

## Abstract

Surveillance statistics show that many food poisoning cases occur in the home and surveys have revealed wide spread ignorance of cross-contamination and temperature control. In this work the food preparation practices of children and young adults ( $n=267$ ) in South East Wales were considered. Regular food preparation was found to occur from age 11 and the most common practices were sandwich and snack making. Sources of information about food hygiene were highlighted and the role of schools in the provision of food hygiene information was considered. Ninety eight teachers responded and of these 86% of Primary School teachers and all Secondary School teachers surveyed claimed they taught food hygiene, with the skill considered most important by the majority of teachers being hand washing. The relationship between food hygiene and psychological precursors of behaviour was investigated. The data regarding food preparation practices was collated and was used to inform the construction of a questionnaire based on the Theory of Reasoned Action. The beliefs used in the construction of the questionnaire were obtained from a sample ( $n=438$ ) and the most common beliefs about what they could do to keep food safe to eat included 'cook food properly', 'wash hands' and 'check the best before date'. Using self report measures ( $n=267$ ) a significant correlation was recorded ( $\beta=0.42$ ) and further, attitude, subjective norm and intention explained 51% of the variance in behaviour. However, using observations ( $n=30$ ) the relationship was not found to be significant ( $\beta=0.03$ ) and attitude, subjective norm and intention explained only 8% of the variance in behaviour. The implications of this in terms both of food hygiene and the Theory of Reasoned Action were considered.

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## Abbreviations

ACMSF	Advisory committee on the microbiological safety of food
FDF	The Food and Drink Federation
HACCP	Hazard analysis and critical control points
HBM	The Health Belief Model
ICMSF	International committee on the microbiological safety of food
MAFF	The Ministry of Agriculture, Fisheries and Food
TPB	The Theory of Planned Behaviour
TRA	The Theory of Reasoned Action
WHO	The World Health Organisation

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# CHAPTER 1

## Introduction



## 1.1 Background

The reported incidence of food poisoning has increased over the last decade, although this increase may now be stabilising (Douglas, 1997). There is growing awareness that food poisoning causes not just acute but also chronic illnesses, resulting in increased costs to the nation.

Food poisoning is researched in many ways including epidemiological studies that attempt to trace outbreaks of food poisoning back to source. These studies focus on a number of distinctive areas. For example, the types of foods that are most often implicated in outbreaks are examined, the areas where outbreaks mostly occur are considered and the practices that most often lead to food poisoning outbreaks are determined, in as much as the latter can be measured using memory. Increasingly, however, it must be accepted that there may be behavioural factors that contribute to food poisoning as it has been said that in every case of food poisoning there is evidence of human failure. Therefore research into the behavioural aspects of food preparation practices needs to be undertaken.

Legislation attempts to reduce food contamination, whilst education can help to reduce poor food handling behaviour. High levels of contaminated food expose poor food handling practices. A high proportion of food poisoning incidents occur in the home and this has implications for consumers' food handling practices. Therefore education needs to be combined with legislation in an attempt to reduce incidence of food poisoning. Food hygiene experts can learn from other health education initiatives. For example, despite extensive nutrition health education the proportion of the population of Great Britain who are overweight is increasing. One of the main strategies within health promotion involves changing knowledge or attitudes in the belief that this will lead to

changes in behaviour. However, it is generally recognised by professionals in the social sciences that the relationship between knowledge attitudes and behaviour is not linear. Therefore the exact nature of the relationship needs to be considered.

## 1.2 Reasons for this research

The increased incidence of food poisoning and domestic food poisoning specifically results in social and economic costs e.g. to the individual in illness and to the nation in days lost through ill health and in health service expenses. It is important that the social/cognitive determinants of food safety behaviours be considered. This would also grant the opportunity to explore a theoretical model in a new context.

It has been suggested that there has been a decrease in ability to cook and that there have been changes in cooking practices which could lead to increases in domestic food poisoning. It is important that this contention be explored. The present work also developed from concern over changes within the education system e.g. the proposed removal of the teaching of food topics from the national curriculum. It is hoped that the work will serve as a frame work for developing educational interventions directed at changing the behaviours in question. It is also believed to be important that the necessity of tailoring interventions to specific behaviours in a specific population be emphasised.

### 1.3 Organisation of present work

The purpose of this work is to determine the food hygiene knowledge, attitudes and behaviour of children and young adults in South East Wales.

To achieve this the first step is to discover the amount of food preparation that occurs amongst children and young adults in South East Wales in order that the food hygiene implications can be considered. The sources of information available about food hygiene are explored and this is done by questioning teachers about where, what, when and how food hygiene in schools is taught. What children themselves believe they can do to keep food safe to eat is determined. This information is used for two purposes, firstly, to compare beliefs across different ages but also to construct an attitude scale. The attitude scale is based on the Theory of Reasoned Action and the hypothesis is that there would be a link between attitude, subjective norm, intention and behaviour. This stage uses self report as the measure of behaviour. The next stage includes a number of observations to see what the link between attitude, subjective norm, intention and actual behaviour is and if this is similar to that found using self report. Finally the appropriateness of the use of the Theory of Reasoned Action with regard to food hygiene is considered, and recommendations for further work are made. This research will be presented in the form of chapters with each chapter having its own introduction, method and discussion. An overview of the research processes will be presented next.

## 1.4 Methods used in present work

The method used was that of non experimental design, i.e. the dependent variable was not manipulated. A non-experimental design was chosen because the emphasis of the study was on exploring the every day experiences of a group of subjects and therefore, manipulation of the independent variables was not considered to be desirable. In addition, non-experimental designs are an effective and efficient means of collecting a large amount of data about a given phenomenon and they also tend to be high in realism (Polit & Hungler, 1997). The study also used a cross sectional design (the collection of data at one point in time). This method was chosen as it is practical and easy to manage (Polit & Hungler, 1997). It was not considered to be necessary to have a time dimension in this research because it is describing phenomena at a fixed point in time.

This study will use a combination of qualitative and quantitative methods. Data quality is equally important in quantitative and qualitative research (Polit & Hungler, 1997). Therefore, the principles of triangulation were adopted in order to enhance the credibility of the qualitative data and improve the likelihood that the findings would reflect the truth (Polit & Hungler, 1997). Using the principles of triangulation the two research methods were integrated into the same study so that the weaknesses of one method were counter balanced by the strengths of the other (Cowman, 1993). Nonetheless, the study took a predominantly quantitative approach, and as such, the researcher maintained an objective position in the study, such that any influence or bias on the part of the researcher was reduced to a minimum (Cormack, 1996). In the following sections whether the method used was qualitative or quantitative will be revealed.

A survey method was used throughout the early part of the work as a means of eliciting the maximum number of responses to the questions, in both a time and a cost efficient way. Questionnaires were chosen as they were a way of standardising the results. This method ensures that the questions are the same for all respondents, which minimises the possible variation in individual interpretation and a questionnaire encourages truthful responses via anonymity. Questionnaires allow efficient measurement and quantification, there are, however, disadvantages, mainly the biases that may be introduced by respondents and by the person who designs the questionnaire, and collects and analyses the data, all of which introduces additional sources of error. The main biases are the social desirability response bias; the extreme response set; the acquiescence response set; and responding in the way that the subject guesses will result in the researcher obtaining the desired outcome of the research (See section 2.21 for further details).

In section 2.24 the aims of the research are outlined. In this overview some research questions will be posed. The purpose of which is to provide a coherent representation of the sequence of the research.

- What beliefs do children have about food safety?
- How much food preparation takes place among children and young adults in South East Wales?
- What information is provided by teachers about food hygiene?
- What perceptions do teachers have about children's knowledge of food hygiene?
- What do children believe they can do to keep food safe?

- Can the Theory of Reasoned Action be applied to explain and/or predict food hygiene?
- Does the Theory of Reasoned Action work equally well for observed as for self-reported behaviour?

In order to answer these research questions a number of stages were necessary and there are outlined below.

### **Stage One**

The first stage of the research was to discover whether children and young adults in South East Wales were involved in food preparation, and if so to what extent. This information was believed to be important for two reasons. Firstly, there was very little known about this subject so it was of inherent interest. Secondly, it was important to determine what food preparation took place as this would impact on the importance of food hygiene. If a lot of food preparation took place then the role of food hygiene would be even more important than if very little occurred. Similarly the types of food preparation (e.g. use of raw foods and high risk foods) would have food hygiene implications. Two hundred and sixty-seven questionnaires were distributed to a sample of children in Primary and Secondary schools in South East Wales. These questionnaires consisted of a number of questions related to food preparation and how frequently these behaviours occurred. Closed questions were chosen because they are less time consuming for the subject and allow those who may have difficulty expressing themselves to complete the task (Fink, 1995). Pre-set answers were preferable because according to Converse & Presser (1986) the questionnaire in this form had a better chance of being accurately interpreted which increases the reliability and consistency over time. The data were

analysed on SPSS for windows using purely descriptive statistics. For further details see chapter 3.

## **Stage Two**

There have been increasing recommendations for teaching in food hygiene, particularly if handling high risk food (Charles, 1982; Gilbert, 1983; Maurice, 1993; Mossel, 1989a; Todd, 1989). Therefore, once the food preparation practices of the sample had been determined it was important to see what formal food hygiene education that the children in South East Wales obtained. Thus in this stage an attempt was made to ascertain the food hygiene knowledge and beliefs of Teachers in South East Wales. There was a dual purpose to this stage. Firstly, it was deemed important to determine if the material being taught to children in schools was of sufficient quality and quantity to enable them to handle food safely. This information would also be considered with respect to the amount of food preparation in which children engage. It was necessary to obtain this information as the school is a very important influence on the knowledge that children obtain, and further if children are found to be preparing a lot of food then it could be suggested that they are more at risk of food poisoning. Secondly, this information would help to illuminate what children knew about food safety.

To this end, two questionnaires were designed- one for Primary schools and one for Secondary schools. Although the questionnaires contained mainly rigidly structured questions, there was also provision to answer outside the rigid structure i.e. in the form of open questions. This ensured that both quantitative and qualitative results were obtained. Using different types of design enables

the researcher to be more confident about the validity of the data (Polgar & Thomas, 1991).

The questionnaires were administered by post to all Primary Schools in South East Wales and to a stratified sample of Secondary Schools. A response of 50% was obtained (N=30) for primary schools and a response of 39% was obtained (N=46) for Secondary Schools. The data were analysed using the appropriate statistical tests- both descriptive and inferential. Descriptive statistics were used to summarise the results and inferential statistics were used to analyse the data for the existence of differences and relationships among variables. Tests of association were carried out to describe the relationships between variables but not to draw any cause and effect conclusion. Due to the lack of manipulative control attempts at inferring any causal relationships could not be undertaken (Polit & Hungler, 1997). Nevertheless, using correlations enabled the researcher to discover a number of important interrelations. Statistical analysis was also carried out using tests of difference to determine whether there were any significant differences between variables. Although the statistical significance could be determined by the researcher it was not possible to determine the factors responsible for those differences as there may have been extraneous variables. However,

*“instead of stating unequivocally causal hypotheses, evidence arising from qualitative data can be used to aid the evaluation of theories of causation”*

*(Polgar & Thomas, 1991, p.79)*

The results were used to inform the next stages of the study. The full report of these stages can be found in Chapters 4 and 5.



### **Stage Three**

At this point having obtained information on how often children prepare food and what they are taught in schools it was envisaged that the next stage must involve obtaining, from the children themselves, information on what they believe they can do to keep food safe to eat. Thus, an open ended question was designed and administered, in groups, to 438 children and young adults in South East Wales. The results were categorised according to themes using a simple form of content analysis. They were also then analysed using inferential statistics to determine what if any differences existed between different age groups of children and young adults. This combination of quantitative and qualitative is called triangulation and is considered to be a very powerful tool in applied research (Cowman, 1993). The results of this stage of the research were pivotal to the next stage of the research as, according to Fishbein & Ajzen (1980), the modal salient beliefs of the sample group must be obtained before the Theory of Reasoned Action could be applied to an area. Thus these results, whilst intrinsically important and interesting had a further use in that they were also used to construct the questionnaires used in the final stages of the research.

### **Stage Four**

The objective of the final stage of the work was fourfold. Firstly, there was a desire to determine if the Theory of Reasoned Action could be used successfully in the area of food hygiene. The Theory of Reasoned Action has been used successfully in many areas (Fishbein & Ajzen, 1977; Wallston & Wallston, 1984) including some food related behaviours and health behaviours (Conner & Norman, 1996). Therefore it was conceived that this success could

be replicated with food hygiene. Secondly, a comparison between observation and self report as measures of behaviour would take place. There are advantages and disadvantages to both self report and observation. The main advantages of using self report measures is the ease of using them, their cost effectiveness and their ability to examine areas that it would be difficult to observe. The alternative to self-report is for researchers to observe behaviour and then draw inferences. The main drawback to drawing inferences is the number of extraneous variables which may confuse the issue. Therefore it was decided that both methods would be evaluated.

Thirdly, having obtained the information outlined above it was hoped that conclusions could be drawn about possible intervention strategies. If the model could be successfully applied to food hygiene then certain sections of the model could be manipulated to improve food handling behaviours. Finally, if the model was successfully applied to food hygiene and if results obtained from observations and self report of behaviour were comparable then in future work it would be feasible to use a questionnaire to determine the efficacy of interventions.

To achieve these ends, a questionnaire was designed based on the Theory of Reasoned Action using the modal salient beliefs collected. The questionnaire was based upon fixed alternative questions to which respondents could tick one of five boxes i.e. it consisted of a number of Likert scales. Likert scales ask respondents to indicate strength of agreement or disagreement with a given statement or series of statements on a five or seven point range (Bell, 1993). The persons attitude score is the total of their ratings, with a higher score indicating a more favourable attitude (Cormack, 1996). Similarly ratings when combined produced measures of intent, subjective norm and behaviour.

The questionnaire was administered to 267 children and young adults in the South East Wales area. The results were analysed using inferential statistics including regression analysis, which were the appropriate tests for use with the Theory of Reasoned Action (Fishbein & Ajzen, 1977; Conner & Norman, 1996). In order to compare self report and observation as measure of behaviour, using the model, a further questionnaire was designed, specific to the recipe that had been chosen for preparation. This recipe was selected as it fulfilled a majority of possible unsafe food handling behaviours. Having chosen the recipe and designed the questionnaire 30 observations then took place to determine if intention would predict observed behaviour.

Based on this information, and the results obtained in the future sections, it was now possible to answer all the research questions that had been posited.

## CHAPTER 2

### Literature review

## 2.1 Introduction

Food is needed for survival, however, food may under certain circumstances cause harm and even death. Malnutrition meaning literally “bad nutrition” (Brownsell, Griffith & Jones, 1989 p.117) describes an imbalance between the needs of the body and the supply of nutrients being provided. Malnutrition can express itself in two ways through too little food- under nutrition, or through too much food- over nutrition. In underdeveloped countries it is usually under nutrition that is the major problem, and this is also manifest in the diseases anorexia and anorexia nervosa, in the developed world. However, it is over nutrition that is often the greater problem in the developed countries where ingestion of excess food, or over consumption of certain foods or nutrients may contribute to obesity (Brownsell et al., 1989) and to ‘diseases of affluence’ (Griffith, Mullan & Price, 1995).

There is another way in which food may cause illness which is as potentially dangerous as malnutrition (Gormley, Downey & O'Beirne, 1986; Wheelock, 1988B) and that is foodborne illness or food poisoning. In this chapter the concept of food poisoning and foodborne illness will be presented, and factors that contribute to food poisoning will be introduced and discussed. Possible ways of decreasing food poisoning will be explored, followed by an examination of the suitability of the application of psychological models- specifically the Theory of Reasoned Action- to this area. Methodological issues will be examined and the most appropriate ways to apply these to children will be considered.

## 2.2 Food Poisoning

Food poisoning can result when food has become contaminated by bacteria, chemicals, mycotoxins, plants or fish and viruses (Sprenger, 1991) although, this work will only be concerned with cases of food poisoning caused by micro-organisms. Wall et al. (1996) stated that the term food poisoning is not defined in the Public Health (Control of Diseases) Act 1984 and that this has led to confusion which in turn led the Advisory Committee On The Microbiological Safety Of Food (ACMSF) to circulate a definition to all doctors in 1992 which was accepted by them and is also accepted by the World Health Organisation (WHO). This definition states that food poisoning is:

*“Any disease of an infectious or toxic nature caused by or thought to be caused by the consumption of food or water” (p. 93 cited in Wall et al., 1996).*

Symptoms of food poisoning can include abdominal pain, diarrhoea, nausea, fever, headache and vomiting, and while unpleasant for the duration of the illness food poisoning is not generally fatal. The exceptions to that being certain strains of bacteria (e.g. *Clostridium botulinum*) or for those people who are in a high risk group i.e. children under 5, pregnant women, the elderly and those with an impaired immune system (Institute of Food Science and Technology (IFST), 1997). However, it is believed that this group account for ¼ of the population. Of additional concern is the increased realisation that chronic illness can be a sequel to food poisoning attacks (Todd, 1989; Griffith et al., 1995). Certain illness including rheumatic conditions appear to be related to earlier attacks of food poisoning (Archer & Kvenberg, 1985).

In recent years interest has focused on emerging pathogens, some of which are psychotrophs i.e. they grow at fridge temperature. Certain strains of bacteria

are known as emerging pathogens e.g. *Listeria* and *E. coli*. Incidence of illness related to these pathogens is becoming more prevalent in the developed world, and there is concern about the severity of resulting illness. The Ministry of Agriculture, Fisheries and Food (MAFF) in 1988 suggested that there were up to 40 deaths every year from food poisoning, mainly salmonellosis. In 1993 four children died in the United States of America (Knabel, 1995) and in 1996 17 elderly people died in Scotland, all these people had contracted food poisoning from *E.coli* 0157 VTEC Maurice (1993) suggests that conservatively there may be as many as 10,000 needless deaths from food poisoning in the USA every year. According to Knabel (1995):

*"Despite progress in improving the overall quality and safety of foods produced in the USA, significant foodborne illness and death due to microbial pathogens still occur" p. 119.*

## 2.3 Bacterial food poisoning

Of the pathogenic micro organisms, food poisoning caused by bacteria has received the most attention. The majority of bacteria are harmless to human health. In fact, some bacteria may be used to contribute to the well being of humans (the study of which is probiotics) whilst others (e.g. bacteria used in the manufacture of cheese) may be useful. Undesirable bacteria can be divided into two main categories, spoilage bacteria, which are responsible for decomposition of food and pathogenic bacteria, which can cause food poisoning. According to Mossel (1991) the latter are the more dangerous as they are hardly ever noticed by sensory evaluation, and further, whereas

spoiled food is noticeable and thus can be replaced, food contaminated by pathogenic bacteria can remain unnoticed and lead to disease.

