

# Food technologies, findings from the 2008 British Social Attitudes survey

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# Food technologies

# Findings from the 2008 British Social Attitudes survey

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# Executive summary

## Background and aims

- The Food Standards Agency (FSA) funded a set of questions on the 2008 British Social Attitudes survey focussing on the topic of food technologies. The main aim of these questions was to explore public attitudes, knowledge and behaviour in relation to food technologies, to contribute to and build upon existing knowledge in this area, by providing a robust quantitative evidence base.
- The processes and technologies involved in food production in Britain and the range of food products available for purchase are constantly evolving and expanding. Yet public attitudes, knowledge and concerns about developments in this area remain poorly understood, with many studies that have been undertaken focussing on individual products or processes. The patchy nature of the evidence base means it is difficult to draw empirical conclusions about this area as a whole. The inclusion of a set of questions on the 2008 British Social Attitudes sought to address this gap.

## Methodology

- The *British Social Attitudes* survey has been undertaken annually since 1983, with the aim of exploring social, moral and political attitudes and values and how these change over time. It is designed to yield a representative sample of adults aged 18 or over in Great Britain and uses a multi-stage sampling design, utilising the Postcode Address File (PAF) as its sampling frame. The survey in 2008 was divided into four questionnaire versions, including both a CAPI (Computer Assisted Personal Interviewing) interview and a self-completion booklet. The module of questions funded by the FSA was fielded on two of the four versions – equating to an achieved sample size of 2,250 for CAPI questions and 1,986 for those fielded on the self-completion.
- Questions were included on the following aspects of food and food technology: reasons for selecting foods to be eaten; involvement in shopping for food; attitudes to processed foods; a knowledge test measuring knowledge of various food technologies; levels of concern about actual and hypothetical food products; genetically-modified (GM) foods; research and development in food technology and other scientific areas.
- Interviewing was mainly carried out between June and September 2008. Interviewers achieved an overall response rate of between 54.8 and 55.9 per cent.

- The data was weighted to take account of the unequal selection of addresses, dwelling units and individuals and for biases caused by differential non-response.

### **Overriding themes**

- There is considerable diversity in public knowledge, attitudes, behaviour and decision-making processes in relation to food in general and food technologies in particular. Many specific attitudes and behaviours link to more general attitudes and concerns – for instance, a willingness to try new types of food and levels of concern about food safety are clearly linked with attitudes and behaviour in relation to food technologies.
- Attitudes to the area of food technology often appear to be mediated by other considerations, not specifically related to food. For example, levels of support for research and development activity in food technology are strongly linked to attitudes to taxation and spending whilst attitudes to GM foods vary depending upon economic and price considerations.
- Knowledge of food technologies is a key factor linking to lower levels of concern about specific processes and products and about this area in general. Clearly, public wariness is linked to a considerable degree to a public lack of knowledge and understanding and a ‘fear of the unknown’.
- Groups defined by demographic characteristics exhibit very different attitudes and behaviour in relation to this area. In particular, women and older age groups have particularly negative attitudes and views.
- However, attitudes to more general and related fields such as science and taxation are also important and to understand and interpret public attitudes to food technologies, it is vital that these are considered within a broad attitudinal and behavioural context, and not simply within a vacuum.

### **Food: public attitudes and behaviour**

- In total, 40% of respondents report avoiding certain foods for one or more of a range of reasons asked about (including health reasons, dieting and religious reasons).
- Small minorities of the public avoid certain foods for particular reasons – the most common being following a diet in order to lose weight (15%) or avoiding particular foods due to medical advice (15%).
- Six-tenths of the public shop for all or most of the food that they eat at home (58%). However, around one-tenth of the public have no involvement in this activity (12%).
- Processed foods are generally regarded more negatively than unprocessed foods; however, the potential irregular appearance of unprocessed foods appears to have a greater effect in reducing public inclination to buy this

type of food, compared to the difficulties of preparing and storing such foods.

- Expressed concern about food safety is high; three-quarters (76%) of the public are very or fairly concerned about this issue.
- The public are evenly split on the idea of trying new foods about which little is known; around half indicate that they are willing to do this, whilst a similar proportion would not try a food if they did not know what was in it.

### **Influences on food choices**

- Choosing foods to eat at home involves a multi-dimensional decision-making process; on average, respondents identify six factors that they consider when selecting foods to eat at home.
- The three most common influences on food choices all relate to the food itself; the quality or freshness of food (79%), low fat or healthy food (64%), and the taste of food (63%). Economic factors including price, value for money and special offers are the next most important category of influence and are considered an important influence by 60%.
- There are three distinct sets of considerations in relation to the selection of food to eat that tend to co-exist – ethical considerations relating to the environment or animal welfare, considerations relating to cost and convenience, and considerations relating to the quality and variety of the food chosen.
- Younger age groups and those with children tend to select foods to eat due to considerations of cost and convenience, whereas older age groups and those with higher incomes tend to focus more on the actual quality of the food.

### **Public knowledge of innovation in food technology**

- Objectively-measured levels of public knowledge of innovative food technologies vary considerably. On a seven-item knowledge test, 19% of respondents answered less than three items correctly, 45% answered three or four items correctly and 36% answered five or more items correctly. Items asking about GM foods and microwaving were most likely to be answered correctly.
- Five characteristics were significantly associated with objectively-measured knowledge about innovative food technologies - age, sex, income, education and ethnicity. When the relationships between these characteristics were controlled for through multivariate analysis, only income and education remained significant.
- Self-assessed knowledge of how the food industry manufactures and prepares food also varied. 9% felt they had a good knowledge, whilst 38% indicated they had a reasonable basic knowledge. 31% described their

knowledge as very patchy, while 21% felt they knew little or nothing. Those who felt they knew little or nothing were more likely to be young than old, to be on a low rather than a high income, to have few rather than many educational qualifications and to have had little direct involvement with food, through food shopping.

- There is a strong link between self-assessed and objectively-measured knowledge of innovative food technologies. 36% of low scorers on the knowledge quiz felt that they knew little or nothing about how the food industry manufactures and prepares food, compared to 21% of middle scorers and 15% of high scorers.

### **Public support for innovation in food technology**

- Over half the public (54%) agree that research and development in food technology should be supported, even if a lot of money would need to be spent. However, only one-tenth (11%) strongly agree with this view. Almost three-tenths neither agree nor disagree, suggesting many do not have a strong opinion on this matter.
- Rather than having a consistent attitude to the funding of research in different scientific fields, the public's attitudes are highly nuanced. They are generally more supportive of research and development in medicine (87%) – an area where research could be regarded as having the potential to yield more significant benefits than in food technology. However, they are considerably less likely to support research in mobile phone technology (13%) – which may be regarded as a less-essential area.
- Women, younger age groups, those on higher incomes and those with higher levels of educational qualifications are the least likely to support research and development in food technology.
- There is a strong link between attitudes to taxation in general, and support for research and development in food technology in particular, that explains many of these sub-group differences. When considering whether research and development in food technology should be supported, it is clear that many are discouraged by the proviso that a lot of money would need to be spent.

### **Attitudes to technology: food products and processes**

- There is considerable diversity in levels of public concern about eating food products created using innovative processes and ingredients. 59% are very or fairly concerned about the use of gases in bags of ready-to-eat salad leaves whereas 23% are concerned about the addition of a component found in vegetable oil to products such as Benecol.
- Around half of the public would not buy various hypothetical food products, even when these would yield specific health advantages.

- Familiarity with the terminology of food technologies appears to reduce levels of public concern. 31% are concerned about eating a food produced using microwaving, whereas 57% express this view when asked about a magnetron (a less well-known term for a microwave). In both cases, respondents had been presented with identical descriptions of the actual process involved.
- Knowledge of food technologies also links with levels of concern. Just 30 per cent of those who answered five or more test items correctly are concerned about three or more of the products, compared with 43 per cent of those who answered three or four items correctly and 50 per cent of those who answered less than three items correctly.
- Attitudes and behaviour in relation to food technologies are not always consistent. 51% of those who buy ready-to-eat salad leaves are nevertheless very or fairly concerned about the process involved in their production.
- Attitudes to food technologies vary markedly across the public. The following characteristics predict a high level of concern – having less knowledge about food technologies, being older, being female, having a low income, a lack of willingness to try new types of food and having a high level of concern about food safety in general.

### **Attitudes to food technology: GM foods**

- Few hold strong attitudes to GM foods, with those who do express a definite view (albeit not necessarily a strong one) tending to regard this technology negatively rather than positively.
- Attitudes to GM foods in particular situations are not always consistent, with views about their production and availability in Britain clearly being influenced by factors other than overall assessments of the worth of this technology.
- Attitudes vary markedly among the public, with women, older age groups and those with greater concerns and less knowledge about food technologies in general being more likely to express a negative view. Less educated and socio-economically disadvantaged groups are much less likely to have an opinion about this topic.
- Since the late 1990s, support for GM foods has not increased markedly, with the most notable change being an increase in the proportion not holding a definite view, between 1999 and 2003. In more recent years, this trend has continued, with evidence of a slight increase in public support for GM foods.

# 1 Introduction

In this report, we analyse and interpret data collected from a module of questions funded by the Food Standards Agency (FSA) and fielded on the 2008 British Social Attitudes survey. The British Social Attitudes survey is an annual general population survey, in existence since 1983, which seeks to analyse social, political and moral attitudes and how these have changed over time. The FSA-funded module primarily focused on public attitudes to innovative food technologies, although a range of background information on attitudes and behaviour in relation to food more generally was collected, to aid analysis.

In this opening chapter we set out the main aims of the research, explain the rationale for the module's focus on the topic of innovative food technologies and present a brief overview of the survey methodology.

## 1.1 Background and objectives

In 2008, the Food Standards Agency commissioned the National Centre for Social Research (NatCen) to field a module of questions on the 2008 British Social Attitudes survey, exploring public attitudes to food technologies. The main aim of the module was to explore public attitudes, knowledge and behaviour in relation to food technologies, to contribute to and build upon the existing knowledge base in this area. The intention of this report was not to review the existing evidence base in this area; however, for the purposes of examining how far our findings reflect current thinking in this area, the report draws upon a recent review of evidence in relation to attitudes to food technologies (Brook Lyndhurst, 2009).

## 1.2 Food technology; policy and research context

The processes and technologies involved in food production in Britain and the resulting range of food products are constantly evolving and expanding. The application of various technologies to the selection, development, presentation, preservation and storage of food products is by no means a new phenomenon. For centuries people have been finding ways to modify the natural properties of food, a famous early example being pasteurisation, which increased the longevity of liquids and, in the longer-term, food products. Technological interventions have generally sought to maximise the benefits and minimise the limitations associated with particular types of food, for instance by making a food product healthier or less costly to produce, or increasing its shelf-life. Many food technologies (or the products resulting from them) which were once considered innovative are now common-place: Quorn, a little-known product prior to the 1990s, is now a well-known meat substitute; while microwave ovens, considered highly novel in the 1970s, are now widespread in Britain. Meanwhile, other innovative technologies

and processes have been developed. A particularly prominent example, in terms of the levels of public discussion it has generated, was the introduction of genetically modified (GM) foods in the 1990s. More recently, the actual and potential applications of nanotechnology and cloning to food production have attracted considerable debate.

Yet public attitudes, knowledge and concerns about developments in this area remain poorly understood. As the potential purchasers and consumers of the food products created using innovative technologies, the British public have a key role to play in determining their long-term impact and success. A recent review commissioned by the Food Standards Agency highlighted the existence of little robust nationally representative quantitative data in Britain on public attitudes in this area, with the majority of studies being highly localised and dealing with very specific products or technologies (Brook Lyndhurst, 2009). Moreover, those technologies or products that have attracted the most vocal public discussion, most recently GM foods, have received disproportionate attention from researchers, although a number of key gaps in the evidence still remain. The patchy nature of the evidence base in relation to food technologies means it is difficult to draw empirical conclusions about this area as a whole. There are a number of questions of interest: what types of technologies are more likely to be acceptable to the British public; do food products have to offer particular benefits to make them popular; are all new food technologies initially unpopular until they attain a degree of familiarity; and so on. This report will seek to build upon the existing evidence base by using the data collected from the 2008 British Social Attitudes survey to address these questions in a more holistic way than has been possible through many previous studies, which have tended to focus on attitudes to individual processes or products.

### **1.3 Methodology**

The Technical Appendix to this report provides details of the survey methodology, including sampling and weighting. In this section we highlight the key details required to equip the reader with an understanding of the design of this survey and how it was implemented.

#### **Sample**

The British Social Attitudes survey is designed to yield a representative sample of adults aged 18 or over. Since 1993, the sampling frame for the survey has been the Postcode Address File (PAF), a list of addresses (or postal delivery points) compiled by the Post Office. The sample is confined to those living in private households and involved a multi-stage design, with three separate stages of selection. At the first stage, postcode sectors were selected systematically from a

list of all postal sectors in Great Britain and were then stratified on the basis of sub-regions, populations density and proportion of population in owner-occupied accommodation. Three hundred and two postcode sectors were selected, with probability proportional to the number of addresses in each sector.

Thirty addresses were selected in each of the 302 sectors, producing a sample of 9,060 addresses.

Interviewers called at each address selected from PAF and listed all those eligible for inclusion in the British Social Attitudes sample – that is, all persons currently aged 18 or over and resident at the selected address. The interviewer then selected one respondent using a computer-generated random selection procedure.

The 2008 British Social Attitudes survey was divided into four questionnaire versions, with questions being funded on either one, two, three or all four versions, both of the CAPI (Computer Assisted Personal Interviewing) interview and of the accompanying self-completion booklet. The module of questions funded by the Food Standards Agency was fielded on two of the four versions – equating to an achieved sample size of 2,250 for CAPI questions and 1,986 for those fielded on the self-completion.

### **Questionnaire development**

The FSA module of questions included questions on the following aspects of food and food technology: reasons for selecting foods to be eaten; involvement in shopping for food; attitudes to processed foods; a knowledge test measuring knowledge of various food technologies; levels of concern about actual and hypothetical food products; genetically-modified (GM) foods; research and development in food technology and other scientific areas. The British Social Attitudes survey collects a wide range of more general demographic and attitudinal information, which it was envisaged would facilitate the analysis of attitudes and experiences by a range of respondent characteristics.

With the exception of a small number of questions on GM foods which have been fielded on the survey on a number of occasions since the late 1990s, the questions for the FSA module were primarily new, having been designed specifically for this study. In some instances, modified versions of questions which had been used on previous surveys, such as the Consumer Attitudes Survey were included (Consumer Attitudes Survey, 2008). The new questions went through an iterative process of question design and were tested in two paper pilots and modified on the basis of the results obtained. The questions were designed with the possibility in mind that they might be repeated in the future, in order to analyse change over time.

The majority of FSA-funded questions were included in the CAPI interview, with a minority being included on the self-completion. Questions were included on the self-completion when they had been asked using that mode previously (to facilitate time series analysis, as was the case with the questions on GM foods) or when it was considered that respondents would answer more accurately than they would face-to-face, due to issues of sensitivity or social desirability considerations (as was the case with questions on attitudes to processed foods).

## **Fieldwork**

Interviewing was mainly carried out between June and September 2008, with a small number of interviews taking place in October and November. Fieldwork was conducted by interviewers drawn from the *National Centre for Social Research's* regular panel and conducted using face-to-face computer-assisted interviewing. Interviewers attended a one-day briefing conference to familiarise them with the selection procedures and questionnaires. Interviewers achieved an overall response rate of between 54.8 and 55.9 per cent, as detailed in the Technical Appendix. As in earlier rounds of the series, the respondent was asked to fill in a self-completion questionnaire which, whenever possible, was collected by the interviewer. A small number of questions in the FSA module were fielded on the self-completion questionnaire.

## **Weighting**

The weights for the British Social Attitudes survey correct for the unequal selection of addresses, dwelling units (DU) and individuals and for biases caused by differential non-response. All of the analyses were undertaken on weighted data, although the unweighted bases are also presented for information in each case.

## **1.4 The report**

The report is divided into seven chapters. After the introduction, the first two chapters explore attitudes and behaviour in relation to food in general. Chapter 2 examines a range of general behaviours and attitudes in relation to food, such as involvement in food shopping and concern about food safety, that are likely to serve as key analytical variables for the remainder of the report. Chapter 3 focuses specifically on the factors which influence individuals' food choices; there is a particular interest here in identifying whether certain factors co-exist and are likely to be important to particular groups of people. The final four chapters focus more narrowly on the subject of food technologies. Chapter 4 examines public knowledge in relation to this issue, and analyses the results of a knowledge test which was undertaken by survey respondents. Chapter 5 examines attitudes to food technologies at the most general abstract level, that of research and

development, and compares these to attitudes to innovation in other scientific fields. In Chapter 6, we examine public attitudes to a range of real and hypothetical food products and consider how, why and to what extent these attitudes vary. Finally, Chapter 7 examines one type of food-related technology – that of GM foods – in detail, and considers in particular how and why attitudes to this topic have changed over time.

Throughout the report the data is analysed by a number of key sub groups of interest. In addition to food-related behaviours, attitudes and knowledge levels, we analyse differences on the basis of age, sex, levels of educational qualifications, income, location, ethnicity and religiosity.

### **Conventions for reporting data**

The following conventions are used throughout the report:

- Percentages have been rounded to the nearest whole percent. As a result, tables for single-code items will not always sum to 100 per cent (and the addition of several figures from a table in the text will not always appear to equal the sum of those figures within the table). Footnotes have been added to the text to indicate when this is the case.
- Unweighted bases of less than 50 have been indicated by the placement of square brackets [ ] around the relevant percentages.
- The symbol '+' indicates that the percentage in question is less than 0.5%, whereas 0 explicitly shows that there are no cases in the cell.
- When a question attracted a considerable proportion of "don't know" and / or "can't choose" responses (more than five per cent), either among the population as a whole or among a sub-group of interest, these have been included as a separate category in the relevant table or chart. When a question has attracted a comparatively low proportion of such responses (less than five per cent), these have not been included in the table, meaning that the sum of all percentages for a single-code question will not necessarily add up to 100%.
- Those questions that use an agree-disagree scale as standard include the option "neither agree nor disagree". It should be recognised at the outset that those respondents who selected this response could have done so for a number of reasons – because they are ambivalent about the topic of interest, because they do not have any particular view or have a view that is neutral, or because they agree with some elements of the question and disagree with others. This response has been interpreted as being substantively different to "don't know" and "can't choose", as the respondent fundamentally knows that they do not agree or disagree with the statement (whereas those in the latter categories may not). These various explanations for the selection of the "neither agree nor disagree"

answer are not stated in each instance at which it is reported, but should be borne in mind throughout.

- Our convention has been to report any differences that were found to be statistically significant at the 95% level, although we also refer to analyses that were undertaken where differences did not emerge as statistically significant. The identification of a difference as statistically significant means that there is a 95% chance of a “real” difference in the population as a whole – although the size of the difference might, in practice, be relatively minor. Inevitably, this means that a small number of significant differences are identified which are based on random chance, rather than reflecting the situation in the population as a whole.
- Where sub group sizes are small, we may encounter relatively large differences without these being identified as statistically significant; where differences would be likely to be significant, were a larger sample available; we will draw the reader’s attention to these levels of difference, and the likely reasons for their non-significance, in the text. Whilst the approach has been to focus on those differences that attain the required level of statistical significance or would be expected to do so given a larger sample size, in some cases differences are reported where this level has been narrowly missed, where we might theoretically or logically anticipate a significant difference. As our analysis is largely exploratory, we have not undertaken any statistical tests to take account of the effect of multiple comparisons. In other words, our interest has been in identifying **likely** rather than **certain** differences in the population as a whole.
- Two-way cross tabulations were analysed using binary logistic regression. In each case, a binary break on the dependent variable was selected (and these are detailed in the text). In some instances, more than one cross-tabulations were run, using different binary breaks on the dependent variable.
- Results of logistic and linear regression analyses and factor analyses are presented in the appendices of the relevant chapter. Further information on how to interpret the information presented in the appendices is contained in section 8.7 of the Technical Appendix.

## 2 Food: public attitudes and behaviour

- In total, 40% of respondents report avoiding certain foods for one or more of the reasons asked about (including health reasons, dieting and religious reasons).
- Small minorities of the public avoid certain foods for particular reasons – the most common being following a diet in order to lose weight (15%) or avoiding particular foods due to medical advice (15%).
- Six-tenths of the public shop for all or most of the food that they eat at home (58%). However, around one-tenth of the public have no involvement in this activity (12%).
- Processed foods are generally regarded more negatively than unprocessed foods; however, the potential irregular appearance of unprocessed foods appears to have a greater effect in reducing public inclination to buy this type of food, compared to the difficulties of preparing and storing such foods.
- Expressed concern about food safety is high; three-quarters (76%) of the public are very or fairly concerned about this issue.
- The public are evenly split on the idea of trying new foods about which little is known; around half indicate that they are willing to do this, whilst a similar proportion would not try a food if they did not know what was in it.

### 2.1 Introduction

In this first chapter, we will introduce some general measures of public behaviour and attitudes in relation to food, which may serve as key analytic variables for the later more focused sections of the report which deal with the issue of food technologies. The chapter starts by looking at food behaviour and will examine the prevalence of dietary habits (such as vegetarianism and dieting) and individual involvement in food shopping. It will then turn to focus on a number of specific attitudes to food that may be relevant to attitudes to emerging food technologies, looking at the desirability of processed foods (in terms of both their appearance and convenience), concerns about food safety and willingness to try new types of food. A key focus of this chapter is establishing the homogeneity or variation that exists among the public in terms of their general behaviour and attitudes in relation to food and considering the reasons for any differences identified.

### 2.2 Dietary behaviour

In order to better understand public attitudes and behaviours towards food, it is important to know whether individuals have any special dietary behaviours as

these may affect their attitudes and behaviours towards food in other areas. We asked respondents to the 2008 British Social Attitudes survey whether they had any of the following dietary behaviours:

- “I am a vegetarian or vegan
- I avoid certain foods as I react badly to them
- I am on a diet trying to lose weight
- I avoid certain food for religious reasons
- I avoid certain food because of medical advice”

In total, four-tenths (40 per cent) of all respondents reported that they had one or more of the dietary habits shown in Table 2-1 below. The most common dietary habits were diets to lose weight (15 per cent), avoiding foods due to medical advice (15 per cent) and avoiding foods due to previous bad reactions to those foods (12 per cent). Fewer people were vegetarian or vegan (five per cent) or avoided foods for religious reasons (four per cent).

**Table 2-1 Prevalence of special dietary behaviour**

*Base: all respondents* *British Social Attitudes 2008*

Behaviour in relation to food	Total %
On a diet trying to lose weight	15
Avoid certain foods because of medical advice	15
Avoid certain foods as react badly to them	12
Vegetarian or vegan	5
Avoid certain foods for religious reasons	4
None of the above	60
<i>Unweighted base</i>	<i>2250</i>
<i>Weighted base</i>	<i>2247</i>

Percentages add up to more than 100% as respondents could give more than one answer.

The focus of this chapter is on examining the extent to which food-related behaviours and attitudes are similar or different for particular groups of the public. It is interesting to know whether some sections of the public are particularly likely to follow certain types of dietary behaviour more than others. In order to examine this issue, we used multivariate analysis techniques to identify whether certain habits tend to be more common among certain groups of people than others, even when the interaction between different characteristics have been controlled for. It is likely that many of the different factors associated with dietary behaviour are themselves inter-related – for example, those who follow a religion, who may have particular dietary habits, are more likely to be older and from a non-white ethnic group. Multivariate analysis allows us to isolate the independent effect of

individual characteristics on dietary behaviour, controlling for their interactions with other relevant factors<sup>1</sup>.

Women tend towards two dietary habits which involve making a choice to avoid certain foods. They are more likely than men to be on a diet to lose weight (20 per cent compared to ten per cent) and to be vegetarian or vegan (six per cent compared to three per cent).

Age is likely to effect dietary behaviours and we found that older respondents are more likely to avoid foods for medical reasons than younger respondents, either because they react badly to them (17 per cent of those aged 65 years and over, compared to 11 per cent of 18-34 year olds) or because they have been given medical advice to avoid certain foods (26 per cent of those aged 65 years and over compared to six per cent of 18-34 year olds). These differences are not surprising, as individual intolerances towards particular food types or the probability of identifying these, are likely to increase with age (COI, 2007).

Non-white respondents avoid certain foods more than white respondents for two reasons. They are more likely to be vegetarian or vegan (12 per cent compared to four per cent) and more likely to avoid food for religious reasons (32 per cent compared to one per cent) than white respondents. The latter difference is likely to reflect the fact that those from non-white ethnic groups are more likely to state they have a religion (85 per cent compared to 53 per cent of white respondents); in addition, vegetarianism is known to be particularly common amongst certain ethnic groups.

Unsurprisingly, those who attend religious services at least once a month are more likely to avoid food for religious reasons (13 per cent compared to two per cent) than those who do not attend religious services this regularly or at all. We would expect religious teachings to be more rigidly followed by the former group, due to their greater levels of commitment to them. Those who attend religious services regularly are also more likely to avoid food for medical reasons (19 per cent compared to 14 per cent) than those who do not attend religious services regularly; this is likely to result from the fact that religiosity is strongly associated with age, itself already demonstrated to be linked with levels of food intolerance.

People on higher incomes were more likely to be vegetarian (seven per cent of those with a household income of over £44,000 per annum compared to two per cent of those with an income of less than £14,999 per annum). This reflects the

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<sup>1</sup> For the multivariate analyses reported in this chapter, the logistic regressions were run using the “Forward conditional” method in SPSS, so that only those variables that remained significantly associated with the dependent variable were included in the final model. The following variables were made available for inclusion in each of the models – age, sex, ethnicity, attendance at religious services, income, current work status, whether the respondent lived with dependent children, whether the respondent lived with a partner.

existing literature, which demonstrates that vegetarianism tends to be more common amongst higher income groups, with the typical vegetarian being most likely to be in the ABC1 economic groupings (Mintel, 2006). People in work are less likely to avoid food because of medical advice (ten per cent compared to 16 per cent) than those not in paid work. The latter difference is again likely to link with the fact that those in work are liable to be younger and less likely to have a long-term health problem or disability.

Who people live with also had an effect on their dietary habits. Those who live with children under 18 years in their household are more likely to avoid food for religious reasons (seven per cent compared to two per cent) than those living without children in the household. This may be because those who avoid foods for religious reasons are predominantly in non-white ethnic groups, which themselves have a younger age profile. People living with a partner are more likely to be on a diet to try and lose weight (17 per cent compared to 12 per cent) than those who live without a partner.

Clearly then, dietary habits differ considerably across the public; we will consider in due course if and to what degree these link to attitudes in relation to food technologies, as these represent additional factors which might influence an individual's particular standpoint or concerns on this issue.

### **2.3 Involvement in shopping for food**

How involved are individuals with food? In addition to consuming food, an individual could potentially shop or cook food regularly, or even have a job that brought them into regular contact with this subject area. In the 2008 British Social Attitudes survey, we focused in particular on individual involvement in food shopping. The extent to which individuals are involved in food shopping is likely to vary substantially and to depend on a number of factors – not least the number of people they live with, particularly if this task were to be shared out amongst the household. It seems likely that the amount of involvement an individual has in food shopping will have an influence on not only what they eat but their views and, in particular, their knowledge about food.

Respondents to the survey were asked to rate how much involvement they had in food shopping through the following question:

“Thinking only of the food you eat at home, how much of the shopping for this food do you do?”

We found that over half (58 per cent) of respondents said that they did all or most of the shopping for the food they eat at home. Smaller proportions said they do about half of the shopping for their food (16 per cent), less than half (14 per cent) and none (12 per cent) of the shopping for the food they ate.

**Table 2-2 Involvement in shopping**

Base: all respondents

British Social Attitudes 2008

Level of involvement in household shopping	Lives alone	Does not live alone	Total
	%	%	
All or most of the food shopping	87	52	58
About half of the food shopping	4	19	16
Less than half of the food shopping	3	16	14
None of the food shopping	6	13	12
<i>Unweighted base</i>	629	1621	2250
<i>Weighted base</i>	374	1873	2247

Unsurprisingly, levels of involvement in food shopping varied by who people lived with. Those who lived alone were more likely to do all or most of their food shopping (87 per cent) whereas those living in multi-person households were more likely to share this task out with only half (52 per cent) doing all or most of the food shopping in the household.

Multivariate analysis revealed that the level of involvement with food shopping varied between respondents by demographic characteristics. Traditionally, there is a perception in Britain that it is women who tend to do the household shopping. We did indeed find that women were much more likely than men to do the shopping for the food they eat. Three-quarters (75 per cent) of women said they do all or most of the food shopping compared to less than half (40 per cent) of men. Respondents in the youngest age group of 18 to 34 year olds are less likely to shop for their food than older respondents which may reflect that this age group are the most likely to be living with their parents, who would undertake this task, or in multi-person households where this role would be shared. Less than half (46 per cent) of 18 to 34 year olds did their food shopping compared to around two-thirds of respondents in the other age groups (61 per cent of 35-54 year olds, 65 per cent of 55-64 year olds and 62 per cent of those aged 65 and over).

## 2.4 Attitudes to processed foods

In examining attitudes to processed foods, we focussed on two potential advantages of processed foods (that are consequently potential disadvantages for unprocessed foods); ease of storage and appearance of the food. By selecting two potential advantages and disadvantages we are able to see whether individuals are in favour or opposed to the idea of processed food per se or whether levels of

support depend on the perceived advantages of this food type. The questions we asked were:

“Please tick one box on each line to show how much you agree or disagree with each of these statements

I buy food that is processed as it is easier to prepare and store

I like food to be unprocessed, even if this means that it takes more effort to prepare and keep fresh

I want food that I buy to look attractive, even if this means it has been processed in some way

I want food that I buy to be unprocessed even if this means it has an irregular appearance”

Table 2-3 shows how people feel about processed and unprocessed foods in terms of the issue of ease of storage. Looking at the results of both statements, support is clearly in favour of unprocessed foods even if they take more effort to prepare and keep fresh; over half (65<sup>2</sup> per cent) of people agree with this statement and 48 per cent state that they do not buy processed foods for their ease of storage. It should be borne in mind that social desirability may be having an effect here, as purchasing unprocessed foods might be perceived to be more desirable and aspirational than purchasing their processed equivalents<sup>3</sup>.

Table 2-3 Attitudes to buying processed food		
<i>Bases: all respondents</i>		<i>British Social Attitudes 2008</i>
		Total %
	...I buy food that is processed as it is easier to prepare and store	...I like food to be unprocessed, even if this means that it takes more effort to prepare and keep fresh
Strongly agree	2	15
Agree	23	51
Neither agree nor disagree	23	20
Disagree	35	8
Strongly disagree	13	1
<i>Unweighted base</i>		1,986
<i>Weighted base</i>		1,975

The data collected in relation to attitudes towards processed foods in terms of appearance are shown in table 2-4. Again, support is in favour of food not being processed, even if this means it has an irregular appearance. However, agreement is not as high as for the previous set of statements, around half (49 per

<sup>2</sup> The figures reported in the text differ slightly from those in Table 2-4 because of rounding.

<sup>3</sup> To limit the impact of social desirability as far as possible, these questions were placed in the self-completion section of the survey.

cent) of respondents agree that they prefer unprocessed food even if it has an irregular appearance and a higher proportion (30 per cent) are undecided on the issue. In other words, the potential appearance of food, rather than the ease of preparing and storing it, appears to have a greater impact on increasing the desirability of processed foods.

<b>Table 2-4 Attitudes to buying processed food</b>		
<i>Bases: all respondents</i>		<i>British Social Attitudes 2008</i>
		Total %
	...I want food that I buy to look attractive, even this means it has been processed in some way	...I want food that I buy to be unprocessed, even if this means that it has an irregular appearance
Strongly agree	1	12
Agree	16	37
Neither agree nor disagree	26	30
Disagree	40	12
Strongly disagree	11	1
<i>Unweighted base</i>		1,986
<i>Weighted base</i>		1,975

Although support seems to be in favour of unprocessed foods, we can see whether certain groups of people are more likely to be in favour than others using multivariate regression analysis. Two factors were associated with higher levels of support for unprocessed foods; being female and living with a partner; women and those living with a partner are more likely than men and those not living with a partner to be in favour of unprocessed foods despite it being more difficult to store and prepare and despite an irregular appearance. Those in rural locations expressed higher levels of support for unprocessed foods in the scenario where these were harder to store (though not in relation to their irregular appearance), than did those living in urban areas<sup>4</sup>. Income was associated with support for unprocessed foods despite an irregular appearance with those with higher household incomes being more in favour than those with lower levels of household income.

## 2.5 Concern about food safety

Concern about food safety is likely to be an important factor in influencing people's behaviours towards the kinds of foods they are willing to eat and their attitudes towards foods in general. Respondents were asked to rate how concerned they are about food safety on a scale from very concerned to not at all concerned, in response to the following question:

<sup>4</sup> Respondents were asked to self-define the type of location in which they lived, which were then categorised as being either rural or urban.

“Generally speaking, which of these best describes your level of concern about food safety in Britain. By food safety, we mean things like food allergies and hygiene when storing and preparing food?”

As table 2-5 shows, there was a high level of concern about food safety in Britain. A third of respondents state they are very concerned and a further 43 per cent state they were quite concerned about food safety. Only a quarter of respondents state they are not very concerned (20 per cent) or not at all concerned about food safety (four per cent).

