Quantitative research survey findings: Food Consumption costs differentials

5.1 Overview of food consumption cost comparisons

This chapter presents summary statistics for the three types of food consumption costs described in Chapter 2, along with findings from the multivariate regression analyses, followed by sensitivity analysis. For the results below, we refer to FIO as an FHS category, however, it is important to note that it is an imprecise categorisation that contains other undiagnosed / suspected food hypersensitivities in addition to food intolerance. Although it is important to keep this in mind, the results are still valid and can be used for comparison as long as the FIO category is similarly defined.

5.2 Summary statistics

Tables 5.1 to 5.3 below set out the summary statistics for the three food consumption costs between FHS types and the non-FHS groups, respectively. These summary statistics are presented with outliers removed (4 outliers removed for weekly groceries costs, and 1 outlier removed for weekly eating out / takeaway costs) fromthe total 1,225 responses for weekly groceries costs and eating out / takeaway costs (footnote 1). Please see Appendix 8 for full summary statistics.

The key findings are:

From Table 5.1 for weekly groceries costs:

- there are higher weekly groceries costs for those with FA (n = 339) compared to non-FHS households (n = 1,530) and the difference in means between the two groups is significant [p < 0.001]. On average, those with FA spend £25.66 per week more than non-FHS households. The annual estimated difference is then £1,334.32
- there are higher weekly groceries costs for those with CD (n = 648) compared to non-FHS households (n = 1,530) and the difference in means between the two groups is significant [p < 0.001]. On average, those with CD spend £17.87 per week more than non-FHS households. The annual estimated difference is then £929.24
- there are higher weekly groceries costs for those in the FIO category (n = 234) compared to non-FHS households (n = 1,530) and the difference in means between the two groups is significant [p < 0.001]. On average, those in the FIO category spend £23.50 per week more than non-FHS households. The annual estimated difference is then £1,222 (footnote 2)

From Table 5.2 for monthly eating out/takeaway costs:

- there are higher eating out / takeaway monthly costs for those with FA (n = 339) category compared to non-FHS households (n = 1,530) and the difference in means between the two groups is significant [p < 0.001]. On average, those with FA spend £12.98 per month more than non-FHS households. The annual estimated difference is then £155.76

- there are higher eating out / takeaway monthly costs for those with CD (n = 651) compared to non-FHS households (n = 1,530) and the difference in means between the two groups is significant [p = 0.02]. On average, those with CD spend £7.98 per month more than non-FHS households. The annual estimated difference is then £95.76
- there are higher eating out / takeaway monthly costs for those in the FIO (n = 234) category compared to non-FHS households (n = 1,530) and the difference in means between the two groups is not significant [p = 0.06]. On average, those in the FIO category spend £10.11 per month more than non-FHS households. The annual estimated difference is then £121.32.

Table 5.1 Summary statistics of weekly grocery costs for adults living with FHS (n = 1,221) and non-FHS households (n = 1,530) in England, Northern Ireland, and Wales following online survey between November 2020 and January 2021

Statistic	FA, N=339	CD, N=648	FIO, N=234	Non-FHS households N=1,530
Mean (SE)	100.41 (2.80)	92.62 (2.12)	98.25 (4.01)	74.75 (38.39)
Difference in means per week	Comparison of FA with non-FHS: 25.66***	Comparison of CD with non-FHS: 17.87***	Comparison of FIO with non-FHS: 23.50***	-
Difference in means per year	Comparison of FA with non-FHS: 1,334.32***	Comparison of CD with non-FHS: 929.24***	Comparison of FIO with non-FHS: 1,222.00***	-
P-values (one way ANOVA test and Turkey Honest Significant differences)	[p < 0.001]	[p < 0.001]	[p < 0.001]	-

P<0.05*,p<0.01**,p<0.001***

Table 5.2 Summary statistics of monthly eating out/takeaway costs for adults living with FHS (n = 1,224) and non-FHS households (n = 1,530) in England, Northern Ireland, and Wales following online survey conducted between November 2020 and January 2021

Statistic	FA, N=339	CD, N=651	FIO, N=234	Non-FHS households N=1,530
Mean (SE)	94.09 (5.63)	92.25 (4.15)	103.53 (5.78)	76.99 (42.92)
Difference in means per week	Comparison of FA with non-FHS: 12.98***	Comparison of CD with non-FHS: 7.98***	Comparison of FIO with non-FHS: 10.11***	-
Difference in means per year	Comparison of FA with non-FHS: 155.76***	Comparison of CD with non-FHS: 95.76***	Comparison of FIO with non-FHS: 121.32***	-
P-values (one way ANOVA test and Turkey Honest Significant differences)	[p < 0.001]	[p = 0.02]	[p = 0.06]	-

P<0.05*,p<0.01**,p<0.001***

5.3 Multivariate regression analysis findings

Multivariate regressions were conducted to examine the relationship between FHS type and non-FHS costs while controlling for differences in demographic characteristics. The fully adjusted model considers all available demographic and household characteristics below (reference categories are in blue):

- household size: Single, Small, Medium, **reference category**: Large
- household income: Low, Medium, **reference category**: High, Very high
- region: **reference category**: England, Northern Ireland, Wales
- gender: **reference category**: Female, Male, Other
- education: **reference category**: No qualifications, Entry level education (NQF Levels 1, 2, 3), Higher level education (NQF Levels 4, 5, 6, 7, 8)
- age group: **reference category**: 18-19, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+
- ethnicity: White, **reference category**: BAME, Other

- geography: **reference category**: Rural, Urban
- place of shop: **reference category**: Supermarket, Online, Other specialist or independent stores (only applicable for Weekly Groceries Costs
- frequency of eating out: At least once a day, 5-6 times a week, **reference category**: 3-4 times a week, Once or twice a week, Once a fortnight, Once a month, Less than once a month, Never (only applicable for Eating Out / Takeaway Costs).