Bacterial food poisoning may be defined as:

*“an acute disturbance of the gastrointestinal tract resulting in abdominal pain, with or without diarrhoea and vomiting, due to eating food contaminated by specific pathogenic bacteria or their toxins” (Sprenger, 1996 p. 9).*

A chain of events must occur before food can result in food poisoning. The food must be contaminated with micro-organisms, these must survive and/or multiply and the food must then be consumed.

For bacteria to grow they need adequate food, water (more specifically water activity, i.e.  $A_w$ ), appropriate temperature and time; if any of these factors can be controlled then bacterial growth can be slowed or stopped. For example, the introduction of high concentrations of sugar or salt into food reduces the  $A_w$  thus inhibiting the growth of bacteria. Extremely low temperatures will slow bacterial growth and most bacteria are killed at high temperatures. However, central temperatures are conducive to bacteria growth, therefore bacteria stored at these temperatures for a sufficient period may reproduce (Hobbs & Roberts, 1993).

Bacteria reproduce by a process of binary fission, which is a doubling of number in a set time. Thus if the generation time is 10 minutes then one thousand could become more than one million in less than 2 hours- which could be enough to cause food poisoning (Donaldson, 1991; Sprenger, 1991).

Another way by which bacteria can cause food poisoning is by the production of toxins. Toxins may be produced by the growth of bacteria in foods so than even



if the bacteria are destroyed the toxins can still cause food poisoning. There are numerous types of bacteria (Sprenger, 1991) that cause food poisoning. It is sufficient for the purposes of this discussion to know that all of these pathogens can cause illness if they are present in food in quantities that exceed their minimum infective dose.

## 2.4 Food Hygiene

Food hygiene is more than just cleanliness, it can be defined as:

*"All environmental factors, practices, processes and precautions involved in protecting food from contamination of any kind and by any agency and preventing any organisms present from multiplying to an extent which would expose consumers to risk or result in premature decomposition of food"*  
(Sprenger, 1996 p. 296).

or as

*"the action taken to ensure that food is handled, stored, prepared and served in such a way, and under such conditions, as to prevent- as far as possible- the contamination of the food"* (Donaldson, 1991 p. 22).

It can be seen from the above definitions that food hygiene involves the food as well as the food handler. At any point in the food chain there is potential for food to become contaminated if the food is not handled hygienically. If food is contaminated then the pathogens must survive and in some cases multiply before food becomes dangerous.

## 2.5 The food chain

There are many possible causes of initial contamination. Food may be infected before entering the food chain, (e.g. a certain percentage of eggs when laid are believed to already contain *Salmonella*; Anon, 1996; Hobbs & Roberts, 1993) DeLouvois (1994) suggests that 1 in 455 boxes of eggs are contaminated with *Salmonella*. With 90 million ounces of eggs being consumed per year in England and Wales (Keynote, 1995), this is a significant hazard for the consumer. In addition, bacteria may enter the food chain at any point thereafter (e.g. soil where vegetables grow may contain *Clostridium perfringens* and the food may be inadequately washed before use). Micro-organisms may be introduced into the food chain directly from animals (e.g. household pets, rodents, insects). Infection can result from cross contamination with other food or the environment during the preparation of food or from infected food handlers. Inadequate food hygiene practices, (e.g. poor hand washing, dirty cloths and utensils being used, food not covered, raw and cooked coming into contact, can all lead to the infection of food with pathogens.

## 2.6 The rise of food poisoning

There are a number of sociological factors that are believed to have contributed to a decrease in cooking in the home which may contribute to incidence of food poisoning, and one of the most important is that of the changing status of women in the workforce. In the USA 70% of women between 25 and 44 work, and 75% of these work full time (Williamson, Gravani & Lawless, 1992), further, of the 17 million women of working age in Britain 12 million are economically active. This can have repercussions firstly, due to a decrease in the time

available to prepare meals which can lead to an increase in usage of convenience foods (e.g. chilled or frozen which if mistreated could increase the risk of food poisoning). Secondly, it may contribute to the number of meals being consumed outside the home. And thirdly, and perhaps most importantly it may contribute to a decline in cooking role models for children (Leith, 1997). This in turn may increase the risk of these children obtaining very little or inappropriate food hygiene messages in the home, which in the future may increase the incidence of food poisoning.

Other sociological changes that may be contributing factors, that are proposed to explain the increase, include the fact that the shopping habits of the nation are changing (Evans, 1992), with fewer people shopping on a daily basis, more people going longer distances to shop and an increase in bulk buying and the purchasing of convenience and pre-cooked and pre-processed foods (Davies & Madran, 1997). This leads to concerns about the storage of foods once purchased by the consumer, especially chilled and frozen food, (e.g. Ackerley 1994). This is further exacerbated by the removal of some preservatives from sauces (e.g. mayonnaise), and condiments (e.g. pickles; Spiegel, 1991) in response to consumer demand, which means that they must be refrigerated although previously they could safely be stored at ambient temperatures, thus incorrect storage may render them unsafe.

This growing desire for a decrease in the use of food additives (Mossel, 1989B) and the continuing rise in the number of reported cases of food poisoning has led to a greater awareness that alternative processing methods must be considered (Mossel, 1989B).

Additionally there is evidence to support the belief that despite advances in cleaning products and kitchen design many consumers fail to take even basic steps to protect themselves from the risk of food poisoning (Spriegel, 1991).

The introduction of new methods of cooking such as microwaves and cook-chill has changed the way some people prepare food. Microwaves and cook-chill were developed separately and were not originally designed to be used together and, as people sometimes do not or can not use microwaves correctly they are putting themselves at risk (Brownsell et al. 1989).

More people eat in restaurants than previously, thus if there is an outbreak of food poisoning a larger number of people will be infected (MAFF 1988).

Murcott, (1997B) found that there was an increase from 10% in 1959-61, to 20% in 1991, of the household food expenditure devoted to eating out, thus further increasing the potential for wide spread infection.

Other factors that could be considered include changes in agricultural practices, (e.g. intensive farming has increased the risk of widespread microbial contamination, Anon, 1997B; Lacey, 1993). Further, there have been changes in the legislation governing practices in slaughter houses, which has resulted in many of the smaller ones closing down. One of the results of this is that animals now have to travel further, which may increase the risks of infection on the way. Further, if an animal is infected, the new system puts more animals at risk of contamination. An increase in the consumption of processed meat obtained from the carcasses of animals also increases the risk of contamination.

Finally it has been suggested that the advent of the package holiday, which decreased the cost of a foreign holiday, has increased the risk of people contracting a bacterial infection abroad and returning home ill or a carrier.

Microbial contamination of food and incidents of food poisoning are on the increase:

*“England and Wales have experienced a five-fold surge over the past decade from around 30 cases to 140 cases per 100,000 people per annum” (Maurice 1994 p. 24).*

Moreover, the 1996 figures from the Communicable Disease Surveillance Centre suggest a further increase to 160 per 100,000 (Douglas, 1997). Notified incidents of food poisoning are presented below in table 2.1. The total number of notified cases of food poisoning in England and Wales in 1980 was in excess of ten thousand. By 1996 this figure had increased to more than eighty thousand.

	Formal	Otherwise ascertained	Total
1989	38086	14471	52557
1990	36945	15200	52145
1991	35291	17252	52543
1992	42551	20796	63347
1993	44271	24316	68587
1994	50412	31421	81833
1995	50761	31280	82041
1996 <sup>1</sup>	50718	32515	83233

Table 2.1 Annual corrected notifications of food poisoning for England and Wales, 1989-1996. Adapted from (Douglas, 1997)

*“Food poisoning from bacteria, viruses and parasites is escalating in almost every country that gathers statistics on the subject” (Maurice, 1994 p. 25).*

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<sup>1</sup> Provisional

Food poisoning has been described as one of the most wide spread problems of the contemporary world (Notermans, Zwietering & Mead 1994) but notified cases only represent a proportion of actual cases. Reported cases of food poisoning are thought to represent only 10% of actual cases (Anon., 1991; Lacey 1993). The WHO (1992 cited in Wall et al, 1996) estimated that only 10% of incidents occurring in most of Europe were reported, and further that reported causes were most probably the more serious. The way in which the food poisoning data is collected is relevant, as it explains where the figures come from and thus contributes to understanding them. Wall et al. (1996) explains that there are three main sources of information on food poisoning, which are a national surveillance scheme for

1. laboratory confirmed infections
2. general outbreaks of infectious disease and
3. statutory notifications from clinicians.

Considering the 'statutory notifications' as seen in the third category it becomes apparent then that this would only represent a small proportion of food poisoning, with cases being seen by the Doctor but not notified and people not seeking medical assistance. It is also believed that the majority of those who report food poisoning are the high risk populations. It has been suggested that these increases may be due to greater awareness because of greater media coverage, due to heightened awareness of food poisoning on the part of the consumer (Mortimore, 1996). However, the increase in food poisoning resulting from specific types of bacteria (e.g. *Salmonella enteritidis* phage type 4) casts doubt on this explanation, suggesting that it may be a combination of both.

According to Maurice (1994):

*"the roots of the problem go back to the post war years, when demand for meat, a favourite abode for many pathogens, began to increase sharply. So too did demand for cheap animal feed from tropical countries, where animal infection is widespread" p. 30.*

Although this situation has changed the damage remains. Maurice (1994) has proposed that, while Governments on the one hand keep assuring the public that food is safe and on the other hand attempt to persuade consumers to change their behaviour, there is little chance of any real change occurring. Irradiation has been propounded as a way of ensuring that the food that is consumed is safe to eat. However, while it will kill bacteria it has encountered consumer resistance (Maurice, 1994).

## 2.7 Costs

As well as the costs alluded to above, in terms of human suffering and pain there are numerous other costs related to food poisoning.

In 1992 it was calculated that an outbreak of *Salmonella enteritidis* in Britain cost between £24,000 and £321,000 (Maurice, 1994). Also, in 1989, in England and Wales, it was estimated that the cost of working days lost due to food poisoning was £20 million. In 1994 in the USA the annual cost of common foodborne disease was estimated as being between \$5 and \$6 billion (Maurice, 1994), by 1997 this had increased to between \$6.6 and \$34.9 million (Busby et al, 1996). Further, contaminated food causes an estimated 6.5-33 million cases

of food poisoning every year in America, and is responsible for up to 9000 deaths (Anon, 1997B, Busby et al, 1996).

In Great Britain it was estimated in 1988 that a hospital outbreak of food poisoning could cost between £200,000 and £900,000 depending on the numbers affected (Wheelock, 1989). In 1982 it was considered that 23 million working days were lost in England and Wales because of food poisoning. In addition to these costs it has been proposed that the costs of food poisoning are extensive and can affect both employers and employees (Sprenger, 1996). According to Mossel (1989A) if the ingestion of a food stuff caused disease the consequences are grave and include:

*“legal measures, substantial claims by victims, and above all, loss of consumers’ confidence and high cost of recalls of defective lots” p. 1.*

Other domains affected include the National Health Service, in sick pay and the costs to the consumer (Sockett, 1995; Todd, 1989; Wheelock, 1988A), which include prescription and non prescription drugs (Henson, 1996).

There are, moreover, social costs related to food poisoning including loss of confidence in the government which will be considered further in a subsequent section.

## 2.8 Practices contributing to outbreaks of food poisoning

In trying to reduce the incidence of food poisoning, attempts have been made to identify risk factors i.e. those events/practices than occur most frequently in outbreaks of food poisoning. The majority of research relies on retrospective analysis of the possible practices which may have contributed to the incident.



There are a number of problems with this, including relying on people's ability to recall correctly, which may in turn lead to imperfect data being collated (Wall et al., 1996).

Roberts (1982) studied epidemiological reports of more than 1000 outbreaks of food poisoning in England and Wales between 1970 and 1979, to determine what the contributing factors were, and these results are presented below.

Roberts		Bryan	
Contributing factor	%	Contributory factor	%
Preparation too far in advance	61	Improper cooling	44
Storage at ambient temperature	40	Lapse of 12 or more hours between preparing and eating	23
Inadequate cooling	32	Infected person handled implicated food	18
Inadequate reheating	29	Incorporating contaminated raw food/ingredient into foods that receive no further cooking	16
Contaminated processed food	19	Inadequate cooking/canning/heat process	16
Undercooking	15	Improper hot holding	14
Inadequate thawing	6	Inadequate reheating	11
Cross contamination	6	Obtaining food from unsafe source	10
Improper warm holding	6	Cross contamination	5
Infected food handlers	5	Improper cleaning of equipment/utensils	5
Use of left leftovers	5	Use of leftovers	3
Raw food consumed	4	Toxin containers/pipelines	3
Extra large quantities prepared	3	Intentional additives	2
Contaminated canned food	3		

**Table 2.2 Practices contributing to outbreaks of food poisoning. Adapted from (Roberts, 1982) and (Bryan, 1988)**

Bryan (1988) analysed the factors that contributed to outbreaks of foodborne disease reported in the United States between 1961-1981 and those results are also presented in table 2.2

While the factors listed in both these studies are not exactly the same, there are many similarities. Preparation too far in advance is responsible for 60% of outbreaks in Roberts' work and is the second highest factor in Bryan's study. However, Roberts points out that if food is prepared 90 minutes or less before consumption most outbreaks of food poisoning could be avoided. Cooking too far in advance causes food poisoning only when combined with other factors e.g. inadequate heating.

From consideration of table 2.2 it can be observed that in combination the three elements from both studies that appear to be the most common causes of food poisoning are, poor temperature control, preparation too far in advance of cooking, and cross contamination from other foods and utensils and from infected people (i.e. The addition of cross contamination, infected food handlers etc).

According to Bryan, (1988):

*"In the United states with its abundance of electrical power, availability of equipment to cool and heat foods and relatively high education level of its populous, it's surprising that a significant foodborne disease problem exists" p. 672.*

## 2.9 Dual approach to reducing food poisoning

*"Everyone in the food system- from producers to preparers- must recognise the need for vigilance in controlling microbiological hazards to reduce food poisoning" (Knabel, 1995 p. 119).*

These have been many proponents of a combined approach i.e. legislation and education, to the problem of food poisoning (Charles, 1982; Gilbert, 1983; Maurice, 1993; Mossel, 1989A; Todd, 1989). The rationale behind legislation is that it leads to safer foods at point of sale, i.e. shops and restaurants. For example, one of the aims of the UK legislation is to reduce the risk of food being contaminated during processing. The food industry and governments have invested considerable time and money into this area (Meldrum, 1997). However, with incidents of food poisoning increasing, there is still room for

improvement. Before changes in legislation can improve a situation people must know about them, they must be understood and actions resulting from the legislation must be implemented. It may be too soon to say if there will be a decrease in incidence of food poisoning as a result of the new legislation, as it takes time for change to occur.

In 1980 the Communicable Disease Surveillance Centre (CDSC) found that 79 out of 100 frozen chickens contained *Salmonella* (Roberts, 1982 ). There is evidence to suggest that the situation has improved. A Which report in 1996 found that 20% of chickens were infected with *Salmonella* which does represent an improvement (Anon, 1996). However, 37% were infected with *Campylobacter*. Thus it would appear that efforts on behalf of industry, to reduce contamination in food at point of sale, are not working sufficiently, and there is still room for improvement. It has been suggested that one of the areas that needs to be considered is the consumers willingness to pay for safer food. Henson (1996) suggests that with regard to the costs of food poisoning:

*“consumers will logically take action to protect themselves , and be willing to pay some finite amount of income to secure a reduction in the risk of food poisoning” p. 404.*

Henson further contends from the results of his research that the two factors which explain why some people are unwilling to pay extra for safe food are a) inability to pay more and b) a belief that the cost should be borne by the food producers, manufacturers, producers or the government. This second point is supported by evidence from Sweden where chicken is *Salmonella* free and:

*"it has been estimated that the cost of the Salmonella-control system is less than the cost of coping with the food poisoning consequences"*

*(Anon, 1995 p. 11).*

However, others have argued that:

*"In the short term at least the consumer must recognise that it is impossible to guarantee the absence of pathogens in unprocessed animal products.*

*However, even if they are contaminated, they do not necessarily pose a threat to health if sensible precautions are taken in their handling and preparation"*

*(Meldrum, 1997, p. 197).*

Consumers can help by adopting good food preparation and food hygiene practices but while such a large proportion of raw materials are infected it is unlikely that good hygiene alone would be enough. Further, it has been suggested that putting the emphasis for food safety on the consumer is unfair:

*"The food industry should accept its role in the food chain, instead of blaming consumers for not preparing food properly- it is clear that some food may be highly contaminated before it reaches consumers" (Anon, 1995 p. 8).*

However, there will always be risk in food production both from bacteria normally present in food, (e.g. *C.perfringens* and *B.cereus*) and from human contamination, (e.g. with *Staph.aureus* Roberts, 1982).

Given that *Salmonella* or *Campylobacter* can contaminate food at almost any stage of production and preparation (Griffith et al., 1995) it is unrealistic to expect absolute safety. Gilbert (1983) suggested that the aim should be to reduce risk to an insignificant or acceptable level. Nonetheless, it has also been concluded that it is desirable to produce food that is free of certain pathogens :

*“pathogens such as E.coli 0157 and campylobacter spp. probably have low infectious doses and a zero tolerance is probably desirable; but this may not necessarily be the case with all Salmonella spp.” (Meldrum, 1997 p. 196).*

Despite the apparent confusion in the area it is generally agreed that there is a minimum acceptable level of risk. Roberts concludes that:

*“prevention will require education of those involved in the preparation, processing and service of food, both on the commercial and domestic scale” p. 497.*

This point has also been made by many others including Charles (1982).

Although efforts are being made to educate food handlers, (e.g. legislation requires that they receive training), consumer food handling has been largely ignored (Griffith et al., 1995).

According to Gilbert (1983) the home is the last line of defence against food poisoning. The house person must assume considerable responsibility for food safety in the home, often without receiving much, if any, hygiene education. However, there has been a call for education at all points in the food chain (Charles, 1982). Combined with an increase in the incidence of food poisoning originating in the home (Sockett, 1993), this points to the need both for further investigation into food safety practices in the home and for more effective means of assessing the effectiveness of education programmes, and ways of measuring the success of programmes.

*“Before public education and training programmes can be planned and printed materials developed, food professionals must learn what consumers know*

*about home food safety and home food preparation practices “ (Williamson et al., 1992 p. 96).*

The cost effectiveness of trying to change food preparation practices in the home has never been calculated but with the costs of food poisoning so high it could be postulated that it should be at least as effective as taking no action. Measurement and assessment of education programmes within the home would also be difficult, as would any attempt to impose guidelines onto people. Therefore, it would appear that if education is to be successful then people must want to change and programmes must both cause this and reflect it.