<b>Table 2-5 Attitudes to food safety in Britain</b>	
<i>Bases: all respondents</i>	
<i>British Social Attitudes 2008</i>	
	Total %
Very concerned	33
Fairly concerned	43
Not very concerned	20
Not at all concerned	4
<i>Unweighted base</i>	2,250
<i>Weighted base</i>	2,247

Multivariate analysis, presented in Table 2-10 in the appendix to this chapter, showed that levels of concern about food safety are not consistent across all groups of respondents. Women are more concerned than men with 37 per cent of women stating they are very concerned compared to just 29 per cent of men. Older respondents tend to be more concerned than younger respondents. A quarter (24 per cent) of 18-34 year olds and a third (32 per cent) of 35-54 year olds are very concerned about food safety whereas high levels of concern rose to 40 per cent for 55-64 year olds and 41 per cent for those aged 65+. Levels of concern decreased as levels of household income rose. Of those in the lowest household income quartile (£14,999 per annum or less) 44 per cent stated that they are very concerned about food safety. This dropped for those in the middle two quartiles (35 per cent for £15,000-£25,999 and 33 per cent for £26,000-£43,999) and decreased further to 23 per cent for those in the highest quartile of households earning £44,000 or more. Interestingly, living in a household with dependent children was not a significant factor; we might have expected this to be the case, as parents’ concern might increase when they had to consider the diet of others dependent upon them, as well as themselves.

## 2.6 Willingness to try new types of foods

Potentially linked to concerns about food safety is the individual's willingness to experiment with the types of food they purchase and consume. Respondents were asked how willing they were to try new foods without knowing what the food was in the following question:

“Which of the following statements comes closest to your view:

I am happy to eat foods that I have never tried before without knowing too much about them, or

I wouldn't eat a food that I had never tried before unless I knew exactly what was in it?”

The public are quite evenly split on this issue with 48 per cent saying that they are happy to try new foods while 47 per cent would not eat a food they had never tried unless they knew exactly what was in it.

Table 2-6 Attitudes to eating new food	
<i>Base: all respondents</i>	
<i>British Social Attitudes 2008</i>	
	Total %
I am happy to eat foods that I have never tried before without knowing too much about them	48
I wouldn't eat a food that I had never tried before unless I knew exactly what it was	47
It depends on the type of food	4
Neither	1
<i>Unweighted base</i>	2,250
<i>Weighted base</i>	2,247

Certain groups were found to be more willing to try new foods than others through multivariate analysis techniques, as presented in Table 2-11 in the appendix to this chapter. White respondents were more likely to report that they are willing to try new foods than non-white respondents (52 per cent compared to 33 per cent). Work and household income also affect how adventurous people are with new foods. Those who are in paid work are more willing to try new foods than those not in work (58 per cent compared to 43 per cent) and as income increases, so does public willingness to try new foods. Just 39 per cent of those in households with incomes of under £14,999 are willing to try new food which increases to 51 per cent for households earning £15,000 to £25,999, 54 per cent for households earning £26,000 to £43,999 and 62 per cent for households with the highest incomes (£44,000 and over). The levels of concern for food safety seen in the previous section also affect whether respondents would be willing to try new foods. As respondents' concern for food safety increases, willingness to try new foods decreases. Of those who said they were very concerned about food safety, only 37 per cent were willing to try new foods while 63 per cent said they would not try

new foods. The reverse was true for those who had low levels of concern for food safety (69 per cent would be willing to try new foods and 31 per cent would not).

## **2.7 Conclusion**

It is clear that public behaviour and attitudes in relation to food are very diverse. At the outset, the extent to which individuals are directly involved with food, measured in terms of their involvement in food shopping, differs markedly. While small minorities have particular dietary habits that are likely to influence the types of food they eat, altogether 40 per cent have at least one special dietary habit and there is also evidence of a considerable degree of concern about food safety, wariness about trying unknown types of food and opposition to the idea of processed foods, that are also likely to affect food choices. However, we cannot automatically assume that public attitudes to food are directly reflected in the food choices that are made; it may be that, in some areas, attitudes are aspirational and that, in reality, more practical considerations are used in the selection of food for purchase and consumption. This issue is explored in greater detail in the following chapter.

## Appendix

### Regression tables

**Table 2-7** Logistic regression of special dietary habits

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Vegetarian or vegan model</b>			
<b>Ethnicity (non-white)</b>			
White	-1.23**	0.29	0.000
<b>Sex (male)</b>			
Female	0.93**	0.29	0.001
<b>Income(less than £12,000)</b>			
£12,000-£22,999	0.60	0.37	0.111
£23,000-£43,999	1.20**	0.35	0.001
£44,000+	1.32**	0.35	0.000
Not known	0.90*	0.41	0.028
<b>Avoid foods due to bad reaction model</b>			
<b>Age (18-34)</b>			
35-49	-0.54	0.19	0.774
50-65	0.18	0.24	0.446
65+	0.54**	0.24	0.009
<b>Diet to lose weight model</b>			
<b>Sex (male)</b>			
Female	0.85**	0.13	0.000
<b>Partner (does not live with partner)</b>			
Lives with partner	0.42**	0.13	0.002
<b>Avoid foods for religious reasons model</b>			
<b>Ethnicity (non-white)</b>			
White	-3.16**	0.46	0.000
<b>Children (no children in household)</b>			
Children in household	0.81**	0.31	0.009
<b>Religion (Does not attend church regularly or at all)</b>			
Attends church regularly	1.17**	0.46	0.012
<b>Avoid foods due to medical advice model</b>			
<b>Work (not in work)</b>			
In work	-0.87**	0.23	0.000
<b>Age (18-34)</b>			
35-49	1.05**	0.37	0.004
50-65	1.64**	0.38	0.000
65+	1.42**	0.38	0.000
<b>Religion (Does not attend church regularly or at all)</b>			
Attends church regularly	0.82**	0.22	0.000
<b>Area (Rural)</b>			
Urban	0.47*	0.23	0.045

Unweighted base: 2,250

Weighted base: 2,247

\*=significant at 95% level \*\*=significant at 99% level

**Table 2-8 Linear regression of involvement in shopping**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Sex (male)</b>			
Female	0.45**	0.31	0.000
<b>Age (18-34)</b>			
35-49	0.23**	0.05	0.000
50-65	0.23**	0.06	0.000
65+	0.16**	0.05	0.003

R<sup>2</sup> = 0.1255

Unweighted base: 2,250

Weighted base: 2,247

\* = significant at 95% level \*\* = significant at 99% level

**Table 2-9 Linear regression of attitudes to processed food**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Ease of storage and preparation</b>			
<b>Sex (male)</b>			
Female	0.30**	0.05	0.000
<b>Partner (does not live with partner)</b>			
Lives with partner	0.34**	0.06	0.000
<b>Area (Rural)</b>			
Urban	-0.25**	0.06	0.000
<b>Appearance</b>			
<b>Sex (male)</b>			
Female	0.10*	0.042	0.017
<b>Partner (does not live with partner)</b>			
Lives with partner	0.11*	0.05	0.025
<b>Income (less than £12,000)</b>			
£12,000-£22,999	0.02	0.06	0.757
£23,000-£43,999	0.17**	0.06	0.008
£44,000+	0.24**	0.07	0.000
Not known	0.12	0.08	0.140

R<sup>2</sup> = 0.0269

Unweighted base: 1,986

Weighted base: 1,975

\* = significant at 95% level \*\* = significant at 99% level

**Table 2-10 Linear regression of attitudes to food safety**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Sex (male)</b>			
Female	0.17**	0.03	0.000
<b>Age (18-34)</b>			
35-49	0.10*	0.05	0.043
50-65	0.24**	0.06	0.000
65+	0.19**	0.05	0.000
<b>Income(less than £12,000)</b>			
£12,000-£22,999	-0.08	0.05	0.086
£23,000-£43,999	-0.12*	0.05	0.027
£44,000+	-0.29**	0.06	0.000
Not known	-0.14*	0.06	0.020
R <sup>2</sup> = 0.0507			
Unweighted base: 2.250			
Weighted base: 2.247			

\* = significant at 95% level \*\* = significant at 99% level

**Table 2-11 Logistic regression of willingness to try new foods**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Ethnicity (non-white)</b>			
White	0.81**	0.19	0.000
<b>Level of concern for food safety</b>			
Increase in level of concern	-0.64**	0.07	0.000
<b>Income(less than £12,000)</b>			
£12,000-£22,999	0.29	0.16	0.069
£23,000-£43,999	0.15	0.16	0.339
£44,000+	0.40*	0.18	0.030
Not known	-0.09	0.21	0.685
<b>Work (not in work)</b>			
In work	0.56**	0.11	0.000
Unweighted base: 2.250			
Weighted base: 2.247			

\* = significant at 95% level \*\* = significant at 99% level

## 3 Influences on food choices

- Choosing foods to eat at home involves a multi-dimensional decision-making process; on average, respondents identify six factors that they consider when selecting foods to eat at home.
- The three most common influences on food choices all relate to the food itself; the quality or freshness of food (79%), low fat or healthy food (64%), and the taste of food (63%). Economic factors including price, value for money and special offers are the next most important category of influence and are considered an important influence by 60%.
- There are three distinct sets of considerations in relation to the selection of food to eat that tend to co-exist – ethical considerations relating to the environment or animal welfare, considerations relating to cost and convenience, and considerations relating to the quality and variety of the food chosen.
- Younger age groups and those with children tend to select foods to eat due to considerations of cost and convenience, whereas older age groups and those with higher incomes tend to focus more on the actual quality of the food.

### 3.1 Introduction

People make many choices each day regarding which foods they are going to purchase and consume. The reasons behind these choices are many and varied and are likely to differ from person to person. To fully understand the rationale for the range of foods that people buy and eat, it is important to identify the reasons behind these choices. A detailed literature exists in relation to individual food choices which draw upon behavioural models and theories. This chapter does not seek to provide such detailed analysis of food choice, rather it focuses on what respondents considered as important factors influencing their food choices to provide background and context to the survey findings. It examines whether different factors influence different groups of people and whether any of these reasons frequently co-occur for certain kinds of people.

### 3.2 Most and least common influences on food choice

Respondents to the 2008 British Social Attitudes survey were presented with a list of reasons why they may or may not choose to eat the foods that they eat at home and were asked to identify the most important reasons that influenced their choice of foods. The question asked was:

“The next questions are about the food you eat at home. There are many reasons why we choose the foods that we eat at home. What would you say are the most important influences on your choice of foods?”

The reasons that were presented to respondents and their responses are presented in table 3-1.

The three most common influences all relate to the food itself; the quality or freshness of food is important for 79 per cent of respondents, low fat or healthy food is an influence for 64 per cent, and the taste of the food eaten is important for 63 per cent of people. Economic factors including price, value for money and special offers are the next most important category of influence in food choices and are considered an important influence by 60 per cent of respondents.

The least common influences are vegetarian foods or food for special dietary requirements (ten per cent), the impact the food has on the landscape where it was produced (nine per cent) and presentation, packaging, advertising and brand of food products (eight per cent).

<b>Table 3-1 Factors that influence choice of foods</b>	
<i>Base: All Respondents</i>	
<i>British Social Attitudes 2008</i>	
	Total %
Quality or freshness of food	79
Eating food that is healthy or low fat	64
Taste of food	63
Price of food/value for money/special offers	60
Foods I know how to cook/prepare	45
Animal welfare/free range	34
To try something new or different	33
What my family/spouse/children will eat	33
Habit or routine	30
Impact on the community where food comes from/fair trade/supporting local farms or industries	27
Availability in the shops I can usually get to	27
Convenience in preparation	26
Number of additives or E numbers in food	20
Recommendations from friends, family or colleagues	18
Amount/type of packaging used e.g. recycled	16
Whether food is organically produced	15
Vegetarian or other special eating habits	10
Impact of the food on the landscape where it was produced	9
Presentation/packaging/advertising/brand	8
Other answer	1
Someone else decides on most of the food I eat	+
No particular influence	+
<i>Unweighted base</i>	2,250
<i>Weighted base</i>	2,247

Percentages add up to more than 100% as respondents could give more than one answer.

‘+’ indicates that the percentage is less than 0.5%

### 3.3 Number of influences on food choice

It seems that decision-making about which foods to buy and eat is not a straight forward process and many factors are considered by people when making these choices. On average respondents mention six reasons that are important to them when making choices about food.

It is interesting to note that very few people said that someone else decided what food they ate (less than one per cent) or that they had no particular influences on their food choices (less than one per cent). Clearly, almost everyone makes some contribution to deciding what foods they eat at home and is aware of one or more factors that influences them in this process.

It may be assumed that people who are not involved with the household shopping would have fewer reasons to consider when making their choices for food to eat at home. But while less factors were rated as important by people who said they did none of the household shopping than by those who do some or all of the food shopping, they did still mention an average of five reasons as being important in their food choices showing that these decisions relating to food go beyond simply household shopping.

### 3.4 How influences differ between people

Do people consider similar reasons to be important when making their choices about food or do some people consider certain issues to be more important than others? In order to look at which influences are more important for certain types of people we have focussed on the four most common influences on food choice which were rated as important by over half of respondents; quality or freshness, taste, healthy or low-fat foods and price. For each of these reasons for choosing particular foods, a logistic regression model was run which examined whether certain socio-demographic factors indicated that certain people were more likely to have chosen these influences on food choice when controlling for other demographic variables<sup>5</sup>.

As we might expect, certain groups are more likely to choose each of these four reasons as important factors in their choices of food than others. The results are shown in figures 3-1, 3-2, 3-3 and 3-4. Three socio-demographic characteristics were found to be associated with more than one of these four influences on food choice and therefore seem to be particularly influential in people's food choices.

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<sup>5</sup> For the multivariate analyses reported in this chapter, the logistic regressions were run using the "Forward conditional" method in SPSS, so that only those variables that remained significantly associated with the dependent variable were included in the final model.

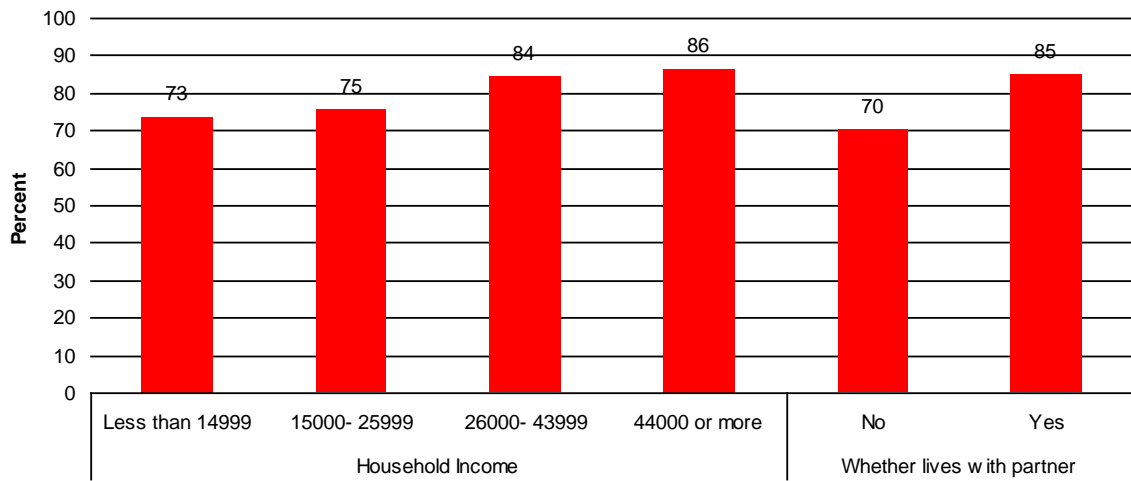
The first of these is household income. People with higher household incomes are more likely than those with lower incomes to say that the quality or freshness of food is important in their food choices (86 per cent of those in the highest income quartile compared to 73 per cent in the lowest). They are also more likely than those from households with lower incomes to say that the taste of food is an important factor in choosing food with 75 per cent of those in the highest household income quartile finding this important compared to just half (50 per cent) of those in the lowest income quartile. Income therefore seems to be an important factor in the reasons for choosing food. We might assume that, for people with higher incomes, cost is less of an issue in food choices and therefore other factors, such as taste and quality, which can be more expensive to attain, assume more importance in food choices. Supporting this, we found that the price of food was considered more important by those on lower incomes (64 per cent of those with a household income of less than £14,999) than those on higher incomes (55 per cent of those with an annual household income of £44,000 or more).

Household composition also stood out as an important factor in food choices. Those who live with a partner chose the quality and freshness of food more often than those who do not live with a partner (85 per cent compared to 70 per cent respectively) as well as citing healthy or low-fat food as an important reason in food choice (68 per cent compared to 58 per cent who did not live with a partner). Who people live with is likely to affect people's food choices as they may not only be thinking of their own preferences, but the preferences of others when choosing what foods to buy and to eat. It may be that, as was the case for those on high incomes, for those living with a partner, cost is less of an issue, due to the ability to share food and other bills, and thus that the quality of foods, in terms of taste and freshness, assumes a greater importance. However, it is interesting to note that the presence of dependent children in the household made no significant difference to reasons for selecting particular foods. We might have anticipated that certain influences, such as the healthiness of food, would assume greater importance, once the respondent was also selecting food for young children, as well as themselves; however, the data suggests that this is not the case.

We found that younger respondents are more likely than older age groups to say that taste is an important reason in their food choices. Three-quarters (74 per cent) of 18 to 34 year olds chose this reason compared to half (51 per cent) of those aged 65 or over. Age is also associated with price being chosen as a consideration in food choices with younger respondents more likely to choose this than older respondents (62 per cent of 18 to 34 year olds compared to 52 per cent of those aged 65 or over).

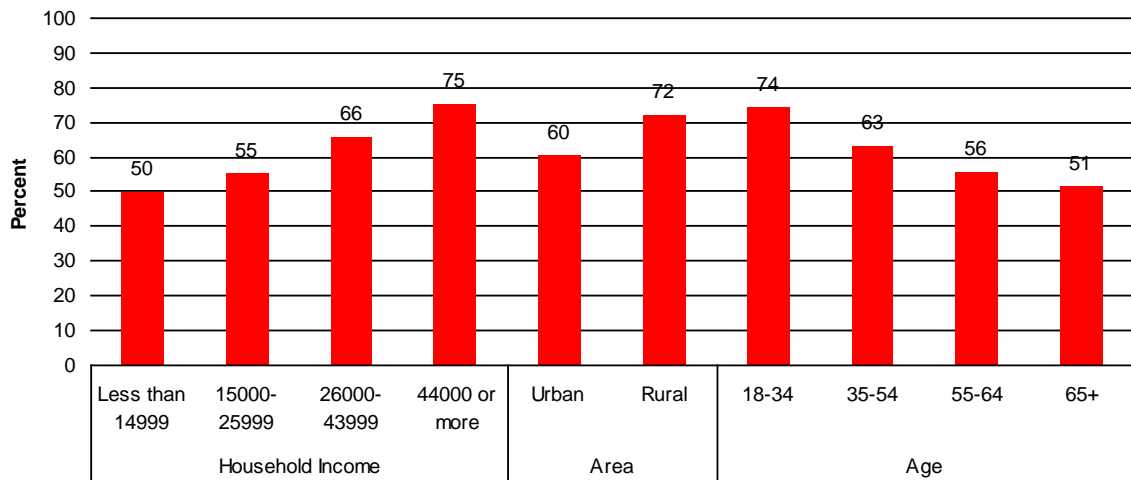
**Figure 3-1 How choosing quality as a reason for choosing foods differs between people**

Base: all respondents



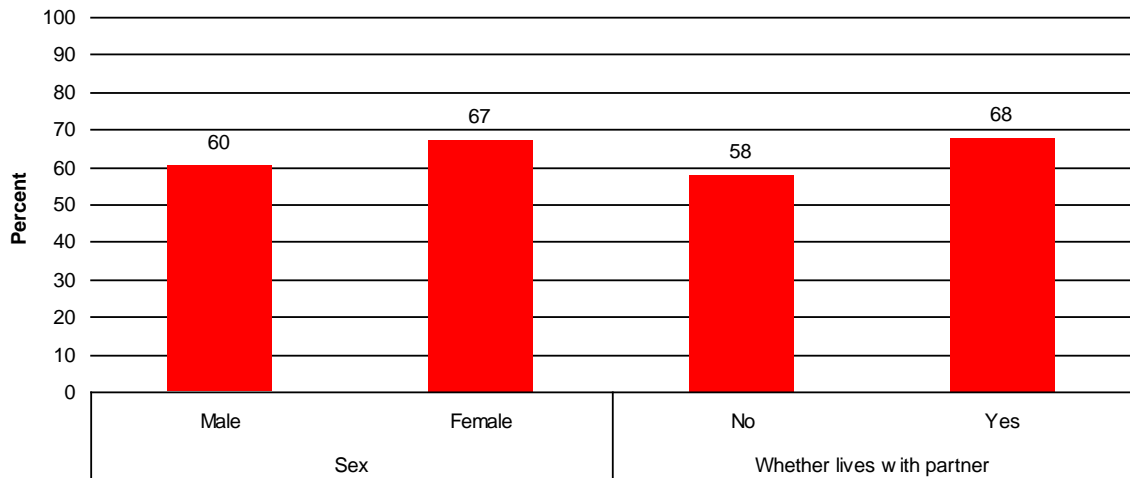
**Figure 3-2 How choosing taste as a reason for choosing foods differs between people**

Base: all respondents



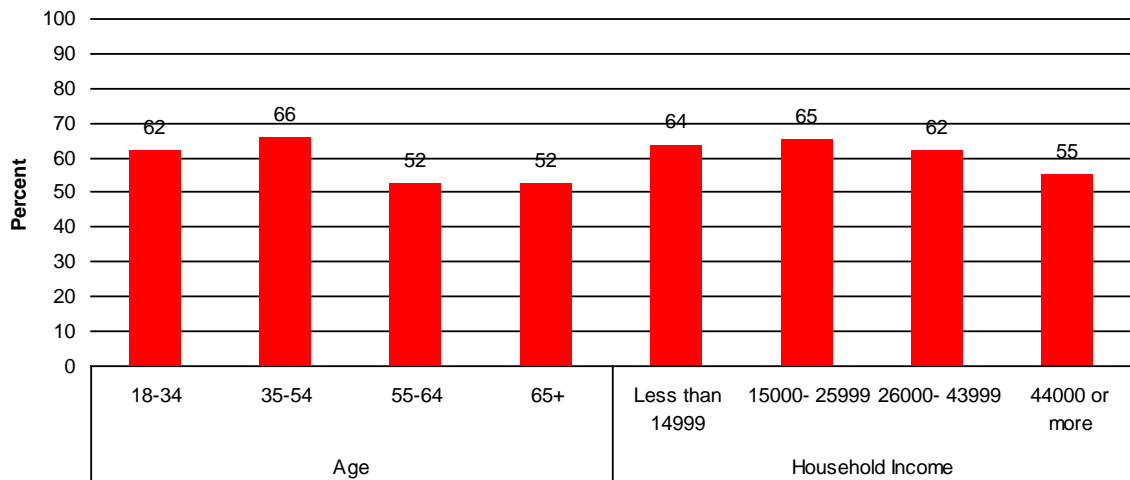
**Figure 3-3 How choosing healthy or low-fat as a reason for choosing foods differs between people**

Base: all respondents



**Figure 3-4 How choosing price as a reason for choosing foods differs between people**

Base: all respondents



### 3.5 Do certain influences on food choice co-exist?

We were interested in the extent to which these different reasons for choosing food were correlated with one another. Is it the case that if people choose one reason relating to convenience of preparation that they will also choose other convenience-related reasons also? To examine this we used a statistical technique called factor analysis to explore the interrelationship between these different reasons for choosing food and the extent to which they tend to be chosen by the same people. We found that reasons for choosing food fell into three groups which are summarised in table 3-2. The first group of reasons all relate to concerns for animal welfare or the environment and include buying vegetarian,

organic and fair-trade products as well as mentioning concerns for animal welfare and the amount of packaging used. The second group of influences on food choice all indicate a desire for convenience and included buying foods out of habit, foods their family ate, convenience in preparation, availability in shops, products they know how to cook and prepare and price, value for money or special offers. The third group includes factors that indicate an importance of the actual food that was being chosen, for example the quality and taste of foods, how healthy the food was, as well as trying foods that were new or different or recommended to them. The results of the factor analysis are shown in more detail in the appendix.

**Table 3-2 Factor analysis of reasons for food choice: loadings for principal components analysis with varimax factor rotation**

Base: All respondents

British Social Attitudes 2008

Factor 1 Animal/environmental welfare	Factor 2 Convenience	Factor 3 Food itself
<ul style="list-style-type: none"> <li>• Vegetarian or other special eating habits</li> <li>• Whether food is organically produced</li> <li>• Animal welfare / free range</li> <li>• Impact of the food on the landscape where it was produced</li> <li>• Amount / type of packaging used e.g. recycled</li> </ul>	<ul style="list-style-type: none"> <li>• Habit or routine</li> <li>• my family / spouse / children will eat</li> <li>• Convenience in preparation</li> <li>• Availability in the shops I can usually get to</li> <li>• Foods I know how to cook / prepare</li> <li>• Price of food / value for money / special offers</li> </ul>	<ul style="list-style-type: none"> <li>• Quality or freshness of food</li> <li>• Taste of food</li> <li>• Eating food that is healthy or low fat</li> <li>• To try something new or different</li> <li>• Recommendations from friends, family or colleagues</li> </ul>

We used the three dimensions (or factors) identified to explore whether particular groups of respondents are more likely to state these reasons are important in their food choices than others. We calculated respondents' summary scores on each of the three factors identified and then compared the scores obtained on each factor on the basis of respondent characteristics such as sex, age and income. The factors have been set up to have an overall mean of 0, with positive values indicating that these reasons are chosen more than average and negative values indicating that they are chosen as important less than average. The results can be seen in Table 3-3 in the appendix to this chapter. As seen in the previous section, income, household composition and age are significantly associated with food choices.

The first group we examine are the group who tend to consider animal welfare and the environment when they choose food. A regression analysis revealed that, controlling for other demographic factors, people choosing food for these reasons are more likely to be female than male and more likely to be in the middle two age groups (aged 35 to 64 years old) rather than in the youngest or oldest age groups. They are also more likely to live in households with a higher annual household income.

Younger people tend to choose food mainly for reasons of convenience (the second group) more than those in the older age groups. Household composition is a factor in whether people chose food for convenience. People with children were also more likely to choose reasons of convenience than those without children and those who did not live with a partner with whom to share the task of food preparation were more likely to cite these reasons than those living with a partner. It may be that the greater amount of time that those who need to prepare food for children, or do not have a partner with whom to share this task, heightens the importance of convenience in the selection of food products.

The third group is made up of people who chose food according to the type and quality of food or by recommendation. Younger people tend to choose these reasons more than older age groups. People with a partner are more likely to choose these reasons than those who do not live with a partner as well as people with higher incomes than those with lower incomes. People in rural areas are more likely than those in urban areas to pick these reasons.

### **3.6 Conclusion**

Many factors influence an individual's choice of foods, with those relating to the actual quality of the food (in terms of freshness or taste) or its cost emerging as particularly important. However, it appears that individual motivations for food choices differ markedly, with particular sub-sections of the population identifying very different reasons or sets of reasons that determine the types of food they eat. To some extent, the different motivations can be seen as being in competition; we can see for instance, that for those for whom cost or convenience becomes less of an issue (due to a high income or a partner with whom to share the task of cooking), factors relating to the actual quality of the food assume a greater importance. It should be borne in mind, however, that respondents might not be fully aware of all of the factors that influence their choice of foods, and that some of these at least might be sub-conscious. Nevertheless, in considering public attitudes to food technologies, it will therefore be key to bear in mind that, even before considering this issue, there are a multitude of considerations that link with public choices regarding food and that these differ markedly.

## Appendix

### Regression tables

**Table 3-3 Logistic regression of individual reasons for food choice**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Quality</b>			
<b>Partner (does not live with partner)</b>			
Lives with partner	0.75**	0.14	0.000
<b>Sex (male)</b>			
Female	0.26*	0.14	0.055
<b>Income(less than £12,000)</b>			
£12,000-£22,999	-0.08	0.16	0.635
£23,000-£43,999	0.44*	0.22	0.043
£44,000+	0.52*	0.21	0.016
Not known	0.14	0.22	0.529
<b>Healthy or Low fat</b>			
<b>Partner (does not live with partner)</b>			
Lives with partner	0.45**	0.11	0.000
<b>Sex (male)</b>			
Female	0.33**	0.11	0.003
<b>Taste</b>			
<b>Income(less than £12,000)</b>			
£12,000-£22,999	0.09	0.18	0.613
£23,000-£43,999	0.52**	0.21	0.012
£44,000+	0.74**	0.21	0.000
Not known	0.33	0.25	0.184
<b>Age (18-34)</b>			
35-49	-0.67**	0.19	0.000
50-65	-0.56**	0.22	0.011
65+	-0.83**	0.21	0.000
<b>Area (Rural)</b>			
Urban	-0.65**	0.16	0.000
<b>Price</b>			
<b>Income(less than £12,000)</b>			
£12,000-£22,999	-0.03	0.14	0.826
£23,000-£43,999	-0.30*	0.15	0.042
£44,000+	-0.65**	0.16	0.000
Not known	-0.64**	0.18	0.001
<b>Age (18-34)</b>			
35-49	0.09	0.14	0.528
50-65	-0.53**	0.18	0.003
65+	-0.59**	0.17	0.001

Unweighted base: 2,250

Weighted base: 2,247

\*=significant at 95% level \*\*=significant at 99% level

**Table 3-4 Linear regression of categories of reasons for food choices**

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Factor one (higher score indicates more likely to choose food for animal/environmental reasons)</b>			
<b>Partner (does not live with partner)</b>			
Lives with partner	0.74**	0.25	0.004
<b>Sex (male)</b>			
Female	0.61**	0.22	0.006
R <sup>2</sup> = 0.0673			
<b>Factor two (higher score indicates more likely to choose food for convenience reasons)</b>			
<b>Children (no children in household)</b>			
Children in household	0.34*	0.14	0.016
<b>Income (less than £12,000)</b>			
£12,000-£22,999	0.06	0.18	0.751
£23,000-£43,999	0.13	0.22	0.547
£44,000+	0.27	0.19	0.153
Not known	-0.52*	0.21	0.016
R <sup>2</sup> = 0.0585			
<b>Factor three (higher score indicates more likely to choose food for reasons about the food itself)</b>			
<b>Income (less than £12,000)</b>			
£12,000-£22,999	0.06	0.15	0.677
£23,000-£43,999	0.42**	0.16	0.008
£44,000+	0.56**	0.15	0.000
Not known	-0.42*	0.18	0.022
<b>Sex (male)</b>			
Female	0.50**	0.09	0.000
<b>Partner (does not live with partner)</b>			
Lives with partner	0.33**	0.10	0.001
R <sup>2</sup> = 0.0720			
Unweighted base: 2,248			
Weighted base: 2,245			

\* = significant at 95% level \*\* = significant at 99% level

## Factor Analysis tables

**Table 3-5 Factor analysis of reasons for food choice: loadings for principal components analysis with varimax factor rotation**

Base: All adults

British Social Attitudes  
2008

	Factor 1 Animal/environmental welfare	Factor 2 Convenience	Factor 3 Food itself
Quality or freshness of food			0.597
Taste of food			0.468
Eating food that is healthy or low fat			0.357
Vegetarian or other special eating habits	0.466		
Habit or routine		0.642	
To try something new or different			0.653
What my family / spouse / children will eat		0.446	
Convenience in preparation		0.615	
Availability in the shops I can usually get to		0.511	
Recommendations from friends, family or colleagues			0.489
Foods I know how to cook / prepare		0.544	
Price of food / value for money / special offers		0.327	
Whether food is organically produced	0.618		
Animal welfare / free range	0.668		
Impact of the food on the landscape where it was produced	0.686		
Amount / type of packaging used e.g. recycled	0.658		
% of variance explained	34.8		
<i>Unweighted base: 2,248</i>			
<i>Weighted base: 2,245</i>			

**Table 3-6 Factors affecting food choice by demographic characteristics: Mean score on factor**

Base: All adults

British Social Attitudes  
2008

	Factor 1 Animal/environmental welfare		Factor 2 Convenience		Factor 3 Food itself		Unwt base	Wtd base
	Mean score	Standard error	Mean score	Standard error	Mean score	Standard error		
Male	-0.13	0.03					965	1088
Female	0.12	0.03					1283	1157
18-34	-0.07	0.05	0.29	0.06	0.14	0.05	485	629
35-49	0.07	0.04	0.05	0.04	0.05	0.04	819	798
50-64	0.09	0.06	-0.27	0.05	-0.07	0.06	375	336
65+	-0.09	0.04	-0.26	0.04	-0.21	0.04	560	474
Income less than £14999	-0.17	0.05			-0.24	0.04	516	395
Income £15000- £25999	-0.08	0.04			-0.15	0.05	535	509
Income £26000- £43999	0.08	0.05			0.14	0.05	430	466
Income £44000 or more	0.29	0.06			0.27	0.05	408	468
<i>Has children in household</i>	0.10	0.04					761	833
<i>Does not have children in household</i>	-0.06	0.03					1487	1412
<i>Does not live with partner</i>	0.12	0.04			-0.16	0.04	1220	1380
<i>Lives with partner</i>	-0.08	0.03			0.10	0.03	1208	864
<i>Urban area</i>					-0.05	0.03	857	891
<i>Rural area</i>					0.15	0.07	261	252

Each factor has an overall mean of 0 and standard deviation of 1.

## 4 Public knowledge of food technologies

- Objectively-measured levels of public knowledge of food technologies vary considerably. On a seven-item knowledge test, 19% of respondents answered less than three items correctly, 45% answered three or four items correctly and 36% answered five or more items correctly. Items asking about GM foods and microwaving were most likely to be answered correctly.
- Five characteristics were significantly associated with objectively-measured knowledge about food technologies - age, sex, income, education and ethnicity. When the relationships between these characteristics were controlled for through multivariate analysis, only income and education remained significant.
- Self-assessed knowledge of how the food industry manufactures and prepares food also varied. 9% felt they had a good knowledge, whilst 38% indicated they had a reasonable basic knowledge. 31% described their knowledge as very patchy, while 21% felt they knew little or nothing. Those who felt they knew little or nothing were more likely to be young than old, to be on a low rather than a high income, to have few rather than many educational qualifications and to have had little direct involvement with food, through food shopping.
- There is a strong link between self-assessed and objectively-measured knowledge of food technologies. 36% of low scorers on the knowledge quiz felt that they knew little or nothing about how the food industry manufactures and prepares food, compared to 21% of middle scorers and 15% of high scorers.