The headline results (statistically significant results highlighted in bold) for the comparison with non-FHS households from the fully adjusted model which control for all demographic and household variations and are from matched and imputed datasets are (footnote 3):

Weekly Groceries Costs

- those with FA (n = 339) spend 14.4% more on weekly groceries than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the FA group spend £0.14 more
- those with CD (n = 648) spend 11.9% more on weekly groceries than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the CD group spend £0.12 more
- those in the FIO (n = 234) category spend 15.8% more on weekly groceries than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the FIO group spend £0.16 more

Weekly eating out / takeaway costs

- those with FA (n = 339) spend 26.7% more on weekly eating out / takeaway than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the CD group spend £0.27 more
- those with CD (n = 651) spend 14.1% more on weekly eating out / takeaway than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the CD group spend £0.14 more
- those in the FIO (n = 234) category spend 15.0% more on weekly eating out / takeaway than non-FHS households (n = 1,530). For every £1 spent by the non-FHS household, those in the FIO group spend £0.15 more

The results above are presented in Table 5.4 below together with their P-values, 95% Confidence Intervals, and their sample sizes.

Table 5.3 Multivariate regression findings: food consumption costs for adults living with FHS (sample size differs between the three food consumption costs presented, thus the specific sample size can be found in the table below) and non-FHS households (n = 1,530) in England, Northern Ireland, and Wales following online survey conducted between November 2020 and January 2021

Costs (outcome variable)	Sample size	Difference in costs compared to non-FHS (95% CI)	P-value
Weekly groceries costs	FA + Non-FHS 448 CD + Non-FHS 826 FIO + Non-FHS 396	FA: 14.4% (4.6% - 25.2%) CD: 11.9% (5.2% - 19%) FIO: 15.8% (5.3% - 27.3%)	FA: 0.003 CD: <0.001 FIO: 0.003
Weekly eating out/takeaway costs	FA + Non-FHS: 440 CD + Non-FHS: 816 FIO + Non-FHS: 374	FA: 26.7% (6.6% - 50.6%) CD: 14.1% (1.5% - 28.4%) FIO: 15.0% (-1.1% to 33.7%)	FA: 0.008 CD: 0.03 FIO: 0.07

Please see Appendix 7 for the full regression tables.

5.4 Sensitivity analysis

5.4.1 High proportion of female respondents

The sensitivity analysis was conducted to address the higher proportion of female respondents (79% of responses) in the FHS household survey and the possibility that the gender of people living with FHS could have a modifying effect on the estimated group differences. The results from the sensitivity analysis showed no statistically significant interactions between type of FHS (comparison of either FIO/CD/FA with non-FHS) and gender for all food consumption cost outcomes. Thus, the gender of people living with FHS surveyed does not have a modifying effect on the estimated group differences.

Please see Appendix 7 for full sensitivity analysis tables.

5.4.2 Multiple imputation

As described in Chapter 2.5.5, sensitivity analysis was conducted using different number of imputations (five, 10, 20, 40, and 100 imputations) for each outcome / dataset combination.

The results show that overall, there is no significant difference in estimates generated between five, 10, 20, 40, and 100 imputations (footnote 4). For example, for the comparison of those in the FIO group with the non-FHS group, the estimates generated by the different number of imputations (five, 10, 20, 40, and 100) are all ± 2.5% different from one another. This small difference in estimates generated by different number of imputations is similar for the separate comparisons of CD and FA with the non-FHS group.

A pragmatic iterative multiple imputation strategy was adopted by selecting the minimum number of imputations once satisfactory convergence had been achieved. All results from other comparisons and outcomes presented in Chapter 5.3 have been generated with 5 imputations as the results are not sensitive to changes in number of imputations. Ultimately, the key concern is that the results for the primary outcome, Weekly Groceries Costs, are stable across the different number of imputations; and the results have shown that they are stable.

The full regression tables from the different multiple imputations can be found in Appendix 7.

1. Specifics of why these outliers were removed can be found in Appendix 6.

2. This and all annual costs presented below in Chapter 5.2 is calculated by the weekly cost difference multiplied by 52 weeks / by the monthly cost difference multiplied by 12.

3. The monetary (£) figures listed below are taken from the calculations to convert individual percentage differences to population costs in Appendix 6. These calculations have inherent limitations in that assumptions are made that costs differences at the household level similarly apply to the individual level. If these monetary amounts are to be cited, please also note the limitations.

4. Imputation is the process of replacing missing data with substituted values