Further according to Scott 1996:

*“Probably the most effective means of promoting food hygiene is via hygiene education programmes in schools. The benefits of hygiene education and the development of a hygiene policy for the home could include not only a reduction in the occurrence of foodborne disease but also a public better able to apply hygiene principles and practice in the community in areas such as day-care centres, residential homes, restaurants and retail outlets” p. 8.*

## 2.10 Domestic food preparation

The final stage in the food chain is the consumption of food, either in the home or in restaurants and take aways. Within restaurants there are minimum levels of food safety imposed by legislation, within the home no such levels exist. It would be impossible not to say unethical to attempt to impose legislation on food preparation practices within the home unless used for commercial purposes, thus it is important to educate domestic food handlers in appropriate

methods of food safety. A further reason for education in the home is that in the USA:

*"Of the estimated 6.5 to 12.6 million to 21 to 80 million foodborne intoxications and infections, all but 3% are believed to come from improper food handling and originate in food service establishments and consumers' homes" (Pivarnik, Patnoid & Giddings, 1994 p. 865)*

and further:

*"although scientific advances have been made to detect and characterise many food associated risks, there has been little progress made in improving public understanding" (Pivarnik et al., 1994 p. 865).*

According to Worsfold & Griffith (1995) it is relatively easy to identify consumers' knowledge of food safety but assessing consumer behaviour is a very different matter. Further, they suggest that there is a lack of information about consumer food handling behaviour and no recognised way of assessing it. They suggest the application of HACCP food preparation in the home, as does Bryan (1992).

In 1986 Sheard (cited in Griffith et al, 1994) suggested that private homes accounted for more outbreaks of food poisoning than the sum total of all other locations. Further, Sockett (1993) found that 86% of *Salmonella* outbreaks reported between 1989 and 1991 were classed as family outbreaks where only members of a single household were affected. Ryan et al. (1996) considering general outbreaks of foodborne infectious intestinal disease in England and Wales, between 1992 and 1994, found that the home was the setting for 16% of them, with a general outbreak meaning an outbreak affecting residents from more than one residential setting, and outbreak an incident involving at least

two people believed to be suffering from the same illness. Scott (1996) declared that

*"in recent times there has been little attention given to the promotion of hygiene practice in the home" p. 5.*

However, one of the results of the increase in incidents of foodborne disease (Maurice, 1993) has been increasing investigation into domestic food preparation practices (Albrecht, 1995; Altekruse et al., 1995; Walker, 1995). These studies rely on self report as the behavioural measure, and therefore have to contend with the same problems as epidemiological data (see section 2.8). The collection of all retrospective self report data faces the double problem of memory lapse and distortion. As Worsfold & Griffith (1995) also highlighted:

*"observation of the domestic environment in which the food was prepared revealed that the opportunities for cross-contamination had been underestimated. This presents a disturbing picture if projected to the public at large" p. 362.*

Early investigations into consumer food handling concentrated mainly on questionnaires regarding consumer knowledge. An important publication was the MAFF report published in 1988 (MAFF, 1988), the main goal of which was to determine how much the public knew about food poisoning; how it may be acquired, and how it may be avoided. The population used for this survey were people over 16 years of age.

Other questionnaires include Sainsbury's 'Food safety in the home' (Spriegel, 1991) which was similar to the MAFF report in that the main aims were to determine the extent of food hygiene knowledge and practices. The results



indicated that consumers' knowledge about food hygiene was incomplete or incorrect, for example, in the Sainsbury survey, it was found that 60% of people defrost chicken outside the fridge, 50% risk cross contamination of chopping boards and surfaces with raw/cooked meat, only 13% knew the correct fridge temperature and 34% examined food past its best before date to decide if it would be consumed.

To date there have been 4 Food And Drink Federation (FDF) National Food Safety Reports; the first in 1993 which was undertaken because:

*"although previous research has been undertaken on food safety in the home, it was felt there were still gaps in consumers' knowledge which needed to be identified, particularly the views of those with primary responsibility for preparing food " p. 3.*

This report wished to determine consumers' knowledge of food hygiene principles and understanding of the issues surrounding the handling of food and the sources of information consumers relied upon for information on food hygiene and handling, how this was perceived and whether it could be improved on.

The report found that for consumers:

*"88% are fairly or very confident when buying food, that they have enough information about storage, preparation and cooking in order to keep it safe to eat" p. 7.*

However it seems that there is a disparity between this and what they actually know, (e.g. 77% did not know, or were unsure of the recommended temperature for their fridge or freezer, and only 22% have a thermometer in the

fridge). The findings of the next three reports were similar. Respondents were asked to choose, from a list of factors believed to contribute to the risk of food poisoning, the factor they believed to be the largest contributor. In the table below the results of consumers perceptions of the causes of food poisoning are presented in the form of percentages.

	1993	1994	1995	1996
Food not heated/cooked properly	40	38	61	61
Food not stored correctly or poorly refrigerated	31	29	25	26
Poor personal hygiene	29	31	37	33
Unclean work surfaces	20	20	22	22
Food not thawed before cooking			46	49
Contamination: pests, insects, pets			28	27
Food been eaten after its best before/use by date	17	15	16	14

Table 2.3 The main causes of food poisoning according to respondents in the

#### FDF surveys between 1993 and 1996

In general the results over the four reports were similar with the exception of the factor "food not heated/cooked properly". The importance of this factor increased from 38-40% between 1993 and 1994, to 61% in 1995 and 1996.

The Richmond report in 1990 made a number of recommendations aimed at reducing contamination of food in the home. These included transportation, storage, refrigeration, food preparation practices, and cleaning. Since then a number of surveys into these areas have been completed. For example, in 1992 Evans looked at consumer handling of chilled foods with the principle aim of judging perception and practice, and concluded that consumers were lacking knowledge both of correct refrigeration practices and of food poisoning bacteria. Colwill (1990) found that the average time consumers kept food out of refrigeration, whilst being transported, was one hour. Walker (1995) considered her findings with particular reference to the points of good practice highlighted by the Richmond report (1990). It was found in this report that respondents

generally were aware of the need to take food safety measures. It was also found that women and those in the 30-59 age group were more likely to have knowledge of specific food safety measures. Certain disparities between knowledge and behaviour were highlighted. These inconsistencies are emphasised in a number of other reports for example, the FDF in 1994 found that:

*"in particular, the report highlights the anomaly that while most people are aware of the need for good food hygiene, they do not always practice it" p. 1.*

Illusion of control may also be a factor in this disparity between saying and doing. It is generally accepted that most people believe that other people are at greater risk of contracting a disease than they are themselves (optimistic bias) and further people believe that they have more knowledge of and control over a situation than others do, thus, suggesting that taking food safety actions is for other people to do rather than for themselves.

The question that arises from this is whether their knowledge was consistent with self-reports or whether it was the inadequacy of knowledge that led to erroneous (over-optimistic) self reports:

*"The over dependence upon a survey approach may have distorted the view we have of domestic food handling behaviour. Many social researchers believe that subjects under investigation, tell researchers what they think they want to hear or what they want them to know" (Douglas, 1976 p. 51).*

This point will be explored further in subsequent sections and in chapter 7.

Another author who considered issues related to hygiene in the home was Scott (1983). In this work it was determined that informing the public in general and house persons in particular, on the correct approaches to home hygiene, would remain a difficult task. Also, that changing habits and correcting ignorance would be a slow process and that a concerted and sustained programme of education would be required to foster the idea of home hygiene from junior school through all levels of school education. The importance of education for domestic food handlers has also been suggested by many other researchers (Ackerley, 1990; Griffith & Worsfold, 1994). Wheelock (1988B) concludes that

*"The basic precautions necessary should be inculcated in everyone at an early age, perhaps in the same way that the rules of road safety are emphasised" p. 63.*

## 2.11 Sources of information about food hygiene

The Food And Drink Federation reports (1993-1996) investigated respondent's sources of information about food hygiene. For example, in 1995 34% saw food manufacturers as the main source of information with only 5% considering their doctor their main source. This contrasts dramatically with a study by Phillipp et.al., 1988, who found that 70 % of respondents received their information from their doctor. However, as food hygiene is not a priority in medical school this is not likely to be as effective as might be expected. The media as sources of information ranged between 12 and 14% in the FDF reports (FDF, 1993-1996). Griffith et al. (1994) found, however, that the information available in the media was inadequate. Frewer, Howard & Shepherd (1995) propose that one of

the most trusted sources of information about food safety (generally, not specifically to food hygiene) were the 'quality press' but that the different issues are described in different ways. For example, biotechnology is portrayed in terms of value statements with little or no information included about quantifiable risk. This can have an impact on consumer perceptions of risk, as it can be expected that those who obtain their information from the media may be influenced by the way the message is delivered. In the 1996 FDF report Health Education authorities were a source of information about food hygiene for 21% of respondents. However, 49% believed that Health Education authorities should provide information. In general in all the FDF reports (FDF, 1993-1996) subjects believed that more information should be provided by all the groups involved in food safety. The FDF reports also considered parents and schools to be important sources of children's food hygiene information. It is important to note here that this year (1997) there will not be a FDF survey into food safety and food poisoning as there has been for the past 4 years. This may be for a number of reasons but it does seem to suggest a reduction in interest by the FDF into this area which could have important implications as this work has formed the basis of a lot of knowledge about consumers' perceptions of food hygiene, and with its ceasing this information will no longer be available.

## 2.12 Consumer perception of risk

According to Coleman & Griffith (1997A) risk can be defined as the probability of a hazard occurring, and a hazard is anything that causes harm to the person. There are many factors that influence the risk of food poisoning and some of these will be explored here. The Institute of Food Science and Technology

(IFST) (1997) has outlined what it considers high risk foods (these are foods and drinks that are most hazardous to the consumer). The foods listed were undercooked poultry, meats and eggs; raw milk or cheese and other dairy products; raw or undercooked eggs or egg products (e.g. home made mayonnaise); raw or undercooked shellfish; any cooked food cross contaminated with raw food; any food past its best before date and any food stored at a higher temperature than that recommended by the supplier.

High risk foods may be defined as

*“foods which, under favourable conditions, support the multiplication of pathogenic bacteria and are intended for consumption without treatment which would destroy such organisms” (Sprenger, 1991 p. 297).*

Further, it is generally accepted that raw food is more likely to be contaminated with pathogens than cooked food (IFST, 1997). While bacterial contamination is considered to be the most hazardous of all by experts (Gormley et al., 1986; Wheelock, 1988) the consumer appears to have a different view.

Medically acknowledged	Perceived by the majority of customers
pathogenic micro-organisms	pesticide residues
toxins of microbial origin	additives
pesticide residues	loss of nutritional integrity
loss of nutritional integrity	toxins of microbial origin
additives	pathogenic micro-organisms

Table 2.4 Scientifically established Vs publicly perceived risks in foods ranging in descending order of severity. Adapted from Mossel & Struvjk, 1992

As demonstrated in table 2.4 consumers are very concerned about pesticides, however, it has been suggested that:

*“government regulation and surveillance of pesticides and herbicide application has been in force for some time and it is an area where the consumer safety needs to be managed by the primary producer” (Mortimore, 1996 p. 5).*

A number of researchers have considered the importance that consumers place on food safety topics (Gormley et al., 1986; Wheelock, 1988B). Wheelock (1988B) reports that although 50% of respondents in a survey considered additives to be harmful, there does not seem to be public concern about food safety from bacteria. For example, in 1988 between 40 and 50 percent of people surveyed said that the presence of artificial colours or flavours or preservatives would discourage them from purchasing food items. Further, when asked about their willingness to pay extra for safe foods, consumers, in a study by Henson (1995), stated that they did not want food that had been ‘messed with’. This is in spite of the fact that experts consider that the risk from microbial contamination far outweighs that from additives.

Wheelock states that:

*“the risks associated with microbial contamination of food exceeds those linked to additives by a factor of about 100,000” (Wheelock, 1988B p. 58).*

It would seem safe to conclude that the risks associated with microbial contamination are underestimated by the consumer. Furthermore, a review of the literature in the area of Health Education would suggest that they are also underestimated by those working in Health Education despite the food experts’ beliefs in the equality of bad food hygiene and poor nutrition.

Considerable work has been done in the USA and elsewhere into other sources of contamination in food. For example, chemical residues (Jussaume & Judson, 1992), food additives (Francis, 1992), traces of antibiotics in beef and

agricultural residues (Nash 1988; Gormley et al., 1989) have all been studied. Further it would appear that these are the areas of concern to consumers (Wheelock, 1988B), however, it is bacterial food poisoning that is responsible for most illness in the Western World (Wheelock, 1988B).

Frewer et al.(1995) propose that there has been an increase in the extent to which the public perceive food to be hazardous, and in addition, suggest that despite some experts believing these perceptions to be exaggerated, the public's perceptions of risk may have important implications for consumer behaviour. For example during the recent Bovine Spongiform encephalopathy (BSE) crisis sales of beef plummeted (although they have now generally recovered). Notwithstanding the fact that a) the link between new variant BSE and Creutzfeldt Jakob Disease (CJD) is still subject to debate, b) the practices that lead to cattle contracting BSE have ceased because of legislation and c) the overall risk of contracting BSE is still very small in comparison of dying from other forms of contaminated food (Ahlstrom, 1996; FSIS, 1997).

Francis (1992) suggests that:

*"The consumer perception of food safety is a phenomenon unique to the life style and culture of each country" p. 33.*

Thus the concerns in Great Britain may be different to those in other countries.

Beardsworth (1990) argued that long term cultural and economic trends have given rise to a situation where consumer distrust about food safety can interact with the media to result in anxiety which is generally short term, but which can have lasting consequences.



According to Francis (1992) consumer perception of risk is a combination of degree of hazard and degree of outrage, with outrage relating to the consumer reaction to the issue.

	High outrage	Low outrage
High hazard(severity)	Nuclear weapons	tobacco abuse
Low hazard	food irradiation/pesticides	<i>food poisoning</i>

Table 2.5 Consumer perception of risk, Adapted from Francis (1992).

The examples provided in Table 2.5 contribute to understanding of why consumers generally do not consider food poisoning to be of major concern. Food poisoning has generally been considered to be both low hazard and low outrage. However, with increasing media attention and an increase in deaths from food poisoning, it is likely that this situation has or will change.

Consumers generally however, are sceptical of food scientists as they believe them to have vested interests in maintaining the status quo (MacConnell, 1996). Moreover, consumer groups pay considerable attention to additives and stress how dangerous they are without providing a balanced view of the consequences of their removal. While some food scientists no doubt consider their company before the good of the consumer, the majority consider both.

Another reason for consumer scepticism about experts is that The Ministry Of Agriculture, Fisheries and Food, is the government agency responsible both for food producers and processors and for the consumer. In Ireland where the situation is the same the Consumers' Association issued the following statement:

*"Every time we have a food scare in Ireland it raises the fundamental question of who controls the food industry. At present the Ministry for agriculture is also*

*the same Ministry for food- these functions should be totally split- the relationship does not inspire consumer confidence" (Gill, 1996 p. 23).*

However, the new Labour government, has agreed to set up a Food Standards Agency (FSA), therefore the situation in Great Britain is set to change. The FSA will have two main aims, to restore public confidence in the safety of food, and to deal with the problem of increases in incidence of food poisoning and a white paper on this is being drafted at present.

## 2.13 Health Promotion and Health Education

Health Promotion is an active and positive concept, where active behavioural change is anticipated. Government interventions via taxation or subsidy (e.g. cigarettes or unleaded petrol), are combined with Health Education to try to persuade people to make the right choices- as defined by the experts of the moment. The aim of Health Education is to persuade people to adopt and sustain healthy practices.

In 1984 the WHO outlined what they believed to be the underlying principles of Health Promotion (WHO, 1985). One of these was that Health Promotion involves the population as a whole, not just those at risk of specific illness. A second was that Health Promotion is directed towards action to the determinants of health. A third that Health Promotion aims particularly at effective public participation.

The traditional approach to Health Promotion has been the provision of information or education working on the assumption that once aware of the

risks or dangers that people will act in their own best interests. According to Fincham (1992)

*"This approach ignores the fact that there is a wide range of social, psychological and demographic factors which influence individual decisions to adopt healthy behaviours, even though the exact nature of these factors is not clear" p. 239.*

Fincham (1992) determined that despite considerable theoretical interest in various models very little evidence existed linking theory, practice and outcome, and recommended basic research into the process of change and outcome evaluations in community health promotion programmes.

In addition, in a review into the effectiveness of a number of Health Education programmes and publications with an adolescent population Rothman & Byrne (1991) concluded that most were ineffective, and with few exceptions there was no association between the literature and concepts or theories within the social sciences and recommended that this position changes. This is a similar recommendation to that of Griffith et al. (1995) who conclude that

*"The use of these models will not offer a panacea but given the present level and cost of foodborne disease their use in food hygiene deserves to be given a higher priority and status." p. 26*

## 2.14 Models in Health Education

Some of the theories available are specific to Health Education, (e.g. The Health Belief Model and the Health Action Model), others are attitude-behaviour models based on the premise that changes in attitude are needed to precede

changes in behaviour. Both types are commonly considered social cognition models. Models are used in Health Education to understand and predict behaviour and to design interventions (see section 7.12).

## 2.15 Social Cognition

Social cognition is concerned with how individuals make sense of social situations, with how people think about themselves and the social world and more specifically with how people select interpret, remember, and use information to make judgments and decisions (Wyer & Srull, 1991).

Social Cognition mainly contains two basic issues which are mental representation and mental processing. A mental representation is how something is represented in the mind (e.g. the route home). Mental processing refers to how people perceive, process and cognate (Lindzey & Aaronson, 1985).

Cognitions within social psychology, or social cognitions are now one of the main areas of study amongst social psychologists. This importance stems from the now obvious assumption that to understand people's social behaviour how people receive, process and organise information about others must be understood.

## 2.16 Social Cognition Models

Social cognition models attempt to identify the variables important in the prediction of health behaviour, which would in turn enable interventions designed to change the cognitions underlying unhealthy behaviour;

*" if cognitions are causally related to behaviours then changes in cognitions should lead to changes in behaviours and so promote positive health outcomes"(Conner & Norman, 1996 p. 15).*

One theory which has been used in the area of health is the Social Learning Theory (Conner & Norman, 1996). This was first developed by Rotter in 1954 to explain human behaviour in complex situations (Rotter, 1966). This theory suggests that the potential of a specific behaviour occurring in a given situation is a function of the expectancy that the behaviour will lead to a particular reinforcement in that situation and the value of the reinforcement to the individual in that situation. Although Social Learning Theory can be applied to predict a statistically significant amount of variance, it must be noted that the percentage of variance explained is relatively low, especially when compared to results of studies using the Health Belief Model variables (Wallston & Wallston, 1984). For example, a study of dental health behaviours which compared the two models found the Health Belief Model explained most variance (Wallston et al., 1982 cited in Wallston & Wallston, 1984). It has been suggested however, that the major difficulty with the model may not be the theory but in the level of specificity of the variables, and research is ongoing.