### 4.1 Introduction

The remaining four chapters in this report will focus specifically on public attitudes, behaviour and knowledge in relation to food technologies. This chapter will examine public knowledge and understanding in relation to this topic, using two key measures – one of individuals' self-assessed knowledge in relation to food technologies, the other an objective measure, based upon a multiple-item knowledge test included in the survey. The chapter will begin by considering how much the public know about various aspects of specific food technologies, and about this topic in general. It will examine how accurately these levels of knowledge reflect the public's own perceptions of how much they know and whether the public have an accurate understanding of the extent, or limitations to, their knowledge of this area. We will then move on to consider variations in

knowledge levels across the public – are there particular groups who have greater and lesser knowledge of this area and how might we explain these differences? Inevitably, any area that involves an element of innovation, such as emerging food technologies, is likely to be new or unfamiliar, at least to certain sections of the public. Therefore, before considering public attitudes in relation to this topic, it is vital to paint a picture of how much the public know and understand, as this is likely to be a key basis on which to interpret their attitudes.

## **4.2 Objectively-assessed knowledge**

Knowledge and understanding of food technologies is likely to be a key factor in explaining public attitudes and behaviour in this area. In designing the module of questions on food technologies for inclusion on the 2008 British Social Attitudes survey, it was recognised that an objective measure of knowledge in this area was needed. The alternative approach to measuring knowledge, by simply asking respondents to subjectively assess their own knowledge, is a technique which has been shown to be strongly influenced by personality traits and individual definitions of what constitutes ‘good’ knowledge, and therefore may potentially be less objectively accurate. Whilst we also included a self-assessed measure of knowledge on the survey, reported in the next section, our main interest was in determining how far this would correlate with objectively-measured knowledge levels, to explore issues of public perception and confidence in relation to knowledge in this topic.

However, we first consider actual levels of public knowledge, by examining each component, and overall scores on, our objective measure of public knowledge of food technologies. It was anticipated that an individual could potentially know much more about certain food technologies than others, as a result of their experiences to date, in terms of the types of food they purchase and eat, their contact with particular technologies through science education, employment and daily life and their exposure to information through media discussion and public debate. For this reason, it was recognised that, to obtain a general measure of attitudes to food technologies, a range of processes and products would need to be asked about.

The survey therefore included a short knowledge test where respondents were asked to indicate whether seven different statements about specific food technologies and processing methods were “definitely” or “probably” true or

“definitely” or “probably” false or whether they did not know which of these was the case<sup>6</sup>. The knowledge test was introduced to respondents as follows:

“Now for a quick quiz about food. For each of the following statements, please tell me whether you think it is true or false. If you are unsure, just say so and we'll go on to the next one.”

The seven statements asked about are presented in Table 4-1 below, along with the proportions of respondents who provided a correct or incorrect answer, or who stated that they did not know what this was, in each case.

Clearly, the public have a much better knowledge of some areas of food technology than others. More than seven-tenths accurately identified the statement that GM food is never sold in Britain as false<sup>7</sup>; on the other hand, just three-tenths correctly concluded that the statement that Omega-3 oils can also be manufactured from plant-like organisms called algae, is true. However, the finding in relation to the sale of GM foods may not reflect an accurate understanding of the current situation as the results of recent qualitative research indicate that people generally think that GM foods are more widely available in Britain than they actually are (Sheldon, 2009). While around seven-tenths of the public accurately stated that using microwave ovens to heat food involves radiation and six-tenths correctly indicated that some foods have extra ingredients added to them to make them healthier, only around half provided accurate answers in response to the items on pasteurised foods, organic food crops and bags containing ready-to-eat salad leaves. It may be that public knowledge about genetic modification in relation to food is comparatively good because this topic has received considerably more public attention and discussion in recent years than any of the other processes or products asked about. Similarly, most of the public would have come into contact with a microwave at some point, which may explain the comparatively high levels of knowledge about the process of microwaving. However, we should be cautious in reading too much meaning into the comparative levels of knowledge about different food technologies as, in a number of instances, the statements presented relate to very specific aspects – for instance, the item on GM foods focuses solely on their regulation, rather than their production or development.

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<sup>6</sup> The answers provided were coded by the CAPI program as either “true” or “false”, with the “definitely” or “probably” options being included only on the showcard to encourage those with less confidence in their own levels of knowledge to express an answer where they had a particular inclination as to what this might be.

<sup>7</sup> Many different types of GM food are authorised for sale in the EU and, although food manufacturers and retailers generally arrange for ingredients to be obtained from non-GM sources, there are a small number of GM products used in the UK such as some imported products and the cooking oil used in some catering establishments. GM ingredients are also commonly used in animal feed for food production.

**Table 4-1** Answers provided to knowledge test items

Base: All respondents

British Social Attitudes, 2008

Individual test items	% answering correctly	% answering incorrectly	% saying unsure / don't know
GM, that is a genetically modified food, is never sold in Britain (FALSE)	73	9	18
Using microwave ovens to heat food involves radiation (TRUE)	68	19	13
Some foods have extra ingredients added to them to make them healthier (TRUE)	61	22	17
Pasteurised foods like orange juice have a longer shelf-life because they don't contain as much bacteria as fresh orange juice (TRUE)	54	14	32
Organic food crops are frequently grown using pesticides (FALSE)	53	27	20
Bags containing ready-to-eat salad leaves are usually filled with gases to ensure the leaves stay fresher for longer (TRUE)	48	11	42
Omega-3 oils, which are usually obtained from fish, can also be manufactured from plant-like organisms called algae (TRUE)	30	14	57
<i>Unweighted base: 2,250</i>			
<i>Weighted base: 2,247</i>			

A knowledge score was calculated for each respondent, with a score of zero meaning that they had not answered any items correctly and a score of seven equating to having answered all of the items correctly. These scores are presented in Table 4-2 and were used to divide respondents into three broad categories, as illustrated below, to enable further analysis.

There was considerable diversity in the numbers of items answered correctly, indicating that it is not the case that there are even levels of knowledge of food technologies across the public (with individuals tending to know more or less about particular items). Overall, 19 per cent of respondents answered less than three answers correctly, termed as “low scorers”, with the largest group, 45 per cent, termed as “middle scorers”, answering three or four items correctly. Just 36 per cent of respondents, identified as “high scorers”, answered five or more of the seven items correctly; the average achieved score on the knowledge test was 3.9. We return to analyse how the knowledge score varied across different sections of the public later in the chapter.

**Table 4-2 Knowledge test scores**

Base: all respondents

British Social Attitudes 2008

<u>Number of items answered correctly</u>	<u>%</u>	<u>Overall scores</u>	<u>%</u>
		Low scorers (0-2 correct answers)	
None	2		19
One	4		
Two	13		
		Middle scorers (3-4 correct answers)	
Three	21		45
Four	24		
		High scorers (5-7 correct answers)	
Five	22		36
Six	10		
Seven	4		
Unweighted base: 2,250			
Weighted base: 2,247			

It should be recognised at the outset that respondents could have potentially provided a correct or incorrect answer to any individual item, simply by guessing. Whilst our question design sought to guard against such a tendency, by encouraging respondents to answer “don’t know” where this was genuinely the case, widespread guessing, which in practice it would be impossible to discern, would inevitably result in our estimates of knowledge of individual items, and knowledge in general, being over-stated. Reassuringly, the considerable proportions of respondents who answered “don’t know” to individual test items does tend to suggest that this was regarded as a valid and acceptable answer option by respondents. It is interesting to note that those items presented in Table 4-1 above that were answered inaccurately by around half of the public, and were thus the least well understood, in each case attracted a particular high proportion of “don’t knows”, with between two-tenths (organic food crops) and almost six-tenths (Omega-3 oils) providing this answer. In addition, no “wrong” answer was selected by more than three-tenths of the public in any case (organic food crops yielding the highest proportion of inaccurate answers).

The comparatively large proportion of “don’t know” responses selected and small number of incorrect answers provided suggests that respondents failed to provide the correct answers to individual items largely because they had no clear view as to what the correct answers were and were willing to admit to this, rather than as a result of widespread perceptions that inaccurate answers were correct or an inclination to guess. In other words, the public has a reasonably good idea of the aspects of food technology which they do, and do not, understand. Whilst a small element of guessing amongst respondents may have led us to over-estimate knowledge of particular items in the data reported above, it should also be borne in mind that respondents who had a vague idea of an answer might not have been sufficiently confident to state this, preferring to offer the response “don’t know”; this Food Technologies, Findings from 2008 BSA 43

trend, conversely, would cause us to under-estimate knowledge of public levels. In other words, whilst we do have to accept that our calculated knowledge test score is, to some degree, an approximate measure of public knowledge, it is not necessarily clear whether this will over or under-represent actual knowledge overall, and in relation to particular items.

We move on next to examine respondents' self-assessed knowledge in relation to food technologies, and if and how this relates to their objectively-measured knowledge.

### **4.3 Self-assessed knowledge**

As well as completing the knowledge test described above<sup>8</sup>, respondents were asked to assess their own levels of knowledge in relation to food technology, by selecting an answer to the following question:

“Which of the statements on this card describes how knowledgeable you feel about the way the food industry prepares and manufactures food nowadays?

(I know little or nothing

My knowledge is very patchy - I know a bit about the areas that concern me but no more

I have a reasonable, basic knowledge

I have a good knowledge)”

As demonstrated in Table 4-3 below, individual assessments of knowledge in relation to the way the food industry prepares and manufactures food varied widely. Only around one-tenth of the public feel that they have a good knowledge, whilst almost four-tenths indicated that they have a reasonable basic knowledge. Almost one-third described their knowledge as very patchy, while around two-tenths indicated that they feel they know little or nothing.

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<sup>8</sup> Respondents were asked this question prior to completing the knowledge test, so that their experiences of completing the latter would not effect their answers.

<b>Table 4-3 Self-assessed knowledge of how the food industry manufactures and prepares food</b>	
<i>Base: all respondents</i>	
<i>British Social Attitudes 2008</i>	
	%
I know little or nothing	21
My knowledge is very patchy-I know a bit about the areas that concern me but no more	31
I have a reasonable, basic knowledge	38
I have a good knowledge	9
Don't know	+ <sup>9</sup>
<i>Unweighted base: 2,250</i>	
<i>Weighted base: 2,247</i>	

How do self-assessed knowledge levels tally with our objective measure of individual knowledge of food technology? A comparison of individuals' self-assessed knowledge levels and scores attained on the knowledge test is presented in Table 4-4 below. This clearly demonstrates that self-assessed and objectively-measured levels of knowledge about food technology are strongly linked. While almost four-tenths of those who obtained a low score on the knowledge quiz claimed to know little or nothing about this area, this was the case for around two-tenths and less than two-tenths of middle and high scorers respectively. On the other hand, just 35 per cent of low scorers felt that they had at least a reasonable basic knowledge of this area, compared to 45 per cent and 57 per cent of middle scorers and high scorers respectively.

However, as well as a considerable degree of linkage between self-assessed and objectively-measured knowledge levels, these comparisons also highlight the fact that some groups of the public are over and under confident in their perceptions of their own understanding; for instance, more than one-tenth of those who attained a high score felt that they knew little or nothing about this area, while over a third of those who attained a low score felt that they had at least a reasonable basic knowledge. As has been found previously in the literature on self-assessed knowledge in relation to scientific and technical disciplines, it is likely that individuals have very different perceptions of what constitutes a "basic" or a "good" knowledge in this area; it may even be that those who know most set the bar for a 'good' knowledge even higher than those who do not, as they are aware of the extent of the detail with which they are not familiar. For this reason, when examining variation in levels of public knowledge, we focus on our objectively-measured knowledge measure, on which all respondents are measured on the same basis.

<sup>9</sup> The symbol '+' indicates that the percentage in question is less than 0.5%.

**Table 4-4 Knowledge scores, by self-assessed knowledge of how the food industry prepares and manufactures food**

Base: All respondents

British Social Attitudes, 2008

Self-assessed knowledge	% low scores (0-2)	% middle scores (3-4)	% high scores (6-7)	% All
I know little or nothing	36	21	15	21
My knowledge is very patchy-I know a bit about the areas that concern me but no more	29	34	30	31
I have a reasonable, basic knowledge	32	37	43	38
I have a good knowledge	3	8	13	9
<i>Unweighted base: 2,250</i>				
<i>Weighted base: 2,247</i>				

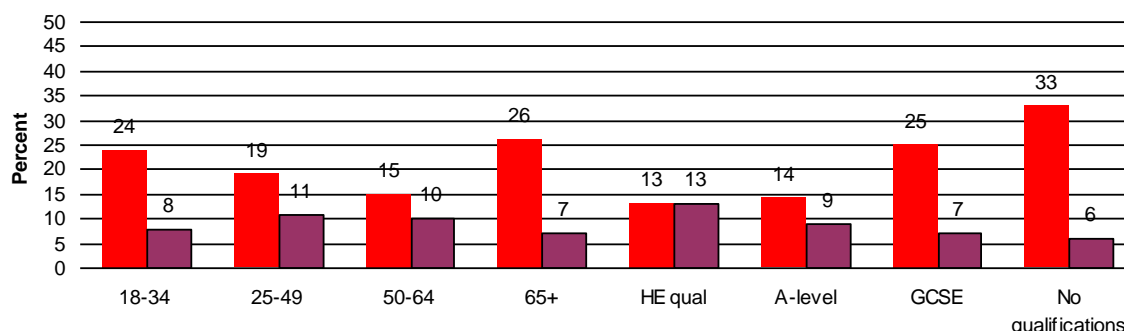
It is worth considering first which groups of the public provided particularly high and low assessments of their own knowledge. In this analysis, we primarily focus on the 21 per cent of the public who feel that they know little or nothing about the way the food industry prepares and manufactures food; trends for the nine per cent of the public at the other end of the spectrum, who feel that they have a good knowledge of this area, have also been analysed and, in most instances, are directly inverse.

It is interesting to note that there are no significant differences in perceived levels of knowledge by sex, with men and women providing almost identical assessments of their knowledge levels in relation to how the food industry prepares and manufactures food. However, the same is not true of age. As demonstrated in Figure 4-1 below, there is a clear curvilinear relationship, with those in the youngest and oldest age groups being most likely to think that they know little or nothing about this topic, and those in the middle age ranges viewing themselves as comparatively well-informed; the reverse of this trend is reflected, less markedly, in the proportions of each group who feel that they have a good knowledge of this area. Self-assessments of knowledge in relation to the industry's preparation and manufacturing of food are also strongly linked with socio-economic status, measured by household income, and educational qualifications. Thirteen per cent of those in the highest income quartile felt they had little or no knowledge of this topic, less than half the proportion (29 per cent) in the lowest income quartile who stated this. Differences relating to the highest educational qualification obtained by the individual were similarly stark; as shown below, slightly more than one-tenth of those with a qualification from higher education felt they had little or no knowledge of this area, compared to around one third of those who had not attained any educational qualifications. Conversely, the proportion of those who had a qualification from higher education who felt they had a good knowledge of this area was more than double that amongst those with no qualifications.

**Figure 4-1 Self-assessed knowledge, by age and education**

Base: All respondents

■ Thinks knows little or nothing ■ Thinks has a good knowledge



In addition to demographic characteristics, it was envisaged that perceived knowledge of how the food industry prepares and manufactures food would be likely to relate to actual involvement with food – measured on this survey through involvement in food shopping. As we might expect, self-assessed knowledge of how the food industry manufactures and prepares food increases with greater levels of involvement in food shopping; around two-tenths of those who do all or most of the food shopping feel they have little or no knowledge about how food is prepared and manufactured (21 per cent), compared to slightly more than three-tenths of those who never engage in this activity (31 per cent). It may be that those who have more direct contact with food, through shopping and cooking, are simply more confident in their knowledge of this topic, even if they know comparatively little of its technological aspects.

#### 4.4 Interpreting knowledge test scores: the impact of “don’t knows”

We now move on to consider variations in knowledge of food technology across the public, using our calculated knowledge test score presented previously, where each respondent was generated a score of between zero and seven, based on the number of items that were answered correctly.

However, before proceeding with this analysis, it is worth considering the extent to which this calculated test score is likely to accurately reflect respondent knowledge. The fact that, in some cases, respondents might have guessed at individual answers, has been discussed previously; while this may have led our data, reported above, to over-state levels of public knowledge about individual items, and in general, it might also be that some respondents stated “don’t know” when they had some suspicion as to what the correct answer was, which

conversely could understate levels of public knowledge. Therefore, we cannot necessarily conclude whether our test scores, which are necessarily approximate, over or under-state levels of public knowledge of food technology in general.

However, it is important that we also consider the issue in relation to specific sub groups of the population. There is a substantial literature on the measurement of knowledge through such objective “tests” as that reported above, which demonstrates that certain groups are more likely to state that they “don’t know” an answer when this is in fact the case, whilst other groups are more likely to take a “blind guess”. Notably, men have been shown to have a greater propensity to guess at answers to multiple-choice quizzes than have women (Mondak and Anderson, 2003). As our knowledge score awards a point for each correct answer (however this was arrived at), whilst awarding no points for those respondents who stated “don’t know”, we could potentially be over-estimating the knowledge of those groups with a greater propensity to guess at answers who, due to chance, will arrive at the correct answer approximately half of the time.

Analysis of the proportions of different groups defined by demographic characteristics who answered “don’t know” to three or more items highlights some clear differences in the propensity of different groups to select this answer. Overall, 34 per cent of respondents indicated that they did not know three or more of the knowledge test items. Reflecting the tendency identified in the existing literature, women were significantly more likely than men to select “don’t know”, with 36 per cent of women selecting this answer three or more times, compared to 32 per cent of men. However, much starker differences are evident in relation to age and educational qualifications. While identical proportions of respondents from the three lowest age groups indicated that they did not know an answer to a test item on three or more occasions, those aged 65 years and over were much more likely to do this (44 per cent, compared to 31 per cent of each of the other three age groups). Most notably, more than twice as many respondents with no educational qualifications answered “don’t know” on three or more occasions (50 per cent) than did those with a qualification from higher education (23 per cent). Obviously, it may be that women, older age groups and those with fewer educational qualifications simply did not know more of the answers than the other groups, and that the data reported above are essentially indicative of this fact. However, we should also bear in mind that these groups may have a lower propensity to guess than, for instance, men and those with the highest educational qualifications; it may therefore be that the variations in public knowledge of food technology, reported below, are over-stated in relation to groups defined by these demographic characteristics. Nevertheless, such is the level of significance of the differences reported below that, even were the extent of blind guessing exerting an

impact, we would anticipate that these differences would endure, were this tendency to be corrected for.

#### **4.5 Variation in levels of public knowledge of food technologies**

We now turn to consider whether knowledge of food technology, as measured objectively by our knowledge test, is evenly spread across the public or if certain groups are comparatively more and less knowledgeable. In this discussion, we primarily focus on the 19 per cent of the public who attained a low score on the knowledge test, answering less than three of the items correctly, as this is the group whose knowledge levels have the most potential to be improved upon. However, as highlighted at a number of points below, analysis has shown that the differences reported are directly inverse for the section of the public who attained the highest test scores.

Logically, we might anticipate that an individual would acquire knowledge about food technology either through their formal education, particularly in science or food technology, or through their day-to-day lives, in terms of their involvement in purchasing and cooking food products or their particular interest in engaging with media and public discussion in relation to this area. It therefore comes as no surprise that those with higher educational qualifications tended to perform better on the knowledge test. Almost three times as many of those with no qualifications, as compared to those with a qualification from higher education were low scorers on the quiz – 35 per cent compared to 11 per cent. A greater experience of formal education is likely to have provided those with a degree or other qualification from higher education with more experience of interpreting complex and technical subject matter, such as that relating to food technologies, as well as more actual knowledge about some of the scientific processes and ingredients asked about in the knowledge test.

Socio-economic status is known to relate closely to education; therefore, it is not surprising to note that those on a higher income have comparatively higher levels of knowledge of food technology, compared to those on a lower income. Around one-tenth of those in the highest income quartile were low scorers on the quiz (11 per cent) compared to three-tenths of those in the lowest income quartile (31 per cent). Although they have no obvious direct connection with the processes of acquisition of knowledge about food technologies, three other demographic characteristics also made a difference – age, sex and ethnicity.

Knowledge of food technology clearly declines with age, with 17 per cent of those aged between 18 and 34, compared to 29 per cent of those aged 65 years and

over, attaining low scores on the quiz. Though the difference is less marked, women were also more likely to exhibit lower levels of knowledge compared to men – 21 per cent of women were low scorers on the knowledge test, compared to 17 per cent of men. Finally, those from a non-white ethnic group were more likely to attain a low score on the test than those from a white ethnic group – 24 per cent compared to 18 per cent. It seems likely that these differences may result from the fact that women, older age groups and those with a non-white ethnicity are over-represented in other groups which have a comparatively low knowledge of food technology – for instance, education levels are known to be higher among younger age groups, who had benefited from the recent expansion of higher education. It may be that the tendency, until recently, for men to more frequently study for scientific and technological qualifications compared to women, explains some of the variation in their levels of knowledge in relation to this area. Similarly, there is substantial evidence to suggest that men have a greater interest in and knowledge about technological topics in general than do women, which they may be able to apply in interpreting information about food technologies. Nevertheless, the difference by sex is slightly surprising, given that women tend to be more involved in the purchasing and cooking of food than do men – activities that would bring them into direct contact with some of the food products and processes developed as a result of food technology. We have seen previously that women tend to be much more involved in shopping for food than do men; however, it is interesting, and perhaps unexpected, to note that involvement in food shopping appears to make little difference to objectively-measured levels of knowledge of food technology.

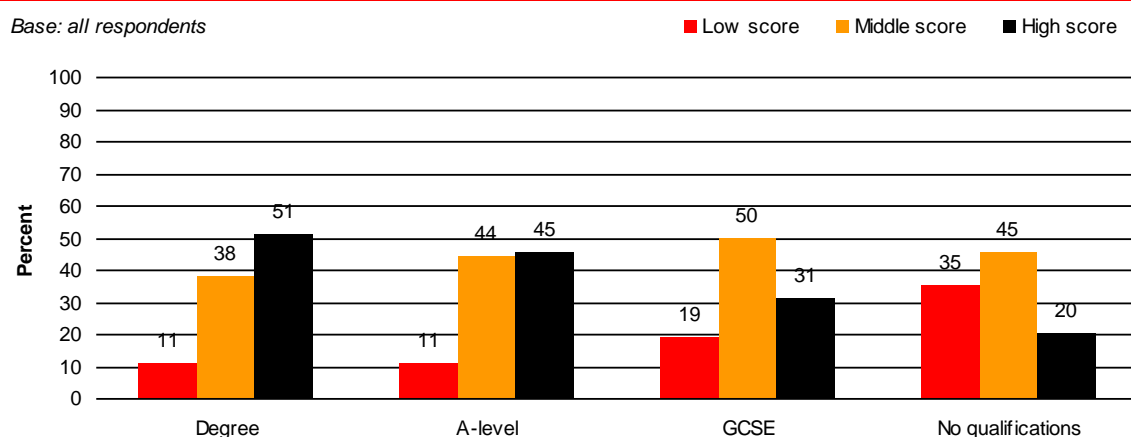
As noted previously, several of the five demographic characteristics shown to be associated with levels of knowledge about food technologies (age, sex, income, education levels and ethnicity) are known to be related to one and other. For this reason, multivariate analysis in the form of logistic regression was undertaken, to try to identify those characteristics that link to objectively-measured knowledge levels in this area, even when their links with the other associated characteristics have been controlled for. The results of the regression analysis are presented in the appendix to this chapter<sup>10</sup>. These indicate that only education and income remain significant predictors of knowledge levels in relation to food technology, once the interactions between all the factors initially identified as being significant were controlled for; the proportions of individual groups defined by the variables that remained significant in our model who attained low, middle and high score on the knowledge test are presented in Figure 4-2 below.

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<sup>10</sup> For the multivariate analyses reported in this chapter and in all subsequent chapters, the logistic regressions were run using the “Enter” method in SPSS, with those variables that were shown to be associated with the dependent variable in the bivariate analysis being included in each model.

These findings suggest that formal education (itself strongly correlated with socio-economic status, measured by income) is key in determining levels of knowledge in relation to food technology – and that knowledge in this area might be acquired through this avenue, rather than through more direct contact and involvement with food. However, it should be born in mind that knowledge of food technologies may not have been acquired directly through formal education – but that this may have equipped the individual with the necessary skills and interest levels in order to absorb information on this topic. This would seem to suggest that, as levels of education rise as more generations come to benefit from compulsory education up to age 16 and the recent expansion in higher education, knowledge in relation to this area might be expected to increase.

**Figure 4-2 Knowledge test scores, by highest educational qualification**



## 4.6 Understanding links between different measures of public knowledge

Self-assessed and objectively-measured levels of knowledge of how the food industry manufactures and prepares food (and the specific use of technologies in this area) vary markedly across the public. Whilst we have previously seen that the two measures are strongly correlated, are there certain groups who are over-optimistic in their own knowledge of this area or, conversely, who know more than they think they do? And do those groups identified previously who are more likely to state that they “don’t know” an answer to a question genuinely know less about this area?

Before considering these questions, we should bear in mind that the topics measured by the objective knowledge test and the self-assessment provided by respondents differed slightly. The “way the food industry prepares and manufactures food nowadays” could cover a broader range of areas than food

technology including, for example, more traditional types of cooking and food preparation. We might therefore expect those with a good knowledge of this area to assess their knowledge more highly than their test answers in relation to food technologies would imply is accurate.

Table 4-5 below compares levels of self-assessed knowledge, objectively-measured knowledge and the propensity to offer “don’t know” as an answer to individual test items, for key demographic groups highlighted as significant by the previous bi-variate analyses. This summary data highlights a number of key trends. All those groups who were more likely to state “don’t know” in response to individual test items also, with the exception of women, provided lower self-assessments of their own knowledge in relation to how the food industry prepares and manufactures food. This clearly implies that those groups who frequently answer “don’t know” are less confident about their own knowledge levels and are likely to be right in being so (though the extent of differences in objectively-measured levels of knowledge may obviously be over-stated by their greater propensity to select “don’t know”). Secondly, not all groups’ self-assessments of their knowledge in relation to the preparation and manufacturing of food were accurately reflected in their test scores. Specifically, men were more likely to obtain high scores, but were not any more confident in assessing their own knowledge levels than were women. Conversely, those who are responsible for all or most of the food shopping gave higher assessments of their own knowledge levels than were warranted by their test scores. It may be that those who are more involved with food, through involvement in shopping for food products, are more confident that this is a topic which, in general, they know about, particularly as the self-assessed measure of knowledge has a far broader focus.

**Table 4-5 Characteristics associated with different measures of knowledge of food technology***Base: All respondents**British Social Attitudes, 2008*

	Self-assessed knowledge	Objectively measured knowledge	Propensity to answer "don't know"
Sex(men)	No difference	More likely to score highly	Less likely to say don't know
Age (65 years and over)	Gave lower assessments	Less likely to score highly	More likely to say don't know
Education (no qualifications)	Gave lower assessments	Less likely to score highly	More likely to say don't know
Income (lowest quartile)	Gave lower assessments	Less likely to score highly	More likely to say don't know
Involvement in food shopping (does all / most of shopping)	Gave higher assessments	No difference	No difference

## 4.7 Conclusions

Public knowledge of food technologies can be characterised by a considerable degree of variation. Knowledge of individual technologies appears to be greater when these have received considerable public coverage or discussion or are common-place within the individual's lived experiences. In general, knowledge of food technology varies dramatically across different sections of the public, with those who are older and have few qualifications being particularly likely to exhibit low levels of knowledge in this area. The acquisition of qualifications from formal education emerges as the key factor that appears to encourage knowledge (or the ability to acquire and retain knowledge) in this area; this appears to exert a much greater influence than direct contact or involvement with food, measured in relation to food shopping. The public appear to have a relatively good understanding of how much they know, and do not know, in relation to this area, with those groups who know little exhibiting a low level of confidence in their own knowledge. Clearly, all of these factors are likely to inform attitudes to food technologies, as different sections of the public are clearly starting from varying positions in relation to this topic, having very different levels of understanding, and confidence in their knowledge of what these involve. Thus, knowledge levels will be a key factor to consider when interpreting and understanding public attitudes to food technology, both in general and in relation to specific products.

## Appendix

### Regression tables

**Table 4-6** Logistic regression of low knowledge score (<3 items answered correctly)

Base: All respondents

British Social Attitudes,  
2009r

	coefficient	standard error	p value
<b>Highest education qualification (no qualifications)</b>			
Degree	-1.15**	0.18	0.000
A-level	-1.22**	0.21	0.000
GCSE	-0.60**	0.15	0.000
<b>Income (£44,000+)</b>			
(less than £12,000)	0.90**	0.22	0.000
£12,000-£22,999	0.40	0.22	0.073
£23,000-£43,999	0.15	0.21	0.489
Not known	0.80**	0.21	0.000
Cox and Snell R <sup>2</sup> .071			
Unweighted base: 2014			
Weighted base: 2014			

\*=significant at 95% level \*\*=significant at 99% level

## 5 Public support for innovation in food technology

- Over half the public (54%) agree that research and development in food technology should be supported, even if a lot of money would need to be spent. However, only one-tenth (11%) strongly agree with this view. Almost three-tenths neither agree nor disagree, suggesting many do not have a strong opinion on this matter.
- Rather than having a consistent attitude to the funding of research in different scientific fields, the public's attitudes are highly nuanced. They are generally more supportive of research and development in medicine (87%) – an area where research could be regarded as having the potential to yield more significant benefits than in food technology. However, they are considerably less likely to support research in mobile phone technology (13%) – which may be regarded as a less-essential area.
- Women, younger age groups, those on higher incomes and those with higher levels of educational qualifications are the least likely to support research and development in food technology.
- There is a strong link between attitudes to taxation in general, and support for research and development in food technology in particular, that may explain many of these sub-group differences. When considering whether research and development in food technology should be supported, it is clear that many are discouraged by the proviso that a lot of money would need to be spent.

### 5.1 Introduction

An individual's support for innovation in food technology could operate, and thus be measured, at a number of different levels, both general and specific as well as abstract and pragmatic. An individual could support the idea of innovation in food technology in the abstract, in terms of research and development activity in this area, but oppose particular technological developments and applications; further, they might view development in this area positively but not be necessarily willing for themselves or their families to purchase or consume all of the products created as a result of such activity. One of the limitations of existing research in this area is that it has tended to focus on attitudes to very specific processes and technologies (Brook Lyndhurst, 2009), rather than considering attitudes to innovation in food technology at the more general level.

This chapter will seek to address this gap in the evidence base by focusing on public support for and opposition to innovation in food technology at the broadest and most abstract level, that of research and development in this area. To place public attitudes to research and development in food technology within a relevant context, it will consider how levels of support for development activity in this area differ from those exhibited in relation to other scientific fields. In particular, it will explore whether individuals tend to support or oppose innovation in scientific fields per se, or if their attitudes are more nuanced. The chapter will then move on to consider the extent of variation in public support for innovation in relation to food technology. It will examine whether certain groups are more likely to support and oppose innovation in this area at the broadest level, and the possible reasons underpinning these differences.

## **5.2 Attitudes to research and development in food technology and other scientific areas**

We begin by examining levels of public support for innovation in food technology and how these compare to those exhibited in relation to other scientific fields of enquiry and application. Measuring public support for “innovation” in any particular area is inevitably highly problematic. Rather than asking about “innovations” or activities, both of which have very positive overtones, our questions focused on the more neutral topic of “research and development”, the activities that, in essence, underpin new technological developments in scientific areas. Inevitably, it would be easy to express support for the idea of research and development in a particular field, such as food technology, when asked about this in isolation. To gain a more balanced assessment of the public’s views, by bringing to mind one of the likely perceived drawbacks of such activity, we asked respondents to what extent they agreed or disagreed that:

“Research and development in food technology should be encouraged and supported, even if a lot of money would need to be invested.”

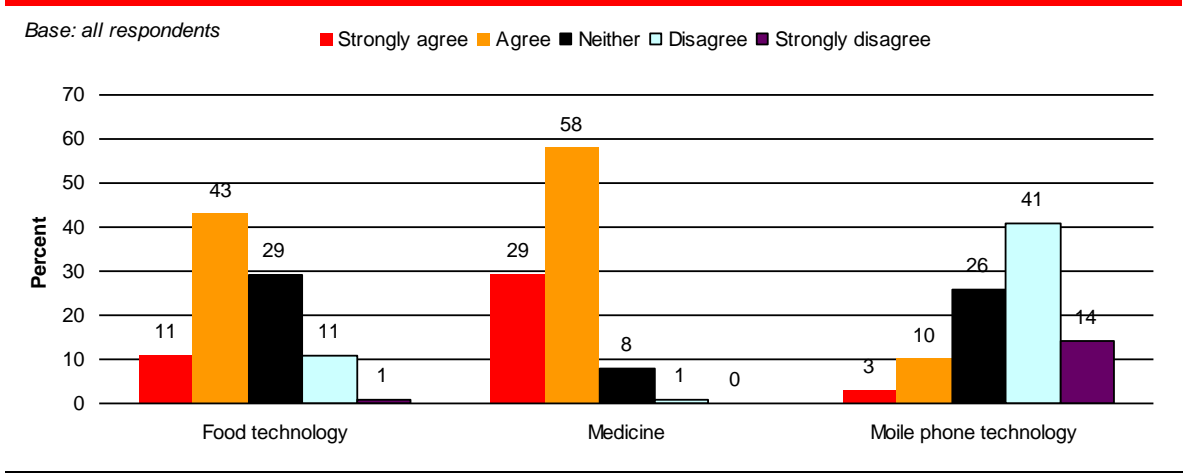
As shown in Figure 5-1, views about the desirability of research and development in food technology are mixed, with very small minorities expressing strong views on this issue. Whilst slightly more than half agree that research and development in this area should be encouraged, only 11 per cent strongly agree with this sentiment. Nevertheless, opposition is far more limited, with just 12 per cent disagreeing or strongly disagreeing that research and development in food technology should be encouraged. Around three-tenths indicate that they neither

agree nor disagree with this statement, indicating that a considerable minority have not formed a clear or consistent view on this issue.

