</b>	<b>1448</b>

Table A6 Variables entered into the regression models

Factor	Category	N	%
<b>Age*Sex</b>	Male 16-34 (ref)	698	9.2
	Male 35-64	1714	22.6
	Male 65-74	474	6.3
	Male 75+	325	4.3
	Female 16-34	1125	14.9
	Female 35-64	2176	28.7
	Female 65-74	583	7.7
	Female 75+	479	6.3
<b>Region</b>	North East (ref)	323	4.3
	North West	646	8.5
	Yorkshire and The Humber	547	7.2
	East Midlands	426	5.6
	West Midlands	538	7.1
	East of England	557	7.4
	London	490	6.5
	South East	795	10.5
	South West	479	6.3
	Wales	531	7.0
	Scotland	1211	16.0
	Northern Ireland	1032	13.6
<b>Rural-urban classification</b>	Urban (ref)	6307	83.3
	Rural	1268	16.7
<b>Highest educational qualification</b>	Degree or higher (ref)	1846	24.4
	Other/ None	5729	75.6
<b>Tenure</b>	Owner occupier (ref)	4722	63.2
	Tenant	2749	36.8
<b>At least one child aged under 5 in the household</b>	No (ref)	6621	87.4
	Yes	954	12.6

Table A6 Variables entered into the regression models (cont.)

Factor	Category	N	%
<b>Socio-economic status (NS-SEC)</b>	Managerial/Professional (ref)	2620	34.6
	Intermediate	1449	19.1
	Routine/Manual	2894	38.2
	Not classifiable/Never worked	544	7.2
<b>Marital status</b>	Married/living as married (ref)	3456	45.6
	Single/widowed/divorced/separated	4119	54.4
<b>Ethnicity</b>	White (ref)	7033	92.8
	Black, Asian, Mixed & Other	448	5.9
	missing	94	1.2
<b>Work status</b>	In work (ref)	3932	51.9
	Retired	2055	27.1
	Unemployed	433	5.7
	Other	1155	15.2
<b>Religion</b>	Christian (ref)	5256	69.4
	Non-Christian	290	3.8
	No religion	2001	26.4
<b>Self-reported health</b>	Good/Very good (ref)	5709	75.4
	Fair	1469	19.4
	Bad/Very bad	397	5.2
<b>Disability/long-lasting illness</b>	Yes (ref)	1610	21.3
	No	5965	78.7
<b>Index of Multiple Deprivation (quintiles)</b>	1 (Most deprived) (ref)	1345	17.8
	2	1502	19.8
	3	1595	21.1
	4	1544	20.4
	5 (Least deprived)	1589	21.0
<b>Household size</b>	1 (ref)	2452	32.4
	2	2712	35.8
	3 or 4	2013	26.6
	5+	398	5.3

**Table A6 Variables entered into the regression models (cont.)**

Factor	Category	N	%
<b>Wave of survey</b>	Wave 1 (ref)	2252	29.7
	Wave 2	2545	33.6
	Wave 3	2778	36.7
<b>Equivalised income (quintiles)</b>	1 (Lowest) (ref)	1897	25.0
	2	1134	15.0
	3	1679	22.2
	4	1417	18.7
	5 (Highest)	1448	19.1
<b>Equivalised income (deciles grouped)</b>	Lowest 10% (ref)	811	10.7
	Mid 20-90%	6073	80.2
	Highest 10%	691	9.1
<b>I always avoid throwing food away</b>	Definitely agree (ref)	1341	17.7
	Tend to agree	2737	36.1
	Neither agree nor disagree	691	9.1
	Tend to disagree	1761	23.2
	Definitely disagree	1044	13.8

**Table A7 Odds ratios of equivalised income groups for predicting checking use-by-dates when shopping**

Outcome: always checking use-by-dates when shopping		OR	95% C.I.		p-value
			Lower	Upper	
Equivalised income groups (p=0.047)	1 (20% lowest)	1.4	1.1	1.8	0.007
	2	1.3	1.0	1.7	0.032
	3	1.2	1.0	1.5	0.057
	4	1.3	1.1	1.6	0.013
	2 (20% highest) (Ref)				

Model includes all variables in Table A6

**Table A8 Odds ratios of equivalised income groups for predicting not eating leftovers more than two days after cooking**

Outcome: Not eating leftovers more than two days after cooking		OR	95% C.I.		p-value
			Lower	Upper	
Equivalised income groups (p=0.066)	10% lowest	1.6	1.0	2.5	0.036
	mid 80%	1.3	1.0	1.7	0.042
	10% highest (Ref)				

Model includes all variables in Table A6

**Table A9 Odds ratios of attitude to throwing food away predicting always checking use-by-dates when shopping**

Outcome: always checking use-by-dates when shopping		OR	95% C.I.		p-value
			Lower	Upper	
“I always avoid throwing food away” (p-value<0.001)	Definitely agree	0.5	0.4	0.6	0.000
	Tend to agree	0.5	0.4	0.7	0.000
	Neither agree nor disagree	0.5	0.4	0.7	0.000
	Tend to disagree	0.7	0.5	0.8	0.001
	Definitely not agree (Ref)	1.0			

**Table A10 Odds ratios of attitude to throwing food away predicting always checking use-by-dates when cooking**

Outcome: always checking use-by-dates when cooking		OR	95% C.I.		p-value
			Lower	Upper	
"I always avoid throwing food away" (p-value<0.001)	Definitely agree	0.4	0.3	0.5	0.000
	Tend to agree	0.6	0.5	0.8	0.001
	Neither agree nor disagree	0.6	0.4	0.9	0.010
	Tend to disagree	0.8	0.6	1.1	0.114
	Definitely not agree (Ref)	1.0			

**Table A11 Odds ratios of attitude to throwing food away predicting re-heating food no more than once**

Outcome: re-heating food no more than once		OR	95% C.I.		p-value
			Lower	Upper	
"I always avoid throwing food away" (p-value<0.001)	Definitely agree	0.4	0.2	0.6	0.000
	Tend to agree	0.5	0.3	0.7	0.001
	Neither agree nor disagree	0.5	0.3	1.0	0.040
	Tend to disagree	0.7	0.4	1.1	0.157
	Definitely not agree (Ref)	1.0			

**Table A12 Odds ratios of attitude to throwing food away predicting eating leftovers more than two days after cooking**

Outcome: not eating leftovers more than two days after cooking		OR	95% C.I.		p-value
			Lower	Upper	
"I always avoid throwing food away" (p-value<0.001)	Definitely agree	0.3	0.2	0.4	0.000
	Tend to agree	0.4	0.3	0.5	0.000
	Neither agree nor disagree	0.5	0.3	0.7	0.000
	Tend to disagree	0.8	0.5	1.1	0.136
	Definitely not agree (Ref)	1.0			

**Table A13 Proportion who reported making the following changes for financial reasons by equivalised income quintiles**

	Income quintiles				
	Lowest 20%	2	3	4	Highest 20%
	%	%	%	%	%
Have kept leftovers for longer before eating due to financial reasons	7.7	7.7	4.8	5.3	4.8
Have eaten food past its use-by-date due to financial reasons	7.5	6.2	7.2	6.1	6.1
<i>Bases</i>	1897	1134	1679	1417	1448

**Table A14 Proportion who said they kept leftovers for longer due to financial reasons by equivalised income quintiles and wave**

	Income quintiles				
	Lowest 20%	2	3	4	Highest 20%
	%	%	%	%	%
Wave 2	7.8	6.4	4.9	6.7	5.9
Wave 3	7.5	8.8	4.8	4.0	3.5
<i>Bases</i>	1283	767	1205	1022	1046

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