Triandis put forward the Theory of Social Behaviour (1977). Triandis sees intention as a major predictor of behaviour, but not of those that are habitual. The Theory of Social Behaviour indicates that behavioural intentions are a function of three constructs; social factors (including normative beliefs), the affect towards the behaviour; and the value of the perceived consequences of the behaviour. There has as yet been little empirical research done on the

Theory of Social Behaviour and further conceptualisation of the theory is needed.

Other theories include protection motivation theory and health efficacy theory (Conner & Norman, 1996).

The theory that is most frequently used and is the most recommended by experts in Health Education (Conner & Norman, 1996) is the Health Belief Model. This model was developed to predict preventative health behaviour of individuals and has been extensively utilised for this purpose (Janz & Becker, 1984). The Health Belief Model has generated more research in the area of health than any of the other models that will be considered in this chapter. It suggests that readiness to take a health action is determined by the perceived likelihood of susceptibility to the particular illness and by the perception of the severity of the consequences of getting the disease. Barriers to action and benefits of taking the action must be taken into account and a cue to action is considered necessary before health action will be taken. For a visual illustration of the model see figure 2.1. In 1974, Haefner characterised the Health Belief Model as:

*“a confusing melange of inconsistent [though by no means disconfirming] results obtained under widely varying conditions and susceptible to no univocal interpretation” p. 430.*

According to Wallston and Wallston (1984) the Health Belief Model is a catalogue of variables more than a model. Another major problem with the Health Belief Model is the lack of consistent manipulation of the variables. Different measures are used in each study. Although prediction using different

operations can enhance the validity of a theory, it makes comparisons across studies difficult, especially when results are not as predicted.

Finally a major problem with the Health Belief Model is the lack of specification of the relationship among the variables i.e. is the model multiplicative or additive?

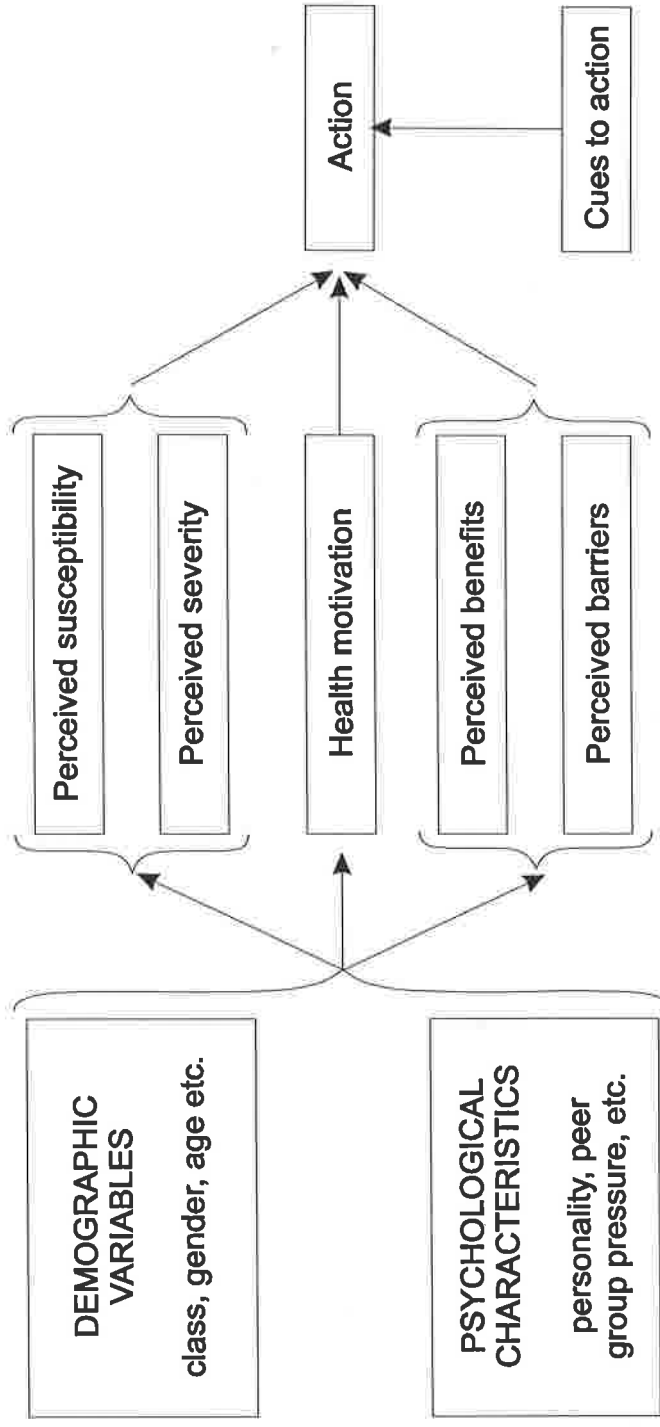


Figure 2.1 The Health Belief Model



Ackerley (1990) used the Health Belief Model to design a questionnaire in an attempt to determine the best way to teach food hygiene within a local health authority. Due to the specific aims of this research one section of the model in particular was focused upon i.e. cues to action, thus a thorough examination of the model as it applied to food hygiene has not been provided. Moreover, although this research focused on people aged 16 and over, one of the recommendations of the work was to provide food hygiene education to children. This is problematic as a major difficulty with the Health Belief Model is that there is very little evidence to support its use with children (Kegeles et al., 1980, 1982 cited in Wallston & Wallston, 1984).

The second health model to be considered here is the Health Action Model (Tones, 1990). This model synthesises the Health Belief Model and the Theory of Reasoned Action.

This theory is recommended by Rennie (1995) for use in the food industries' education programmes. Rennie suggests that the models generally applied to food hygiene education are KAP (knowledge, attitude, practice) models, meaning that changes in practices are preceded by changes in attitudes which result from provision of knowledge. However she concludes

*"The validity of this simple unidirectional linear relationship between the three factors has been tested in many situations and frequently found to be inadequate" p. 77.*

Rennie believes that provision of training courses are unlikely to result in many changes unless supported by workplace reinforcements. In support of this she suggests the application of the Health Action Model to food hygiene education, and concludes that successful Health Education must be theory driven and

consider all relevant variables. An obstacle to this is that not all possible variables are known. The Health Action Model is a composite model combining elements from The Health Belief Model and The Theory of Reasoned Action. This model suggests that beliefs and attitudes may interact to produce a behavioural intention. This intention may then lead to behaviour when appropriate environmental and social conditions predominate.

There are a number of difficulties with the Health Action Model. Firstly, the research into its effectiveness is limited. Secondly, it can be argued that the Theory of Reasoned Action and the Health Belief Model are already effective so an amalgamation of the models is unnecessary. Perhaps one reason why the Health Action Model has not been used more is the lack of basic research into beliefs and intentions generally and regarding food safety behaviour (Griffith et al., 1995).

Before considering the final social cognition model- which is the model used in this study- a brief summary of attitude research will be provided, as attitudes are one of the important concepts included in the model.

## 2.17 Attitudes

In the study of psychology attitudes play and have played an important role. As early as 1935 Allport stated that:

*"The concept of attitude is probably the most distinctive and indispensable concept in contemporary American social psychology"*

*(Allport, 1935, p. 198).*

Eagly & Chaiken, (1993) believe that this assertion is as valid today as it was then. It is beyond the scope of this report to explore in depth the literature relating to attitudes, therefore, a definition of attitude will be presented and the relationship between attitudes and behaviour will be considered. The definition which will be used for the rest of this work is that suggested by Eagly & Chaiken (1993) who state that:

*“an attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour” p. 1.*

As understood in the above definition, a psychological tendency is an internal state of a person, and can be considered as a tendency that predisposes a person towards a particular evaluative response. A concept central to this definition is that attitudes are tendencies and that tendencies last for at least a short time (generally for a long time but that is not a central issue in this definition, Eagly & Chaiken, 1993). Another is that attitudes themselves are not observable and can only be inferred from observable responses. These evaluative responses to the attitude object will be either positive or negative:

*“An attitude object can be any discriminable aspect of the physical or social environment, such as things (cars, drugs), people (doctors, the British), behaviour (jogging, drinking alcohol) or even abstract ideas (religion, health)”*

*(Stroebe & Stroebe, 1995 p. 14).*

An early view of attitudes (Katz & Stotland, 1959) was that the evaluative responses contain three components, cognitive, affective and conative aspects, and may be verbal or non verbal. Whilst most researchers will accept that attitudes may contain some or all of these aspects, most would accept that they need not be all three concurrently (Eagly & Chaiken, 1993; Stroebe & Stroebe,

1995; Lindzey & Aaronson, 1985). Evaluative responses of the cognitive type reflect thoughts, perceptions or knowledge about the attitude object. This knowledge need not be correct factually as long as the subject believes it. For example, a positive attitude to a particular political party would be reflected in beliefs that their policies are good and fair and that the politicians in that party are incorruptible and moral, whereas, a negative attitude may reflect the reverse.

Evaluative responses of the affective type reflect emotions or feelings experienced by the person with respect to the attitude object. For example when considering a particular political party some people may experience feelings of dismay or disgust whilst others may experience feelings of confidence or hope.

Conative responses reflect the behavioural responses to the attitude object. Again using the example of the political party, if one has a positive attitude towards it then one is likely to contribute money to party funds or canvass for a particular candidate, whereas if one had a negative attitude then one may support any candidate who opposes that party or write to newspapers protesting that party's policies. The issue of social constructionism needs to be mentioned in relation to attitude theory as any theory is based on social construction of a situation or experience of real worlds, nonetheless further discussion of this is not necessary here and the reader is referred to Burr (1995).

With respect to food hygiene, subjects with a positive attitude to food hygiene may express beliefs about the importance of hand washing or keeping food covered, have feelings or emotions of disgust and anger when bad hygiene

practices are observed, and comment upon anyone seen practising good or bad hygiene or avoid restaurants where they believe malpractice occurs.

## 2.18 Attitudes and Behaviour

Since the 1920's the relationship between attitudes and behaviour has been central to psychology. Whilst it would be unrealistic to expect a perfect or even a very close relationship due to the unreliable methods of measurement, consistent relationships would be expected (Eagly & Chaiken, 1993).

*"Social psychologists have traditionally assumed that people's evaluations of social policies and other entities in their social environment have major consequences" (Eagly & Chaiken, 1993 p. 1).*

However, as early as the 1930's researchers were discovering that the relationship was not as clear as had been expected. LaPiere's famous study in 1934 was the first to evoke doubts about the attitude behaviour relationship, when it was found that no relationship existed between people's attitudes and behaviour with respect to Chinese people. However, in a more recent article Dockery & Bedeian (1989) suggested that

*"In fact, the actual discrepancy uncovered was between true attitudes- the tendency to act in a certain way- and that which is measured by an attitude questionnaire" p. 9.*

For example, the situation involved a Chinese couple and a white man entering hotels and restaurants requesting service where in general they were served, the questionnaire did not specify these variables and only asked if the proprietor would serve Chinese people.

Wicker's study in 1969, which concluded that there was no relationship between attitudes and behaviour, was seen by many as the end of research in the area, as it was seen as evidence that attitudes did not predict behaviour (Eagly & Chaiken, 1993). However, work by Fishbein and Ajzen (Ajzen & Fishbein, 1977; Fishbein & Ajzen 1975) which stressed the importance of correspondence was seen by many as the rebirth of attitude behaviour research (Conner & Norman, 1996). 'Correspondence' relates to the importance of ensuring that the target, action, context and time are the same for both the attitude and the behaviour being measured (Ajzen, 1991A; Eagly & Chaiken, 1993). For example, to return to the example of support for a political party, if the researcher is interested in how a subject is going to vote in next Tuesday's election, then a general question about what party they favour, is not likely to elicit a strong relationship between attitude and behaviour. However, if the question 'In the general election next Tuesday will you vote for the labour party?' is asked, there should be a better relationship found between attitudes and behaviour, due to the inclusion of the elements-target, action, context and time. In this case the action is voting, the target the labour party, the context the next election and the time next Tuesday.

However, just because there is a predisposition to act this does not mean that the person will always do so, and Niven (1989) further contends that:

*"a positive attitude to health may not necessarily result in a positive behavioural outcome; but a negative attitude to health will almost certainly result in a negative behavioural outcome" p39.*

## 2.19 The Theory of Reasoned Action

The Theory of Reasoned Action was first introduced by Fishbein in 1967. In collaboration with Ajzen the theory was refined, tested and extensively researched over the next three decades.

*“Generally speaking, the theory is based on the assumption that human beings are usually quite rational and make systematic use of the information available to them” (Ajzen & Fishbein, 1980 p. 5).*

Fishbein and Ajzen argue that if one wishes to look at a specific behaviour then the attitude measured must be specific, whereas if the behaviour to be studied is general then a general attitude measure must be used.

The Theory of Reasoned Action proposes that the main predictor of behaviour is intention to perform that behaviour, which is determined from the attitude to the behaviour and the subjective norm. Intention can be defined as

*“a person’s motivation in the sense of her or his conscious plan or decision to exert effort to perform the behaviour” (Conner & Norman, 1996 p. 122).*

Attitude consists of the individual’s overall evaluations of the behaviour, and subjective norms are a measure of whether an individual believes that significant others believe s/he should engage in the behaviour. Attitudes are related to beliefs about an object, person or thing. In the following work the object is food safety thus a person’s attitude consists of beliefs about things which can be done to keep food safe and how important these behaviours are considered. Subjective norm relates to significant others in the person’s life, so in the present work with food safety it relates to whether they consider that important people in their life want them to perform certain food safety

behaviours, and how likely it is that they will comply with these significant others. For a visual illustration of the Theory of Reasoned Action see Figure 2.2.

The Theory of Reasoned Action asserts that most overt behaviour is a function of intention to perform the behaviour. Behavioural intention in turn can be predicted by a linear combination of attitude toward the act and normative beliefs multiplied by motivation to comply with the beliefs. The Theory of Reasoned Action has been used in considerable research since it was first postulated. It has become established within Health Psychology (Conner & Norman, 1996; Stroebe & Stroebe, 1995) as one of the main structures that can be used to predict behaviour from attitudes. Although not universally accepted, a recent meta-analysis of the Theory seems to suggest that if the Theory is used correctly its predictive utility is strong (Sheppard, Hartwich & Warshaw, 1988), for example they found an average correlation of 53% between intention and behaviour, and of 66% between attitude and subjective norm with intention. This meta analysis considered behaviour in general not specific to health.

The theory has been used with strong predictive utility in the following areas; health behaviours; AIDS; breast cancer; testicular cancer; breast feeding; voting behaviour; healthy eating; marketing; consumer behaviour (Ajzen & Fishbein, 1980; Conner & Norman, 1996; Eagly & Chaiken, 1993; Stroebe & Stroebe, 1995). For example, in an investigation into voting behaviour Singh et al. (1995) found that the model explained between 27 and 36 percent of the variance, with attitude rather than subjective norm being the most important predictor. A review of research using the model found that intention explained



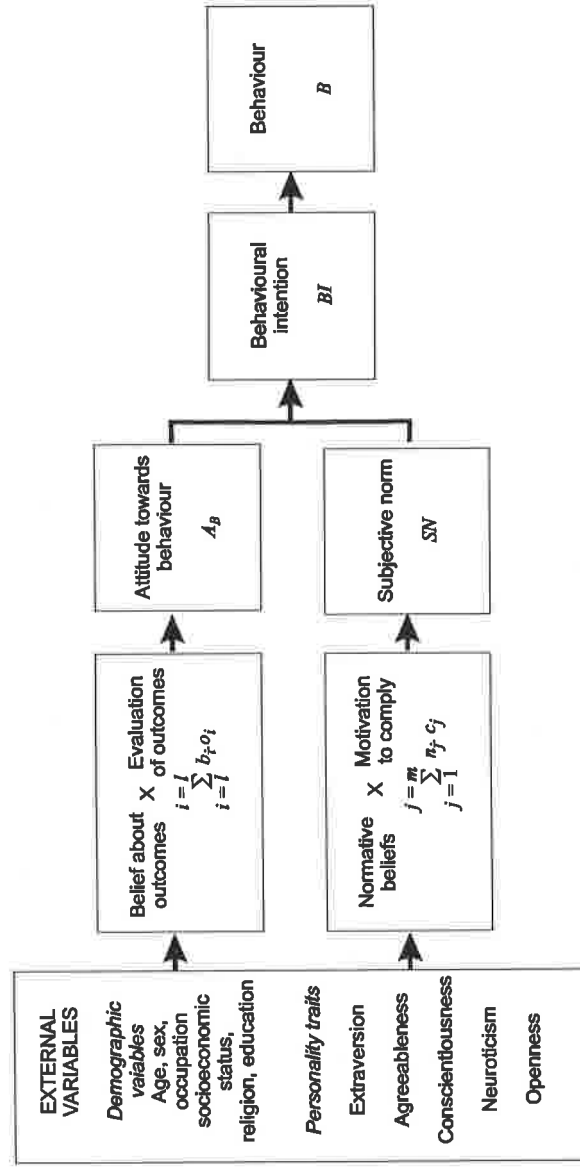


Figure 2.2 The Theory of Reasoned Action

up to 80% of variance (Fishbein & Ajzen, 1977). Another review found that up to 68% of variance in intention could be explained (Wallston & Wallston, 1984). However, more recent reviews have found the theory demonstrating less predictive utility, but it is still considered to be an important model as the differences measured are statistically significant. For example, in a study into visiting drinking places in Oslo, Træen & Nordland (1993) found that intention predicted 37% of the variance in behaviour with perceived behavioural control contributing most, then attitude and subjective norm the least. In recent research into food choice the Theory of Reasoned Action has been used extensively (Shepherd & Stockley, 1987; Shepherd, 1995; Raats, Shepherd & Sparks, 1995; Conner & Norman, 1996; Frewer et al., 1995). For example, Shepherd & Stockley (1987) found that there was a relationship of .68 between attitude and intention, .49 between subjective norm and intention and .69 between intention and behaviour.

The Theory of Reasoned Action has been used with children (Schaalma et al., 1993). The children in this study were aged between 12 and 19 years of age, and there were no difficulties with using the model, in that the analysis suggested that children could understand the concepts and questions or statements and apply them to their own behaviour.

Wallston & Wallston (1984) claim that in many ways the Theory of Reasoned Action may prove the most useful of health models as they believe it to be relatively parsimonious and as it has been shown to be relatively successful in its prediction of behaviours. The consistency of measurement eases comparisons across studies. However, its biggest advantage may also be its biggest weakness. New beliefs must be assessed for each behaviour and

sample, so development of measures can be time consuming. People may be *differentially* able to carry out their intentions, according to their life circumstances. The Theory of Reasoned Action fails to give sufficient attention to factors that help or hinder behaviour. Desirability of behaviours may affect intention measures (Wallston & Wallston, 1984; Strobe & Strobe, 1995).