Inevitably, responses to this statement may not only reflect public attitudes to research and development in food technology. An individual could potentially agree or disagree with this statement to express their approval or disapproval for research and development in general, for technological research in particular, or for the investment of large amounts of (potentially public) money, in what they might regard as a non-essential area. To understand attitudes to research and development in food technology within these broader contexts, we also asked respondents to what extent they agreed with similar statements, asking about medicine and mobile phone technology. These two technological fields were selected as it was envisaged that the former might be regarded as having the potential to yield greater human benefits than food technology while, for the latter, the opposite might be seen to be the case.

The answers obtained, also presented in the figure below, suggest that attitudes to research and development in food technology are not simply a function of attitudes to research and development in general or to technological research in particular. The public exhibit much stronger support for research and development in medicine, with nine-tenths (89 per cent) agreeing this should be supported and encouraged. On the other hand, while a considerable absence of strong opinion is evident in relation to research and development in mobile phone technology, as was the case with food technology, with almost a quarter neither agreeing or disagreeing that this should be encouraged, attitudes in general are far less supportive. Thirteen percent agree that such research should be supported and encouraged, whereas this was the case for more than half in relation to food technology. Clearly then, while attitudes to innovation in food technology at the most general level can be characterised as moderately supportive, with few expressing a strong opinion, this cannot simply be regarded as a reflection of public attitudes to research and development in general or technological research in particular.

**Figure 5-1 Agreement that research and development in different scientific areas should be encouraged and supported even if a lot of money would need to be invested**



### 5.3 Do individuals support or oppose innovation per se?

While the data reported above indicates a degree of variation in levels of public support for research and development activity in the different scientific fields investigated, it may be that these attitudes are mediated by perceptions of the desirability of innovation in general, and that those who are likely to support innovation in medicine and mobile phone technology are thus also much more likely to support this in relation to food technology. Alternatively, the perceived importance and potential of the different fields may be generating very different attitudes, within the same individuals, to research and development in the different areas.

To explore which of these explanations for variations in public attitudes to research and development in the three different scientific fields holds most weight, we compared responses to the two statements about medicine and mobile phone technology, with that about food technology. We have seen previously that 54 per cent of the public agree that research and development in food technology should be supported and encouraged. However, this was the case for 61 per cent of those who thought that development activity in medicine should be encouraged (analysis was not possible for those who did not feel research and development in medicine should be encouraged, given the small numbers involved). More markedly, 91 per cent of those who stated that research in mobile phone technology should be encouraged expressed this view in relation to food technology, compared to 46 per cent of those who did not support research in this area. Logically, technological developments in mobile phone technology could be regarded as having far less potential to benefit society than those in medicine and food – and the stark differences noted above may result from the fact that those

who support development activity in this area, are strongly in favour of technological developments per se.

Therefore, while our data clearly indicate that individuals hold different views towards research and development in different technological fields, there is clear evidence that it is not just attitudes regarding those fields, but attitudes to technological research in general, that are exerting an influence.

We next turn from variation within individual views, to consider variation across the public as a whole, in levels of support for development activity in the area of food technology.

#### **5.4 Variation in public attitudes to innovation in food technology**

Do the public as a whole hold fairly homogenous attitudes to research and development in food technology or do these vary substantially for different groups? Analysis of levels of agreement with the view that research and development in food technology should be encouraged was undertaken by a range of demographic characteristics, and a number of interesting differences emerged. Firstly, support for research and development in this area increases significantly with age. Around half of those aged between 18 and 34 agree that research and development in this area should be encouraged (51 per cent), compared to more than six-tenths of those aged 65 years and over (62 per cent). Men are also more supportive, with 60 per cent agreeing with the statement relating to research and development in food technology, compared to 48 per cent of women.

We have noted previously that support for development activity in food technology correlates strongly with support for such activity in other scientific and technological areas; there is evidence in the existing literature that men tend to have a greater enthusiasm and interest in these areas (Brook Lyndhurst, 2009), and it may be this factor that is contributing to higher expressed levels of support amongst men, compared to women. Education levels and socio-economic status also appear to make a difference, with those who are more educated and have the highest incomes being the least likely to be supportive. For instance, 15 per cent of those with a qualification from higher education disagree with the view that research and development in food technology should be encouraged, whilst only seven per cent of those with no qualifications state this. Similarly, 15 per cent of those in the highest income quartile, compared to nine per cent of those in the lowest income quartile disagree with this view.

As we will see in later chapters, the greater levels of support for development activity in food technology among those on lower incomes and with fewer educational qualifications are somewhat unusual, when we consider public attitudes to this topic as a whole. We therefore need to consider the possibility that different sections of the population are reacting differently to the caveat included in our question that “a lot of money would need to be invested”. It could be this proviso has had the effect of reducing the support of certain groups, to a greater extent than others. The British Social Attitudes survey consistently includes a measure of support for taxation and spending, with respondents being asked to consider the following situation:

“Suppose the government had to choose between the three options on this card. Which do you think it should choose?

(Reduce taxes and spend **less** on health, education and social benefits

Keep taxes and spending on these services at the **same** level as now

Increase taxes and spend **more** on health, education and social benefits)”

In 2008, the options of reducing taxes and spending, keeping these at current levels and increasing taxation and spending were supported by seven per cent, 51 per cent and 40 per cent of the public respectively. However, when we compare these attitudes to levels of support for research and development in food technology, as presented in Table 5-1, a considerable degree of correlation between attitudes to the two issues emerges. In particular, those who do not support the view that research and development in food technology should be encouraged are twice as likely to think that taxes and spending in general should be reduced, compared to those who support development activity in this area – 14 per cent compared to seven per cent.

It is also interesting to note that those who neither agree nor disagree that research and development in food technology should be supported, are also more likely to express a neutral view with regards to spending and taxation in general; around six-tenths of those who neither agree nor disagree that research and development in food technology should be encouraged also express this view in relation to taxation and spending in general, compared to less than five-tenths of those who express support or opposition for development activity in this area. This group may have selected the neutral position in both instances, due to an absence of strong views about the topics of taxation and research and development in food technology. Thus we can conclude that, to some degree, attitudes to research and development in food technology are influenced by views about the spending of public money in general, particularly for those who hold a position of opposition, or a view that is less strong or unformed, in relation to this

subject. This may also explain why those on higher incomes, who are known to be more likely to oppose an increase in taxation and spending, are more likely to oppose research and development in food technology. However, it should be borne in mind that some respondents at least may have answered the question about research and development in food technology, assuming that this would be undertaken using private funds (and thus their own views on current taxation levels may have had little impact).

**Table 5-1 Support for research and development in food technology, by attitudes to taxation and spending**

Base: all respondents

British Social Attitudes 2008

Research and development in food technology should be encouraged		Attitude to tax and spending		
		Reduce taxes and spending	Keep taxes and spending at current levels	Increase taxes and spending
Agree	%	7	49	42
Neither agree nor disagree	%	3	59	35
Disagree	%	14	45	41
All	%	7	51	40
<i>Unweighted base:</i>		70	489	404
<i>Weighted base:</i>		63	492	385

As many of the factors shown to link with levels of support for research and development in food technology are known to be linked to each other, multivariate analysis, in the form of logistic regression, was undertaken to determine which of these factors independently link with attitudes in this area, once their relationships with one and other have been controlled for. The results of this analysis are presented in the appendix to this chapter. It is interesting to note that general attitudes to taxation and spending and education levels emerge as the only two significant factors that link with public attitudes to research and development in food technology, once their relationships with other characteristics have been controlled for. This suggests that attitudes to research and development in food technology are strongly mediated by considerations relating to the costs of such activity. In addition, the findings of the multivariate analysis suggest that the fact that those with higher levels of educational qualifications are more likely to oppose research activity in this area is not simply a consequence of the fact that education and income levels are known to be linked with attitudes to taxation and spending. On the other hand, these findings also imply that the lower levels of support witnessed amongst younger age groups may simply be a result of the fact that these groups are more likely to be opposed to increased public spending. In other words, attitudes to research and development in food technology strongly relate to the practical context in which this work would be undertaken, with respondents

considering not only its advantages, but its potential drawbacks in terms of an increased level of public spending.

## **5.5 Conclusion**

Attitudes to innovation in food technology, at the most general and abstract level, can therefore be characterised as varied and moderate, with around one third not having a clear view on this issue and only around one-tenth of the public strongly supporting development activity in this area. To a considerable degree, attitudes to research and development in food technology are linked to views about research and development in scientific and technological fields in general, and the public funding of such activities; we clearly cannot interpret attitudes to innovation in food technology simply as indicative of views about developments in that specific area, considered in a vacuum. The fact that attitudes to research and development in food technology are clearly linked to attitudes to scientific research in general, and to public spending, provide further weight to the view that opinions about this topic in isolation are not well-formed and often do not reflect strong convictions about this topic – meaning that, in a real-life context, other considerations pull a greater weight. It will be interesting to consider whether this is still the case when we consider innovation in food technology in a much more specific and personal context – that of the individual eating products developed using specific technologies. This is examined in the next chapter.

## Appendix

### Regression tables

**Table 5-2** Logistic regression of agreement with view that research and development in food technology should be supported

Base: All respondents

British Social Attitudes,  
2008

	coefficient	standard error	p value
<b>Highest education qualification (no qualifications)</b>			
Degree	-0.83*	0.33	0.012
A-level	-0.94*	0.37	0.010
GCSE	-0.38	0.36	0.286
<b>Attitude to taxation and spending (increase taxes and spending)</b>			
Reduce taxes and spending	-0.93**	0.35	0.009
Keep taxes and spending at the same level	0.26	0.23	0.249
Cox and Snell R <sup>2</sup> .026			
Unweighted base: 814			
Weighted base: 814			

\*=significant at 95% level \*\*=significant at 99% level

## 6 Attitudes to food technology: products and processes

- There is considerable diversity in levels of public concern about eating food products created using processes and ingredients. 59% are very or fairly concerned about the use of gases in bags of ready-to-eat salad leaves whereas 23% are concerned about the addition of a component found in vegetable oil to products such as Benecol.
- Around half of the public would not buy various hypothetical food products, even when these would yield specific health advantages.
- Familiarity with the terminology of food technologies appears to reduce levels of public concern. 31% are concerned about eating a food produced using microwaving, whereas 57% express this view when asked about a magnetron (a less well-known term for a microwave). In both cases, respondents had been presented with identical descriptions of the actual process involved.
- Knowledge of food technologies also links with levels of concern. Just 30 per cent of those who answered five or more test items correctly are concerned about three or more of the products, compared with 43 per cent of those who answered three or four items correctly and 50 per cent of those who answered less than three items correctly.
- Attitudes and behaviour in relation to food technologies are not always consistent. 51% of those who buy ready-to-eat salad leaves are nevertheless very or fairly concerned about the process involved in their production.
- Attitudes to food technologies vary markedly across the public. The following characteristics predict a high level of concern – having less knowledge about food technologies, being older, being female, having a low income, a lack of willingness to try new types of food and having a high level of concern about food safety in general.

### 6.1 Introduction

This chapter moves beyond attitudes to innovation in food technology in general, to explore public attitudes within a number of very precisely-defined and practical contexts. Nevertheless, one of the key aims of this exploration will be to identify general patterns in levels of support, opposition and concern, and to consider how widely these can be applied to predict current and, potentially, future attitudes in this area.

The chapter focuses on public concern about eating food products created using a range of ingredients and processes, some real and others hypothetical. It explores public attitudes to a range of food products currently available in Britain and considers to what extent these are homogenous. To better understand the influences behind levels of public concern about individual products, the chapter considers which advantages and disadvantages of food products tend to engender high levels of public enthusiasm and concern, and the impact of familiarity with a product on levels of concern about it. It also considers the relationship between attitudes, knowledge and behaviour in this area. Finally, the chapter will seek to identify the extent and nature of variation in public attitudes. It will examine if particular sections of the public are more likely to express concern about food products and consider the possible reasons for this.

## 6.2 Attitudes to food products

To explore public attitudes to specific food products and processes, respondents were presented with detailed descriptions of five processes or ingredients and were asked how concerned they would be, either if the process described was part of the production of a product that they ate regularly, or about eating a food that contained that particular ingredient. The five products and processes asked about were bags of ready-to-eat salad leaves, fresh fruit juice, microwaving, Benecol and Quorn<sup>11</sup>, Respondents were presented with the following descriptions:

“A process is used to produce bags containing ready-to-eat salad leaves. This involves filling the bags with gases that control the growth of bacteria and keep leaves fresher for longer.

It is possible to increase the shelf-life of products such as fresh fruit juice by putting them under high pressure. Some people think using high pressure retains the flavour of the food more than pasteurisation using heat.

A microwave is a device in which food can be exposed to radiation to heat it and kill bacteria before eating.

A range of products including Benecol have been developed that contain a concentrated variety of an ingredient found in vegetable oil that lowers levels of cholesterol found in the blood.

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<sup>11</sup> For three of the products, two different question variants were available, with half of the sample in each instance being randomly assigned to each. The main distinction between the two question variants was that the name of the familiar product or process was used in one version, but not in the other. The initial analysis Food Technologies, Findings from 2008 BSA 65

There is an ingredient called Quorn available that provides a non-meat source of protein grown in large tanks using a processed edible fungus and added to a variety of products.”

In each case, respondents were then asked how concerned they would be eating a product created using the relevant process or ingredient, Thus, having being provided with the descriptions of the ingredients added to products such as Benecol and Quorn, respondents were then asked:

“How concerned would you be about eating food that contained this ingredient?”

On the other hand, after being presented with the descriptions of the use of gases in the production of bags of ready-to-eat salad leaves and high pressure pasteurisation in the production of fresh fruit juice, respondents were asked:

“If this process was part of the production of a food which you eat regularly, how concerned would you be?”

Finally, after the process of microwaving was described to respondents, they were asked:

“How concerned would you be about eating food prepared using this device?”

As shown in Table 6-1, there is considerable diversity in levels of public concern about eating food products developed using the different ingredients and processes. In each case, a substantial majority, at least seven-tenths, express some level of concern (albeit very, fairly or not very concerned), with minorities of between one-tenth and three-tenths indicating they are not at all concerned. As well as displaying widespread public concern, albeit often fairly moderate, about the use of technologies in food production, these data also indicate that attitudes to this issue are highly nuanced, and vary substantially, depending on the process or ingredient being considered. The process used in the production of bags of ready-to-eat salad leaves attracts the greatest level of concern, with six-tenths indicating they are very or fairly concerned about this, while the ingredient used to develop products such as Benecol attracts the least, with only slightly more than two-tenths expressing this level of concern. The low level of concern about the

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reported below relates solely to those respondents who were asked the questions with the product or process being named, as indicated in the question wording presented.

process used in the production of products such as Benecol reflects the finding of previous research that such “functional” foods, developed in order to provide a specific health benefit to the public, generally attract less concern than those produced in order to yield non health-related benefits, either to consumers or producers (Brook Lyndhurst, 2009). The processes involved in the production of fresh fruit juice and Quorn, and in microwaving, emerge as a matter of considerable concern for around one third of the public in each case – with 37 per cent, 35 per cent and 31 per cent respectively indicating that they are very or fairly concerned. It should be noted that levels of concern might be influenced by the description of the process or technology described, rather than or addition to the actual process itself; for instance, the use of the word “fungus”, whilst being technically accurate, may hold negative connotations for sections of the public and effect the levels of concern expressed about Quorn.

**Table 6-1 Public concern about food products developed using technology**

Product or process		Very concerned	Fairly concerned	Not very concerned	Not at all concerned	Unweighted base <sup>12</sup>	Weighted base
Bags of ready-to-eat salad leaves	%	22	37	29	10	2250	2247
Fresh fruit juice.	%	10	27	45	16	2250	2247
Microwaving	%	11	20	43	26	1121	1125
Benecol	%	6	17	49	26	1119	1119
Quorn	%	17	18	36	26	1104	1104

### 6.3 Benefits and risks of products

We next turn to consider the characteristics of food products that might influence levels of public concern about purchasing or consuming them. One factor that might potentially influence levels of public concern about the use of particular technologies in food production is the potential benefits that the resulting food products provide to the public. In the descriptions of the five food products discussed previously, clear benefits to the consumer are stated explicitly or are implied in each case - for fresh fruit juice and bags of ready-to-eat salad leaves, a longer shelf life; for microwaving, the convenience of being able to heat food quickly and the health benefit of ensuring that bacteria has been killed; for Quorn, convenience in terms of the provision of an alternative protein substitute to meat, and for Benecol, health benefits in terms of the reduction of cholesterol. Previous research has shown that levels of concern about particular food products are

<sup>12</sup> Bases for the items asking about microwaving, Benecol and Quorn are lower as a random half of the sample in each case was routed to an alternative variant of the question, excluding the name of the familiar process or product. Comparison of these answers with those obtained in response to the alternative question variants are presented later in the chapter.

partly formed as the result of a risk-benefit assessment by the consumer, which tend to prioritise possible positive and negative impacts on health (Brook Lyndhurst, 2009). It therefore may not be coincidental that Benecol, the only one of our five products to yield a health benefit to consumers, attracts the least amount of concern. Nevertheless, it should be borne in mind that, while the potential benefit of each product was described, it was not stated explicitly that this offered an advantage to the purchaser or consumer of the product (respondents would have needed to draw this conclusion themselves). To determine more precisely the impacts of particular benefits and drawbacks on levels of public concern about specific products, it was envisaged that these would need to be asked about with the central factor, the identity of the product itself, remaining constant.

For this reason, we described to respondents two hypothetical food products that could be developed using processes and ingredients, each of which would yield a particular benefit to the consumer. The hypothetical products presented to respondents were as follows:

“Imagine an extremely low calorie cake. It tastes the same and looks the same as conventional cake sold in the supermarket but has had an extra ingredient added to reduce the number of calories it contains

Imagine a sausage that helps reduce the risk of high blood pressure, which tastes the same and looks the same as normal sausages sold in the supermarket. It would be available in meat and vegetarian varieties. The sausage could be produced by adding ingredients which have been medically proven to reduce the risk of high blood pressure”

Respondents were asked whether they would buy the described product in each case. With the exception of those respondents who indicated that they “definitely would not”, respondents were then asked whether they would buy the product in scenarios where it had particular associated disadvantages, compared to its traditional equivalent – specifically in terms of cost and shelf-life. As shown in Table 6-1, enthusiasm for the hypothetical products is by no means universal, even when no disadvantages to the purchaser are explicitly identified. Fifty-three per cent of the public would buy the extremely low calorie cake rather than traditional cake while 63 per cent would buy the sausage that helps reduce the risk of blood pressure, rather than a traditional sausage. In other words, almost half of the public would not buy each product even when a cost-benefit assessment would suggest its impact were neutral, (if they were not interested in the health advantage yielded) or positive. It should be borne in mind that, whilst no

disadvantages were explicitly stated in the product descriptions, respondents may nevertheless have anticipated certain drawbacks, such as a higher cost, which may have influenced their initial responses. In addition, there are likely to be a minority of respondents who would not buy the hypothetical products simply because cake or sausages are not products that they would ever have an interest in purchasing<sup>13</sup>.

Nevertheless, it may be that a lack of familiarity with the products and the ways in which they are produced would put substantial numbers off purchasing them, rather than the more familiar alternative; this will be key to our consideration of the impact of familiarity on attitudes to food products in the next section. When potential drawbacks to the products were highlighted in subsequent questions, public support reduced even further. Around four-tenths of the public would still buy the extremely low calorie cake, even if it were more expensive than traditional cake (39 per cent) or had a shorter shelf-life (41 per cent). Similarly, around half would buy the sausage that reduces the risk of blood pressure, even if it were more expensive (52 per cent) or had a shorter shelf-life (50 per cent). It is interesting to note that, in both cases, whilst the proportions who would buy the product decline by around 10 per cent once specific disadvantages are cited, the proportions who would definitely buy the product almost halve. In each case, this is caused by around one third of the respondents who initially stated that they “definitely would” buy the product, down-grading their response to “probably would”. For instance, among those who stated that they “definitely would” buy the low calorie cake, 54 per cent still provided this response once the drawback of a higher cost was highlighted, while 34 per cent indicated they “probably would” buy the product. Only around one-tenth were sufficiently influenced by this consideration to stated that they “probably would not” (nine per cent) or “definitely would not” (two per cent) buy the low calorie cake. This pattern is almost exactly replicated when respondents are informed that the cake has a shorter shelf-life, and when these two disadvantages are highlighted for the sausage that reduces the risk of high blood pressure. In other words, non health-related advantages appear to have the impact, for the majority, of moderating responses, rather than fundamentally altering these.

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<sup>13</sup> For the sausage that reduces the risk of high blood pressure, we tried to minimise the impact of this by stating that it would also be available in vegetarian varieties.

**Table 6-2 Attitudes to buying hypothetical food products, with particular benefits and drawbacks**

Process or product		Definitely would	Probably would	Probably would not	Definitely would not	<i>Unweighted base</i>	<i>Weighted base</i>
<b>Extremely low calorie cake</b>							
Would buy rather than traditional cake	%	23	30	23	24	2250	2247
...even if it were more expensive	%	12	27	24	35	2250*	2247
...even if it had a shorter shelf-life	%	13	28	24	35	2250	2247
<b>Sausage that helps reduce the risk of blood</b>							
Would buy rather than traditional sausage	%	26	37	20	15	2250	2247
...even if it were more expensive	%	14	38	24	23	2250	2247
...even if it had a shorter shelf-life	%	14	36	23	25	2250	2247

\* In both cases, it was assumed that those respondents who stated that they “definitely would not” buy the hypothetical product, as originally described, would have also provided this response when certain associated disadvantages were stated (though they were not asked the follow-up questions explicitly). This approach was taken to determine the proportion, amongst the public as a whole, who would buy each hypothetical product in particular scenarios.

The fact that interest in buying the products reduces by an almost identical degree, when a negative consequence for cost or shelf-life is highlighted, suggests that neither of these aspects stands out as a particularly important drawback for the public as a whole. Moreover, the small reductions in the overall proportions of the public who would purchase each product when specific disadvantages are stated, suggests the perceived importance of the positive health impacts which initially encourage interest may outweigh any perceived negative impacts of a higher cost or reduced shelf-life. To examine the importance attached to the stated health benefits further, we analysed the responses of those to whom the stated health benefits in each case were likely to be particularly important – those in poor health, in relation to the sausage that reduces the risk of blood pressure, and those on a diet to lose weight – in relation to the extremely low calorie cake. In the latter case, those who are dieting to lose weight were much more likely to indicate that they would buy the extremely low calorie cake – 73 per cent stated this, compared to 49 per cent of the majority of the public, who are not on such a diet. However, willingness to buy sausages that reduce the risk of high blood was fairly even amongst those who rated their own health as very good, good, fair or bad. It may be that we would need a specific measure of high blood in order to ascertain to what extent this specific health concern would prompt interest in the sausage. Nevertheless, the importance of health-related benefits in determining the desirability of food products is clear.

## 6.4 Familiarity with products

As well as the potential benefits and risks of an food product, it was envisaged that the level of public familiarity with its terminology and usage might also link with Food Technologies, Findings from 2008 BSA 70

levels of concern; it was hypothesized that levels of concern about food technologies might, to some extent, reflect a fear of the unknown. The fact that almost half of respondents would not buy each hypothetical food product described above, even when an overall assessment of its benefits and risks could be regarded as neutral or positive, implies the existence of an innate concern about purchasing and consuming unknown food products, that may have little to do with the advantages and drawbacks they yield. It might be that the public are inherently concerned about food products about which they know little, and thus that their levels of concern about particular products are therefore, to some extent, a function of their familiarity, both with their terminology and usage.

To explore the extent to which this is the case, respondents were randomly assigned to two groups, for each of the questions asking about levels of concern in relation to microwaving, Quorn and Benecol. One half of respondents was asked a version of each question with the name of the product or process being stated, with the data for this group being reported above. The other half was asked an identical question, from which the product's name was omitted or, in the case of microwaving, with this being replaced with the word magnetron (a little-known technical term for a microwave)<sup>14</sup>. Table 6-3 below presents the levels of concern expressed about eating the products created using the three different processes or ingredients, separated for those who were told the commonly-known name of the product or process and those who were not.

What is clear from these data is that, regardless of the description of an process or ingredient provided, when this is attached to the name of a familiar product or process, levels of expressed concern are often much reduced. Most markedly, 57 per cent of respondents are very or fairly concerned about eating a food prepared using a magnetron, whereas this was the case for just 31 per cent of those who were asked about a microwave. Similarly, 52 per cent of respondents were concerned about eating a product such as Quorn when this was not explicitly named, compared to 35 per cent of those who were presented with the name of this product, alongside its description. It is interesting to note that, for Benecol, being told the name of this product made little difference to expressed levels of concern; 27 per cent of those who were presented with the description without Benecol being mentioned are very or fairly concerned, compared to 23 per cent of those whose description included this product's name. This may be a consequence of the fact that levels of public concern about Benecol are much lower overall, meaning the minority who do express concern have very specific reasons for this stance, that will not simply be eliminated by mention of the product

name. In addition, the description of the process used in the production of Benecol, involving the addition of an ingredient found in vegetables, appears potentially less frightening and “unnatural” than those relating to microwaving and Quorn – which refer to radiation and fungus respectively. What is clear from these data is that levels of concern about food technologies may, to a considerable degree, reflect a fear of the unknown. Hence, as well as the perceived advantages that they yield, an additional reason why the public may be more positive about certain products than others may simply be a consequence of their greater familiarity with their terminology and usage.

**Table 6-3 Levels of concern about different food products, by whether name of product identified**

Process or product		Very concerned	Fairly concerned	Not very concerned	Not at all concerned	Unweighted base	Weighted base
<b>Device in which food can be exposed to radiation to heat it and kill bacteria before eating</b>							
Identified as microwave	%	11	20	43	26	1121	1125
Identified as magnetron <sup>15</sup>	%	22	35	27	11	1146	1122
<b>Products containing concentrated variety of ingredient found in vegetable oil that lowers levels of cholesterol in the blood</b>							
Identified as Benecol	%	6	17	49	26	1119	1119
Not identified as Benecol		6	21	47	25	1131	1128
<b>Ingredient that provides non-meat source of protein grown in large tanks using a processed edible fungus and added to variety of products.</b>							
Identified as Quorn	%	17	18	36	26	1104	1114
Not identified as Quorn	%	24	28	30	14	1129	1143

## 6.5 Attitudes, knowledge and behaviour

Clearly, there is a considerable level of public concern about eating food products produced using technologies, processes or ingredients. The public’s stance in relation to specific food products is far more negative than that which we observed in relation to the abstract context of research and development in food technology, even though the products considered would, logically, have been created as a

<sup>14</sup> In other words, each respondent was asked one question about microwaving, Benecol and Quorn. The fact that a respondent was asked about a named product in one instance did not determine whether or not they were asked about a named or unnamed product in another instance.

<sup>15</sup> In each case, those respondents who were asked about each process or ingredient without the commonly-known name of a food product or process being included might have identified this spontaneously themselves, and the interviewer was asked to record instances where this occurred. This was done by two per cent in relation to microwaving, two per cent in relation to Quorn and less than 0.5 per cent in relation to Benecol.

consequence of such development activity. This implies that public attitudes to this area may not be entirely consistent.

The levels of concern expressed in relation to the different food products are also relatively surprising because, whilst each was developed using a process or ingredient representing recent technological innovation, with the exception of pasteurisation involving high pressure used in the production of fruit juices, they are all relatively well-known and have been available or utilised in Britain for more than a decade<sup>16</sup>. This might suggest that public purchasing and consumption of food products cannot be taken simply to reflect approval of the technologies involved in their production – in other words, attitudes and behaviour in relation to food products may not be consistent.

To test this theory, we asked respondents whether they buy bags of ready-to-eat salad leaves, with the intention of comparing their answers with the levels of concern expressed about the process involved in the production of this product, to establish how far public consumption of a product can be regarded as indicative of a lack of concern about the technology used in its production. Fifty-one per cent of those who buy bags of ready-to-eat salad leaves are either very or fairly concerned about the process used in their production, compared to 67 per cent of those who do not purchase this product and 72 per cent of those who once did so, but for whom this is no longer the case<sup>17</sup>. Concern among the latter group about the process used in the packaging of bags of ready-to-eat salad leaves may have informed their decision to stop purchasing this product. Clearly, these data do imply, at least in the case of bags of ready-to-eat salad leaves, a relationship between individual concern about technologies and the consumption of products where these technologies have been used, with those who are more concerned being less likely to purchase the product.

Nevertheless, the fact remains that almost half of current purchasers of bags of ready-to-eat salad leaves are very or fairly concerned about the process involved in their production. However, it should be borne in mind that, as testified by our knowledge test, around half of respondents did not know about the process used in the production of bags of ready-to-eat salad leaves, prior to the interview.

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<sup>16</sup> Modified Atmosphere Packaging, the technique used in bags containing ready-to-eat salad leaves has been increasingly applied to a diverse range of food products. Microwaves became increasingly common within British households in the mid-1980s. Widespread distribution of Quorn, the leading brand of myco-protein food in Britain, began in the 1990s, while Benecol has been sold in Britain since the mid- 1990s. High pressure pasteurisation, the most recent technological innovation, has been used in the production of food products in Britain since the beginning of this decade.

<sup>17</sup> Seven per cent of respondents indicated that they had bought bags of ready-to-eat salad leaves in the past, but did not do so now. We cannot necessarily assume this change in behaviour results from concerns about the innovative technology involved.

Armed with this knowledge, it may be that subsequent behaviour would change on this basis. The relationship between public knowledge of food technologies and levels of concern about products is explored in greater detail later in the chapter. Alternatively, it may be that the public are willing to consume food products, even when they have some concerns about the processes involved in their production, because they see these as yielding significant advantages that ultimately outweigh their concerns.

## **6.6 Variations in public concern about different food products**

Public attitudes to food products are highly nuanced, are informed by the potential benefits and risks associated with an individual product and levels of familiarity with it, and are not always consistent with behaviour in terms of the purchasing and consumption of individual products. However, whilst there is clear inconsistency within individual attitudes and behaviour, are attitudes relatively consistent across the public as a whole?

The existing literature on public attitudes to food technologies indicates that these have few links with standard demographic characteristics, with the exception that women and the elderly generally express greater levels of concern. Instead, values and beliefs, both in general, including attitudes to science and levels of social trust, and with regard to food in particular, are seen as better predictors of attitudes in this area (Brook Lyndhurst, 2009). However, as noted previously, research on this topic has tended to focus on specific products and technologies, rather than attitudes to technological innovation across the board. In this final section, we examine whether this assessment of the distribution of attitudes to innovation in food technology amongst the public holds true in relation to levels of concern about eating products developed using technologies.

To explore levels of public concern about eating foods developed using technologies, a summary measure was created, involving the calculation of a score for each respondent, representing the number of products which they would be very or fairly concerned about eating. The range of scores attained further reflects the considerable diversity in views on this issue; 24 per cent are not concerned about eating food products developed using any of the five processes or ingredients described, whilst 19 per cent express concern about one of the products. Similar proportions are vary or fairly concerned about two (18 per cent), three (16 per cent), four (12 per cent) or all of the five (11 per cent) products described<sup>18</sup>. In the analysis below, we focus on the substantial minority of the

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<sup>18</sup> This analysis includes all respondents – regardless of the variants of the questions about microwaves, Quorn and Benecol which they were asked. This may contribute to some random noise in the data, but we Food Technologies, Findings from 2008 BSA 74

public (39 per cent) who are either very or fairly concerned about three or more of the five products asked about. We focus on those with comparatively high levels of concern, in order to ascertain what characteristics and attitudes might be underpinning and be associated with this stand-point.

## **Knowledge of food technologies**

We begin by examining whether levels of knowledge about innovation in food technology relate to levels of concern about eating products developed using these methods. It has already been noted that levels of concern about specific innovations in food technology are strongly linked to the extent to which the public are familiar with the products that are developed as a result. Whilst familiarity could be gained through exposure to the terminology of a technology or through purchasing or consumption of the food product, this could also result from an individual's level of knowledge about innovation in food technology in general. We might anticipate that those with a greater knowledge of innovation in food technology will have fewer concerns about eating food products developed as a result, as the inherent fear of the unknown which appears to promote concerns in this area would not be present.

As detailed in Chapter 4, responses to the knowledge test included on the survey were used to calculate a knowledge score for each respondent, with a score of zero meaning they had not answered any items correctly and a score of seven equating to having answered all the items correctly. However, as a number of the items included in the quiz were concerned with the specific products for which levels of public concern were measured, we can assess whether those with knowledge of a particular technology are more likely to be concerned about it by comparing the two sets of questions, where they asked about the same technology. This was the case for questions about bags of ready-to-eat salad leaves, fresh fruit juice produced using pasteurisation and microwaving.

As demonstrated in Table 6-4 below, those sections of the public who exhibit knowledge of a specific food technology tend to be less concerned about eating a food product that had been developed as a result. Most markedly, slightly less than six-tenths of those who answered the question about bags of ready-to-eat salad leaves correctly are concerned about the process used in their production, compared to more than seven-tenths of those who answered this question incorrectly. Similarly, four-tenths of those who answered the item about pasteurisation incorrectly were concerned about the use of this process in the

production of fresh fruit juices, compared to three-tenths of those who answered this item correctly. On the other hand, three-tenths of those who know that microwaving involves radiation are concerned about this process, compared to four-tenths of those who do not know this. The levels of concern of those who state they were “unsure” in each case present an interesting pattern – with these being closer to the responses of those who have knowledge of the relevant process for bags of ready-to-eat salad leaves, but reflecting the levels of concern of those without knowledge for the other two products. We cannot conclude definitively from these patterns how being unsure in one’s knowledge of a particular technology links to levels of concern about its use in particular food products.

**Table 6-4 Levels of concern about individual food products, by knowledge of technology used in their production**

<b>Food product or process</b>	<b>% very/fairly concerned about ingredient or process used in production</b>	<b>Unweighted base</b>	<b>Weighted base</b>
<b>Bags of ready-to-eat salad leaves</b>			
Has knowledge of process	56	1043	1066
Unsure	59	940	948
Has no knowledge of process	72	262	248
<b>Fresh fruit juice</b>			
Has knowledge of process	32	1199	1218
Unsure	43	721	722
Has no knowledge of process	43	304	302
<b>Microwaving</b>			
Has knowledge of process	27	730	767
Unsure	38	167	211
Has no knowledge of process	37	206	145

We can also compare levels of knowledge and concern about food technologies more generally, by analysing our summary measure of concern by the respondents’ calculated knowledge test scores. This suggests that levels of knowledge about innovation in food technology and levels of concern about eating products developed as a result are strongly linked. Just 30 per cent of those who answered five or more of the test items correctly were concerned about three or more of the products, compared with 43 per cent of those who answered three or four items correctly and 50 per cent of those who answered less than three items correctly. Clearly then, levels of concern about innovation in food technology are strongly associated with a lack of knowledge of this area, just as, as previously seen, they are strongly linked to a lack of familiarity. In other words, levels of concern in this area can be explained to some degree on the basis of the public’s fear or misunderstanding of the unknown.

## Demographic characteristics

As detailed previously, research to date has indicated that demographic characteristics, with the exception of sex and age, are not generally effective predictors of attitudes towards food technologies. Analysis of our summary measure of concern indeed confirms what has been found elsewhere, that older age groups and women are substantially more likely to be concerned about innovation in food technology. As demonstrated in Table 6-5 below, more than half of those aged 65 years and over are concerned about three or more of the products asked about, compared to just one third of those aged between 18 and 34 years. On the other hand, three-tenths of men and almost five-tenths of women express concern about three or more of the food products.

However, we envisaged that a number of demographic characteristics, in addition to age and sex, might logically be related to attitudes in this area – namely educational levels, income, ethnicity, geographic location and the presence of dependent children. Data for those characteristics which were significantly linked to levels of concern about food technologies are presented, alongside those for age and sex, in Table 6-5 below. As noted previously, knowledge of innovation in food technology is strongly linked with levels of concern about this area. It therefore seemed plausible that those with higher educational qualifications would be less concerned about eating foods produced using technologies, as they would have been more likely to acquire such knowledge, or to have the ability or experience to assist in understanding the technical concepts and language used. This link between education levels and levels of concern about innovation in food technology is confirmed by the data, with three-tenths of those with a degree or equivalent expressing concern about three or more of the food products, compared to almost six-tenths of those with no qualifications. This link suggests further likely variations in levels of concern amongst sections of the public with different demographic characteristics. In particular, levels of education are known to be strongly related to socio-economic status, which we measure in terms of levels of household income, with those in low income groups tending to have fewer qualifications. It therefore comes as no surprise that those in the lowest income quartile are almost twice as likely as those in the highest to express concern about three or more of the food products described. This variation is interesting, as previous research in this area has not produced conclusive results in terms of the presence of a link between socio-economic status and attitudes in this area (Brook Lyndhurst, 2009).

There are a number of additional demographic characteristics which it was anticipated might also link with attitudes to innovation in food. Individuals living in

rural locations are more likely to have direct contact with and experience of the traditional methods of food production, in terms of agricultural farming, and might therefore be expected to have particular attitudes to the newer non-agricultural processes being introduced into food production, such as those used in the development of the products asked about. On the other hand, the experience of bringing up young children might raise interest and concern amongst parents about the types of food being consumed by the family, which might heighten levels of concern about any processes involved in particular. However, contrary to these expectations, those living in rural and urban locations express almost identical levels of concern about food technologies, whilst those with dependent children are actually less likely to be concerned (which may be a consequence of their younger age profile).

In addition to age, sex, income and education, ethnicity emerged as the only other demographic characteristic that is significantly linked with levels of concern about food technologies. Less than four-tenths of those from a white ethnic group are concerned about three or more of the food products, compared to more than five-tenths of those from a non-white ethnic group. In understanding the reasons for this, and for the greater levels of concern expressed by older age groups and women, it is necessary to consider alternative characteristics, in terms of food-related attitudes and behaviour and more general attitudes and values, that might link to attitudes in this area, and explain such demographic variation. It is these aspects which we turn to consider next.

**Table 6-5 Levels of concern about innovation in food technology, by significantly-related demographic characteristics**

	% very/fairly concerned about 3-5 innovative products or processes	Unweighted base	Weighed base
<b>All</b>	40	2250	2247
<b>Age</b>			
18-34	32	485	629
35-49	35	819	798
50-64	48	375	336
65+	51	562	476
<b>Sex</b>			
Male	30	966	1089
Female	48	1284	1158
<b>Highest educational qualification</b>			
Degree or equivalent	30	615	626
A-levels	32	312	354
GCSEs	39	546	564
No qualifications	55	549	491
<b>Income</b>			
Highest quartile	28	408	468
Lowest quartile	54	517	396
<b>Ethnicity</b>			
White	38	2074	2045
Non-white	51	172	198

## Food-related attitudes and behaviours

Logically, we might expect levels of concern about innovation in food technology to link with, be informed by and potentially influence other attitudes and behaviours in relation to food. In particular, it seems plausible that attitudes to food technologies might link to attitudes to food safety, particularly if the main reason for public concern about the products described is uncertainty as to whether they or the processes involved in their production are sufficiently safe. Table 6-6 below presents the proportions of groups defined by various food-related attitudes and behaviours who are concerned about three or more of the products asked about, where significant differences were identified. As it demonstrates, the difference in the levels of concern about innovation in food technology between those with different degrees of concern about food safety in general are stark; more than five-tenths of those who are very concerned about food safety express concern about three or more of the food products asked about, compared to less than two-tenths of those who claim to be not very or not at all concerned about food safety. The latter group express the lowest level of concern about food technologies of all the groups examined, whether defined by demographic, attitudinal or behavioural characteristics. This clearly indicates that concerns about innovation in food

technology are very strongly linked to, and potentially informed by, concerns about food safety.

However, analysis of alternative food-related attitudes reveals that a concern about food safety is not the only factor linking with levels of concern about innovation in food technology. As detailed in Chapter 2, we asked respondents about their different motivations for selecting or avoiding particular types of food and, in relation to attitudes to technologies, two of these motivations emerged as significant. Firstly, those who avoid certain foods because they react badly to them are more likely to be concerned about the products described, possibly because they have a heightened level of concern about selecting food products in general, particularly those about which they know little. Alternatively, whilst a comparatively small group, those respondents who avoid certain foods for religious reasons are more likely to be concerned about three or more of the five products described; more than five-tenths indicate that this is the case, compared to three-tenths of those who are not motivated by this consideration. Many religions disagree with human interference in natural processes (for instance adherents to a number of faiths oppose genetic-testing on the basis that it is akin to 'playing God'), and respondents who adhere to these faiths may have considered the processes used in the development of the different food products in this light.

Levels of concern about food technologies are also linked with individual propensity to try new types of foods about which little is known; three-tenths of those who would be happy to eat a new food even without knowing much about it were concerned about three or more of the food products, compared to almost five-tenths of those who would not be happy to do this, unless they knew exactly what the food product contained. This measure clearly captures the extent to which the public are wary of the unknown, which we have identified previously as being strongly linked to attitudes to innovation in food. Finally, we envisaged that involvement in the purchasing and preparation of food might be linked with concerns about technologies, as those undertaking these roles might have a greater understanding of the potential benefits and drawbacks of different food products, including those developed using technologies. This was in fact the case, with those with a greater involvement with food, measured in terms of individual contribution to the household's food shopping, being more likely to express concern. Clearly then, public attitudes to innovation in food technology are strongly inter-meshed, and cannot be easily separated from, other attitudes and behaviours in relation to food.

**Table 6-6 Levels of concern about innovation in food technology, by significant food-related attitudes and behaviours**

	% very/fairly concerned about 3-5 products or processes	Unweighted base	Weighted base
<b>All</b>	40	2250	2047
<b>Involvement in food shopping</b>			
Does all / most of shopping	43	1491	1300
Does some shopping	35	554	678
Does no shopping	36	203	267
<b>Concern about food safety</b>			
Very concerned	55	761	742
Fairly concerned	40	961	962
Not very / not at all concerned	17	523	539
<b>Attitudes to trying new types of food</b>			
Happy to eat foods not tried before without knowing too much about them	30	1062	1088
Wouldn't eat a food that had never tried before unless knew exactly what was in it	48	1077	1061
<b>Motivations for avoiding certain foods</b>			
Avoids certain foods as reacts badly to them	46	287	275
Does not avoid certain foods for this reason	39	1962	1971
Avoids certain foods for religious reasons	52	73	91
Does not avoid certain foods for this reason	39	2176	2155

## General attitudes and values

As noted previously, the existing literature suggests that general attitudes and values, rather than demographic characteristics, tend to be more effective in predicting public attitudes to innovation in food technology – including levels of social trust, attitudes to science and levels of religiosity. Data relating to the latter two measures<sup>19</sup>, when they were found to be significantly linked with levels of concern about food technologies, are presented in Table 6-7 below. We have seen previously that those who avoid certain types of food for religious reasons are more likely to express concern about eating food products. The implied link between adherence to a religion and levels of concern in this area is confirmed by the data presented below; 43 per cent of those who have a religion are concerned about three or more of the food products, compared to 35 per cent of those who do not. We might anticipate that those with a positive attitude towards scientific developments would be less likely to be concerned about the food technologies which are one of the by-products of scientific activity. However, the relationship presented below appears to be more complicated. Whilst those who express a positive attitude towards science, by disagreeing with the view that “modern

<sup>19</sup> Unfortunately, the 2008 British Social Attitudes survey did not include a measure of social trust that was asked of all those respondents, who also were asked the set of questions about innovative food technologies. Food Technologies, Findings from 2008 BSA 81

science does more harm than good”, are the least likely to express concern about three or more of the products, it is those who neither agree or disagree with this view, and who can thus be regarded as most ambivalent towards and undecided about modern science, who are more likely to be concerned about innovation in food technology. This may reflect the fact that those who know least about scientific developments are the least likely to have a strong view about them but, as we have seen, are also more likely to be concerned about the actual products developed as a result of such development activity.

**Table 6-7 Levels of concern about innovation in food technology, by significant general attitudes and values**

	% very/fairly concerned about 3-5 products or processes	Unweighted base	Weighted base
<b>All</b>	40	2250	2247
<b>Agreement with view that modern science does more harm than good</b>			
Agree	42	330	326
Neither agree nor disagree	49	535	535
Disagree	32	996	1004
<b>Religion</b>			
Has a religion	43	1271	1258
Does not have a religion	35	970	981

## 6.7 Characteristics that predict levels of concern about food technologies

We have seen that attitudes to food technologies vary substantially across the public, with a large number of demographic, attitudinal and behavioural factors being significantly linked. Inevitably, many of the factors that are linked to attitudes in this area will also relate to one and other; for instance, it is known that those who have a religion are more likely to be older; hence, one of these factors might be linked to attitudes to innovation in food simply because of its link to the other demographic characteristic. To identify the factors that link with levels of concern about food technologies, even when their links with each other are controlled for, multivariate analysis (logistic regression) was undertaken, the results of which are presented in the appendix to this chapter<sup>20</sup>. Once the relationships between the different demographic, knowledge, attitudinal and behavioural characteristics have been controlled for, six characteristics remain significantly linked to levels of concern about innovation in food technology. Interestingly, two of these are demographic characteristics – sex and education,

<sup>20</sup> Household income was not included in the regression analysis, as it is highly correlated with education levels (which are theoretically likely to exert the greater direct influence on attitudes in this area by linking with levels of knowledge and interest in related technological areas). Ethnicity was also not included due to the small number of those from a non-white group and the fact that ethnicity is highly correlated with religiosity and avoiding certain foods for religious reasons.

while the remaining four are levels of concern about food safety<sup>21</sup>, willingness to try new types of food, attitudes to science and knowledge about innovation in food technology. This importance of demographic characteristics in linking with attitudes to innovation in food technology contradicts the assumptions of the existing literature, which identify general values and beliefs as having the key role to play. On the other hand, the importance of food-related attitudes and knowledge, and attitudes to science, highlight the fact that attitudes to innovation in food technology do not develop or operate in a vacuum, but form part of a coherent set of beliefs and understandings of food, technology and science.

## 6.8 Conclusion

Whilst public attitudes to individual food products are highly nuanced, a number of clear patterns are evident in relation to this topic. Whilst levels of concern about individual products are clearly informed by assessments of their risks and benefits, a fear of the unknown appears to link with concerns about food products for a considerable proportion of the public, even when these can be regarded as yielding specific advantages compared to more traditional products. Attitudes and behaviour in relation to this area are not always consistent, with considerable numbers consuming products about which they express considerable levels of concern. Knowledge of innovation in food is linked with lower levels of concern, both in relation to specific products and in this area in general. Attitudes in this area vary markedly across the public, with demographic characteristics, other food-related attitudes, particularly levels of concern about food safety, and more general attitudes and values linking with levels of concern.

In other words, we would expect a reduction in levels of concern about innovation in food technology to be accompanied by an increase in levels of public knowledge and understanding of this area (although it is not clear which factor would be the driving force in this relationship). Similarly, attitudes broader attitudes and concerns in relation to food and science also clearly link with levels of concern about food technologies and might need to be addressed in order for the latter to be reduced.

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<sup>21</sup> It was envisaged that levels of concern about food safety may directly map onto our measure of levels of concern about innovative food technologies (with the two variables largely measuring the same factor). For this reason, a regression model was also run that excluded food safety; however, the results produced, in terms of the remaining variables that were identified as being significant, were almost identical; thus the original model, including levels of concern about food safety, has been retained.

## Appendix

**Table 6-8** Logistic regression (dependent variable whether respondent very / fairly concerned about three or more food products), by demographic, attitudinal and behavioural characteristics

	coefficient	standard error	p value
<b>Sex (male)</b>			
Female	0.69**	0.11	0.000
<b>Highest educational qualification (no qualifications)</b>			
Degree	-0.62**	0.16	0.000
A levels	-0.56**	0.18	0.002
GCSEs	-0.39*	0.16	0.013
<b>Knowledge of innovation in food technology (5–7 items answered correctly)</b>			
0–2 items answered correctly	0.53**	0.16	0.001
3–4 items answered correctly	0.32*	0.13	0.011
<b>Modern science does more harm than good (disagrees with view)</b>			
Agrees	0.47**	0.16	0.002
Neither agrees nor disagrees	0.43**	0.13	0.001
<b>Concern about food safety (not very/not at all concerned)</b>			
Very concerned	1.32**	0.17	0.000
Fairly concerned	0.79**	0.16	0.000
<b>Attitude to trying new types of food (happy to eat food not tried before)</b>			
Wouldn't eat food never tried before unless knew exactly what was in it	0.43**	0.12	0.000
Cox and Snell R <sup>2</sup> .146			
Uneighted base 2250			
Weighted base 2247			

\* = significant at 95% level; \*\* = significant at 99% level

## 7 Attitudes to innovation: GM foods

- Few hold strong attitudes to GM foods, while those who do express a definite view (albeit not necessarily a strong one) tending to regard this technology negatively rather than positively.
- Attitudes to GM foods in particular situations are not always consistent, with views about their production and availability in Britain clearly being influenced by factors other than overall assessments of the worth of this technology.
- Attitudes vary markedly among the public, with women, older age groups and those with greater concerns and less knowledge about innovation in food in general being more likely to express a negative view. Less educated and socio-economically disadvantaged groups are much less likely to have an opinion about this topic.
- Since the late 1990s, support for GM foods has not increased markedly, with the most notable change being an increase in the proportion not holding a definite view, between 1999 and 2003. In more recent years, this trend has continued, with evidence of a slight increase in public support for GM foods.

### 7.1 Introduction

We finally turn to focus specifically on attitudes to one type of technological innovation in the area of food – its genetic modification. Genetically modified (GM) foods have attracted considerable public debate and media coverage since they were first introduced in European countries in the early 1990s. As a consequence of this focus, public attitudes to GM foods have received disproportionate attention from researchers, with levels of public approval and concern, the factors underpinning this and the extent of variation in views across the public being relatively well-documented, in comparison with some of the other food technologies that have been reviewed thus far. Nevertheless, there are still a number of outstanding gaps in the evidence base, particularly in examining the sources of indifference to GM foods and the link between values, attitudes and behaviours (Brook Lyndhurst, 2009).

Our aim in this chapter is to update the existing evidence base, through analysis of the data collected as part of the 2008 British Social Attitudes survey. In the following sections, we report the results of four key questions about GM foods that were asked of respondents. We first examine the distribution of attitudes to GM foods in 2008 before moving on to consider, in particular, the consistency between

different attitudes to GM foods and variation in attitudes across the population as a whole. As the four key questions have been fielded on the British Social Attitudes survey on a number of occasions since the late 1990s, we will focus in particular on examining change over time and considering the likely implications of this for future developments in attitudes to this topic.

## **7.2 GM foods; public attitudes, knowledge and behaviour**

When the questions that form the main focus of this chapter were originally designed in the late 1990s, GM foods were not widely available for purchase in Britain and the situation has changed little since that time. To facilitate time series analysis and to reflect the ongoing situation in Britain today, rather than asking about respondents' levels of concern as potential purchasers or consumers of GM foods, as we did in relation to other products and processes which are widely available, the questions asked on the 2008 survey focus on the potential benefits and drawbacks of GM foods being produced or made widely available in Britain.

It was envisaged that attitudes to GM foods might reflect not just the individual's overall assessment of whether they represent a positive development or not, but views about the desirability of their potential impacts on Britain's economy and trade. In order to tease out such nuances, we asked respondents to what extent they agree or disagree with three different statements about GM foods, as set out below:

“On balance, the advantages of GM foods outweigh any dangers

In order to compete with the rest of the world, Britain should grow GM foods

GM foods should be banned, even if food prices suffer as a result<sup>22</sup>”

The responses obtained, presented in Table 7-1 below, reveal considerable uncertainty about the extent to which GM foods represent a positive development. Around four-tenths of the public neither agree nor disagree that the advantages of GM foods outweigh any dangers, with a further 10 per cent indicating they were unable to select an answer to this question. In other words, around half of the British public are unable to express a clear view in either direction as to whether, in their eyes, GM foods represent a positive development or not. Among the

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<sup>22</sup> As in previous years, these questions were included in the self-completion booklet, to be completed by the respondent as a separate exercise to the main CAPI interview. Questions such as these which are relatively straight-forward and ask about topics that might be perceived to be controversial, work particularly well in this format. In addition, the mode of question format is invariably kept consistent on the British Social Attitudes survey, in order to facilitate effective time series analysis by eliminating possible mode effects.

substantial minority who do express a particular view, the balance of public opinion appears to be to some degree in opposition to GM foods. Eighteen per cent<sup>23</sup> agree that the advantages of GM foods outweigh any dangers, whilst 31 per cent<sup>24</sup> disagree with this view. Nevertheless, it should be noted that less than one-tenth of the public express a strong view in relation to GM foods by strongly agreeing or disagreeing with this statement, with those who do so being more likely to express a negative attitude (seven per cent) than a positive one (two per cent).

How do the public weigh up these abstract assessments of the extent to which GM foods represent a positive development, with the economic and trade considerations that may affect their views about whether these products should be produced or made available in Britain? Only half as many respondents agree that Britain should grow GM foods in order to compete with the rest of the world as those who disagree with this view – 19 per cent<sup>25</sup> compared to 41 per cent. However, similar proportions agree and disagree with the proposition that GM food should be banned, even if food prices suffer as a result – 26 per cent compared to 30 per cent<sup>26</sup>. This suggests that price considerations potentially have a greater impact in terms of encouraging support for GM foods, compared to economic and trade considerations. This finding is not particularly surprising, as price considerations have a greater immediate impact on the individual, in terms of their own budgeting for food, than more general trade considerations. However, it should be noted that public attitudes in relation to both of the latter statements, as was the case with assessments of GM foods in the abstract, are often not strong or well-formed; more than three-tenths in each case indicate that they neither agree nor disagree with each statement. Thus, overall, public attitudes to GM foods can be characterised by a lack of conviction, with only minorities holding particular views on this issue, the balance of which tend to oppose this technological innovation in the abstract, or their production or widespread availability in Britain in practice. These conclusions reflect those drawn from attitudinal research on GM foods generally (Brook Lyndhurst, 2009).

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<sup>23</sup> This figure differs slightly from the sum of the two figures in Table 7.1 due to rounding.

<sup>24</sup> This figure differs slightly from the sum of the two figures in Table 7.1 due to rounding.

<sup>25</sup> This figure differs slightly from the sum of the two figures in Table 7.1 due to rounding.

<sup>26</sup> This figure differs slightly from the sum of the two figures in Table 7.1 due to rounding.

**Table 7-1 Attitudes to GM foods***Base: all respondents**British Social Attitudes 2008*

<b>Attitude to GM foods</b>	<b>%</b>
<b>On balance, the advantages of GM foods outweigh any dangers</b>	
Strongly agree	2
Agree	15
Neither agree nor disagree	39
Disagree	23
Strongly disagree	7
Can't choose	10
<b>In order to compete with the rest of the world, Britain should grow GM foods</b>	
Strongly agree	3
Agree	17
Neither agree nor disagree	31
Disagree	31
Strongly disagree	10
Can't choose	7
<b>GM foods should be banned, even if food prices suffer as a result</b>	
Strongly agree	6
Agree	20
Neither agree nor disagree	33
Disagree	25
Strongly disagree	6
Can't choose	7
<i>Unweighted base 1986</i>	
<i>Weighted base 1975</i>	

In addition to public attitudes to GM foods, the British Social Attitudes survey also included two questions to try to attain measures of public knowledge and actual (or potential) behaviour in relation to these food products. As reported in Chapter 4, one of the items included on our knowledge test related to GM foods; specifically, respondents were asked whether they thought the statement “GM, genetically modified food, is never sold in Britain” was true, false, or whether they were unsure. As reported in Chapter 4, the majority of the public are aware of the current situation in relation to GM foods<sup>27</sup>. Seventy-three per cent correctly indicate that GM foods are sold in Britain; just nine per cent explicitly state that they did not think this was the case, and 18 per cent are unsure about this issue. In other words, even though it may be unlikely that most respondents would have knowingly come across GM foods, either as purchasers or consumers, three-quarters are nevertheless aware, perhaps from public discussion or media coverage, that such products are available in Britain.

<sup>27</sup> Many different types of GM food are authorised for sale in the EU and, although food manufacturers and retailers generally arrange for ingredients to be obtained from non-GM sources, there are a small number of GM products used in the UK such as some imported products and the cooking oil used in some catering establishments. GM ingredients are also commonly used in animal feed for food production.

In recognition of the fact that GM foods are not widely available in Britain, rather than asking respondents what they do in practice when they come across these products, we asked them to what extent they agreed or disagreed with the following statement, which taps into both actual and potential behaviour in this area:

“It is important for me to check whether or not foods contain genetically modified ingredients”

As detailed in Table 7-2 below, respondents hold mixed views about whether it is important for them, personally, to check whether foods contain GM ingredients. Around four-tenths, 40 per cent<sup>28</sup>, agree that this is important to them, whilst around half of this proportion, 18 per cent disagree with this view. As was the case with our measures of attitudes to GM foods, we can again detect a considerable degree of uncertainty in relation to this issue, with around one third stating they neither agree nor disagree with this statement. Previous research has indicated that around one fifth of the public report actually check food products to see if they contain GM ingredients (Brook Lyndhurst, 2009) in practice; the greater proportion we have encountered who state that it would be important for them to do this may reflect the fact that some are currently certain that the food products they buy do not contain GM ingredients, or the tendency of the public to report or predict good intentions, that do not always translate into actual behaviour.

We might expect those respondents who think that GM foods are available in Britain to regard it as more important to check the food products they purchase in relation to this issue, than those for whom the described situation would only be hypothetical (as they are not aware of the actual availability of such products). In fact, the reverse is the case; 50 per cent of those who think that GM foods are never sold in Britain stated that it was important for them to check whether or not foods contain genetically modified ingredients, compared to 41 per cent of those who thought that such foods are available and 32 per cent of the group who were unsure about this issue. It may be that those who think that GM foods are never sold in Britain have a more negative attitude to these products in general, reflected in their greater concern, at least in a hypothetical situation, about checking for the presence of GM ingredients. It is also interesting to note the low level of concern about checking for the presence of GM ingredients amongst those who are unsure if GM foods are available in Britain or not; it may be that this group are generally little concerned by (or inclined to find out about) this topic.

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<sup>28</sup> This number differs from the sum of the two figures in Table 7.2, due to rounding.  
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**Table 7-2 Views of importance of checking whether foods contain GM ingredients**

*Base: all respondents* *British Social Attitudes 2008*

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Agreement with view that "It is important for me to check whether or not foods contain genetically modified ingredients"	%
Strongly agree	9
Agree	32
Neither agree nor disagree	32
Disagree	15
Strongly disagree	3
Can't choose	7

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*Unweighted base 1986*

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*Weighted base 1975*

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Individuals might regard it as important for them to check for the presence of GM ingredients in food products for a number of reasons – because they, or someone they purchase or prepare food for, would not want to eat products containing such ingredients or because they are generally of the view that it is important to know exactly what they are cooking or eating. With regard to the latter point, it comes as no surprise that those who state that they would not eat a food that they had never tried before are more likely to regard it as important to check for the presence of GM ingredients – 46 per cent state this, compared to 34 per cent of those who would be happy to try a new food that they had never encountered before.

In other words, we cannot assume that the four-tenths of the public who agree with the statement of interest would all necessarily not purchase a product if they found out it contained GM ingredients. We will attempt to disentangle this issue further in the next section, where we move on to consider the relationships between the different attitudes and behaviours in relation to GM foods examined thus far.

### **7.3 Consistency in public attitudes**

How do the different attitudes to GM foods reported previously relate to each other and how do they link with behaviour and knowledge in relation to this issue? To answer this question, we first compare each of the statements about the desirability of producing or selling GM foods in Britain, were this to have particular impacts, with individuals' assessments of whether, overall, GM foods represent a positive development or not. These analyses are presented in Table 7-3 and Table 7-4 below.

What is clear from this analysis is that attitudes to growing or selling GM foods do not always correlate with individual assessments of whether such products

represent a positive development or not (in terms of the overall balance between advantages and dangers)

As we might logically expect, more than nine-tenths of those who agree that GM foods should be banned, even if food prices suffer, do not actively agree with the proposition that these foods have more advantages than dangers (with just eight per cent agreeing that this is the case). However, among those who disagree with the idea of banning GM foods in this scenario, 18 per cent do not think that GM foods yield more advantages than dangers and a further 32 per cent (who stated neither agree nor disagree) have unclear or inconsistent views on this issue. It seems likely therefore that the minority who do not agree that the advantages of GM foods outweigh their dangers, but disagree with the notion that these foods should be banned even if food prices would suffer, have prioritised their concerns about possible impacts on food prices over their negative assessments of GM foods, when determining their responses to this statement. Nevertheless, the extent of consistency between different attitudes to GM foods, at least for some sections of the public, should not be under-stated; 45 per cent of those who disagree with the idea of banning GM foods think that their advantages outweigh any dangers (more than five times the proportion who agreed with banning GM foods who provided this assessment).

**Table 7-3 Attitudes to advantages and dangers of GM foods, by attitudes to banning GM foods, even if food prices would suffer**

Base: all respondents

British Social Attitudes 2008

Attitudes to banning GM foods, if food prices would suffer				
	Agree GM foods should be banned, even if food prices suffer	Neither agree nor disagree	Disagree GM foods should be banned, even if food prices suffer	Total
On balance, the advantages of GM foods outweigh any dangers				%
Agree	8	5	45	18
Neither agree nor disagree	12	76	32	39
Disagree	77	15	18	31
Can't choose	2	4	5	10
<i>Unweighted base:</i>	522	660	601	1986
<i>Weighted base:</i>	527	664	585	1974

The picture in relation to the view that Britain should grow GM foods in order to compete with the rest of the world is similar. Sixty-five per cent of those who agree with this proposition think that GM foods have more advantages than dangers, compared to just five per cent of those who disagree with the idea of Britain growing GM foods. However, of those who think that Britain should grow GM foods in order to compete with the rest of the world, five per cent feel that the dangers of such foods are not outweighed by their advantages and a further 22

per cent (who neither agree nor disagree) are unable to express a clear view on this issue. In other words, we might regard this group as prioritising their concern that Britain competes economically and in trade with the rest of the world, over their negative or uncertain overall assessments of GM foods. In both cases therefore, we can see the public balancing their assessments of GM foods ( in terms of the balance between advantages and dangers) with other considerations and, in some cases, the former not being regarded as the overriding priority.

**Table 7-4 Attitudes to advantages and dangers of GM foods, by attitudes to Britain growing GM foods in order to compete with rest of world**

Base: all respondents

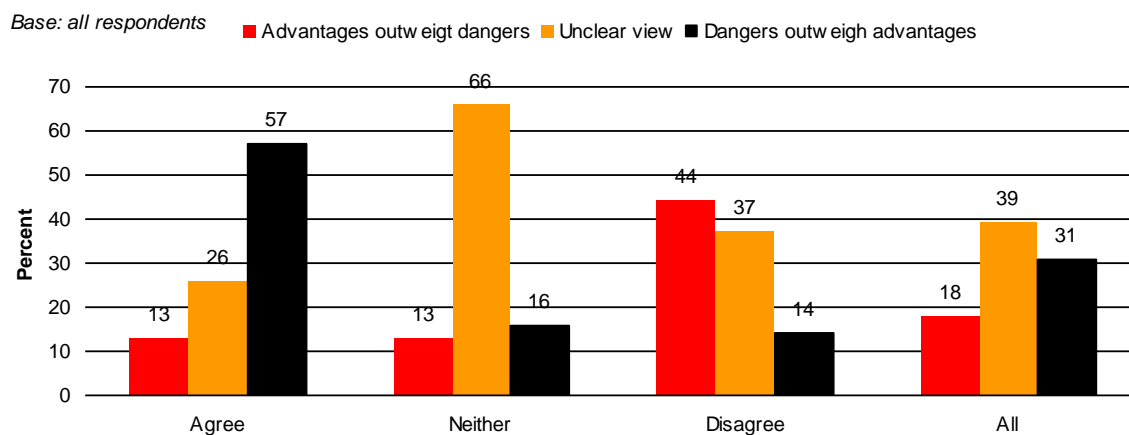
British Social Attitudes 2008

On balance, the advantages of GM foods outweigh any dangers	Attitudes to Britain growing GM foods in order to compete with the rest of the world			Total
	Agree Britain should grow GM foods in order to compete with rest of world	Neither agree nor disagree	Disagree Britain should grow GM foods in order to compete with rest of world	%
Agree	65	10	5	18
Neither agree nor disagree	25	80	22	39
Disagree	5	6	68	31
Can't choose	3	4	5	10
<i>Unweighted base:</i>	522	660	601	1986
<i>Weighted base:</i>	527	664	585	1974

What is also interesting to note, in both instances, is that those with an unclear or uncertain view regarding the balance between the advantages and dangers of GM foods also tend not to hold strong or consistent views about the desirability of producing or selling such products in Britain. Notably, their expressed attitudes tend to be in opposition to GM foods on both measures. Seventy-six per cent of those who neither agree nor disagree that GM foods should be banned do not hold a clear view as to their advantages and dangers (also answering neither agree nor disagree in response to this statement), whilst this is the case for 80 per cent of those who neither agree nor disagree with the view that Britain should grow GM foods in order to compete with the rest of the world. Those who do not hold strong or consistent attitudes to the notions of increasing the availability or production of GM foods therefore often also do not hold a clear view as to the overall advantages and dangers of such products. Nevertheless, it is clear that attitudes towards the further involvement of Britain in the production and sale of GM foods are not solely determined by assessments of the overall worth of GM foods as an innovation – in fact, these assessments are clearly often being over-ridden by other concerns.

But how do attitudes to GM foods relate to the perceived importance of knowing whether a particular food product contains GM ingredients or not? A comparison between these two measures is presented in the chart below. As we might expect, those who feel that the advantages of GM foods outweigh any dangers are over-represented in the group who do not think it is important to know about GM ingredients, comprising 44 per cent of this group compared to 13 per cent of the group who do think knowing about the presence of these ingredients is important. However, just as a minority of those with a positive assessment of GM foods, in terms of its advantages and dangers, still think it is important to know about the presence of GM ingredients, so a considerable proportion, 14 per cent of those who don't think that this is important, hold a negative overall view of GM foods. In other words, it is not simply the case that it is those who think the dangers of GM food outweigh their advantages who are more concerned about eating such products, reflected in their expressed desire to check for the presence of GM ingredients. Once again, we see that those who do not hold a clear view about the importance of checking for GM ingredients are also likely to have an unclear or inconsistent view as to these GM products in general; 66 per cent of those who neither agree nor disagree that it is important to check whether foods contain GM ingredients also neither agree nor disagree that the advantages of such food products outweigh their dangers.