The Theory of Reasoned Action deals directly with the attitude-behaviour relationship and seeks to explain rational behaviour which is under the control of the individual, whereas the Theory of Planned Behaviour applies to non-volitional behaviours, goals and outcomes which are not entirely under the control of the person. Thus in the original Theory of Reasoned Action, Ajzen & Fishbein (1980) said that they would:

*“make the assumption that most actions of social relevance are under volitional control and, consistent with this assumption, our theory views a person’s intention to perform (or not perform) a behaviour as the immediate determinant of the action” (Ajzen & Fishbein, 1980 p. 5).*

The Theory of Planned Behaviour which developed out of The Theory of Reasoned Action includes a component of perceived control, thus non-volitional behaviours would it is argued correlate better including this component than without it (Ajzen, 1991B).

## 2.20 The Theory of Planned Behaviour

Volitional behaviours are those that are totally under the will of the person, and are the only behaviours which the Theory of Reasoned Action is designed to measure. The Theory of Planned Behaviour was developed to produce a model

which could be used on non-volitional behaviours. It is the same as the Theory of Reasoned Action with one addition, that of perceived behavioural control (Conner & Norman, 1996). According to Ajzen (1991B) judgements of perceived behavioural control are influenced by beliefs as to whether the necessary resources and opportunities are available to perform the behaviour successfully, and beliefs about the power of each factor. For example, perceived behavioural control with respect to getting a sun tan would include the probability of there being enough sunshine, having sufficient money to use a sun bed, time available to sun bathe etc. It is the issue of whether or not a behaviour is under volitional control that makes it necessary to modify the Theory of Reasoned Action to include perceived behavioural control. However, in a study by Fishbein & Sasson (1990), concerning training course attendance (which they considered non-volitional), it was found that the inclusion of perceived behavioural control failed to improve behavioural prediction. They concluded that

*"The current study seriously questions the appropriateness of adding perceived behavioural control to the Theory of Reasoned Action" p. 197.*

However, the majority of research using the Theory of Planned Behaviour with non volitional behaviour has found that it contributes to prediction of behaviour. This raises the question of the nature of volitional and non-volitional behaviours.

### **Volitional Vs. Non-volitional Behaviours and Food Hygiene**

Volition can be defined as :

*“the act of exercising the will, the faculty of conscious choice, decision and intention”*

or as

*“the resulting choice or resolution” (Collins, 1979 p. 1624).*

A behaviour is under volitional control if the individual can decide at will whether or not to perform it.

As stated above the Theory of Reasoned Action deals directly with the attitude-behaviour relationship. The Theory of Reasoned Action seeks to explain rational behaviour which is under the control of the individual, whereas the Theory of Planned Behaviour applies to non-volitional behaviours, goals and outcomes which are not entirely under the control of the person. The Theory of Reasoned Action argues that intention to perform a behaviour is the best single predictor of behaviour.

This raises the question of whether food safety behaviours are volitional or non-volitional. Firstly, consider the food practices seen in table 2.2. It will be argued that all these factors are under the control of the person preparing the food. For example, consider 'preparation too far in advance', 'improper storing' and 'inadequate thawing'; people preparing food have control over whether or not to do these things. Where the consumer may not have control is if the food is already contaminated. However, if food is contaminated food hygiene behaviours can help to reduce but cannot eliminate pathogens. Further, if consumers believe that food safety is not controllable by them, because food is unsafe, then they are less likely to practice safe food practices. Additionally one of the FDF reports (1994) found that

*"Most consumers now blame food poisoning on poor food hygiene, or incorrect storage preparation or cooking, rather than the food itself" p. 4.*

Therefore consumers believe that it is under volitional control.

Table 2.3 shows the top 7 factors that respondents believe contribute to food poisoning. All these can be seen to be under volitional control. For example, hand washing is a major part of what is considered personal hygiene. This could be considered to be a habitual behaviour and thus to be a non-volitional behaviour but to correctly wash hands using soap and hot water, involves volition. This same principle holds for all the other items. However, the costs related to buying soap and heating water need to be considered as it is possible that economic considerations may make the behaviours less than volitional for some of the socio-economic groups in this country.

Nonetheless, having considered all the issues it was decided that the Theory of Reasoned Action would more accurately represent food hygiene behaviour, than would the Theory of Planned Behaviour.

## 2.21 Observation Vs self report

There are numerous ways of collecting data. For the purposes of this research the two main ones to be considered will be self-report measures and observations. There are advantages and disadvantages to both which will be considered further below.

*"Verbal report instruments are strong with respect to the directness of their approach. If we want to know how people think, feel, believe or behave, the*

*most direct means of gathering this information is to ask them about it.” (Polit & Hungler, 1989 p. 198).*

The main advantages of using self report measures is the ease of using them, their cost effectiveness and their ability to examine areas that it would be difficult to observe (e.g. sexual behaviours, child abuse- interviews are another possible alternative in such cases but less likely to be time and cost effective). Thus researchers into these areas have limited choice in the measurement techniques used. Moreover, researchers into cognition (e.g. thoughts and beliefs), cannot measure these things directly (except maybe through the use of Positron Emission Tomography (P.E.T). scans), they can either use self-report or observe behaviour and then draw inferences. The main drawback to drawing inferences is the number of extraneous variables which may confuse the issue. To sum up, self-report allows efficient measurement and quantification. There are, however, disadvantages, mainly the biases that may be introduced by respondents and by the person who designs the questionnaire, and collects and analyses the data, all of which introduces additional sources or error. The main biases are

- the social desirability response bias, which is answering questions in the way that it is believed that society expects.
- the extreme response set, which is always ticking the responses at the extremes of the scale.
- the acquiescence response set, which is always answering yes or no regardless of the content of the question.
- responding in the way that the subject guesses will result in the researcher obtaining the desired outcome of the research.

On balance, based on the amount of research that takes place using self report measures, where observations would be possible (e.g. Manstead, Proffitt & Smart, 1983; Fishbein & Sasson, 1990), it would appear that for most researchers, the advantages of self report measures seem to outweigh the disadvantages.

There are a number of benefits and drawbacks to observations also. The shortcomings include the difficulties of objective observations, because of personal prejudices of the observer. The observer may anticipate results, thus seeing what is not there, or seeing things in a particular way (e.g. with observations of aggression in children the observer may interpret certain actions as aggression that in other circumstances would not be so considered). Finally, the person being observed may alter their behaviour to concur with what they believe the observer is looking for i.e. reactivity (Polit & Hungler, 1989; e.g. in studies of healthy eating the subject may choose healthy food because they know that that is what is being measured).

Benefits include the depth of information that it is possible, the avoidance of self-report biases and even untruths from participants and the exclusion of the introduction of 'mind-sets' as may happen with self-report measures. Benefits also include the fact that there is no need to rely on memory which can influence self report responses.

Griffith & Worsfold (1994) found that using observations revealed that opportunities for cross-contamination had been greatly underestimated. Further Douglas (1976) claimed that using self report has distorted the view of consumer food preparation practices and food hygiene behaviour. However, as the majority of research using the Theory of Reasoned Action used self report it



was believed that this would be appropriate, but that observation would be used to test and or support the results obtained from self report. This would allow both comparison of the Theory of Reasoned Action as it related to food hygiene with other related research, but also a comparison of different types of data collection methods.

## 2.22 Children and Health

Studies into health behaviour and children were undertaken in an attempt to discover stages at which humans would be more amenable to change:

*“The relative stability of adult health behaviours, in the face of attempts to modify them and the difficulty encountered in significantly altering selected health beliefs , suggest the importance of studying a wide range of health-relevant behaviours as they emerge in the child. Such investigations could point to periods when health behaviours are more amenable to modification through educational programmes and communications” (Gochman, 1972, p. 259).*

Nielson Natapoff (1978) examined children’s views of health. Her results indicated that children saw health as a positive attribute that enabled them to participate in desired activities; and that health and illness were two separate concepts rather than two points on a continuum. She also found both quantitative and qualitative changes with age were consistent with developmental theories. Palmer & Charles (1976) investigated the development of health attitudes and behaviours. They identified a number of differences between health beliefs for older and younger children. Most differences related to the ability to conceptualise health and illness, but of most immediate concern was the finding that from eight years of age onwards, by which stage most have

reached the concrete operational stage (Piaget, 1954 cited in Yussen & Santrock, 1982), children can be taught preventative health behaviours. There was one proviso, however, in that this teaching should focus on the prevention of illnesses of which the child has previous experience. However, Gochman (1972) found the converse for this proviso, and suggests that children do not need to have experienced an illness to be able to learn preventive health behaviours.

Backett and Alexander (1991) in a study in Edinburgh found that up to the age of twelve children show a limited understanding of their parents' health behaviour (e.g. they did not associate parents physical exercising with preventative health behaviours). They also discovered that there may be a weak link between health related attitudes and beliefs and behaviour. Thus, children may hold positive attitudes to health, they may have the appropriate information and yet, they may behave in ways that are not consistent with either of these.

Although the Food And Drink Federation has looked at the behaviour of children in the area of food hygiene, this is only as an addendum to the main thrust of their work. Very little other work has been done to access children's knowledge, beliefs and perceptions about food hygiene.

## 2.23 Summary of chapter 2

The importance of food handling behaviours in food safety have been considered. Food poisoning is on the increase and consumers are increasingly implicated in outbreaks of food poisoning. A combination of legislation and education has been postulated as the best way of dealing with the situation.

New legislation both nationally and European Union led has been implemented and education of the consumer is now needed e.g. the Public Health (Control of Diseases) Act 1984 (See Sprenger, 1996 for further details). The use of social cognition models have been used in health for some time. It seems appropriate for these models to be applied to the area of food hygiene, both as a way of determining people's knowledge, attitudes and behaviour but also as a way of designing intervention strategies. Children are crucial in any attempt to educate in food safety both with relation to developmental stages and learning and because children are the adults of tomorrow.

## 2.24 Aims

- To determine what food preparation children and young adults undertake in South East Wales.
- To consider the extent and content of the teaching of food hygiene in South East Wales.
- To measure the beliefs and knowledge about food safety and food poisoning of children and young adults in South East Wales.
- To determine the appropriateness of the application of the Theory of Reasoned Action to food hygiene behaviours in South East Wales.
- To compare attitudes and subjective norm as determinants of behavioural intention.
- To compare self report and observation as measures of food hygiene behaviours.

- To determine the age at which children hold the most positive food hygiene attitudes, as this may make them more susceptible to food hygiene messages.

## **CHAPTER 3**

**The food preparation practices of children and  
young adults in South East Wales.**

### 3.1 Introduction

The purpose of this chapter is to investigate the food preparation practices of children and young adults in South East Wales and to consider such practices in relation to the hygiene knowledge needed to perform them safely. The terms cooking and meal assembly will be introduced and differences between them will be considered. The term "Food preparation practices" will be used to include both food assembly and cooking. The food hygiene implications will be considered and a discussion will take place to consider the degree to which lack of knowledge or implementation of food hygiene could adversely affect the safety of food preparation.

Leigh (1997) suggests that it is now impossible for children in Britain to learn to cook. There has been in her opinion a decrease in the teaching of food preparation at home but even more importantly:

*"the cost of teaching cooking, and its low academic status has led to cooking being either optional or so theoretical as to bear little relationship to the real thing" p. 16.*

In support of this, Meldrum (1997) contends that:

*"The British are now reported to be a nation of grazers or snackers, lacking the skills that existed 10-20 years ago to handle, prepare and cook food" p. 197.*

A number of other studies indicate that domestic cooking is on the decline.

Lang & Baker (1993) have suggested that there has been a reduction in cooking behaviour in the past decade. In support of this, the study by Dunmeyer-Stookey (1994) also found that cooking skills are disappearing

generation by generation. This reduction in cooking practices would also appear to be reflected in the behaviour of children. Evidence to support this contention was found in a poll of children aged between 7 and 15 years (MORI, 1993) which found that whilst 93% of those sampled could play a computer game, only 54% could bake a cake and only 38% could cook a jacket potato in the oven. However, in the USA a study in 1990 concluded that 70% of households have no adult at home during the day, and that one result of this was that more children are shopping and preparing food than in previous times (Williamson et al., 1992). It may be that the types of cooking that take place have changed rather than a reduction in cooking. If the results from the USA are applicable to Britain then the types of cooking in which people engage needs to be re-evaluated. The Collins English Dictionary (1979) defines "Cook" as

*"To prepare food by the action of heat, or to become ready for eating by such a process" p. 329.*

This may be distinguished from meal assembly which is the preparation of food from pre prepared ingredients, or the use of food that is cold, e.g. salad.

Therefore, it may be that while food assembly has increased cooking has decreased. It may also be necessary to differentiate between the action of 'cooking' and of 'reheating' the first involves changing the nature of the food the second raising the temperature of the food to both make it safer and to make it more appetising.

Whatever the actual situation it would appear that there have been changes in food preparation practices, and for England and Wales a number of possible antecedents of changing cooking patterns have been proposed. Lang & Baker

(1993) suggest that one of the reasons that children are less likely to cook may be as a result of recent developments in the National Curriculum which have marginalised Home Economics (Bender, 1994; Mortimore, 1996).

An alternative explanation lies in modern trends in social behaviour, which are also more likely to be the factors influencing changes in the cooking patterns of adults. In 1971, in Britain, 43% of women were described as economically active. By 1993 this figure had increased to 53% (Keynote, 1995). Since women are still responsible for the majority of labour in the home these figures would suggest that there may be less time devoted to traditional domestic work (Mennell et al., 1992). Confirmation of this is provided by Axelson & Brinberg (1989) who observed that:

*"More specifically, the more hours wives spent employed outside the home, the fewer hours they spent in meal preparation, with estimates of about 15-20 minutes per day less for employed wives than unemployed wives" p. 97.*

Evidence from the USA indicated that while 85% of working women still do the food shopping and preparation, most spend less than 30 minutes preparing the evening meal and one fifth spend less than 20 minutes (Williamson et al., 1992) who conclude that:

*"Because of these lifestyle and demographic changes, many children and young adults may grow up without learning the basic principles of safe home food preparation" p. 94.*

Other social changes that may contribute to the decline of domestic cooking are reductions in family size and fewer meals being eaten together as a family.

Leigh (1997) suggests that family meal times contribute to humankind



remaining civilised, and further, that it is the rituals surrounding food that provides the

*"glue that sticks society together" p. 16.*

Murcott (1997A) suggests, however, that there is a lack of evidence to support the contention that family meals have ever been regular, and further suggests that they cannot be declining as they are objects of myth. However, whether family meals are declining or whether as Murcott (1997A) contends they never existed in the pattern assumed, it would appear to be the case that family meals are not the norm for many families.

*"'Family meals' as a thing of the past' should be followed by a question mark.*

*Not only do we have insufficient evidence but we may also be looking for the wrong type of evidence, confusing historical fact with the myths human beings create to make sense of the social arrangements they inherit and the social*

*changes they experience" (Murcott, 1997 p. 15).*

Another change that has taken place is an increase in eating outside the home (Mintel, 1990; Richmond, 1990). A study by MAFF (1988) found that a quarter of their respondents ate out once a month, and 40% of people between 16 and 34 bought sandwiches once a month. The availability and consumption of ready made meals and novel cooking methods, e.g. microwaves, have also increased in recent years and may have contributed to changes in food preparation in the home (MAFF, 1988). The introduction of new popular cooking methods such as barbecues into Great Britain has also had an effect on the type of food preparation that is undertaken. Such factors would suggest the probability that traditional food preparation behaviour has changed and may signify a need to investigate modern food preparation practices.

Changes in the teaching of food within the National Curriculum may affect children's competence with food. If, as has been postulated above, there have been changes in food handling behaviour in the home, there exists the possibility that children are receiving less information than previously about food handling practices. It is for this reason that it was believed important to investigate the food handling behaviour of a wide range of children and young adults and to seek to determine what, if any, age differences exist in performance.

In addition to influencing children's competence of food preparation which may in turn affect the frequency of occurrence, food handling behaviour may also affect the safety of food. If food is handled incorrectly then there is a potential for pathogen survival and/or growth which may lead to food poisoning.

Therefore, knowledge and practice of good food hygiene must be considered in relation to actual food preparation and a comparison between knowledge and practice made. Maurice (1993) reported that food poisoning was on the increase, and the home is being increasingly implicated in outbreaks of food poisoning (Todd, 1989). Both these factors would imply that inadequate food safety practices in the home may be on the increase. Meldrum (1997) suggests that at the same time as eating habits are changing, reported incidents of food poisoning are increasing and asks if the microbiological status of our food has changed or whether it has something to do with the way in which it is handled. Any consideration of the development of food hygiene behaviour and attitudes would suggest the necessity of studying food preparation practices. In chapter 6 and chapter 7 children's beliefs and attitudes about food hygiene will be examined. In order to provide the appropriate framework in which to study

these findings it is important that the frequency of food preparation be measured.

### 3.2 Aims

- To investigate the food preparation practices carried out by children and young adults in South East Wales.
- To compare the food preparation practices of different age groups.

### 3.3 Method

#### 3.3.1 Design and materials

A questionnaire, containing details of seven typical food preparation practices, was designed. This was based in part on appraisals of common hazards (Griffith & Worsfold, 1994; Roberts, 1982; Bryan, 1978), and partially on the responses to a brain storming session at which routine and common food operations were suggested. The purpose of brain storming is to suggest all possible solutions to a problem no matter how impractical they may seem. This was deemed suitable for use here as it was important that no food preparation practices were ignored. The team for the brain storming were the researcher, a food microbiologist, an expert in food hygiene and a psychologist. In the brain storming session all possible food preparation practices were suggested, those that were believed to occur frequently and those that contained an element of food hygiene risk were selected.

*"A risk is the probability of a hazard occurring"*

*a hazard is anything that may cause harm to a consumer"*

*Coleman & Griffith 1997 p. 236-237.*

Thus the food preparation practices that were chosen reflected commonly held beliefs regarding the hazards of such practices. A selection of possible procedures were identified and the ones chosen were believed to reflect the most common food handling behaviours and are listed below.

• prepare snack foods
• prepare sandwiches
• make cakes or buns
• heat up prepared meals
• prepare food using eggs
• prepare food in advance of eating
• prepare meals using raw ingredients

Table 3.1 The seven food preparation practices used in the questionnaire

In order to answer the questions, six response options were given ranging from 'about once a day' to 'less than once a month or never'. A pilot study involving 22 primary school children and eight secondary school children was performed resulting in some minor amendments then being made. For example, it was found that certain of the younger children had difficulty with some of the vocabulary, thus, it was modified to make it easier to comprehend.

Demographic details were also ascertained. A copy of this questionnaire may be found in appendix 1.

### **3.3.2 Procedure**

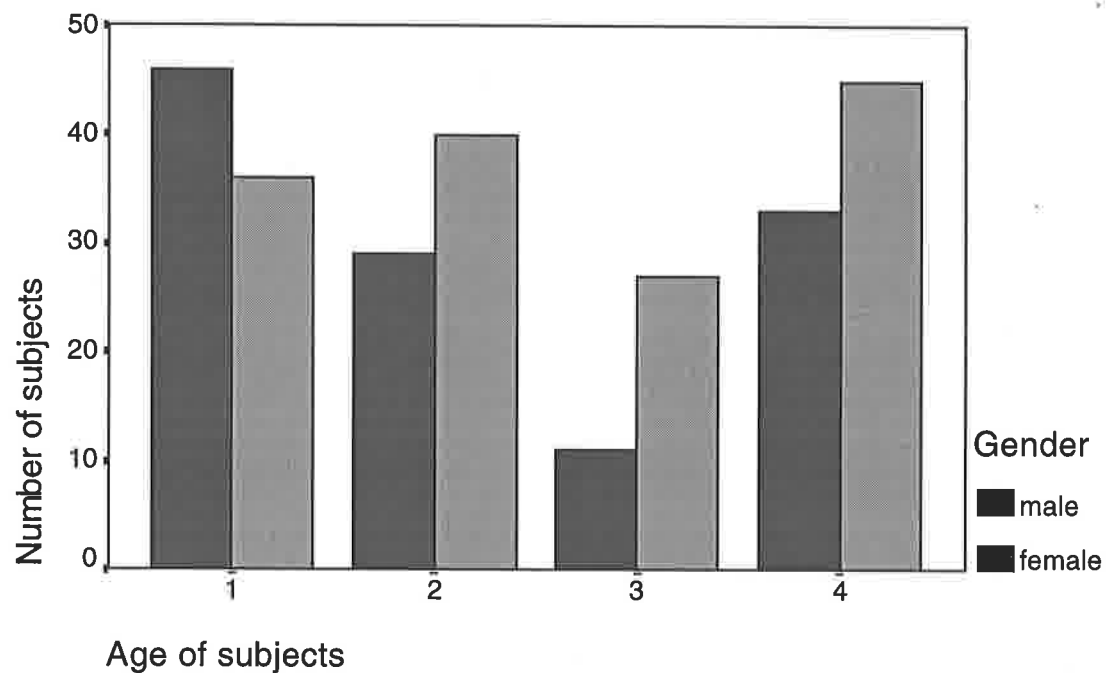
Primary and secondary schools in the South East Wales area were divided into rural and urban schools contingent on location and then subdivided dependent on school size. Schools from each section were approached and requested to participate in the study, not all of the schools approached agreed to participate, mainly for reasons of time, however, the resultant four primary schools consisted of two urban and two rural. Of the three secondary schools who agreed to participate one was a large city school, one small and one a non city school, thus attempting to ensure that all school goers in South East Wales were represented. The questionnaire was administered to pupils aged 10 and

above in the four primary schools. A range of pupils from different year groups from each of the secondary schools was utilised. Further subjects were recruited from a college of a University in South East Wales. All sessions took place during class time and instructions were given by the experimenter to each group. The respondents were thanked for helping with the research, they were requested to listen carefully and definitions of full meals, sandwiches, convenience food and snacks (e.g. beans on toast, instant soup and corn flakes with milk) were provided as were some examples of raw and cooked foods. In the primary schools the questionnaire was administered orally by the researcher, with all children working filling in their answers on the questionnaire at the same rate- that of the slowest child. The older subjects worked at their own pace and were allowed to proceed with their class work once they had finished. It was explained that questions were permitted and that answers would be provided to the group as a whole. All subjects were told that they had as much time as necessary for the completion of the questionnaire and each session took between one and five minutes, the duration being dependent upon age.

### **3.3.3 Subjects**

A total of 267 subjects participated of which 119 were male and 148 were female. While there were more males in the youngest age group, there were more females in all of the other groupings. The mean age of the subjects was 15 years, ranging from 10 to 19. The respondents were arranged into four distinct groups, primary school i.e. age 10-11 (N=82), lower secondary school, i.e. age 12-15 (N=69), upper secondary school i.e. age 16-18 (N=38), and

higher education students i.e. age 19 plus (N=78). The breakdown of subjects by age and gender appears in Figure 3.1.



Key	
1-age	10-11 (N=82)
2-age	12-15 (N=69)
3-age	16-18 (N=38)
4-age	19 plus (N=78).

Figure 3.1 The number of subjects displayed by age and gender

### 3.3.4 Analysis

The data were analysed using SPSS (PC) for windows and the results are presented below. Descriptive statistics were utilised during this stage as they were the most appropriate means for examination of the data.

### 3.4 Results

Respondents were asked to state how often they performed seven different food preparation practices. The frequency of occurrence of these behaviours, for the whole sample, can be found in table 3.2, and the frequency expressed as percentages is illustrated in figure 3.2.

	Snack foods	Sandwiches	Cakes & buns	Prepared meals	Food with eggs	Food in advance	Raw ingredients
Daily	132	73	4	36	17	22	35
More than Weekly	78	90	10	58	45	37	64
Weekly	31	59	19	61	56	41	50
Fortnightly	11	11	40	37	51	38	41
Monthly	7	13	67	26	45	43	23
Never	7	21	127	47	52	80	53

Table 3.2 The frequency of food preparation practices.

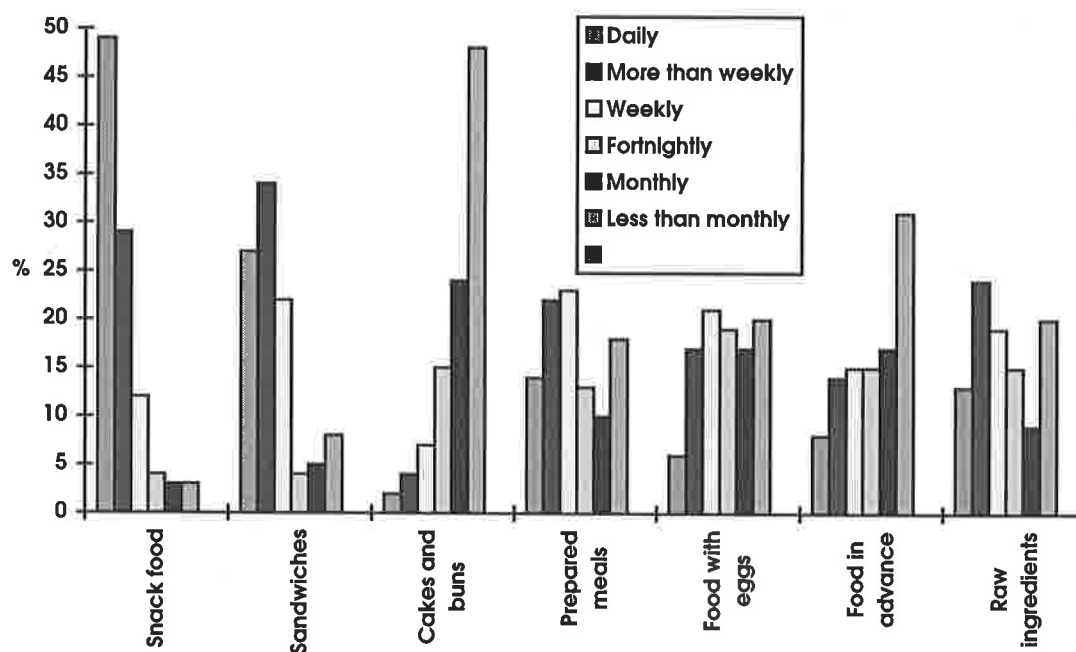


Figure 3.2 The percentage of subjects who perform specific food preparation practices.



The data presented in table 3.2 indicate that over 50% of respondents report that they conduct two food handling behaviours more than once a week (which is a combination of daily and more than weekly); these being preparing snack foods and making sandwiches. Only 13% of respondents make cakes or buns weekly or more regularly. Only 6% of the sample use eggs daily, however, 44% of those sampled use eggs weekly or more frequently.

<sup>1</sup>A breakdown by age of the two most commonly occurring food preparation practices are presented in Table 3.3 and Table 3.4.

Age	Once a day	More than once a week	Once a week	Once a fortnight	Once a month	Less than once a month	Total
10-11	41 (50.6)	22 (27.2)	8 (9.9)	7 (8.6)	3 (3.7)	0 (0)	81 (100)
12-15	41 (59.4)	14 (20.3)	8 (11.6)	2 (2.9)	1 (1.4)	3 (4.3)	69 (100)
16-18	20 (52.6)	16 (42.1)	1 (2.6)	1 (2.6)	0 (0)	0 (0)	38(100)
19 and older	30 (38.5)	26 (33.3)	14 (17.9)	1 (1.3)	3 (3.8)	4 (5.1)	78 (100)

Table 3.3 The degree of snack foods preparation, according to age (all figures in parenthesis are percentages)

Age	Once a day	More than once a week	Once a week	Once a fortnight	Once a month	Less than once a month	Total
10-11	25 (30.5)	29 (35.4)	16 (19.5)	3 (3.7)	1 (1.2)	8 (9.8)	82 (100)
12-15	23 (33.3)	19 (27.5)	14 (20.3)	3 (4.3)	5 (5.8)	6 (8.7)	69 (100)
16-18	10 (26.3)	17 (44.7)	5 (13.2)	2 (5.3)	2 (5.3)	2 (5.3)	38 (100)
19 and older	15 (19.2)	25 (32.1)	24 (30.8)	3 (3.8)	6 (7.7)	5 (6.4)	78 (100)

Table 3.4 The frequency of sandwiches preparation, according to age group (all figures in parenthesis are percentages)

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<sup>1</sup> Not all the respondents responded to each question, thus the total number of subjects may vary between questions.

More than half of all respondents between 10 and 18 prepare snacks once a day, whereas the equivalent figure for sandwich making is approximately a third. All age groups are more likely to prepare snacks daily than sandwiches. The percentages of respondents who make snack foods more than once a week ranges from 71% of 19 year olds to 95% of 16-18 year olds. This compares with 51% and 72% respectively for sandwich making. Indeed, while 90% of all age groups make snacks at least once a week, a similar proportion make sandwiches with the same regularity for all age groups except the oldest. The results for the other food preparation practices are presented below in tables 3.4-3.8 and figures 3.3-3.7.

	daily	more than weekly	weekly	fortnightly	monthly	less than monthly
10-11	2	7	10	22	25	16
12-15	2	2	4	10	25	26
16-18	0	0	2	2	7	27
19+	0	1	3	6	10	58

Table 3.5 The preparation of cakes and buns, according to age group

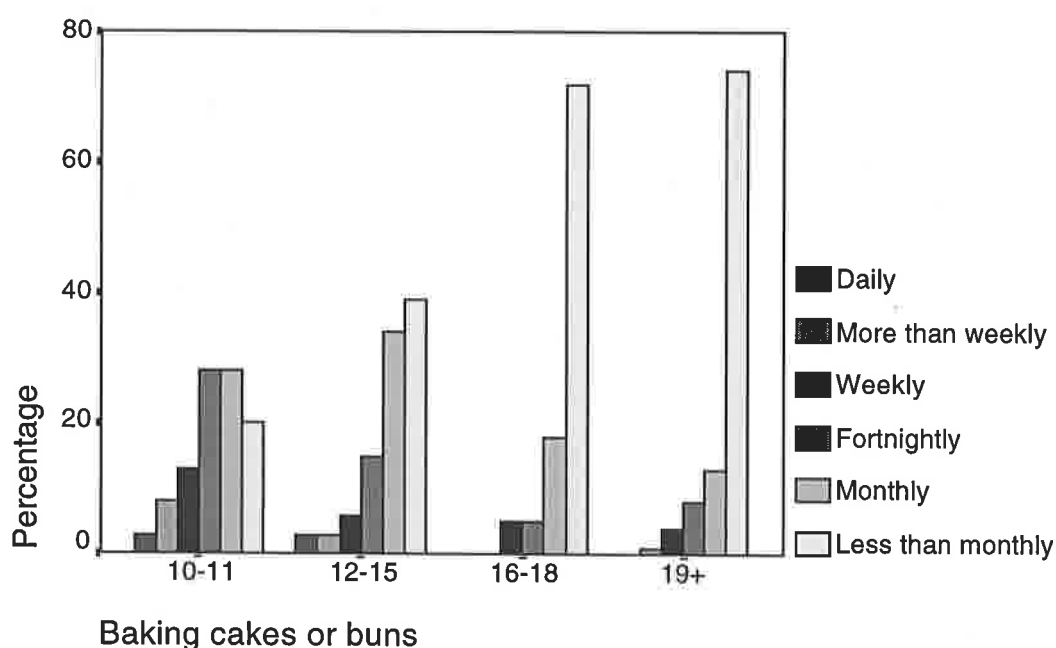


Figure 3.3 The frequency of the preparation of cakes and buns expressed as a percentage of each age group

The majority of those in the age groups 16-18 and 19+ make cakes or buns less than once a month or never. The only group that appears to prepare cakes or buns with any degree of regularity are those aged between 10 and 11, where half claim that they bake at least once a fortnight.

	daily	more than weekly	weekly	fortnightly	monthly	less than monthly
10-11	17	17	14	11	5	17
12-15	11	14	22	9	2	10
16-18	3	10	7	5	6	7
19+	5	17	18	12	13	13

Table 3.6 The reheating of prepared meals, according to age group

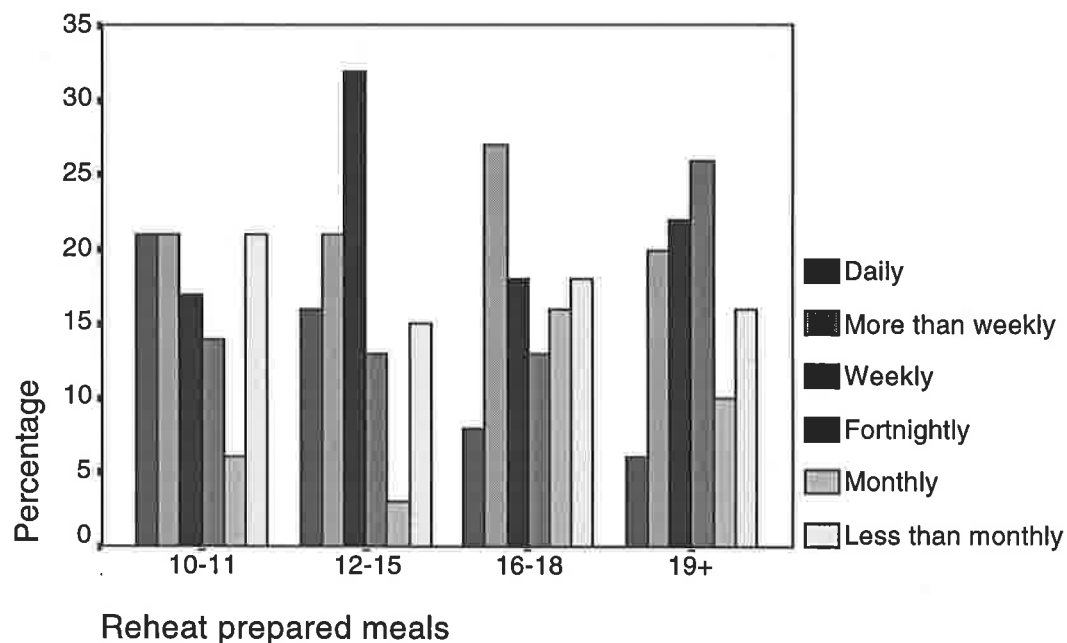


Figure 3.4 The frequency of the reheating of prepared meals expressed as a percentage of each age group

Twenty percent of 10-11 year olds reheat ready made meals daily and 20% do so less than once a month. Only 5 in the oldest age group reheat ready made

meals daily, whereas slightly less than half do so less frequently than once a fortnight, this compares with 3 16-18 year olds and slightly less than half respectively. More than 20% of all respondents reheat pre-prepared meals more than once a week.

	daily	more than weekly	weekly	fortnightly	monthly	less than monthly
10-11	9	14	19	14	14	12
12-15	5	12	14	11	13	14
16-18	0	4	5	5	10	13
19+	3	15	18	21	8	13

Table 3.7 The preparation of food with eggs, according to age group

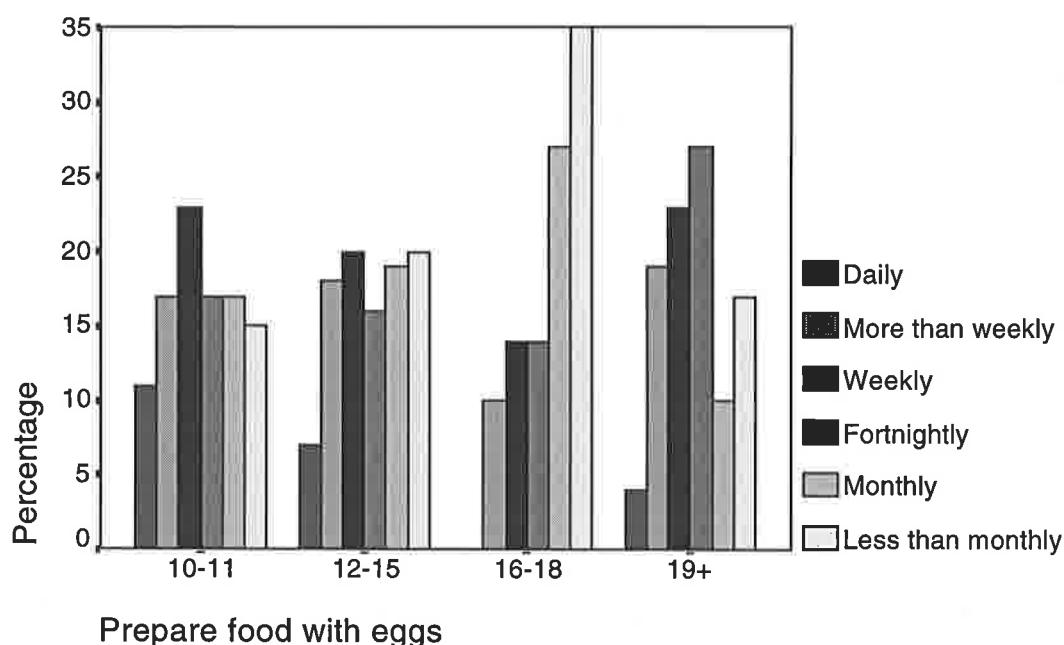


Figure 3.5 The frequency of the preparation of food with eggs expressed as a percentage of each age group

Thirty-five percent of 16-18 year olds cook with eggs less than once a month or never, for the other age groups it is approximately 15%. Indeed, none of the 16-