**Figure 7-1** Perceived importance of knowing whether foods contain GM ingredients, by whether advantages of GM foods outweigh dangers



We also compared public knowledge about GM foods with overall views of whether their advantages outweigh any dangers. Those who correctly answered the knowledge test item about GM foods, by identifying the statement that “GM foods are never sold in Britain” as false, were less likely to provide a positive assessment; 18 per cent of those who were aware of the current situation in relation to GM foods in Britain thought that their advantages outweighed any dangers, whilst 26 per cent who indicated a lack of understanding of the current Food Technologies, Findings from 2008 BSA 93

situation thought this was the case. This contradicts the findings from previous research, which have shown that those with an accurate knowledge of current policy in relation to GM foods tend to regard these more positively (Brook Lyndhurst, 2009). However, the fact that an even smaller proportion – 11 per cent – of those who are unsure of the current situation in relation to the availability of GM foods in Britain provide a positive assessment suggests that the relationship between knowledge and overall attitudes, at least on our measure of interest, is unclear. It may also be that although respondents answers to the quiz were technically correct, their understanding as to the extent of the availability of GM foods does not accurately reflect the current position, as discussed in section 4.2.

In summary, individuals often express a set of attitudes that do not reflect coherent support or opposition to GM foods, suggesting that other factors are at play in influencing specific attitudes in this area, including economic and price considerations and competing attitudes and behaviour in relation to food. Given the general absence of strong opinion noted in public attitudes to GM foods, this is not particularly surprising; it seems likely that responses to the different statements were simply influenced by topics about which many respondents felt more strongly than GM foods. In the next section, we focus solely on the question about the overall advantages and dangers of GM foods, as this represents the purest available measure of attitudes to this singular issue, less likely to have been influenced by concerns about food prices, Britain's economy and trade and broader food-related knowledge and concerns. We turn to examine which groups of the public are more likely to provide positive and negative assessments of GM foods and the possible reasons for any patterns identified.

## **7.4 Who supports and opposes GM foods?**

How do attitudes to GM foods vary across the public? The existing evidence base highlights a number of factors, that have been shown to relate to attitudes to GM foods. Generally, women have been shown to be much less positive than men, often attributed to their greater involvement in the purchasing and preparation of food; however, in terms of other demographic characteristics, the evidence is mixed, with socio-economic characteristics being highlighted as linking with attitudes in this area by some studies, but not others. Attitudes to science have been identified as the strongest predictor of attitudes to GM foods, and there is some evidence that increased knowledge of this topic tends to be associated with lower levels of opposition. (Sheldon et al, 2009) To what extent are these variations reflected in the assessments of GM foods provided by respondents to the 2008 British Social Attitudes survey and on what basis can we explain these differences? We consider these questions by focussing first on demographic

characteristics, before considering food-related attitudes, knowledge and behaviour and more general attitudes and beliefs.

## Demographic characteristics

The existing evidence base and a number of theoretical assumptions suggest that a range of demographic characteristics might potentially link with attitudes to GM foods, namely sex, age, education, income, class, ethnicity and location.

The overall assessments of the advantages and dangers of GM foods provided by men and women are presented in Table 7-5. These support the overriding conclusion, drawn from the existing literature, that women are much less likely than men to express a positive view about GM foods and more likely to express a negative attitude. Specifically; one-quarter of men agree with the notion that the advantages of GM foods outweigh any dangers, compared to just one-tenth of women. As identified previously, this association has been explained on the basis of the greater involvement of women with purchasing and preparing food; the validity of this conclusion is considered in the next section, which focuses on food-related attitudes and knowledge.

**Table 7-5 Attitudes to balance of advantages and dangers of GM foods, by sex**

Base: all respondents

British Social Attitudes 2008

	Sex		
	Men	Women	All
<b>On balance, the advantages of GM foods outweigh any dangers</b>			
	%	%	%
Agree	25	11	18
Neither agree nor disagree	38	39	39
Disagree	27	35	31
Can't choose	8	12	10
<i>Unweighted base:</i>	<i>854</i>	<i>1132</i>	<i>1986</i>
<i>Weighted base:</i>	<i>962</i>	<i>1014</i>	<i>1976</i>

We have seen in Chapter 6 that older age groups tend to express much greater levels of concern about eating food products developed using technologies; it was therefore envisaged that this might also be the case in relation to the provision of negative assessments of GM foods. As revealed by Table 7-6 below, this is indeed the case, with older age groups being much more likely than younger ones to disagree that the advantages of GM foods outweigh any dangers. The key distinction is between those aged 18-34 and older age groups; 21 per cent of the youngest age group provide a negative assessment of GM foods, compared to more than three-tenths of each of the other age groups. This difference can largely be explained by the fact that the youngest age group are much less likely to have a strong or consistent view about GM foods; almost half of those aged

between 18-34 neither agree nor disagree that the advantages of GM foods outweigh any dangers, compared to less than three-tenths of those aged over 65 years. Interestingly, there are no significant differences in the proportions of each age group who provide a positive overall assessment of GM foods. It may be that the same factors that generate greater levels of concern about food technologies amongst the oldest age group also encourage a more negative overall assessment of GM foods.

**Table 7-6 Attitudes to balance of advantages and dangers of GM foods, by age**

Base: all respondents

British Social Attitudes 2008

On balance, the advantages of GM foods outweigh any dangers	18-34 %	35-49 %	50-64 %	65+ %	All %
Agree	19	15	18	22	18
Neither agree nor disagree	48	39	35	28	39
Disagree	21	36	35	30	31
Can't choose	8	8	9	15	10
<i>Unweighted base:</i>	419	723	344	495	1986
<i>Weighted base:</i>	532	710	307	422	1971

We have seen in Chapter 6 that socio-economic characteristics, in terms of income levels and social class, link with attitudes to innovation in food technology, with those in the lower social classes and income groups being more likely to express concern. However, the existing evidence on the relationship between socio-economic characteristics and attitudes to GM foods is inconclusive, with studies having produced mixed results to date. Interestingly, in relation to income, no significant differences were detected in terms of the provision of positive and negative assessments of the balance between the advantages and dangers of GM foods. Our findings in relation to social class are slightly different. Those in a semi-routine or routine manual occupation are less likely to provide a positive assessment than those in professional or managerial occupations; 20 per cent of the latter group provided a positive overall assessment of GM foods, compared to 13 per cent of those in semi-routine or routine manual occupations. However, professionals were also slightly more likely to provide a negative assessment than those in manual occupations. In essence, these two differences can be explained by the fact that those in routine occupations were around twice as likely to state they were unable to choose an answer – this was the case for 14 per cent, compared to seven per cent of professionals.

**Table 7-7 Attitudes to balance of advantages and dangers of GM foods, by social class**

Base: all respondents

British Social Attitudes 2008

	Professional and managerial	Intermediate occupations	Self-employed	Lower supervisory and technical	Semi routine and routine manual	Total
	%	%	%	%	%	%
<b>On balance, the advantages of GM foods outweigh any dangers</b>						
Agree	20	11	21	25	13	18
Neither agree nor disagree	39	39	28	42	41	39
Disagree	32	42	36	23	28	31
Can't choose	7	7	11	7	14	10
<i>Unweighted base:</i>	705	232	181	259	546	1975
<i>Weighted base:</i>	717	240	177	258	556	1986

Education levels are known to be strongly linked with social class and income, and therefore we might anticipate observing similar patterns in attitudes to GM foods for those groups with different levels of educational qualifications. This was, in fact, the case, with the trends noted above appearing even more starkly. Those with no qualifications were considerably more likely to indicate that they were unable to choose an answer – this was the case for 20 per cent, compared to six per cent of those with a qualification from higher education. In terms of the provision of positive and negative assessments of GM foods, those with higher level qualifications were slightly more likely to provide both a positive and a negative assessment (with these differences narrowly missing the required level of statistical significance). It seems likely that those with no qualifications have a lesser understanding of GM foods and their associated benefits and risks, as they would have acquired less knowledge about related scientific areas and would have less experience in interpreting such technical information – and subsequently were less well equipped to provide an overall assessment. We return to examine the relationship between knowledge and attitudes to GM foods in the following section.

**Table 7-8 Attitudes to balance of advantages and dangers of GM foods, by highest educational qualification**

Base: all respondents

British Social Attitudes 2008

On balance, the advantages of GM foods outweigh any dangers	Higher education %	A-level %	GCSE %	No qualification %	Total %
Agree	21	19	15	15	18
Neither agree nor disagree	37	42	45	31	39
Disagree	35	30	30	28	31
Can't choose	6	8	7	20	10
Don't know	2	1	4	6	3
<i>Unweighted base:</i>	552	281	484	465	1782
<i>Weighted base:</i>	560	318	497	413	1788

We envisaged that overall assessments of the advantages and dangers of GM foods might also vary by an individual's ethnicity and location. We have seen, in Chapter 6, that those from a non-white ethnic group express greater levels of concern about food products in general; however, no significant differences in relation to attitudes to GM foods were observed. It should be borne in mind that this may partly result from the small sample size of the group with a non-white ethnic background, meaning only larger differences would be identified as statistically significant. It seemed plausible that location might also make a difference, given that those resident in rural locations might have particular views about GM foods, due to their greater level of contact and possible involvement with agriculture and traditional farming. In fact, the assessments of the advantages and dangers of GM foods provided by those living in rural and urban locations were almost identical, as was also found to be the case in relation to levels of concerns about innovation in food technology in general.

In terms of differences between demographic groups, we have seen that women and older age groups tend to provide more negative overall assessments of GM foods. While we can tentatively conclude that this may also be the case for groups defined by socio-economic characteristics, it seems likely that this is primarily due to the greater likelihood of less educated and lower socio-economic groups being unable to select an answer to the question. To further understand the reasons for these differences, we now move on to review the variation in attitudes between those with different attitudes, behaviours and knowledge in relation to food. Attitudes, behaviour and knowledge in relation to food in general could potentially influence those with regards to one sub-set of food products – namely GM foods.

## **Food-related knowledge, attitudes and behaviour**

It seemed plausible that a range of food-related knowledge, attitudes and behaviours might link with public attitudes to GM foods. In terms of attitudes in particular, assessments of GM foods could potentially be influenced by more general attitudes to food safety, to trying new foods and to innovation in food technology in general.

In the first place, some of the potential dangers of GM foods that might be perceived by the public as relating to food safety. It therefore seemed likely that those respondents who are more concerned about food safety might be more likely to attribute more significance to this potential danger in their overall assessment of GM foods, making it more likely that this would be negative. This assumption is borne out by the data; 14 per cent of those who are very concerned about food safety express a positive view of GM foods, compared to 18 per cent of those who are fairly concerned and 23 per cent of those who are not very or not at all concerned; those who are more concerned about food safety were also more likely to provide a negative assessment of GM foods (though this difference narrowly missed the selected level of statistical significance). Similarly, it seemed likely that those who are more willing to try unknown foods would generally perceive less potential dangers in a product such as GM foods, about which comparatively little may be known.

However, no significant difference on this measure was observed, between those who were willing to try a new food about which little was known and those for whom this was not the case.

In Chapter 6, we analysed in detail a summary measure of respondent concern about innovation in food technology. As GM foods represent one such innovation, it seemed likely that attitudes to these products would correlate with attitudes to innovation in the area of food more generally. This was indeed found to be the case; 21 per cent of those who are either very or fairly concerned about less than three of the food products asked about present a positive assessment of GM foods, compared to 14 per cent of those who are concerned about three or more of the products. Even more markedly, those respondents who are concerned about innovation in food technology in general are much more likely to express a negative assessment of GM foods; 37 per cent of those who are concerned about three or more food products disagree that the advantages of GM foods outweigh their dangers, compared to just 26 per cent of those who are not concerned about this number of products.

As noted previously, the prevailing tendency for women to express more negative views about GM foods than men has traditionally been explained on the basis of their greater involvement in the purchasing and preparation of food. It is therefore interesting to note that there are no notable differences in assessments of GM foods between those who claim to have responsibility for all or most, some or none of the food shopping. It may be that it is, in fact, involvement in the preparation of food that makes the key difference; this issue was not asked about directly on the 2008 British Social Attitudes survey. Alternatively, the data shows that those who live alone are more likely to be responsible for all of their food shopping, and groups with particularly negative attitudes to GM foods, such as older age groups, are over-represented in this category.

As detailed in Chapter 4, respondents completed a knowledge test on the topic of innovation in food technology, with an individual test score being calculated for each respondent. As noted previously, the existing literature suggests an association between increased knowledge of GM foods and an increase in positive attitudes, and this is borne out by the data presented in Table 7-9 below. Two-tenths of those who answered more than five items on the knowledge test correctly provide a positive assessment of the advantages and dangers of GM foods, compared to slightly more than one-tenth of those who achieved three or less correct answers. However, those with greater levels of knowledge about food technologies in general were also more likely to provide a negative answer – 36 per cent of those who answered more than five of the seven test items correctly disagreed that the advantages of GM foods outweigh any dangers, compared to just 22 per cent of those who answered three or less answers correctly. These differences can both be explained by marked differences in the extent to which these two groups were able to select answers to this question. Twenty per cent of those who gained a low score on the knowledge test were unable to select an answer to this question compared to five per cent of those who achieved a high score. One of the clearest patterns to emerge in terms of differences amongst the public in overall attitudes to GM foods is therefore that those in the most disadvantaged groups, both economically, educationally and in terms of related knowledge – are the most likely to be unable to offer an opinion on this matter.

**Table 7-9 Attitudes to advantages and dangers of GM foods, by knowledge of innovation in food technology**

Base: all respondents

British Social Attitudes 2008

On balance, the advantages of GM foods outweigh any dangers	0-3 correct answers	4-5 correct answers	5+ correct answers	Total
	%	%	%	%
Agree	13	18	20	18
Neither agree nor disagree	40	39	37	39
Disagree	22	30	36	31
Can't choose	20	9	5	10
<i>Unweighted base:</i>	394	892	700	1986
<i>Weighted base:</i>	369	884	721	1974

## General attitudes and values

As noted previously, the existing evidence base on attitudes to GM foods points to attitudes to science as being the best predictor of levels of support or opposition to this development. As detailed in earlier chapters, the 2008 British Social Attitudes survey included a question asking respondents to what extent they agree with the statement that “Overall, modern science does more harm than good”. As shown in Table 7-10 below, attitudes to GM foods do indeed vary considerably on this measure. By far the most striking difference relates to the group who neither agree nor disagree that modern science does more harm than good. This group are much less likely than those who regard modern science positively or negatively to express a positive assessment of the advantages and dangers of GM foods. This is the case for seven per cent of those who express a neutral attitude towards modern science, compared to around two-tenths of those who express a positive or negative view. Those who hold a neutral attitude towards modern science are also much more likely to neither agree nor disagree that the advantages of GM foods outweigh any dangers, suggesting that they might have unformed or neutral attitudes to many topics of a scientific nature. What is interesting to note is that attitudes to modern science appear to make little difference to the extent to which the public hold negative views of GM foods – very similar proportions who regard modern science positively, neutrally or negatively regard the dangers of GM foods as outweighing their advantages. This challenges, to some extent, the view expressed in the current literature that attitudes to science are the best indicator of attitudes to GM foods, although this may result from the particular attitude to modern science (focussing on its impacts) that was included on the 2008 British Social Attitudes survey.

**Table 7-10 Attitudes to advantages and dangers of GM foods, by agreement with view “Modern science does more harm than good”**

Base: all respondents

British Social Attitudes 2008

	Agree	Neither agree nor disagree	Disagree	Total
	%	%	%	%
<b>On balance, the advantages of GM foods outweigh any dangers</b>				
Agree	20	7	23	18
Neither agree nor disagree	35	50	35	39
Disagree	30	31	32	31
Can't choose	11	9	8	10
<i>Unweighted base:</i>	330	535	996	1986
<i>Weighted base</i>	326	536	1033	1986

In addition to attitudes to science, we envisaged that religious views might correlate with attitudes to GM foods. Certain religions preach against human intervention in natural processes (such as through genetic testing, abortion or birth control), a school of thought which could potentially be applied to the genetic modification of food. In fact, no significant differences in overall assessments of GM foods were identified between those who do and do not subscribe to a religion.

## 7.5 Characteristics that predict negative assessments of GM foods

We have seen that overall assessments of GM foods are linked to a range of demographic, attitudinal and behavioural factors. However, as noted in several instances above, many of these factors themselves are likely to be linked; for instance, we have seen in previous chapters that particular groups of the population are much more likely to have greater knowledge of innovation in food technology or levels of concern about food safety. For this reason, multivariate analysis, in the form of logistic regression, was undertaken, to identify those characteristics that link to attitudes to GM foods, once their relationships with one and other are controlled for. The results of this analysis are presented in the appendix to this chapter. In this instance, the decision was taken to focus on those with a negative attitude towards GM foods – who regard its advantages as not outweighing its dangers. This is the group who would be likely to be most opposed to the widespread production and introduction of GM foods in Britain, so it is worth understanding what might be underpinning their views. All five of the factors which emerged as being significantly linked with a negative assessment of GM foods remained significant predictors of negative public assessments of GM foods, even once their interactions with each other were controlled for, namely age, social class, sex, concern about innovation in food and knowledge of

innovation in food technology. These findings suggest that, despite some key differences, attitudes to innovation in food technology in general and GM foods specifically are strongly linked. They support the existing literature by confirming the more negative attitudes held by women and by groups defined by socio-economic characteristics; however, they also challenge the existing consensus in the literature that attitudes to science are the most important predictor of attitudes to GM foods. The fact that younger age groups tend to be less concerned about food technologies but are the least positive about GM foods (mainly because they are much less likely to hold a view on this issue) may also warrant further investigation.

## **7.6 Change over time**

Clearly, attitudes to GM foods vary markedly across the public. But how have these attitudes changed over time, and how might they change in the future? By comparing responses to the questions reviewed previously, asking about the desirability of producing and making widely available GM foods within Britain, fielded in 1999, 2003 and 2008, we can explore how increasing public familiarity with the idea of the application of GM technology to food, through exposure to popular discussion and media coverage, links with levels of public support.

As demonstrated by Table 7-11 below, attitudes to GM foods, which changed dramatically between 1999 and 2003, have continued to move in a similar direction in the last five years, but at a much slower pace. Analysis of the data collected in 2003 noted that, whilst the strong opposition to GM foods evident in the 1990s had reduced considerably, this was due greater proportions neither agreeing nor disagreeing with the three statements detailed below, rather than any significant increase in public support (Sturgis et al., 2004). Since 2003, although the changes only just attain statistical significance, we can see greater proportions expressing positive attitudes towards GM foods, with the proportions adopting a neither positive nor negative position remaining relatively unchanged. Specifically, the proportions who agree with the notions that Britain should grow GM foods in order to compete with the rest of the world and that the advantages of GM foods outweigh any dangers have both increased by four percentage points, whilst disagreement with the view that GM foods should be banned has increased by the same degree. It may be that attitudes to GM foods have changed little, compared to the major shifts in public opinion witnessed between 1999 and 2003, because levels of production and availability in Britain in 2008 are very similar to those that existed in 2003, meaning public familiarity with this technological innovation and the level of media and popular discussion and debate remains the same. Indeed, analysis of the marked changes in public attitudes between 1999 and 2003

pointed towards the unprecedented quantity of media coverage in the latter year, which may have made the subject of GM foods much more familiar, and thus less fearful to the British public (Sturgis et al, 2004). Looking towards the future, we therefore cannot assume that public attitudes in relation to GM food will remain static or continue to move towards a position of moderate support and general ambivalence, if the situation with regards to the production and availability of GM foods or the level of debate of this issue in Britain changes. However, these data do lend support to our findings in relation to alternative food products, in suggesting that increasing public familiarity with an technology does tend to link with a reduction in opposition.

**Table 7-11 Attitudes to GM foods, 1999, 2003 and 2008**

Base: all respondents

British Social Attitudes 2008

	Agree	Neither agree nor disagree	Disagree	Unweighted base
<b>In order to compete with the rest of the world, Britain should grow GM foods</b>				
1999	10	18	65	833 <sup>29</sup>
2003	15	30	45	2649
2008	19	31	41	1975
<b>GM foods should be banned, even if food prices suffer as a result</b>				
1999	52	22	20	833
2003	29	33	26	2649
2008	26	33	30	1975
<b>On balance, the advantages of GM foods outweigh any dangers</b>				
1999	12	22	57	833
2003	14	38	33	2649
2008	18	39	31	1975

## 7.7 Conclusion

Public attitudes to GM foods in 2008 can be characterised as moderate, with those who do express a definite view being more likely to adopt a negative than a positive standpoint. Attitudes to this topic are not necessarily consistent, and in some cases it is clear that particular groups prioritise other concerns in determining their attitudes to GM foods in particular scenarios. This reflects the prevailing view in the literature that GM foods do not represent a top-of-mind concern for many people. There is considerable variation across the public; whilst previous research has tended to focus on those groups with greater or lesser levels of concern, one stark finding to emerge is the much greater inability of more

<sup>29</sup> In 1999, questions on GM foods were only fielded on one version of the self-completion booklet completed by respondents after the interview, which explains the smaller achieved sample sizes.

disadvantaged groups, such as those with lower incomes and educational qualifications, to articulate a view in relation to this matter. The more negative attitudes held by women and older age groups reflect our findings in relation to innovation in food technology in general. Whilst attitudes to GM foods have become less firm and slightly more positive over time, future developments are likely to be determined not only by a growing familiarity with these products, but their level of availability and the extent and tone of media and public discussion that takes place within Britain.

## Appendix

**Table 7-12** Logistic regression (dependent variable disagreement with view that the advantages of GM foods outweigh their dangers), by demographic, attitudinal and behavioural characteristics

	coefficient	standard error	p value
<b>Age (65+)</b>			
18–34	0.39*	0.16	0.014
35–49	-0.30*	0.14	0.030
50–64	-0.26	0.17	0.113
<b>Sex (female)</b>			
Male	-0.24*	0.11	0.025
<b>Class (semi routine and routine manual)</b>			
Professional and managerial	-0.19	0.13	0.145
Intermediate occupations	-0.63**	0.17	0.000
Self-employed	-0.39**	0.19	0.039
Lower supervisory and technical	0.24	0.18	0.184
<b>Knowledge of innovation in food technology (5–7 items answered correctly)</b>			
0–2 items answered correctly	0.74**	0.16	0.000
3–4 items answered correctly	0.32**	0.11	0.005
<b>Level of concern about food technologies (concerned about three or more products)</b>			
Concerned about less than three products	-0.55**	0.11	0.000
Cox and Snell $R^2$ .057			
Unweighted base 1986			
Weighted base 1975			

\* = significant at 95% level; \*\* = significant at 99% level

## 8 Technical Appendix

In 2008, the sample for the British Social Attitudes survey was split into four sections: versions A, B, C and D, each made up a quarter of the sample. Depending on the number of versions in which it was included, each 'module' of questions was thus asked either of the full sample (4,486 respondents) or of a random quarter, half or three-quarters of the sample. The module of questions funded by the Food Standards Agency (FSA) was fielded on two questionnaire versions – Version A and Version B. The structure of the questionnaire can be found at [www.natcen.ac.uk/bsaquestionnaires](http://www.natcen.ac.uk/bsaquestionnaires).

### 8.1 Sample design

The British Social Attitudes survey is designed to yield a representative sample of adults aged 18 or over. Since 1993, the sampling frame for the survey has been the Postcode Address File (PAF), a list of addresses (or postal delivery points) compiled by the Post Office<sup>30</sup>.

For practical reasons, the sample is confined to those living in private households. People living in institutions (though not in private households at such institutions) are excluded, as are households whose addresses were not on the PAF.

The sampling method involved a multi-stage design, with three separate stages of selection.

#### Selection of sectors

At the first stage, postcode sectors were selected systematically from a list of all postal sectors in Great Britain. Before selection, any sectors with fewer than 500 addresses were identified and grouped together with an adjacent sector; in Scotland all sectors north of the Caledonian Canal were excluded (because of the prohibitive costs of interviewing there). Sectors were then stratified on the basis of:

- 37 sub-regions;

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<sup>30</sup> Until 1991 all *British Social Attitudes* samples were drawn from the Electoral Register (ER). However, following concern that this sampling frame might be deficient in its coverage of certain population subgroups, a 'splicing' experiment was conducted in 1991. We are grateful to the Market Research Development Fund for contributing towards the costs of this experiment. Its purpose was to investigate whether a switch to PAF would disrupt the time-series – for instance, by lowering response rates or affecting the distribution of responses to particular questions. In the event, it was concluded that the change from ER to PAF was unlikely to affect time trends in any noticeable ways, and that no adjustment factors were necessary. Since significant differences in efficiency exist between PAF and ER, and because we considered it untenable to continue to use a frame that is known to be biased, we decided to adopt PAF as the sampling frame for future *British Social Attitudes* surveys. For details of the PAF/ER 'splicing' experiment, see Lynn and Taylor (1995).

- population density with variable banding used, in order to create three equal-size strata per sub-region; and
- ranking by percentage of homes that were owner-occupied.

Three hundred and two postcode sectors were selected, with probability proportional to the number of addresses in each sector.

### **Selection of addresses**

Thirty addresses were selected in each of the 302 sectors. The issued sample was therefore  $302 \times 30 = 9,060$  addresses, selected by starting from a random point on the list of addresses for each sector, and choosing each address at a fixed interval. The fixed interval was calculated for each sector in order to generate the correct number of addresses.

The Multiple-Occupancy Indicator (MOI) available through PAF was used when selecting addresses in Scotland. The MOI shows the number of accommodation spaces sharing one address. Thus, if the MOI indicates more than one accommodation space at a given address, the chances of the given address being selected from the list of addresses would increase so that it matched the total number of accommodation spaces. The MOI is largely irrelevant in England and Wales, as separate dwelling units (DU) generally appear as separate entries on PAF. In Scotland, tenements with many flats tend to appear as one entry on PAF. However, even in Scotland, the vast majority of MOIs had a value of one. The remainder were incorporated into the weighting procedures (described below).

### **Selection of individuals**

Interviewers called at each address selected from PAF and listed all those eligible for inclusion in the *British Social Attitudes* sample – that is, all persons currently aged 18 or over and resident at the selected address. The interviewer then selected one respondent using a computer-generated random selection procedure. Where there were two or more DUs at the selected address, interviewers first had to select one DU using the same random procedure. They then followed the same procedure to select a person for interview within the selected DU.

## 8.2 Weighting

The weights for the *British Social Attitudes* survey correct for the unequal selection of addresses, DUs and individuals and for biases caused by differential non-response. The different stages of the weighting scheme are outlined in detail below.

### Selection weights

Selection weights are required because not all the units covered in the survey had the same probability of selection. The weighting reflects the relative selection probabilities of the individual at the three main stages of selection: address, DU and individual. First, because addresses in Scotland were selected using the MOI, weights were needed to compensate for the greater probability of an address with an MOI of more than one being selected, compared to an address with an MOI of one. (This stage was omitted for the English and Welsh data.) Secondly, data were weighted to compensate for the fact that a DU at an address that contained a large number of DUs was less likely to be selected for inclusion in the survey than a DU at an address that contained fewer DUs. (We use this procedure because in most cases where the MOI is greater than one, the two stages will cancel each other out, resulting in more efficient weights.) Thirdly, data were weighted to compensate for the lower selection probabilities of adults living in large households, compared with those in small households.

At each stage the selection weights were trimmed to avoid a small number of very high or very low weights in the sample; such weights would inflate standard errors, reducing the precision of the survey estimates and causing the weighted sample to be less efficient. Less than one per cent of the sample was trimmed at each stage.

### Non-response model

It is known that certain subgroups in the population are more likely to respond to surveys than others. These groups can end up over-represented in the sample, which can bias the survey estimates. Where information is available about non-responding households, the response behaviour of the sample members can be modelled and the results used to generate a non-response weight. This non-response weight is intended to reduce bias in the sample resulting from differential response to the survey.

The data was modelled using logistic regression, with the dependent variable indicating whether or not the selected individual responded to the survey. Ineligible households<sup>31</sup> were not included in the non-response modelling. A number of area-level and interviewer observation variables were used to model response. Not all the variables examined were retained for the final model: variables not strongly related to a household's propensity to respond were dropped from the analysis.

The variables found to be related to response were; Government Office Region (GOR), dwelling type, condition of the local area, relative condition of the address and whether there were entry barriers to the selected address. The model shows that response increases if there are no barriers to entry (for instance, if there are no locked gates around the address and no entry phone) and if the general condition of the address and area is good. Response is also higher for addresses in the North East and East Midlands, but lower for semi-detached and terraced houses as well as for purpose-built flats and maisonettes. The full model is given in Table A.1.

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<sup>31</sup> This includes households not containing any adults aged 18 and over, vacant dwelling units, derelict dwelling units, non-resident addresses and other deadwood.

**Table 8-1 The final non-response model**

Variable	B	S.E.	Wald	df	Sig.	Odds
<b>Govt Office Region</b>			30.38	10	0.00	
North East	0.22	0.10	4.50	1	0.03	1.25
North West	0.12	0.08	2.15	1	0.14	1.12
Yorks. and Humber	0.00	0.08	0.00	1	0.98	1.00
East Midlands	0.36	0.09	16.51	1	0.00	1.43
West Midlands	0.09	0.08	1.17	1	0.28	1.09
East of England	-0.01	0.08	0.01	1	0.91	0.99
London	0.13	0.08	2.86	1	0.09	1.14
South East	0.03	0.07	0.14	1	0.71	1.03
South West	0.07	0.08	0.61	1	0.43	1.07
Wales	0.17	0.10	2.59	1	0.11	1.18
Scotland	(baseline)					
<b>Barriers to address</b>			7.61	1	0.01	
No barriers	0.21	0.08	7.61	1	0.01	1.24
One or more	(baseline)					
<b>Condition of the area</b>			21.57	2	0.00	
Mainly good	0.24	0.13	3.46	1	0.06	1.27
Mainly fair	0.06	0.13	0.25	1	0.62	1.07
Mainly bad	(baseline)					
<b>Relative condition of the address</b>			57.52	2	0.00	
Better	0.73	0.10	52.29	1	0.00	2.07
About the same	0.31	0.08	15.12	1	0.00	1.36
Worse	(baseline)					
<b>Dwelling type</b>			15.43	5	0.01	
Semi-detached house	-0.12	0.05	6.24	1	0.01	0.88
Terraced house	-0.13	0.05	6.47	1	0.01	0.87
Flat purpose built	-0.28	0.08	11.70	1	0.00	0.76
Flat conversion	-0.03	0.13	0.06	1	0.80	0.97
Other	-0.14	0.21	0.43	1	0.51	0.87
Detached house	(baseline)					
Constant	-0.24	0.18	1.77	1	0.18	0.79

**Notes:**

The response is 1 = individual responding to the survey, 0 = non-response

Only variables that are significant at the 0.05 level are included in the model

The model R<sup>2</sup> is 0.01 (Cox and Snell)

**B** is the estimate coefficient with standard error **S.E.**

The **Wald**-test measures the impact of the categorical variable on the model with the appropriate number of degrees of freedom **df**. If the test is significant (**sig.** < 0.05), then the categorical variable is considered to be 'significantly associated' with the response variable and therefore included in the model

The non-response weight is calculated as the inverse of the predicted response probabilities saved from the logistic regression model. The non-response weight was then combined with the selection weights to create the final non-response weight. The top one per cent of the weight were trimmed before the weight was scaled to the achieved sample size (resulting in the weight being standardised around an average of one).

## Calibration weighting

The final stage of weighting was to adjust the final non-response weight so that the weighted sample matched the population in terms of age, sex and region.

**Table 8-2 Weighted and unweighted sample distribution, by GOR, age and sex**

	Population	Unweighted respondents	Respondents weighted by selection weight only	Respondents weighted by un- calibrated non- response weight	Respondents weighted by final weight
	%	%	%	%	%
<b>Govt Office Region</b>					
North East	4.4	4.8	4.3	4.4	4.4
North West	11.5	11.9	6.5	11.7	11.5
Yorks. and Humber	8.7	8.7	8.5	8.9	8.7
East Midlands	7.4	8.9	8.2	7.9	7.4
West Midlands	9.0	9.3	3.1	9.2	9.0
East of England	9.5	8.3	4.5	8.5	9.5
London	12.7	10.9	9.9	11.7	12.7
South East	14.0	15.0	5.1	15.4	14.0
South West	8.9	8.8	8.8	8.8	8.9
Wales	5.0	4.8	10.8	4.6	5.0
Scotland	8.8	8.7	10.3	9.0	8.8
<b>Age &amp; sex</b>	%	%	%	%	%
M 18–24	6.2	2.9	4.3	4.3	6.2
M 25–34	8.2	5.9	6.5	6.7	8.2
M 35–44	9.6	8.5	8.5	8.5	9.6
M 45–54	8.2	7.7	8.2	8.1	8.2
M 55–59	3.9	3.0	3.1	3.1	3.9
M 60–64	3.6	4.4	4.5	4.5	3.6
M 65+	8.9	10.6	9.9	9.8	8.9
F 18–24	5.8	4.1	5.1	5.2	5.8
F 25–34	8.2	8.8	8.8	8.9	8.2
F 35–44	9.8	11.3	10.8	10.8	9.8
F 45–54	8.4	9.5	10.3	10.2	8.4
F 55–59	4.0	4.5	4.7	4.6	4.0
F 60–64	3.7	4.8	4.6	4.5	3.7
F 65+	11.6	14.0	10.9	10.8	11.6
<i>Base</i>	46,537,051	4486	4486	4486	4486

Only adults aged 18 and over are eligible to take part in the survey, therefore the data have been weighted to the British population aged 18+ based on the 2007 mid-year population estimates from the Office for National Statistics/General Register Office for Scotland.