18 year olds prepare food with eggs daily and generally appear to infrequently cook with eggs. The frequency of use of eggs for the two younger age groups is similar, and approximates that of the oldest group, with the exception of fortnightly which is the most frequent response for the oldest age group.

	daily	more than weekly	weekly	fortnightly	monthly	less than monthly
10-11	6	15	10	9	19	22
12-15	7	11	13	16	4	15
16-18	2	3	10	6	5	11
19+	7	8	8	7	15	32

Table 3.8 The preparation of food in advance of eating, according to age group

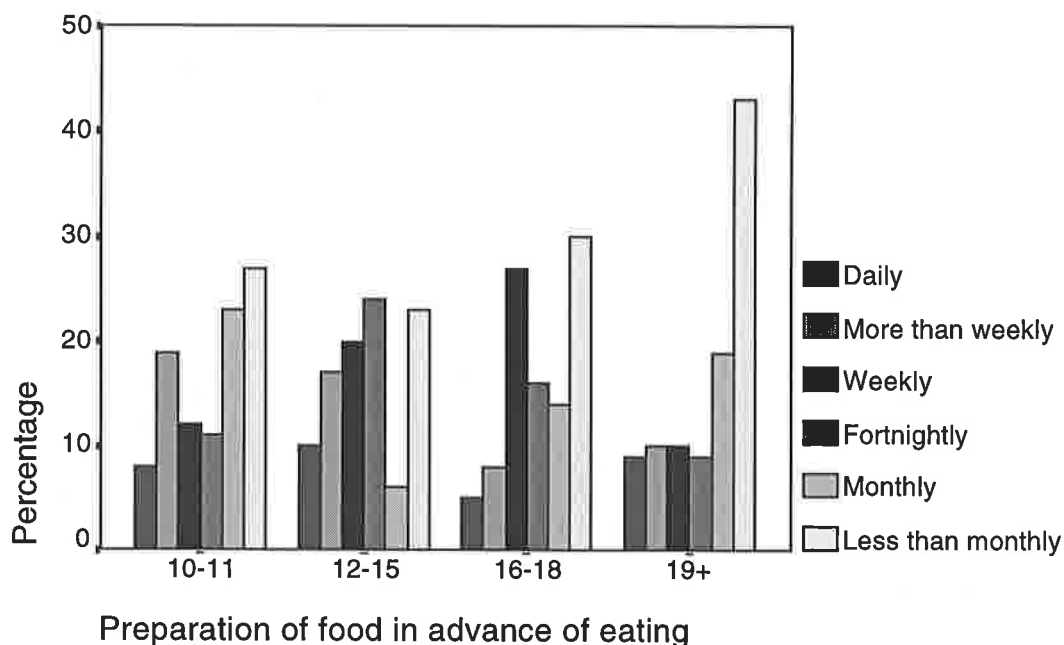
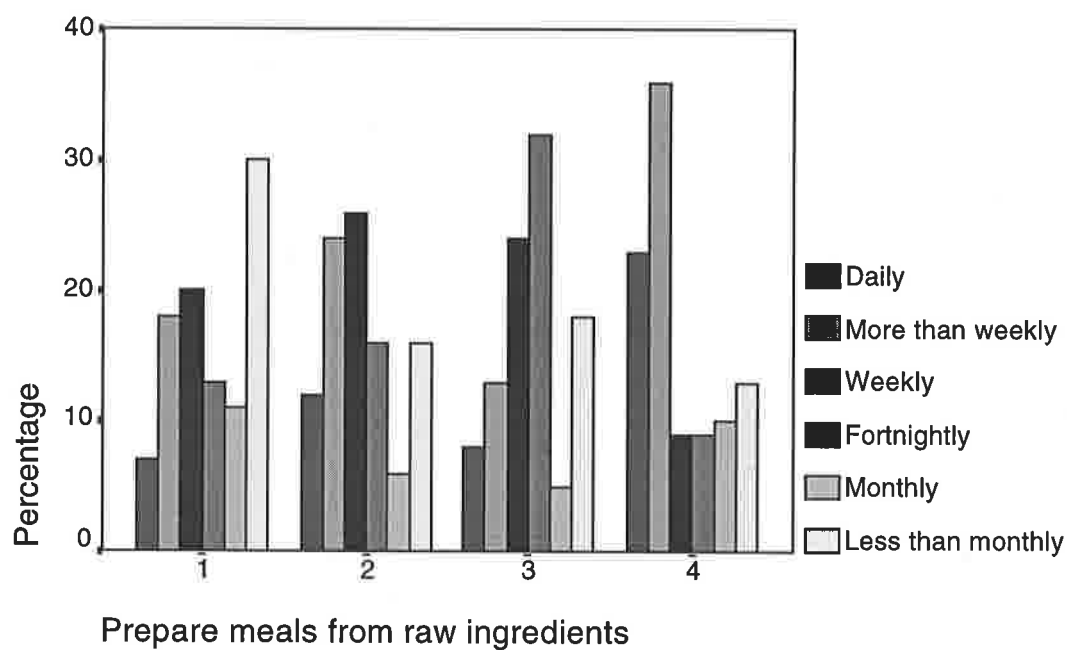


Figure 3.6 The frequency of the preparation of food in advance of eating expressed as a percentage of each age group

Only ten percent or less of all age groups daily prepare food in advance of eating. More than 40% of all those in the oldest age group prepare food in advance of eating less than once a month or never.

	daily	more than weekly	weekly	fortnightly	monthly	less than monthly
10-11	6	15	16	11	9	25
12-15	8	16	18	11	4	11
16-18	3	5	9	12	2	7
19+	18	28	7	7	8	10

Table 3.9 The preparation of meals from raw ingredients, according to age group



Key	
1	age 10-11 (N=82)
2	age 12-15 (N=69)
3	age 16-18 (N=38)
4	age 19 plus (N=78).

Figure 3.7 The frequency of the preparation of meals from raw ingredients expressed as a percentage of each age group

Twenty five of the respondents in the youngest age group cook with raw ingredients less than once a month or never and only 6 do so daily. This compares with 10 and 18 respectively for those in the oldest age group.

To summarise, tables 3.4-3.7 show the different categories of food handling behaviour. While 20% of 10-11 year olds reheat ready made meals daily by the age of 19 and older this has reduced to 6%. The inverse is true for preparing meals from raw ingredients decreasing from 23% of those aged 19 and older to 7% of 10-11 year olds. At age 16-18 no one reported cooking with eggs on a daily basis nor of making cakes and buns. Although making cakes and buns is the lowest reported percentage for all ages a considerable minority of the other ages use eggs daily- ranging from 4% to 11%.

## **3.5 Discussion**

### **3.5.1 Introduction**

It would appear that there is considerable preparation of food by children and young adults taking place in South East Wales. The type of food preparation that occurs does seem to vary with age but the frequency of food preparation does not. These points will be elaborated upon in the following section and the other results will be considered in light of relevant research in the area.

### **3.5.2 Preparation of snacks and sandwiches**

More than fifty per cent of 11 year olds make snacks daily. This finding is unexpected in light of the Get Cooking report (MORI, 1993) which suggests that there has been a decline in both cooking and the ability to cook among children. The significance of this finding may hinge upon the definition of cooking. As mentioned earlier cooking involves heat. Thus whilst not suggesting that making beans on toast, for example, can strictly be defined as cooking (as they could be eaten cold) it would denote a familiarity with food handling that the Get Cooking report (Lang & Baker, 1993) seems to suggest does not exist. In this study sixty-five per cent of 11 year olds also reported making sandwiches more than once a week, and this also would indicate that food handling is a regular behaviour at this age. The preparation of both snacks and sandwiches increases with age up to age 16-18. As children get older they take more responsibility for their own actions and this includes the food they eat. This may help to explain the slight decrease in daily preparation of both sandwich and snack food between ages 16-18 and age 19 and older in that as people get



older they are more likely to take responsibility for preparing main meals and consequently may have less inclination for the preparation of snacks or sandwiches.

A further reason for a fall in the preparation of snacks by 19 year olds is that those surveyed were students who may have been living in catered accommodation. Many students live in halls of residence where meals are provided so are unlikely to prepare food for themselves, further the facilities available to them for food preparation are generally limited.

A survey into the eating habits of young people in Wales (Roberts, Smith, Moore, & Catford, 1993) found that there was a decrease in the consumption of snacks as girls get older but that the same does not hold for boys. Roberts et al. (1993) suggested that this may have been because of the importance being placed at this age on physical appearance and shape. Caution should be taken when considering their results in comparison to our data because their definition of snack foods was rather different being mainly concerned with confectionery products. Nevertheless, it raises the possibility that the decrease with age seen in our survey may have been related to a more general concern amongst teenagers, particularly girls, about their physical appearance.

Another feasible explanation relates to children's freedom to eat outside of their home and to the amount of pocket money they receive. As children get older there is generally an increase in their pocket money, so a teenage child who is hungry may purchase a snack or sandwich whereas younger children are more likely to obtain food from home. This would also be related to the amount of autonomy a child has, again as children get older they are more likely to spend less time at home and more time in public places with their peers, for example

hamburger restaurants, thus increasing the opportunity for the purchase of snacks. Once the adolescent had left home to attend college the situation again may change, with more situations available for them to meet their peers other than in eating establishments, also as mentioned, the provision of meals in their halls of residence that are paid for reduces the need for eating outside the home.

Considering the nature of the foods most commonly used in snacks and snack making, concerns of food hygiene and safety need to be examined. The examples of snack foods given in the questionnaire (e.g. beans on toast, instant soup and corn flakes with milk), were not obvious food hygiene risks. However, this may lead to a possible risk, in that if snack foods are generally low risk foods then the general population may expect the same degree of safety from more high risk foods. For example, the cooked foods described to the subjects before the questionnaire was distributed included cooked chicken and sausage rolls which are high risk foods but which may be treated the same as low risk foods. Snack foods that are incorrectly stored may provide an opportunity for pathogens to grow as they are generally pre-cooked and are usually inadequately reheated (Worsfold & Griffith, 1995), e.g. quiche, or eaten cold e.g. chicken drumsticks. Another latent risk involves the removal of some preservatives from sauces, e.g. mayonnaise, and condiments, e.g. pickles, which means that they must be refrigerated but which previously involved different storage e.g. ambient temperatures, thus incorrect storage may render them unsafe. As mentioned in chapter 2 this relates to the consumer's perception of risk, where the perceived risk of food preservatives may conceal from them the more potent risk of food poisoning.

### 3.5.3 Preparation of cakes and buns

Very few respondents of any age group prepare cakes and buns on a regular basis. There are a number of possible reasons for this. Late twentieth century trends indicate that there are more than 50% of women working outside the home (Keynote, 1995). Consequently, this may imply that today's cooks are unable or unwilling to justify the extra time needed to be spent in the preparation of cakes or buns, consequently children may not be exposed to the preparation of cakes or buns in the home. Likewise, while children are still being taught to prepare cakes and buns in school this is not to the same extent as in the past. Design and technology classes place more emphasis on designing recipes than on gaining the necessary food preparation skills.

A further rationale for these results lies in the increase in cake and biscuit consumption from 9.07 (ounces per person per week) to 9.21 between 1983 and 1994 (Mintel, 1990). Considering the media focus on low calorie diets it may follow that if sales of 'bought cakes and buns' are on the increase, then home baking may be on the decrease. Both these contentions are supported by the Keynote (1995) document which states that

*"Sugar is in long term decline, hampered by the desire to reduce sugar levels and the fall in home baking" (p 6).*

The results of the present questionnaire indicate that as children and young adults get older they are less likely to involve themselves in baking cakes and buns. A plausible explanation for this decrease is that younger children may enjoy baking both at home and at school but for older children it may have become a chore as they are more likely to be involved in other food preparation on a more regular basis. If as has been suggested the amount of food

preparation in the home is decreasing, cakes and buns may be one of the first casualties. Naturally, the availability of good quality 'home baked' products in supermarkets and other shops, which are often of a better quality than those that the home maker could produce, is likely to have contributed to the decline in cooking.

According to the Get Cooking report (MORI, 1993) 54% of their sample could bake a cake. It would seem then that ability to bake a cake does not necessarily lead to performance of the behaviour. Another possible explanation is that as children age their pocket money allowance is liable to increase, thus any increase in consumption of sweet foods could be purchased outside the home.

The vast majority of respondents do not make cakes or buns (87%) regularly.

Of all the food preparation practices listed, however, this is the lowest risk behaviour with respect to microbial contamination. Baking does, however, normally include the use of eggs, so the points raised regarding cooking with eggs need to be considered when considering baking skills. As with snack foods, however, the potential for harm lies in the careless treatment of any food becoming a habit and leading to mishandling of more high risk foods.

#### **3.5.4 The reheating of ready made meals**

The Keynote (1995) document states that

*"ready meals have been one of the star performers of the food sector in recent years with sales growing dramatically by 41.6% between 1990 and 1994" p. 6.*

This is supported by Mintel (1990) who reported that the sale of cook-chill and cook-freeze dishes has increased rapidly in the past decade and by a MAFF survey in 1988 which found that 87% of people between 16 and 34 and 69% of single person households bought pre-packed food items which are chilled or frozen.

In the present work it was found that 59% of the total sample of respondents, regardless of age, reheat prepared meals regularly. The Keynote survey stated that in 1995, 13% of a representative sample of adults often heat up food rather than cooking meals from raw ingredients and 19% regularly ate convenience or microwave food. For 16-24 year olds these figures peaked at 22% (for heating up food) and 25% (for eating convenience or microwave food). It was expected that an increase with age in the use of ready made meals might be found in the present study. This, however, was not the case. A possible reason is that many students live in accommodation where meals are provided. Ready made meals are also expensive and with the real value of grants decreasing rapidly, this may partly explain their lack of popularity in this age group. This assumption is supported by the increased incidence of 'preparation of meals from raw ingredients' by the age group 19 years and older. Another conceivable reason lies in the provision by parents/guardians of meals to their children. In the home, meals are provided by parents so respondents in the younger age groups who consumed convenience foods did not have to bear the cost.

With an increase in bacteria that can grow at fridge temperature (i.e. psychotrophs) e.g. *Listeria* the potential dangers of reheating food has increased. This is exacerbated both by the misuse of microwaves or the use of

faulty microwaves and by the fact that many people do not reheat food until it is hot enough (Worsfold & Griffith, 1995).

### **3.5.5 Cooking with eggs.**

Over the past two decades the messages reaching the consumer regarding eggs have been ambiguous, nutritionists have taken both the position that eggs have a high nutritional value and uncertainty relating to recommended frequency. This position is further complicated by food scares relating to *Salmonella* and possible health risks consequent upon their high cholesterol content. Consumption of eggs has, in fact, fallen from 3.53 ounces per person per week in 1983 to 1.86 in 1994 (Keynote, 1995). It was not unexpected, therefore, to observe that preparation of meals using eggs was relatively low amongst all age groups of respondents.

Food poisoning due to various forms of *Salmonella* is increasing more rapidly than that due to other pathogens, so it becomes apparent that unsafe cooking practices involving eggs are a potential hazard, regardless of the relatively smaller number of consumers using them. However, despite the decrease in egg consumption 90 million ounces of eggs were consumed in Britain in 1994 (Keynote, 1995). Despite the risk of salmonellosis, however, certain television cooks, i.e. Delia Smith (1996) prepare dishes using raw eggs with no mention whatsoever of the potential food safety risk. This type of attitude on behalf of certain segments of the media which results in a contradictory message reaching the consumer and may mean that consumers have received

*"an overload of Health/Food-scare information and have decided to dismiss it all (Boyle, Cathro & Emmett, 1991 p. 2)*

While it would appear that both eggs and poultry are becoming more safe, for example according to Meldrum (1997) by 1993 most of the flocks from which the majority of eating eggs are derived were free of infection and a similar position is being seen with poultry meat, until consumer perception of risk is similar to actual risk the possibility of food poisoning remains high.

### **3.5.6 Preparing meals in advance of cooking**

Changing patterns of food preparation in recent years may place less emphasis on family meal times. In addition microwaves provide a convenient but not always appropriate way to reheat certain foods (Brownsell et al. 1989). Both of these trends mean that nowadays more people prepare food well in advance of eating. In this study 38% of respondents prepared meals in advance of cooking. The biggest single risk to hygiene according to certain authors (Roberts, 1982) is preparation of food too far in advance of eating. Although Roberts does not specify what is meant by 'too far in advance', it is generally understood that any time in excess of four hours at ambient temperature increases the risk of microbial growth substantially. Moreover, Williamson et al. (1992) suggest that meat and poultry be kept at room temperature for as short a time as possible and no longer than 2 hours. Thus it is of concern to note that 38% of respondents regularly prepare food in advance of eating. In a study by Worsfold & Griffith (1992) it was found that sandwiches were often not stored correctly and often prepared in advance of eating; thus with 83% of subjects making sandwiches regularly this also highlights a potential hygiene risk behaviour.

Reheating of meals poses the potential for microbial survival and growth if the food is incorrectly stored and/or incorrectly reheated.

### **3.5.7 Preparing meals from raw ingredients**

Fifty-six per cent of all respondents prepare food from raw ingredients regularly, with almost 68% of respondents aged 19 and older doing so. As preparation of food from raw ingredients is what is generally regarded as 'cooking' these results would indicate that there is more 'cooking' taking place than previous surveys (MORI, 1993) had suggested. A possible reason for this apparent inconsistency may be the types of food handling behaviours considered. For example, MORI (1993) found that only 38% of the children they surveyed could bake a jacket potato in the oven. It is possible that this is not an appropriate example of the type of cooking in which children engage, and thus may not be representative of the cooking that does take place. For example, if asked about baking potatoes in the microwave it is possible that a much higher percentage would have responded in the affirmative. As children get older the amount of cooking with raw materials in which they engage increases. The potential risks therefore are that by the time they begin to cook they will either have insufficient food hygiene knowledge, because of not cooking before or that they will have picked up bad habits because of more familiarity with low risk foods.

If there has been a decrease in the amount of food preparation in which children engage, it may be related to an increase in attention to accidents in the home (more people are killed in accidents in the home than in road traffic accidents; Department of Health, 1991). Parents may be reluctant to allow their



children to use equipment that has the potential for risk and this could contribute to a decrease in cooking.

### 3.6 Conclusions

Food preparation would appear to be more frequent than the get cooking report suggests. Sandwich and snack making are the most common food preparation practices. It is postulated that people's ability to prepare food and the frequency that they do so will have an impact on the risk they pose in terms of food hygiene. As children increase in age the amount of food preparation that they do changes in character. An area of concern that arose from this work related to the relationship between the amount of food preparation that a person undertakes and their knowledge of food hygiene. One of the main areas of life where children learn about food is in school. Because of changing patterns of food preparation it was believed to be important to investigate what was being taught about food in schools with respect to both food hygiene and food preparation. Inasmuch as nutrition receives more media attention than food hygiene it was decided to consider it also. One of the reasons for the present research is to investigate the teaching of food hygiene, and to compare this to beliefs people hold about it. If risk is the likelihood of a hazard occurring then the amount of food preparation is a significant factor in any food hygiene risk assessment. Therefore any consideration of food hygiene must take into account the probability of hazards taking place, thus the frequency of food preparation becomes vital. In the following chapters the beliefs, knowledge, attitudes and behaviour of young people in South East Wales will be regarded and will be considered with reference to the frequency of food preparation.