The survey data were weighted to the marginal age/sex and GOR distributions using raking-ratio (or rim) weighting. As a result, the weighted data should exactly match the population across these three dimensions. This is shown in Table A.2.

The calibration weight is the final non-response weight to be used in the analysis of the 2008 survey; this weight has been scaled to the responding sample size. The range of the weights is given in Table A.3.

**Table 8-3 Range of weights**

	N	Minimum	Mean	Maximum
DU and person selection weight	4486	0.55	1.00	2.20
Un-calibrated non-response weight	4486	0.42	1.00	2.39
Final calibrated non-response weight	4486	0.34	1.00	3.82

All of the analyses reported were run on the weighted data-set (with the “weight cases” command in SPSS being used). In addition, for the logistic regression analyses, the CSLOGISTIC command from the SPSS Complex Survey module was used, in order to take into account the effects of survey design on the standard errors of the parameter estimates (and to ensure that these were both calculated correctly).

### Effective sample size

The effect of the sample design on the precision of survey estimates is indicated by the effective sample size (neff). The effective sample size measures the size of an (unweighted) simple random sample that would achieve the same precision (standard error) as the design being implemented. If the effective sample size is close to the actual sample size, then we have an efficient design with a good level of precision. The lower the effective sample size is, the lower the level of precision. The efficiency of a sample is given by the ratio of the effective sample size to the actual sample size. Samples that select one person per household tend to have lower efficiency than samples that select all household members. The final calibrated non-response weights have an effective sample size (neff) of 3,651 and efficiency of 81 per cent.

All the percentages presented in this report are based on weighted data.

### 8.3 Questionnaire versions

Each address in each sector (sampling point) was allocated to either the A, B, C or D portion of the sample. If one serial number was version A, the next was version B, the third version C and the fourth version D. Thus, each interviewer was allocated seven or eight cases from each of versions A, B, C and D. There were 2,265 issued addresses for each version.

## 8.4 Fieldwork

Interviewing was mainly carried out between June and September 2008, with a small number of interviews taking place in October and November.

Fieldwork was conducted by interviewers drawn from the *National Centre for Social Research's* regular panel and conducted using face-to-face computer-assisted interviewing<sup>32</sup>. Interviewers attended a one-day briefing conference to familiarise them with the selection procedures and questionnaires.

The mean interview length was 66 minutes for versions A and B of the questionnaire, 72 minutes for version B and 68 minutes for version D<sup>33</sup>. Interviewers achieved an overall response rate of between 54.8 and 55.9 per cent. Details are shown in Table A.4.

**Table 8-4 Response rate<sup>1</sup> on British Social Attitudes, 2008**

	Number	Lower limit of response (%)	Upper limit of response (%)
Addresses issued	9060		
Out of scope	870		
Upper limit of eligible cases	8190	100.0	
Uncertain eligibility	166	2.0	
Lower limit of eligible cases	8024		100.0
Interview achieved	4486	54.8	55.9
<b>Interview not achieved</b>	3538	43.2	44.1
Refused <sup>2</sup>	2763	33.7	34.4
Non-contacted <sup>3</sup>	357	4.4	4.4
Other non-response	418	5.1	5.2

1 Response is calculated as a range from a lower limit where all unknown eligibility cases (for example, address inaccessible or unknown whether address is residential) are assumed to be eligible and therefore included in the unproductive outcomes, to an upper limit where all these cases are assured to be ineligible (and are therefore excluded from the response calculation).

<sup>32</sup> In 1993 it was decided to mount a split-sample experiment designed to test the applicability of Computer-Assisted Personal Interviewing (CAPI) to the *British Social Attitudes* survey series. CAPI has been used increasingly over the past decade as an alternative to traditional interviewing techniques. As the name implies, CAPI involves the use of lap-top computers during the interview, with interviewers entering responses directly into the computer. One of the advantages of CAPI is that it significantly reduces both the amount of time spent on data processing and the number of coding and editing errors. There was, however, concern that a different interviewing technique might alter the distribution of responses and so affect the year-on-year consistency of *British Social Attitudes* data. Following the experiment, it was decided to change over to CAPI completely in 1994 (the self-completion questionnaire still being administered in the conventional way). The results of the experiment are discussed in *The 11<sup>th</sup> Report* (Lynn and Purdon, 1994).

<sup>33</sup> Interview times recorded as less than 20 minutes were excluded, as these timings were likely to be errors.

2 'Refused' comprises refusal before selection of an individual at the address, refusals to the office, refusal by the selected person, 'proxy' refusals (on behalf of the selected respondent) and broken appointments after which the selected person could not be re-contacted.

3 'Non-contacted' comprises households where no one was contacted and those when the selected person could not be contacted.

As in earlier rounds of the series, the respondent was asked to fill in a self-completion questionnaire which, whenever possible, was collected by the interviewer. Otherwise, the respondent was asked to post it to the *National Centre for Social Research*. If necessary, up to three postal reminders were sent to obtain the self-completion supplement.

A total of 496 respondents (11 per cent of those interviewed) did not return their self-completion questionnaire. Version A of the self-completion questionnaire was returned by 88 per cent of respondents to the face-to-face interview, version B by 89 per cent and versions C and D by 90 per cent. As in previous rounds, we judged that it was not necessary to apply additional weights to correct for non-response to the self-completion questionnaire, due to the large majority of respondents who complete this section of the interview.

### **Advance letter**

Interviewers were supplied with letters describing the purpose of the survey and the coverage of the questionnaire, which they posted to sampled addresses before making any calls<sup>34</sup>.

## **8.5 Analysis variables**

A number of standard analyses have been used in the tables that appear in this report. The analysis groups requiring further definition are set out below. For further details see Stafford and Thomson (2006). Where there are references to specific question numbers, the full question text, including frequencies, can be found at [www.natcen.ac.uk/bsaquestionnaires](http://www.natcen.ac.uk/bsaquestionnaires)

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<sup>34</sup> An experiment was conducted on the 1991 *British Social Attitudes* survey (Jowell *et al.*, 1992) which showed that sending advance letters to sampled addresses before fieldwork begins has very little impact on response rates. However, interviewers do find that an advance letter helps them to introduce the survey on the doorstep, and a majority of respondents have said that they preferred some advance notice. For these reasons, advance letters have been used on the *British Social Attitudes* surveys since 1991.

## **Standard Occupational Classification**

Respondents are classified according to their own occupation, not that of the 'head of household'. Each respondent was asked about their current or last job, so that all respondents except those who had never worked were coded. Additionally, all job details were collected for all spouses and partners in work.

With the 2001 survey, we began coding occupation to the new Standard Occupational Classification 2000 (SOC 2000) instead of the Standard Occupational Classification 1990 (SOC 90). The main socio-economic grouping based on SOC 2000 is the National Statistics Socio-Economic Classification (NS-SEC).

## **National Statistics Socio-Economic Classification (NS-SEC)**

The combination of SOC 2000 and employment status for current or last job generates the following NS-SEC analytic classes:

Employers in large organisations, higher managerial and professional  
Lower professional and managerial; higher technical and supervisory  
Intermediate occupations  
Small employers and own account workers  
Lower supervisory and technical occupations  
Semi-routine occupations  
Routine occupations

The remaining respondents are grouped as "never had a job" or "not classifiable". For some analyses, it may be more appropriate to classify respondents according to their current socio-economic status, which takes into account only their present economic position. In this case, in addition to the seven classes listed above, the remaining respondents not currently in paid work fall into one of the following categories: "not classifiable", "retired", "looking after the home", "unemployed" or "others not in paid occupations".

## **Income**

Two variables classify the respondent's earnings (REarn) and household income (HHInc) on the questionnaire (see [www.natcen.ac.uk/bsaquestionnaires](http://www.natcen.ac.uk/bsaquestionnaires)). Two new derived variables were added to the *British Social Attitudes 2008* dataset giving quartiles of these variables. They are [REarnQ] and [HHIncQ] and are

calculated based on quartiles of all valid responses to the questions. For this report, the main analytical variable used to measure income is household income.

## Other analysis variables

These are taken directly from the questionnaire and to that extent are self-explanatory (see [www.natcen.ac.uk/bsaquestionnaires](http://www.natcen.ac.uk/bsaquestionnaires)). The principal ones are:

Sex (Q. 45)

Age (Q. 46)

Household income (Q. 1353)

Economic position (Q. 944)

Religion (Q. 1119)

Highest educational qualification obtained (Qs. 1168–1199)

Whether lives with a partner (Q. 56)

Whether children in the household (Q. 46)

Ethnicity (Q. 1149)

Location (Q.1100)

## 8.6 Sampling errors

No sample precisely reflects the characteristics of the population it represents, because of both sampling and non-sampling errors. If a sample were designed as a random sample (if every adult had an equal and independent chance of inclusion in the sample), then we could calculate the sampling error of any percentage,  $p$ , using the formula:

$$s.e. (p) = \frac{\sqrt{p(100 - p)}}{\sqrt{n}}$$

where  $n$  is the number of respondents on which the percentage is based. Once the sampling error had been calculated, it would be a straightforward exercise to calculate a confidence interval for the true population percentage. For example, a 95 per cent confidence interval would be given by the formula:

$$p \pm 1.96 \times s.e. (p)$$

Clearly, for a simple random sample (srs), the sampling error depends only on the values of  $p$  and  $n$ . However, simple random sampling is almost never used in practice, because of its inefficiency in terms of time and cost.

As noted above, the *British Social Attitudes* sample, like that drawn for most large-scale surveys, was clustered according to a stratified multi-stage design into 302 postcode sectors (or combinations of sectors). With a complex design like this, the sampling error of a percentage giving a particular response is not simply a function of the number of respondents in the sample and the size of the percentage; it also depends on how that percentage response is spread within and between sample points.

The complex design may be assessed relative to simple random sampling by calculating a range of design factors (DEFTs) associated with it, where:

$$\text{DEFT} = \sqrt{\frac{\text{Variance of estimator with complex design, sample size } n}{\text{Variance of estimator with srs design, sample size } n}}$$

and represents the multiplying factor to be applied to the simple random sampling error to produce its complex equivalent. A design factor of one means that the complex sample has achieved the same precision as a simple random sample of the same size. A design factor greater than one means the complex sample is less precise than its simple random sample equivalent. If the DEFT for a particular characteristic is known, a 95 per cent confidence interval for a percentage may be calculated using the formula:

$$p \pm 1.96 \times \text{complex sampling error } (p) \\ = p \pm 1.96 \times \text{DEFT} \times \sqrt{\frac{p(100 - p)}{n}}$$

Calculations of sampling errors and design effects were made using the statistical analysis package STATA.

Table A.5 gives examples of the confidence intervals and DEFTs calculated for a range of different questions. Most background variables were fielded on the whole sample, whereas many attitudinal variables were asked only of a half or quarter of the sample; some were asked on the interview questionnaire and some on the self-completion supplement.

**Table 8-5 Complex standard errors and confidence intervals of selected variables**

	% (p)	Complex standard error of p	95% confidence interval	DEFT	Base p
<b>Attitudes to food module variables</b>					
<b>Most important influences on your choice of foods? Quality or freshness of food</b>					
0 Not mentioned	20.9%	1.0%	19.0%	22.9%	1.160 479
1 Mentioned	79.0%	1.0%	77.0%	80.9%	1.157 1769
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Taste of food</b>					
0 Not mentioned	37.5%	1.2%	35.1%	39.9%	1.172 885
1 Mentioned	62.5%	1.2%	60.1%	64.8%	1.169 1363
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Eating food that is healthy or low fat</b>					
0 Not mentioned	35.9%	1.2%	33.7%	38.2%	1.141 801
1 Mentioned	64.0%	1.2%	61.7%	66.2%	1.139 1447
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Presentation / packaging / advertising / brand</b>					
0 Not mentioned	91.8%	.6%	90.5%	93.0%	1.071 2070
1 Mentioned	8.1%	.6%	7.0%	9.4%	1.060 178
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Vegetarian or other special eating habits</b>					
0 Not mentioned	90.0%	.8%	88.4%	91.5%	1.239 2040
1 Mentioned	9.9%	.8%	8.5%	11.5%	1.236 208
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Number of additives or E numbers in food</b>					
0 Not mentioned	80.1%	.9%	78.3%	81.8%	1.060 1788
1 Mentioned	19.8%	.9%	18.2%	21.6%	1.049 460
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Habit or routine</b>					
0 Not mentioned	70.4%	1.1%	68.2%	72.5%	1.137 1615
1 Mentioned	29.5%	1.1%	27.4%	31.7%	1.141 633
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? To try something new or different</b>					
0 Not mentioned	66.6%	1.1%	64.3%	68.8%	1.152 1522
1 Mentioned	33.3%	1.1%	31.1%	35.6%	1.152 726
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? What my family / spouse / children will eat</b>					
0 Not mentioned	67.2%	1.1%	64.9%	69.4%	1.140 1569
1 Mentioned	32.7%	1.1%	30.5%	35.0%	1.139 679
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Convenience in preparation</b>					
0 Not mentioned	73.5%	1.1%	71.3%	75.5%	1.144 1639
1 Mentioned	26.4%	1.1%	24.4%	28.6%	1.150 609
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Availability in the shops I can usually get to</b>					
0 Not mentioned	73.4%	1.2%	71.0%	75.6%	1.249 1644
1 Mentioned	26.6%	1.2%	24.3%	28.9%	1.248 604
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Recommendations from friends, family or colleagues</b>					
0 Not mentioned	82.5%	1.0%	80.5%	84.3%	1.198 1883
1 Mentioned	17.5%	1.0%	15.7%	19.5%	1.198 365
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Foods I know how to cook / prepare</b>					
0 Not mentioned	55.4%	1.3%	52.8%	58.1%	1.271 1261
1 Mentioned	44.5%	1.3%	41.9%	47.1%	1.272 987
8 Don't know	.1%	.0%	.0%	.3%	.891 2
<b>Most important influences on your choice of foods? Price of food / value for money / special offers</b>					
0 Not mentioned	40.2%	1.3%	37.6%	42.8%	1.290 893

1	Mentioned	59.8%	1.3%	57.1%	62.4%	1.289	1355
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Whether food is organically produced</b>							
0	Not mentioned	85.1%	.8%	83.4%	86.6%	1.073	1913
1	Mentioned	14.9%	.8%	13.3%	16.5%	1.078	335
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Animal welfare / free range</b>							
0	Not mentioned	66.2%	1.2%	63.9%	68.5%	1.158	1489
1	Mentioned	33.7%	1.2%	31.4%	36.0%	1.160	759
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Impact on the community where food comes from / fair trade / supporting local farms and industries</b>							
0	Not mentioned	73.0%	1.2%	70.5%	75.4%	1.308	1641
1	Mentioned	26.9%	1.2%	24.6%	29.4%	1.309	607
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Impact of the food on the landscape where it was produced</b>							
0	Not mentioned	90.6%	.8%	89.0%	92.0%	1.233	2041
1	Mentioned	9.3%	.8%	7.9%	10.9%	1.234	207
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Amount / type of packaging used e.g. recycled</b>							
0	Not mentioned	84.0%	.9%	82.2%	85.7%	1.140	1891
1	Mentioned	15.9%	.9%	14.3%	17.8%	1.146	357
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? Other answer</b>							
0	Not mentioned	99.1%	.2%	98.6%	99.5%	1.084	2230
1	Mentioned	.8%	.2%	.5%	1.3%	1.099	18
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? SPONTANEOUS - Someone else decides on most of the food I eat</b>							
0	Not mentioned	99.6%	.1%	99.2%	99.8%	1.053	2239
1	Mentioned	.4%	.1%	.2%	.8%	1.081	9
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>Most important influences on your choice of foods? SPONTANEOUS - No particular influence</b>							
0	Not mentioned	99.8%	.1%	99.5%	99.9%	1.013	2246
1	Mentioned	.1%	.1%	.0%	.4%	1.094	2
8	Don't know	.1%	.0%	.0%	.3%	.891	2
<b>I am a vegetarian or vegan</b>							
0	Not mentioned	95.2%	.5%	94.1%	96.2%	1.199	2142
1	Mentioned	4.7%	.5%	3.8%	5.9%	1.186	107
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>I avoid certain foods as I react badly to them</b>							
0	Not mentioned	87.7%	.8%	86.0%	89.3%	1.226	1962
1	Mentioned	12.2%	.8%	10.6%	14.0%	1.223	287
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>I am on a diet trying to lose weight</b>							
0	Not mentioned	85.1%	.9%	83.2%	86.7%	1.163	1902
1	Mentioned	14.9%	.9%	13.3%	16.7%	1.166	347
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>I avoid certain food for religious reasons</b>							
0	Not mentioned	95.9%	.6%	94.5%	97.0%	1.499	2176
1	Mentioned	4.0%	.6%	3.0%	5.5%	1.503	73
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>I avoid certain food because of medical advice</b>							
0	Not mentioned	85.4%	.8%	83.9%	86.8%	1.010	1895
1	Mentioned	14.5%	.8%	13.1%	16.1%	1.013	354
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>Mentioned no food intolerances</b>							
0	Not mentioned	40.1%	1.3%	37.7%	42.6%	1.220	917
1	Mentioned	59.8%	1.3%	57.3%	62.3%	1.219	1332
8	Don't know	.0%	.0%	.0%	.3%	.971	1
<b>Thinking only of the food you eat at home, how much of the shopping for this food do you do?</b>							
1	All or most of the food shopping	57.9%	1.3%	55.3%	60.4%	1.251	1491

2 About half of the food shopping	16.2%	.9%	14.4%	18.1%	1.182	312
3 Less than half of the food shopping	14.0%	.9%	12.2%	16.0%	1.296	242
4 None of the food shopping	11.9%	.9%	10.2%	13.9%	1.370	203
8 Don't know	.1%	.1%	.0%	.4%	1.017	2

**Do you buy bags containing ready-to-eat salad leaves?**

1 Yes	48.5%	1.2%	46.1%	50.9%	1.141	1086
2 No	44.7%	1.2%	42.3%	47.1%	1.153	1004
3 I have done in the past but I don't any more	6.8%	.5%	5.9%	7.9%	.980	159
8 Don't know	.0%	.0%	.0%	.3%	.971	1

**Which of the statements on this card describes how knowledgeable you feel about the way the food industry prepares and manufactures food nowadays?**

1 I know little or nothing	21.3%	1.0%	19.4%	23.4%	1.173	483
2 My knowledge is very patchy - I know a bit about the areas	31.3%	1.1%	29.1%	33.6%	1.157	701
3 I have a reasonable, basic knowledge	38.4%	1.2%	36.0%	40.9%	1.204	864
4 I have a good knowledge	8.9%	.7%	7.6%	10.3%	1.146	199
8 Don't know	.1%	.1%	.0%	.3%	.882	3

**I would try unknown food or not?**

1 happy to eat foods never tried before	48.4%	1.3%	45.8%	51.0%	1.238	1062
2 wouldn't eat a food that I had never tried before	47.2%	1.3%	44.7%	49.7%	1.188	1077
3 (SPONTANEOUS: It depends on the type of food)	3.7%	.5%	2.8%	4.8%	1.233	96
4 (SPONTANEOUS: Neither)	.6%	.2%	.3%	1.2%	1.187	14
8 Don't know	.0%	.0%	.0%	.3%	.971	1

**I would try unknown food or not?**

1 happy to eat foods never tried before	48.4%	1.3%	45.8%	51.0%	1.238	1062
2 wouldn't eat a food that I had never tried before	47.2%	1.3%	44.7%	49.7%	1.188	1077
3 (SPONTANEOUS: It depends on the type of food)	3.7%	.5%	2.8%	4.8%	1.233	96
4 (SPONTANEOUS: Neither)	.6%	.2%	.3%	1.2%	1.187	14
8 Don't know	.0%	.0%	.0%	.3%	.971	1

**Which of these best describes your level of concern about food safety in Britain. By food safety, we mean things like food allergies and hygiene when storing and preparing food?**

1 Very concerned	33.0%	1.2%	30.7%	35.4%	1.207	761
2 Fairly concerned	42.8%	1.3%	40.2%	45.4%	1.251	961
3 Not very concerned	20.5%	1.0%	18.5%	22.6%	1.203	447
4 Not at all concerned	3.5%	.5%	2.7%	4.6%	1.211	76
8 Don't know	.2%	.1%	.1%	.4%	.849	5

**Imagine a sausage that helps reduce risk high blood pressure, which tastes the same and looks the same as normal sausages sold in the supermarket. It would be available in meat and vegetarian varieties. would you buy?**

1 Definitely would	26.3%	1.1%	24.2%	28.5%	1.183	568
2 Probably would	37.4%	1.2%	35.0%	39.8%	1.205	838
3 Probably would not	19.7%	.9%	18.0%	21.6%	1.085	445
4 Definitely would not	15.3%	.9%	13.6%	17.3%	1.223	368
8 Don't know	1.3%	.3%	.8%	2.1%	1.320	31

**Whether you would buy the sausage that helps reduce the risk of high blood pressure if it was more expensive than a traditional sausage?**

-1 Skip, definitely wouldn't buy

1 Definitely would	15.3%	.9%	13.6%	17.3%	1.223	368
2 Probably would	14.8%	.9%	13.2%	16.6%	1.174	338
3 Probably would not	35.7%	1.2%	33.4%	38.1%	1.169	791
4 Definitely would not	23.6%	1.0%	21.7%	25.7%	1.113	529
8 Don't know	8.4%	.7%	7.1%	9.9%	1.201	178
9 Refusal	.7%	.2%	.4%	1.2%	1.112	15

**Whether you would buy the sausage that helps reduce the risk of high blood pressure if it had a shorter shelf-life than a traditional sausage?**

-1 Skip, definitely wouldn't buy

1 Definitely would	13.6%	.8%	12.1%	15.4%	1.160	305
2 Probably would	36.3%	1.1%	34.1%	38.6%	1.131	813
3 Probably would not	23.3%	1.0%	21.3%	25.4%	1.156	515
4 Definitely would not	9.7%	.8%	8.3%	11.4%	1.272	209
8 Don't know	.4%	.1%	.2%	.8%	1.047	9
9 Refusal	1.3%	.3%	.8%	2.1%	1.320	31

**Imagine an extremely low calorie cake. It tastes the same and looks the same as conventional cake sold in the supermarket but has had an extra ingredient added to reduce the calories. Would you buy?**

1 Definitely would	22.3%	1.0%	20.4%	24.2%	1.106	505
2 Probably would	29.5%	1.2%	27.2%	32.0%	1.249	652
3 Probably would not	22.8%	1.1%	20.8%	25.0%	1.216	501
4 Definitely would not	24.1%	1.1%	22.0%	26.2%	1.189	561
8 Don't know	1.3%	.3%	.9%	2.0%	1.111	31
<b>Whether you would buy the extremely low calorie cake if it was more expensive than traditional cake?</b>						
-1 Skip, definitely wouldn't buy	24.1%	1.1%	22.0%	26.2%	1.189	561
1 Definitely would	12.4%	.7%	11.0%	13.9%	1.076	294
2 Probably would	26.7%	1.1%	24.5%	29.0%	1.220	583
3 Probably would not	24.2%	1.0%	22.2%	26.3%	1.135	537
4 Definitely would not	10.7%	.8%	9.2%	12.5%	1.246	230
8 Don't know	.6%	.2%	.3%	1.2%	1.276	14
9 Refusal	1.3%	.3%	.9%	2.0%	1.111	31
<b>Whether you would buy the extremely low calorie cake if it had a shorter shelf-life than traditional cake?</b>						
-1 Skip, definitely wouldn't buy	24.1%	1.1%	22.0%	26.2%	1.189	561
1 Definitely would	12.5%	.7%	11.2%	14.0%	1.039	296
2 Probably would	27.9%	1.1%	25.7%	30.2%	1.203	612
3 Probably would not	23.8%	1.0%	21.8%	25.9%	1.167	524
4 Definitely would not	9.9%	.7%	8.6%	11.5%	1.162	213
8 Don't know	.5%	.1%	.3%	.8%	.925	13
9 Refusal	1.3%	.3%	.9%	2.0%	1.111	31
<b>Whether you would buy the extremely low calorie cake if it was more expensive than traditional cake?</b>						
-1 Skip, definitely wouldn't buy	24.1%	1.1%	22.0%	26.2%	1.189	561
1 Definitely would	12.4%	.7%	11.0%	13.9%	1.076	294
2 Probably would	26.7%	1.1%	24.5%	29.0%	1.220	583
3 Probably would not	24.2%	1.0%	22.2%	26.3%	1.135	537
4 Definitely would not	10.7%	.8%	9.2%	12.5%	1.246	230
8 Don't know	.6%	.2%	.3%	1.2%	1.276	14
9 Refusal	1.3%	.3%	.9%	2.0%	1.111	31
<b>GM, genetically modified, food is never sold in Britain? true or false?</b>						
1 True	8.6%	.7%	7.4%	10.0%	1.144	192
2 False	73.1%	1.0%	71.0%	75.1%	1.117	1634
3 Unsure	18.1%	.9%	16.3%	20.0%	1.165	418
9 Refusal	.2%	.1%	.1%	.5%	.976	6
<b>Using microwave ovens to heat food involves radiation? true or false?</b>						
1 True	68.0%	1.1%	65.9%	70.1%	1.089	1493
2 False	18.6%	1.0%	16.8%	20.6%	1.198	420
3 Unsure	13.1%	.8%	11.7%	14.8%	1.114	332
9 Refusal	.2%	.1%	.1%	.5%	.984	5
<b>Organic food crops are frequently grown using pesticides? true or false?</b>						
1 True	27.1%	1.3%	24.7%	29.7%	1.341	619
2 False	52.8%	1.3%	50.3%	55.4%	1.213	1175
3 Unsure	19.8%	.9%	18.0%	21.7%	1.125	451
9 Refusal	.2%	.1%	.1%	.6%	1.104	5
<b>Pasteurised foods like orange juice have a longer shelf life because they don't contain as much bacteria as fresh orange juice? true or false?</b>						
1 True	54.2%	1.3%	51.7%	56.8%	1.235	1199
2 False	13.5%	.9%	11.9%	15.3%	1.193	304
3 Unsure	32.1%	1.2%	29.8%	34.5%	1.209	742
9 Refusal	.2%	.1%	.1%	.6%	1.093	5
<b>Some foods have extra ingredients added to them to make them healthier? true or false?</b>						
1 True	61.1%	1.3%	58.5%	63.7%	1.261	1348
2 False	21.5%	.9%	19.7%	23.5%	1.087	492
3 Unsure	17.1%	.9%	15.4%	18.9%	1.132	404
9 Refusal	.3%	.1%	.1%	.6%	1.082	6
<b>Bags containing ready-to-eat salad leaves are usually filled with gases to slow the growth of bacteria and ensure the leaves stay fresh for longer? true or false?</b>						
1 True	47.5%	1.2%	45.1%	50.0%	1.176	1043
2 False	11.0%	.7%	9.7%	12.6%	1.117	262
3 Unsure	41.3%	1.3%	38.8%	43.8%	1.237	940
9 Refusal	.2%	.1%	.1%	.5%	.975	5

<b>Omega-3 oils, which are usually obtained from fish, can also be manufactured from plant-like organisms called algae? true or false?</b>						
1 True	29.6%	1.1%	27.5%	31.8%	1.135	643
2 False	13.7%	.9%	12.1%	15.4%	1.184	323
3 Unsure	56.4%	1.3%	53.9%	59.0%	1.231	1277
9 Refusal	.3%	.1%	.1%	.6%	.996	7
<b>Whether asked Magnetron (1) or Microwv (2)</b>						
1 Asked Magnetron	49.9%	1.1%	47.7%	52.2%	1.066	1146
2 Asked Microwave	50.1%	1.1%	47.8%	52.3%	1.066	1104
<b>How concerned eating food prepared by magnetron?</b>						
1 Very concerned	21.9%	1.3%	19.5%	24.5%	1.044	264
2 Fairly concerned	34.7%	1.6%	31.6%	37.9%	1.139	403
3 Not very concerned	27.1%	1.5%	24.1%	30.2%	1.165	290
4 Not at all concerned	11.4%	1.1%	9.3%	13.9%	1.212	126
7 Identified magnetron=microwave, no other answer	2.3%	.5%	1.5%	3.6%	1.141	29
8 Don't know	2.6%	.5%	1.8%	3.9%	1.092	34
<b>Identified a magnetron as a microware[asked magnetron]</b>						
1 Yes	2.3%	.5%	1.5%	3.6%	1.141	29
2 No	95.1%	.8%	93.3%	96.3%	1.171	1083
8 Don't know	2.6%	.5%	1.8%	3.9%	1.092	34
<b>A microwave is a device in which food can be exposed to radiation to heat it and kill bacteria before eating. How concerned would you be about eating food prepared using this device?[asked microwave]</b>						
1 Very concerned	10.6%	1.0%	8.7%	12.9%	1.128	106
2 Fairly concerned	19.5%	1.4%	16.9%	22.4%	1.172	227
3 Not very concerned	43.4%	1.8%	39.8%	47.0%	1.221	477
4 Not at all concerned	26.0%	1.5%	23.1%	29.1%	1.161	287
8 Don't know	.5%	.2%	.2%	1.2%	.988	7
<b>Whether asked VegOil (1) or Benecol (2)</b>						
1 Asked vegetable oil	50.2%	1.0%	48.2%	52.2%	.962	1131
2 Asked Benecol	49.8%	1.0%	47.8%	51.8%	.962	1119
<b>Products have been developed that contain a concentrated variety of an ingredient found in vegetable oil that lowers levels of cholesterol. How concerned would you be about eating food that contained this[asked vegetable oil]</b>						
1 Very concerned	5.5%	.8%	4.2%	7.2%	1.123	67
2 Fairly concerned	20.9%	1.3%	18.5%	23.6%	1.075	238
3 Not very concerned	46.7%	1.7%	43.4%	50.1%	1.143	516
4 Not at all concerned	24.9%	1.4%	22.1%	27.8%	1.124	289
7 (SPONTANEOUS - Respondent independently identifies ingredient)	.3%	.2%	.1%	1.0%	1.123	3
8 Don't know	1.7%	.5%	1.0%	2.8%	1.186	18
<b>Identified ingredient as Benecol [asked vegetable oil]</b>						
1 Yes	.3%	.2%	.1%	1.0%	1.123	3
2 No	98.1%	.5%	96.8%	98.8%	1.176	1110
8 Don't know	1.7%	.5%	1.0%	2.8%	1.186	18
<b>Products including Benecol have been developed that contain a ingredient found in vegetable oil that lowers levels of cholesterol. How concerned would you be about eating food this ingredient? [asked Benecol]</b>						
1 Very concerned	5.7%	.8%	4.4%	7.5%	1.119	71
2 Fairly concerned	17.2%	1.3%	14.8%	19.8%	1.130	187
3 Not very concerned	48.7%	1.9%	45.0%	52.4%	1.246	544
4 Not at all concerned	26.4%	1.6%	23.3%	29.7%	1.230	291
8 Don't know	2.0%	.5%	1.3%	3.2%	1.078	26
<b>Whether asked Protein (1) or Quorn (2)</b>						
1 Asked protein	50.9%	1.1%	48.7%	53.0%	1.039	1129
2 Asked Quorn	49.1%	1.1%	47.0%	51.3%	1.039	1121
<b>How concerned would you be about eating food that contained a processed edible fungus[asked protein]</b>						
1 Very concerned	23.5%	1.6%	20.5%	26.7%	1.237	271
2 Fairly concerned	28.3%	1.4%	25.6%	31.1%	1.041	323
3 Not very concerned	29.6%	1.6%	26.6%	32.8%	1.161	323
4 Not at all concerned	14.3%	1.2%	12.1%	16.8%	1.147	161
7 (SPONTANEOUS - Respondent independently identifies ingredient)	1.9%	.4%	1.2%	2.9%	1.064	26
8 Don't know	2.5%	.5%	1.6%	3.8%	1.185	25
<b>Identified processed edible fungus as Quorn[asked protein]</b>						

1 Yes	2.4%	.5%	1.6%	3.5%	1.074	31
2 No	95.2%	.7%	93.5%	96.4%	1.146	1073
8 Don't know	2.5%	.5%	1.6%	3.8%	1.185	25

**There is an ingredient called Quorn available, a non-meat source of protein grown in large tanks using a processed edible fungus. How concerned would you be about eating food that contain this ingredient[asked Quorn]**

1 Very concerned	17.3%	1.4%	14.8%	20.2%	1.205	209
2 Fairly concerned	18.0%	1.2%	15.7%	20.6%	1.085	203
3 Not very concerned	36.1%	1.5%	33.1%	39.2%	1.076	396
4 Not at all concerned	26.2%	1.5%	23.3%	29.4%	1.176	285
8 Don't know	2.3%	.5%	1.5%	3.6%	1.113	28

**A process is often used to produce bags containing ready-to-eat salad leaves. This involves filling the bags with gases that control the growth of bacteria and keep leaves fresher for longer. Are you concerned?**

1 Very concerned	21.8%	1.1%	19.7%	24.1%	1.275	534
2 Fairly concerned	37.3%	1.3%	34.8%	40.0%	1.281	828
3 Not very concerned	28.9%	1.2%	26.6%	31.4%	1.261	633
4 Not at all concerned	9.9%	.8%	8.5%	11.6%	1.209	212
8 Don't know	2.0%	.3%	1.5%	2.6%	.982	43

**Increase the shelf-life of products such as fresh fruit juice by putting them under high pressure. Some people think using high pressure retains the flavour of the food more than pasteurisation using heat.**

1 Very concerned	10.1%	.7%	8.9%	11.5%	1.050	252
2 Fairly concerned	26.7%	1.2%	24.5%	29.1%	1.234	603
3 Not very concerned	44.5%	1.3%	42.1%	47.0%	1.194	983
4 Not at all concerned	15.8%	1.0%	13.9%	17.8%	1.275	340
8 Don't know	2.9%	.4%	2.2%	3.7%	1.119	72

**I buy food that is processed as it is easier to prepare and store?**

1 Agree strongly	1.8%	.4%	1.2%	2.7%	1.223	36
2 Agree	22.8%	1.1%	20.6%	25.2%	1.219	466
3 Neither agree nor disagree	23.0%	1.1%	20.9%	25.2%	1.173	446
4 Disagree	34.6%	1.3%	32.1%	37.2%	1.202	673
5 Disagree strongly	12.9%	.8%	11.4%	14.6%	1.090	267
8 Don't know	2.5%	.4%	1.7%	3.5%	1.265	47
9 Not answered	2.4%	.4%	1.7%	3.4%	1.193	51

**I like food to be unprocessed, even if this means that it takes more effort to prepare and keep fresh?**

1 Agree strongly	14.7%	.9%	13.0%	16.6%	1.129	304
2 Agree	50.7%	1.3%	48.2%	53.3%	1.146	980
3 Neither agree nor disagree	20.3%	1.1%	18.3%	22.5%	1.179	411
4 Disagree	7.5%	.6%	6.3%	8.9%	1.101	155
5 Disagree strongly	1.1%	.3%	.6%	2.0%	1.468	18
8 Don't know	3.1%	.5%	2.3%	4.2%	1.192	66
9 Not answered	2.5%	.4%	1.8%	3.5%	1.165	52

**I want food that I buy to look attractive, even if this means it has been processed in some way?**

1 Agree strongly	1.3%	.3%	.8%	2.1%	1.287	20
2 Agree	15.5%	.9%	13.7%	17.4%	1.135	300
3 Neither agree nor disagree	26.0%	1.2%	23.8%	28.4%	1.201	526
4 Disagree	40.2%	1.2%	37.8%	42.7%	1.115	793
5 Disagree strongly	10.6%	.7%	9.3%	12.1%	1.008	220
8 Don't know	3.3%	.5%	2.5%	4.4%	1.205	64
9 Not answered	3.1%	.4%	2.3%	4.1%	1.153	63

**I want food that I buy to be unprocessed, even if this means it has an irregular appearance?**

1 Agree strongly	11.9%	.9%	10.2%	13.8%	1.246	239
2 Agree	37.3%	1.2%	35.0%	39.7%	1.093	739
3 Neither agree nor disagree	30.0%	1.2%	27.7%	32.4%	1.141	595
4 Disagree	12.4%	1.0%	10.5%	14.5%	1.357	240
5 Disagree strongly	1.4%	.3%	.9%	2.1%	1.096	29
8 Don't know	4.3%	.5%	3.3%	5.5%	1.208	86
9 Not answered	2.8%	.4%	2.1%	3.7%	1.122	58

**Research and development in medicine should be encouraged and supported, even if a lot of money would need to be invested?**

1 Agree strongly	28.8%	1.1%	26.8%	31.0%	1.050	569
2 Agree	58.0%	1.3%	55.4%	60.6%	1.199	1158
3 Neither agree nor disagree	7.8%	.6%	6.6%	9.2%	1.065	156
4 Disagree	1.3%	.3%	.8%	2.1%	1.185	25

5 Disagree strongly	.1%	.1%	.0%	.5%	1.062	3
8 Don't know	1.5%	.3%	1.0%	2.3%	1.104	31
9 Not answered	2.4%	.4%	1.7%	3.4%	1.232	44
<b>Research and development in food technology should be encouraged and supported, even if a lot of money would need to be invested?</b>						
1 Agree strongly	11.2%	.7%	9.8%	12.8%	1.057	222
2 Agree	42.7%	1.2%	40.3%	45.2%	1.107	838
3 Neither agree nor disagree	28.5%	1.1%	26.4%	30.7%	1.069	580
4 Disagree	10.9%	.8%	9.5%	12.5%	1.081	211
5 Disagree strongly	1.0%	.2%	.6%	1.6%	1.085	21
8 Don't know	2.7%	.4%	2.0%	3.7%	1.107	59
9 Not answered	2.9%	.5%	2.2%	4.0%	1.196	55
<b>Research and development in mobile phone technology should be encouraged and supported, even if a lot of money would need to be invested?</b>						
1 Agree strongly	2.5%	.5%	1.6%	3.8%	1.563	43
2 Agree	10.3%	.8%	8.9%	11.9%	1.120	205
3 Neither agree nor disagree	26.4%	1.1%	24.2%	28.6%	1.124	538
4 Disagree	40.5%	1.3%	38.0%	43.0%	1.146	799
5 Disagree strongly	13.7%	.8%	12.2%	15.4%	1.049	267
8 Don't know	3.7%	.5%	2.9%	4.8%	1.136	78
9 Not answered	2.9%	.5%	2.2%	4.0%	1.199	56
<b>In order to compete with the rest of the world, Britain should grow genetically modified (GM) foods?</b>						
1 Agree strongly	2.6%	.4%	1.9%	3.6%	1.167	53
2 Agree	16.5%	1.0%	14.6%	18.6%	1.208	318
3 Neither agree nor disagree	30.6%	1.1%	28.5%	32.9%	1.083	613
4 Disagree	31.2%	1.2%	28.9%	33.5%	1.124	601
5 Disagree strongly	9.7%	.8%	8.3%	11.4%	1.167	205
8 Don't know	6.6%	.6%	5.5%	8.0%	1.113	139
9 Not answered	2.7%	.4%	2.0%	3.7%	1.187	57
<b>Genetically Modified (GM) foods should be banned, even if food prices suffer as a result?</b>						
1 Agree strongly	6.0%	.6%	4.9%	7.4%	1.172	127
2 Agree	20.4%	1.0%	18.6%	22.3%	1.054	400
3 Neither agree nor disagree	33.4%	1.2%	31.1%	35.8%	1.111	664
4 Disagree	24.9%	1.1%	22.9%	27.0%	1.092	481
5 Disagree strongly	5.5%	.6%	4.4%	6.9%	1.228	104
8 Don't know	6.9%	.7%	5.7%	8.3%	1.170	150
9 Not answered	2.9%	.5%	2.1%	3.9%	1.202	60
<b>On balance, the advantages of genetically modified (GM) foods outweigh any dangers?</b>						
1 Agree strongly	2.4%	.4%	1.8%	3.3%	1.122	47
2 Agree	15.5%	.9%	13.8%	17.3%	1.079	292
3 Neither agree nor disagree	38.5%	1.2%	36.2%	40.9%	1.087	760
4 Disagree	23.4%	1.1%	21.3%	25.6%	1.153	467
5 Disagree strongly	7.3%	.7%	6.1%	8.8%	1.160	150
8 Don't know	9.8%	.7%	8.4%	11.3%	1.120	206
9 Not answered	3.1%	.5%	2.3%	4.1%	1.167	64
<b>It is important for me to check whether or not foods contain genetically modified ingredients?</b>						
1 Agree strongly	8.8%	.8%	7.3%	10.5%	1.287	172
2 Agree	31.7%	1.1%	29.6%	33.8%	1.034	630
3 Neither agree nor disagree	31.8%	1.2%	29.6%	34.2%	1.104	631
4 Disagree	14.8%	.9%	13.1%	16.8%	1.167	289
5 Disagree strongly	3.3%	.5%	2.5%	4.4%	1.214	54
8 Don't know	6.7%	.6%	5.6%	7.8%	.990	149
9 Not answered	2.9%	.4%	2.2%	3.9%	1.164	61

The table shows that most of the questions asked of all sample members have a confidence interval of around plus or minus two to three per cent of the survey percentage. This means that we can be 95 per cent certain that the true population percentage is within two to three per cent (in either direction) of the percentage we report.

Variables with much larger variation are, as might be expected, those closely related to the geographic location of the respondent (for example, whether they live in a big city, a small town or a village). Here, the variation may be as large as six or seven per cent either way around the percentage found on the survey. Consequently, the design effects calculated for these variables in a clustered sample will be greater than the design effects calculated for variables less strongly associated with area. Also, sampling errors for percentages based only on respondents to just one of the versions of the questionnaire, or on subgroups within the sample, are larger than they would have been had the questions been asked of everyone.

## 8.7 Analysis techniques

### Regression

Regression analysis aims to summarise the relationship between a 'dependent' variable and one or more 'independent' variables. It shows how well we can estimate a respondent's score on the dependent variable from knowledge of their scores on the independent variables. It is often undertaken to support a claim that the phenomena measured by the independent variables *cause* the phenomenon measured by the dependent variable. However, the causal ordering, if any, between the variables cannot be verified or falsified by the technique. Causality can only be inferred through special experimental designs or through assumptions made by the analyst.

All regression analysis assumes that the relationship between the dependent and each of the independent variables takes a particular form. In *linear regression*, it is assumed that the relationship can be adequately summarised by a straight line. This means that a one percentage point increase in the value of an independent variable is assumed to have the same impact on the value of the dependent variable on average, irrespective of the previous values of those variables.

Strictly speaking the technique assumes that both the dependent and the independent variables are measured on an interval-level scale, although it may sometimes still be applied even where this is not the case. For example, one can use an ordinal variable (e.g. a Likert scale) as a *dependent* variable if one is willing to assume that there is an underlying interval-level scale and the difference between the observed ordinal scale and the underlying interval scale is due to random measurement error. Often the answers to a number of Likert-type questions are averaged to give a dependent variable that is more like a continuous

variable. Categorical or nominal data can be used as *independent* variables by converting them into dummy or binary variables; these are variables where the only valid scores are 0 and 1, with 1 signifying membership of a particular category and 0 otherwise.

The assumptions of linear regression cause particular difficulties where the *dependent* variable is binary. The assumption that the relationship between the dependent and the independent variables is a straight line means that it can produce estimated values for the dependent variable of less than 0 or greater than 1. In this case it may be more appropriate to assume that the relationship between the dependent and the independent variables takes the form of an S-curve, where the impact on the dependent variable of a one-point increase in an independent variable becomes progressively less the closer the value of the dependent variable approaches 0 or 1. *Logistic regression* is an alternative form of regression which fits such an S-curve rather than a straight line. The technique can also be adapted to analyse multinomial non-interval-level dependent variables, that is, variables which classify respondents into more than two categories.

The two statistical scores most commonly reported from the results of regression analyses are:

*A measure of variance explained:* This summarises how well all the independent variables combined can account for the variation in respondents' scores in the dependent variable. The higher the measure, the more accurately we are able in general to estimate the correct value of each respondent's score on the dependent variable from knowledge of their scores on the independent variables.

*A parameter estimate:* This shows how much the dependent variable will change on average, given a one-unit change in the independent variable (while holding all other independent variables in the model constant). The parameter estimate has a positive sign if an increase in the value of the independent variable results in an increase in the value of the dependent variable. It has a negative sign if an increase in the value of the independent variable results in a decrease in the value of the dependent variable. If the parameter estimates are standardised, it is possible to compare the relative impact of different independent variables; those variables with the largest standardised estimates can be said to have the biggest impact on the value of the dependent variable.

Regression also tests for the statistical significance of parameter estimates. A parameter estimate is said to be significant at the five per cent level if the range of the values encompassed by its 95 per cent confidence interval (see also section on sampling errors) are either all positive or all negative. This means that there is less than a five per cent chance that the association we have found between the dependent variable and the independent variable is simply the result of sampling error and does not reflect a relationship that actually exists in the general population. For the regressions presented in this report, we provide an indication of associations that were significant at the 95% and 99% levels.

The logistic regressions undertaken for this report were run using the “Forward conditional” method, where all variables of interest had a chance of being included in the final model (with only those that remained significantly associated with the dependent variable doing so).

## **Factor analysis**

Factor analysis is a statistical technique which aims to identify whether there are one or more apparent sources of commonality to the answers given by respondents to a set of questions. It ascertains the smallest number of *factors* (or dimensions) which can most economically summarise all of the variation found in the set of questions being analysed. Factors are established where respondents who give a particular answer to one question in the set, tend to give the same answer as each other to one or more of the other questions in the set. The technique is most useful when a relatively small number of factors are able to account for a relatively large proportion of the variance in all of the questions in the set.

The technique produces a *factor loading* for each question (or variable) on each factor. Where questions have a high loading on the same factor, then it will be the case that respondents who give a particular answer to one of these questions tend to give a similar answer to the other questions. The technique is most commonly used in attitudinal research to try to identify the underlying ideological dimensions which apparently structure attitudes towards the subject in question.

## Appendix 1 Questions funded by FSA asked on 2008 British Social Attitudes survey

### Face-to-face questionnaire

- VERSIONS A AND B: ASK ALL**
- Q561 [FdChoi]<sup>35</sup> \$  
CARD F1  
The next questions are about the food you eat at home.  
There are many reasons why we choose the foods that we eat at home. What would you say are the most important influences on your choice of foods?  
INTERVIEWER: CODE ALL THAT APPLY  
PRESS KEY F9 TO SEE FULL LIST OF ANSWERS  
PROBE: Which others?  
Multicoded (Maximum of 22 codes)
- 1 Quality or freshness of food
  - 2 Taste of food
  - 3 Eating food that is healthy or low fat
  - 4 Presentation / packaging / advertising / brand
  - 5 Vegetarian or other special eating habits
  - 6 Number of additives or E numbers in food
  - 7 Habit or routine
  - 8 To try something new or different
  - 9 What my family / spouse / children will eat
  - 10 Convenience in preparation
  - 11 Availability in the shops I can usually get to
  - 12 Recommendations from friends, family or colleagues
  - 13 Foods I know how to cook / prepare
  - 14 Price of food / value for money / special offers
  - 15 Whether food is organically produced
  - 16 Animal welfare / free range
  - 17 Impact on the community where food comes from / fair trade / supporting local farms and industries
  - 18 Impact of the food on the landscape where it was produced
  - 19 Amount / type of packaging used e.g. recycled
  - 20 Other answer (WRITE IN)
  - 21 (SPONTANEOUS - Someone else decides on most of the food I eat)
  - 22 (SPONTANEOUS - No particular influence)
  - 98 (Don't know)
  - 99 (Refusal)
- IF 'Other answer' AT [FdChoi]**
- Q583 [OthSpec] \$  
WRITE IN OTHER ANSWER GIVEN  
Open Question (Maximum of 120 characters)
- VERSIONS A AND B: ASK ALL**
- Q585 [FdCQual]<sup>36</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Quality or freshness of food dv
- Q586 [FdCTaste]<sup>37</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Taste of food dv

<sup>35</sup> See derived variables [FdCQual], [FdCTaste], [FdCLowf], [FdCBrand], [FdCVeg], [FdCAddit], [FdCHabit], [FdCTrynw], [FdCFamEa], [FdCConv], [FdCAvail], [FdCRecom], [FdCKnow], [FdCPrice], [FdCOrgan], [FdCANim], [FdCFairt], [FdCLands], [FdCPack], [FdCOth], [FdCSElse] and [FdCNoInf]

<sup>36</sup> Derived from [FdChoi]

<sup>37</sup> Derived from [FdChoi]

- Q587 [FdCLowf]<sup>38</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Eating food that is healthy or low fat dv
- Q588 [FdCBrand]<sup>39</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Presentation / packaging / advertising / brand dv
- Q589 [FdCVeg]<sup>40</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Vegetarian or other special eating habits dv
- Q590 [FdCAddit]<sup>41</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Number of additives or E numbers in food dv
- Q591 [FdCHabit]<sup>42</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Habit or routine dv
- Q592 [FdCTrynw]<sup>43</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? To try something new or different dv
- Q593 [FdCFamEa]<sup>44</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? What my family / spouse / children will eat dv
- Q594 [FdCConv]<sup>45</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Convenience in preparation dv
- Q595 [FdCAvail]<sup>46</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Availability in the shops I can usually get to dv
- Q596 [FdCRecom]<sup>47</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Recommendations from friends, family or colleagues dv
- Q597 [FdCKnow]<sup>48</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Foods I know how to cook / prepare dv
- Q598 [FdCPrice]<sup>49</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Price of food / value for money / special offers dv
- Q599 [FdCOrgan]<sup>50</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Whether food is organically produced dv

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<sup>38</sup> Derived from [FdChoi]

<sup>39</sup> Derived from [FdChoi]

<sup>40</sup> Derived from [FdChoi]

<sup>41</sup> Derived from [FdChoi]

<sup>42</sup> Derived from [FdChoi]

<sup>43</sup> Derived from [FdChoi]

<sup>44</sup> Derived from [FdChoi]

<sup>45</sup> Derived from [FdChoi]

<sup>46</sup> Derived from [FdChoi]

<sup>47</sup> Derived from [FdChoi]

<sup>48</sup> Derived from [FdChoi]

<sup>49</sup> Derived from [FdChoi]

<sup>50</sup> Derived from [FdChoi]

- Q600 [FdCAnim]<sup>51</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Animal welfare / free range dv
- Q601 [FdCFairt]<sup>52</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Impact on the community where food comes from / fair trade / supporting local farms and industries dv
- Q602 [FdCLands]<sup>53</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Impact of the food on the landscape where it was produced dv
- Q603 [FdCPack]<sup>54</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Amount / type of packaging used e.g. recycled dv
- Q604 [FdCOth]<sup>55</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? Other answer (WRITE IN) dv
- Q605 [FdCSElse]<sup>56</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? (SPONTANEOUS - Someone elSe decides on most of the food I eat) dv
- Q606 [FdCNoInf]<sup>57</sup> **(NOT ON SCREEN)** \*  
Most important influences on your choice of foods? (SPONTANEOUS - No particular influence) dv

\* [FdCQual] to [FdCNoInf]

0 Not mentioned

1 Mentioned

8 (Don't know)

9 (Refusal)

- Q607 [Diet]<sup>58</sup> \$  
CARD F2  
Which, if any, of the statements on this card apply to you?  
PROBE: which others?  
INTERVIEWER: IF ASKED, REACTING BADLY TO CERTAIN TYPES OF FOOD CAN INCLUDE FOOD INTOLERANCES  
Multicoded (Maximum of 6 codes)
- 1 I am a vegetarian or vegan [Diet]
- Veg]
- 2 I avoid certain foods as I react badly to them [Diet]
- Reac]
- 3 I am on a diet trying to lose weight [Diet]
- Wt]
- 4 I avoid certain food for religious reasons [Diet]
- Relg]

<sup>51</sup> Derived from [FdChoi]

<sup>52</sup> Derived from [FdChoi]

<sup>53</sup> Derived from [FdChoi]

<sup>54</sup> Derived from [FdChoi]

<sup>55</sup> Derived from [FdChoi]

<sup>56</sup> Derived from [FdChoi]

<sup>57</sup> Derived from [FdChoi]

<sup>58</sup> See derived variables [], [], [], [] and []

- 5 I avoid certain food because of medical advice [Diet  
Med]
- 6 None of the above
- 8 (Don't know)
- 9 (Refusal)
- Q [DietVeg]<sup>59</sup> **(NOT ON SCREEN)** \*  
I am a vegetarian or vegan :dv
- Q [DietReac]<sup>60</sup> **(NOT ON SCREEN)** \*  
I avoid certain foods as I react badly to them :dv
- Q [DietWt]<sup>61</sup> **(NOT ON SCREEN)** \*  
I am on a diet trying to lose weight :dv
- Q [DietRelg]<sup>62</sup> **(NOT ON SCREEN)** \*  
I avoid certain food for religious reasons :dv
- Q [DietMed]<sup>63</sup> **(NOT ON SCREEN)** \*  
I avoid certain food because of medical advice :dv
- \* [DietVeg] to [DietMed]
- 0 Not mentioned
- 1 Mentioned
- 8 (Don't know)
- 9 (Refusal)
- Q613 [Muchshp]  
CARD F3  
Thinking only of the food you eat at home, how much of the shopping for this food do you do?
- 1 All or most of the food shopping
- 2 About half of the food shopping
- 3 Less than half of the food shopping
- 4 None of the food shopping
- 8 (Don't know)
- 9 (Refusal)
- Q614 [Buybag]  
CARD F4  
Do you buy bags containing ready-to-eat salad leaves?
- 1 Yes
- 2 No
- 3 I have done in the past but I don't any more
- 8 (Don't know)
- 9 (Refusal)
- Q615 [FdKnow]  
CARD F5  
Which of the statements on this card describes how knowledgeable you feel about the way the food industry prepares and manufactures food nowadays?
- 1 I know little or nothing
- 2 My knowledge is very patchy - I know a bit about the areas that concern me but no more
- 3 I have a reasonable, basic knowledge
- 4 I have a good knowledge
- 8 (Don't know)

<sup>59</sup> Derived from [Diet]

<sup>60</sup> Derived from [Diet]

<sup>61</sup> Derived from [Diet]

<sup>62</sup> Derived from [Diet]

<sup>63</sup> Derived from [Diet]

- 9 (Refusal)
- Q616 [Tryfd]  
Which of the following statements comes closest to your view ...READ OUT...
- 1 ... I am happy to eat foods that I have never tried before without knowing too much about them OR
- 2 I wouldn't eat a food that I had never tried before unless I knew exactly what was in it?
- 3 (SPONTANEOUS: It depends on the type of food)
- 4 (SPONTANEOUS: Neither)
- 8 (Don't know)
- 9 (Refusal)
- Q617 [Safety]  
CARD F6  
Generally speaking, which of these best describes your level of concern about food safety in Britain. By food safety, we mean things like food allergies and hygiene when storing and preparing food?
- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 8 (Don't know)
- 9 (Refusal)
- Q618 [SausRdBp]  
CARD F7  
Imagine a sausage that helps reduce the risk of high blood pressure, which tastes the same and looks the same as normal sausages sold in the supermarket. It would be available in meat and vegetarian varieties. The sausage could be produced by adding ingredients which have been medically proven to reduce the risk of high blood pressure. Please say whether...  
...you would buy the sausage that helps reduce the risk of blood pressure rather than a traditional sausage?
- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)
- 9 (Refusal)
- IF 'Definitely/Probably would' OR 'Probably would not' AT [SausRdBp]**
- Q619 [SausExp]  
CARD F7 AGAIN  
(And please say whether you would buy the sausage that helps reduce the risk of high blood pressure)  
...if it was more expensive than a traditional sausage?
- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)
- 9 (Refusal)
- Q620 [SausShf]  
CARD F7 AGAIN  
(And please say whether you would buy the sausage that helps reduce the risk of high blood pressure)  
...if it had a shorter shelf-life than a traditional sausage?
- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)

9 (Refusal)

**VERSIONS A AND B: ASK ALL**

Q621 [CakeLCal]

CARD F7 AGAIN

Imagine an extremely low calorie cake. It tastes the same and looks the same as conventional cake sold in the supermarket but has had an extra ingredient added to reduce the number of calories it contains. Please say whether...

...you would buy the extremely low calorie cake rather than traditional cake?

- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)
- 9 (Refusal)

**IF 'Definitely/Probably would' OR 'Probably would not' AT [CakeLCal]**

Q622 [CakeExp]

CARD F7 AGAIN

(And please say whether you would buy the extremely low calorie cake)

...if it was more expensive than traditional cake?

- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)
- 9 (Refusal)

Q623 [CakeShf]

CARD F7 AGAIN

(And please say whether you would buy the extremely low calorie cake)

...if it had a shorter shelf-life than traditional cake?

- 1 Definitely would
- 2 Probably would
- 3 Probably would not
- 4 Definitely would not
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK ALL**

Q624 [QuzGM]

CARD F8

Now for a quick quiz about food. For each of the following statements, please tell me whether you think it is true or false. If you are unsure, just say so and we'll go on to the next one.

GM, that is genetically modified, food is never sold in Britain?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q625 [QuzMicro]

CARD F8 AGAIN

(And tell me whether you think the following is true or false or if you are unsure)

Using microwave ovens to heat food involves radiation?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q626 [QuzOrg]  
CARD F8 AGAIN  
(And tell me whether you think the following is true or false or if you are unsure)

Organic food crops are frequently grown using pesticides?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q627 [QuzPast]  
CARD F8 AGAIN  
(And tell me whether you think the following is true or false or if you are unsure)

Pasteurised foods like orange juice have a longer shelf life because they don't contain as much bacteria as fresh orange juice?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q628 [QuzExt]  
CARD F8 AGAIN  
(And tell me whether you think the following is true or false or if you are unsure)

Some foods have extra ingredients added to them to make them healthier?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q629 [QuzSald]  
CARD F8 AGAIN  
(And tell me whether you think the following is true or false or if you are unsure)

Bags containing ready-to-eat salad leaves are usually filled with gases to slow the growth of bacteria and ensure the leaves stay fresh for longer?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

Q630 [QuzOmeg]  
CARD F8 AGAIN  
(And tell me whether you think the following is true or false or if you are unsure)

Omega-3 oils, which are usually obtained from fish, can also be manufactured from plant-like organisms called algae?

- 1 True
- 2 False
- 3 Unsure
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK ALL**

Q631 [Rand1] computed random **(NOT ON SCREEN)**  
Whether asked Magnet (1) or Microw (2)  
Range: 1 ... 2

**VERSIONS A AND B: ASK RANDOM 50% (1 AT [Rand1])**

- Q632- [Magnet] <sup>64</sup> \$  
Q636 CARD F9  
A magnetron is a device in which food can be exposed to radiation to heat it and kill bacteria before eating. How concerned would you be about eating food prepared using this device?  
Multicoded (Maximum of 2 codes – if 2 codes, one must be 5)
- 1 Very concerned
  - 2 Fairly concerned
  - 3 Not very concerned
  - 4 Not at all concerned
  - 5 (SPONTANEOUS - Respondent independently identifies device as being a microwave)
  - 8 (Don't know)
  - 9 (Refusal)

- Q [MagnetA] <sup>65</sup> **(NOT ON SCREEN)** \*  
A magnetron is a device in which food can be exposed to radiation to heat it and kill bacteria before eating. How concerned would you be about eating food prepared using this device?
- 1 Very concerned
  - 2 Fairly concerned
  - 3 Not very concerned
  - 4 Not at all concerned
  - 7 (Identified magnetron = microwave - no other answer)
  - 8 (Don't know)
  - 9 (Refusal)

- Q [MagnetB] <sup>66</sup> **(NOT ON SCREEN)** \*  
Identifies a magnetron as a microwave.
- 1 yes
  - 2 no
  - 8 (Don't know)
  - 9 (Refusal)

**VERSIONS A AND B: ASK RANDOM 50% (2 AT [Rand1])**

- Q637 [Microw] \$  
CARD F9  
A microwave is a device in which food can be exposed to radiation to heat it and kill bacteria before eating. How concerned would you be about eating food prepared using this device?
- 1 Very concerned
  - 2 Fairly concerned
  - 3 Not very concerned
  - 4 Not at all concerned
  - 8 (Don't know)
  - 9 (Refusal)

**VERSIONS A AND B: ASK ALL**

- Q638 [Rand2] computed random **(NOT ON SCREEN)**  
Whether asked VegOil (1) or Benecol (2)  
Range: 1 ... 2

**VERSIONS A AND B: ASK RANDOM 50% (1 AT [Rand2])**

- Q639- [VegOil] <sup>67</sup> \$  
Q643 CARD F9 AGAIN  
A range of products have been developed that contain a concentrated variety of an ingredient found in vegetable oil that lowers levels of cholesterol found in the blood. How concerned would you be about eating food that contained this ingredient?

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<sup>64</sup> See derived variables [MagnetA] and [MagnetB]

<sup>65</sup> Derived from [Magnet]

<sup>66</sup> Derived from [Magnet]

<sup>67</sup> See derived variables [VegOilA] and [VegOilB]

- Multicoded (Maximum of 2 codes – if 2 codes, one must be 5)
- 1 Very concerned
  - 2 Fairly concerned
  - 3 Not very concerned
  - 4 Not at all concerned
  - 5 (SPONTANEOUS - Respondent independently identifies ingredient as being Benecol)
  - 8 (Don't know)
  - 9 (Refusal)

Q [VegOilA]<sup>68</sup> **(NOT ON SCREEN)**  
 A range of products have been developed that contain a concentrated variety of an ingredient found in vegetable oil that lowers levels of cholesterol found in the blood. How concerned would you be about eating food that contained this ingredient?

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 7 (Identified the ingredient as Benecol - no other answer)
- 8 (Don't know)
- 9 (Refusal)

Q [VegOilB]<sup>69</sup> **(NOT ON SCREEN)**  
 Identifies ingredient as being Benecol

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK RANDOM 50% (2 AT [Rand2])**

Q644 [Benecol]  
 CARD F9 AGAIN  
 A range of products including Benecol have been developed that contain a concentrated variety of an ingredient found in vegetable oil that lowers levels of cholesterol found in the blood. How concerned would you be about eating food that contained this ingredient?

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK ALL**

Q645 [Rand3] computed random **(NOT ON SCREEN)**  
 Whether asked Protein (1) or Quorn (2)  
 Range: 1 ... 2

**VERSIONS A AND B: ASK RANDOM 50% (1 AT [Rand3])**

Q646- [Protein]<sup>70</sup> \$  
 Q650 CARD F9 AGAIN  
 There is an ingredient available that provides a non-meat source of protein grown in large tanks using a processed edible fungus and added to a variety of products. How concerned would you be about eating food that contained this ingredient?

- Multicoded (Maximum of 5 codes)
- 1 Very concerned
  - 2 Fairly concerned
  - 3 Not very concerned
  - 4 Not at all concerned
  - 5 (SPONTANEOUS - Respondent independently identifies ingredient as being Quorn)

<sup>68</sup> Derived from [VegOil] (just like Benecol)

<sup>69</sup> Derived from [VegOil] (just like Benecol)

<sup>70</sup> See derived variables [ProteinA] and [ProteinB]

- 8 (Don't know)
- 9 (Refusal)

Q [ProteinA]<sup>71</sup> **(NOT ON SCREEN)**

There is an ingredient available that provides a non-meat source of protein grown in large tanks using a processed edible fungus and added to a variety of products. How concerned would you be about eating food that contained this ingredient? dv

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 7 (Identifies ingredient as being Quorn – no further answer)
- 8 (Don't know)
- 9 (Refusal)

Q [ProteinB]<sup>72</sup> **(NOT ON SCREEN)**

Identifies ingredient as being Quorn

- 1 Yes
- 2 No
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK RANDOM 50% (2 AT [Rand3])**

Q651 [Quorn]

CARD F9 AGAIN

There is an ingredient called Quorn available that provides a non-meat source of protein grown in large tanks using a processed edible fungus and added to a variety of products. How concerned would you be about eating food that contained this ingredient?

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 8 (Don't know)
- 9 (Refusal)

**VERSIONS A AND B: ASK ALL**

Q652 [BagConc]

CARD F9 AGAIN

A process is often used to produce bags containing ready-to-eat salad leaves. This involves filling the bags with gases that control the growth of bacteria and keep leaves fresher for longer. If this process was part of the production of a food which you eat regularly, how concerned would you be?

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 8 (Don't know)
- 9 (Refusal)

Q653 [PastConc]

CARD F9 AGAIN

It is possible to increase the shelf-life of products such as fresh fruit juice by putting them under high pressure. Some people think using high pressure retains the flavour of the food more than pasteurisation using heat. If this process was used in the production of a food which you eat regularly, how concerned would you be?

- 1 Very concerned
- 2 Fairly concerned
- 3 Not very concerned
- 4 Not at all concerned
- 8 (Don't know)

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<sup>71</sup> Derived from [Protein]

<sup>72</sup> Derived from [Protein]

## Self-completion questionnaire

1. Please tick one box on each line to show how much you agree or disagree with each of these statements.

<i>PLEASE TICK <b>ONE</b> BOX ON EACH LINE</i>	<b>Agree strongly</b>	<b>Agree</b>	<b>Neither agree nor disagree</b>	<b>Disagree</b>	<b>Disagree strongly</b>	<b>Can't choose</b>
a. I buy food that is processed as it is easier to prepare and store	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I like food to be unprocessed, even if this means that it takes more effort to prepare and keep fresh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I want food that I buy to look attractive even if this means it has been processed in some way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I want food that I buy to be unprocessed even if this means it has an irregular appearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(1)	(2)	(3)	(4)	(5)	(8)

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2. Please tick one box on each line to show how much you agree or disagree with each of these statements.

<i>PLEASE TICK <b>ONE</b> BOX ON EACH LINE</i>	<b>Agree strongly</b>	<b>Agree</b>	<b>Neither agree nor disagree</b>	<b>Disagree</b>	<b>Disagree strongly</b>	<b>Can't choose</b>
a. Research and development in medicine should be encouraged and supported even if a lot of money would need to be invested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Research and development in food technology should be encouraged and supported even if a lot of money would need to be invested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Research and development in mobile phone technology should be encouraged and supported even if a lot of money would need to be invested	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(1)	(2)	(3)	(4)	(5)	(8)

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3. You may have heard of genetically modified or 'GM' foods. These are made from plants which have had their genes altered. Some people say that growing these plants may damage other plants and wildlife and that food made from them may not be safe to eat. Other people say that growing these plants may mean lower food prices and less use of pesticides and weedkillers.

Please say how much you agree or disagree with each of these statements about genetically modified (GM) foods.

<i>PLEASE TICK <b>ONE</b> BOX ON EACH LINE</i>	<b>Agree strongly</b>	<b>Agree</b>	<b>Neither agree nor disagree</b>	<b>Disagree</b>	<b>Disagree strongly</b>	<b>Can't choose</b>
a. In order to compete with the rest of the world, Britain should grow genetically modified (GM) foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Genetically Modified (GM) foods should be banned, even if food prices suffer as a result	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. On balance, the advantages of genetically modified (GM) foods outweigh any dangers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. It is important for me to check whether or not foods contain genetically modified ingredients	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	(1)	(2)	(3)	(4)	(5)	(8)

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