## **CHAPTER 4**

**The teaching of food related subjects in Primary  
Schools in South East Wales, at Key Stage 2**

## 4.1 Introduction

In this chapter the teaching of food related subjects, at key stage 2, will be examined. The importance of childhood in forming attitudes, and the role of schools in this formation will be discussed. Changes in the National Curriculum may have impacted on the teaching of food related subjects, therefore these changes will be considered. The results from a survey about the teaching of food related subjects by primary school teachers will be presented and discussed in light of the relevant research in the area and of the results from chapter 3.

Childhood is a particularly important time for attitude formation and the acquisition of knowledge (Forrester, 1992; Meadows, 1994). Knowledge obtained in childhood is believed to influence the attitudes children develop. Yussen & Santrock (1982) discuss the importance of childhood in the acquisition of learning skills and memory. Consequently any childhood influences can have a very strong impact on later life, and conversely information not obtained when young could have a detrimental affect on later attitude formation, with respect to socially desirable attitudes. It is believed that one of the main influences on younger children is their schooling (Havinghurst, 1952, cited in Palmer & Charles, 1976). Therefore the ability of schools to change the attitudes of the young must not be underestimated. Schools should be one of the areas where children are exposed to Health Education. However, as a result of recent changes in the National Curriculum in England and Wales (Dearing 1994), Health Education as a subject is no longer taught. It has been suggested that one result of this could be that duplication will occur in some

areas of Health Education and other areas will be omitted. Donoghue (1991) dismisses this stating that:

*"the most effective form of provision for Health Education is a carefully planned programme across the 5-16 age range which embraces all the formal and informal arrangements that schools use to promote positive health behaviour. Effective management and co-ordination of Health Education should minimise repetition and help to provide a coherent programme which supports progression and continuity" p. 17.*

This theme of cross-curricular activity is continued in a joint publication from the Curriculum Council For Wales and Health Promotion Wales (1993). For example, it is suggested that personal hygiene can be taught in Science, Physical Education, English, Design and Technology, Geography and History. In 1990 the Health Education authority discussed the importance of the school health service working in unison with the teaching staff:-

*"Health Education is an important component of the WHO strategy and nowhere more so than in childhood, when values, attitudes and behaviour patterns are being shaped and formed" p. 1.*

It may be argued that it is unreasonable to expect teachers to be health promoters. Where opportunities exist within the confines of the National Curriculum then there is no difficulty but it is difficult to expect teachers to be expert in all areas of Health Education as there are so many Health Education messages e.g. AIDS, smoking, sex, drugs, food hygiene, nutrition. Further, with

the time constraints on teachers there is competition between the different issues as to which receive the most time.

A further difficulty with Health Education in schools is similar to difficulties in the wider community:

*"Earlier research focused on measuring knowledge and attitudes since Health Education was being taught as information. The thrust in the 1970's to identify school programs that prevent the onset of cigarette smoking showed that information programs had little or no effect. This led to a movement toward behavioural models from social psychology as the theoretical underpinnings for affected areas such as smoking as well as other health areas such as eating and physical activity" (Stone, 1996 p. 54).*

The changes in the National Curriculum (Dearing 1994) have also impacted on the teaching of food related subjects. Home Economics teaching in schools has been a traditional source of information relating to food (Geen, 1993). However, as a subject, Home Economics is not generally taught in primary schools so this change in the National Curriculum will not have affected the teaching of food related subjects in primary schools. Thus any teaching of food related subjects in primary schools will fall under the auspices of some other subject. It is in Health Education that food hygiene and nutrition are generally covered. Key stage 2 covers pupils aged 7-11, and at this key stage food is specifically referenced, rather than optional as it is in key stage 1 and later in key stage 3. Thus, formal education in food related subjects ends at 11. With respect to food

preparation changes in the national curriculum are also believed to have impacted on that. Leigh (1997) suggests that:

*"before the announcement of the national curriculum a lot of cooking went on in primary school. But now it features, if at all, as part of the design and technology syllabus, which requires all children to work with materials such as paper, card, dowel, fabric and food. Not all schools do anything with food, though they are meant to" p.16.*

There are three main components to teaching about food (food hygiene, nutrition, and food preparation) and each will be considered here.

Fox (1970) found that food hygiene was only taught directly in 16% of primary schools. Where food hygiene was taught, it mainly concentrated on personal hygiene and cleanliness. More recently in 1986 the World Health Organisation recommended that food hygiene be included in all primary school curricula (WHO, 1985). It is suggested, however, that despite these recommendations there has been little or no improvement in the quantity of food hygiene teaching in primary schools. Research has suggested that food hygiene is largely ignored in primary schools (Griffith & Griffith, 1993). Preliminary work already carried out (Griffith & Griffith, 1993) has indicated that 9 year old children have little knowledge of food hygiene yet the subject could be incorporated into many subjects in both primary and secondary schools.

This lack of teaching could have two major consequences. The principal outcome may be that many young people having to prepare food for themselves for the first time are ill-equipped to do so from a food hygiene perspective. The second effect is the importance placed on food hygiene by these children. If, as has been suggested, more importance is placed on

nutrition than on food hygiene in primary schools, then this could have an impact on the formation of attitudes about the topic.

Where food hygiene is taught it is important that it is taught appropriately. For example Anon in 1991 suggested that:

*"teaching home hygiene will involve students addressing the question of what bacteria are and how the threat from harmful strains can be reduced" p. 14.*

This can be considered a very simplistic view both in light of the failure of information based Health Education and of the ability of the child to master complex information at an early developmental stage (Gochman, 1971; Kalnins & Love, 1982; Rothman & Byrne, 1991). In a series of studies in the 1980's Baddeley (1990) found that learning and information retrieval was situation and/or context specific. Thus raising the question of whether teaching food hygiene or nutrition outside a food preparation setting would achieve the aims intended.

There has never been a strong tradition of teaching food preparation in primary schools. However, recent initiatives e.g. Get Cooking, have included primary schools in their remit. As a consequence of this it was considered important to address the frequency of teaching of food preparation in primary schools. A further reason for this study is that it can be argued that not teaching food preparation increases the risk of inappropriate teaching of food hygiene. As mentioned learning should be context specific, therefore teaching food hygiene in a theory class may mean that knowledge is obtained but the transfer of skills to the food preparation arena is unlikely to take place.

In chapter 3 children and young adults' food preparation skills were discussed in relation to not only their frequency, but also with reference to food hygiene.

The question of where food preparation and food hygiene skills are taught gains importance considering that little is known about this area. Nutrition has received considerable attention in the past decade, generally (Griffith, Mullan, & Price, 1995) and in schools (Edwards, Acock, & Johnston, 1985; Tilston, Gregson, Neale, & Douglas, 1991), and thus a comparison between nutrition and food hygiene, in light of this interest, was deemed important.

Surveys into people's knowledge about food hygiene have demonstrated that generally people do not have the necessary knowledge to prepare, store and serve food safely (Ackerley, 1990; FDF, 1993-1996). Studies of domestic food preparation have highlighted the errors that people commit when preparing food (Griffith & Worsfold, 1994). Reasons for this failure could include lack of interest or ignorance and raises the question of when and how adults acquire their knowledge and attitudes concerning food hygiene. One of the reasons for the present work was an attempt to provide at least partial answers to these questions. Information about what children learn in primary schools regarding food related subjects will provide a starting point in this exploration which will be further explored in the subsequent chapters.

## 4.2 Aims

1. To determine the extent of the teaching about food by primary school teachers.
2. To compare the extent of the teaching of food hygiene to that of food preparation and nutrition.
3. To examine the extent to which food hygiene teaching may have increased since the study by Fox (1970).



4. To ascertain the relationship between the importance of the topics- food preparation, nutrition and food hygiene and the individual factors which make up these areas, for example 'using good personal hygiene'.
5. To determine if the importance that teachers placed on food preparation, nutrition, and food hygiene was related to the skills they believed it was important for children to have by the age of eleven.

## **4.3 Method**

### **4.3.1 Design**

A questionnaire was designed based on three interviews with Primary school teachers. These interviews were informal and unstructured. The aim of these sessions was to elicit information about the teaching of food related subjects to year 5 and year 6 pupils. This preliminary information thus helped to ensure that the appropriate parameters were used in designing the questionnaire which was then piloted on a small number of teachers and some minor adjustments made. The questionnaire consisted of firstly, general questions aimed at determining children's sources of information regarding food, and secondly more specific questions about the teaching of nutrition, food hygiene and food preparation. A copy of the final questionnaire can be seen in Appendix 2.

### **4.3.2 Procedure**

Local Education Authorities granted permission to approach the schools in Glamorgan (South, Mid, West) and Gwent with the questionnaires. Sixty primary schools were randomly selected (stratified random selection) from all the primary schools in South East Wales. The head teachers were contacted and their participation in the study requested. Although none of the schools refused to participate at this point, all head teachers said that responses were at the discretion of the individual teachers. The questionnaires were administered by post to the Head Teachers who distributed them to their year 5 and year 6 teachers, and were accompanied by a covering letter explaining the importance of the research and requesting participation in the study. Stamped

addressed envelopes were enclosed to facilitate returns. A follow-up letter was sent out two weeks later to those who had not initially responded.

#### **4.3.3 Subjects**

Random stratified sampling was used to ensure that the schools chosen represented both urban and rural schools. Questionnaires were completed and returned. The questionnaires were confidential but not anonymous which may have affected the response rate. Thirty (50%) of the 60 schools who were approached responded. In some cases, schools had more than one teacher for each year so they returned more than one questionnaire bringing the total to 52. Of these, 20 taught only year 5, 22 only year 6 and ten taught both year groups. A fifty per cent response is relatively low and means that care must be taken in interpreting the results as they may not be representative of the sample as a whole. To counteract this contact was made to those who had not responded and questions were posed concerning their lack of response. From this contact it was found that the general reason for not responding was lack of time rather than lack of interest. It can be postulated, therefore, that while the results were not totally representative of the sample, the results could be interpreted as characteristic of teachers with an interest in food related subjects.

#### **4.3.4 Analysis**

SPSS(PC) for windows was used to analyse the data. Descriptive analysis was performed initially followed by Spearman's Correlations, and Mann-Whitney where appropriate. These tests were chosen because of three reasons

- The data collected were ordinal data.

- The data were not homogeneous so the tests chosen were non parametric.
- The data were unrelated- thus necessitating the use of the Mann-Whitney.

Nine factors were correlated with food hygiene, nutrition or food preparation as outlined below.

'Use of cooking equipment safely' and 'Prepare simple snack meals' were considered food preparation practices.

'Prepare meals for a balanced diet', 'Choose high fibre foods' and 'Understand the relationship between diet and disease' were nutrition practices.

The other four were food hygiene behaviours ('Reheat ready made meals', 'Use a fridge correctly', 'Prepare meals using good personal hygiene' and 'Know when food is cooked sufficiently'.

## 4.4 Results

### 4.4.1 Descriptive results

An important question related to the subjects in which food plays an important role. The results are presented in Table 4.1: The majority of teachers felt that food related areas formed less than 25% of the teaching of technology, science, geography and history

	0-25%	26-50%	51-75%	76-100%
Technology	25 (63)	8 (20)	5 (12)	2 (5)
Science	22 (51)	12 (28)	6 (14)	3 (7)
Geography	24 (67)	9 (25)	2 (6)	1 (2)
History	4 (72)	4 (18)	0 (0)	0 (0)

Table 4.1 The subjects in which elements of food were taught (all figures in parenthesis are percentages).

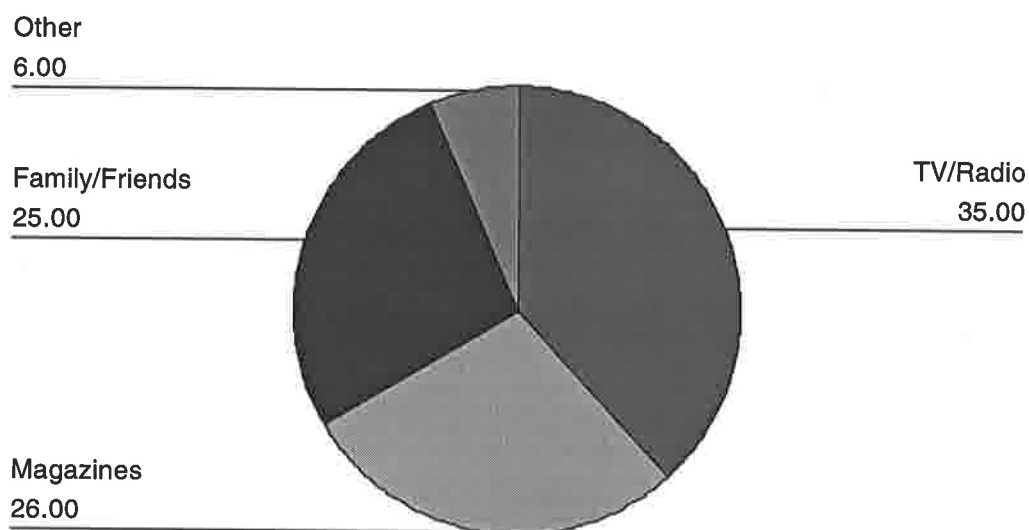


Figure 4.1 The sources where food information may be obtained outside of school

The teachers were asked to give their opinion as to what means, other than school, children could learn about food. The results can be seen in Figure 4.1. The majority believed that the biggest source of knowledge about food was television and radio.

The next question explored the facilities available in schools for the teaching of food. Figure 4.2 shows that 75% of teachers said they had access to a cooker, 77% a refrigerator and 37% a microwave. In many cases, however, these may have been provided for use in the staff room rather than specifically for use in the teaching of cookery. This information was obtained from the comment section in the questionnaire and was not provided by all participants in the survey, therefore, no firm conclusions can be reached.

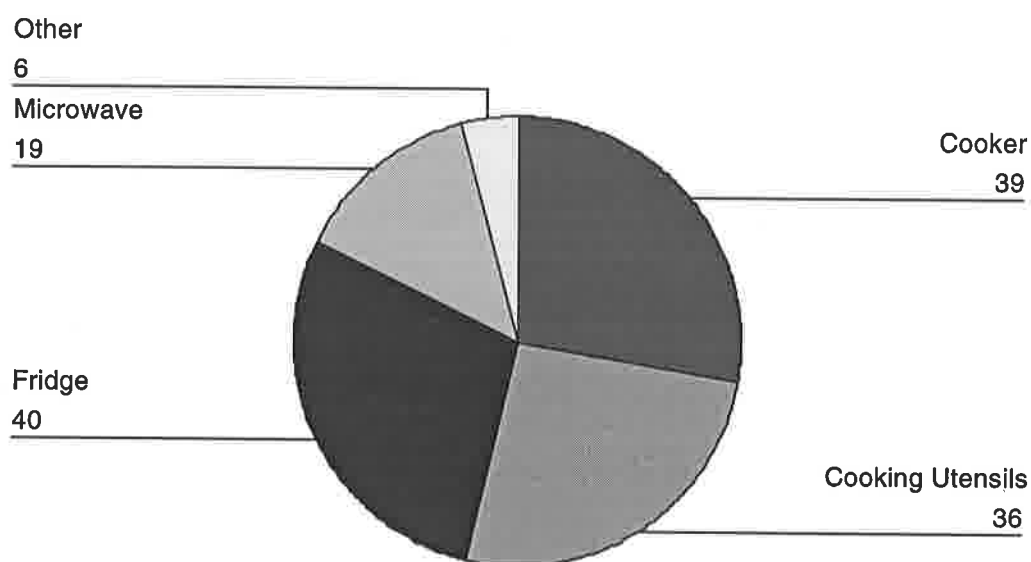


Figure 4.2. The facilities available for the teaching of food related subjects in Primary Schools

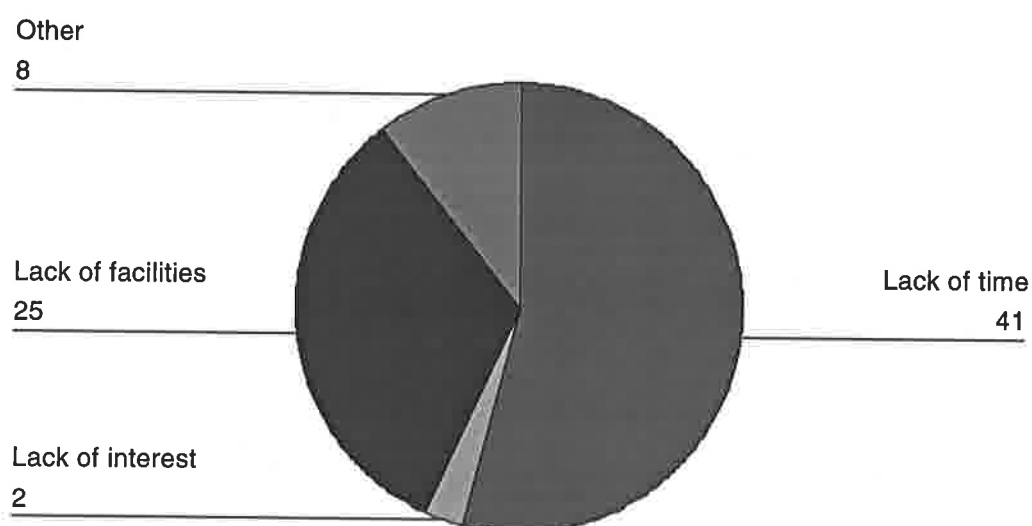


Figure 4.3 Possible constraints to the teaching of food related subjects in Primary Schools

The types of constraint that may hinder the teaching of food are illustrated in Figure 4.3. Forty-one subjects believed that lack of time is a constraint, 25 lack of facilities, 2 lack of interest and 8 some other unspecified constraint.

	Is food preparation taught?	Is nutrition taught?	Is food hygiene taught?
Yes	23(51)	39(81)	41(85)
No	22(49)	9(19)	7(15)

Table 4.2 The provision of instruction in food preparation, nutrition and food hygiene in Primary Schools (all figures in parenthesis are percentages).

Times the subject is taught per year	Food preparation	Nutrition	Food hygiene
1-4	21 (84)	28(70)	30 (68)
5-8	3 (12)	7 (18)	10 (23)
9-12	0 (0)	5 (12)	1 (2)
13+	1 (4)	0 (0)	3 (7)

Table 4.3 The amount of teaching of the food preparation, nutrition and food hygiene in Primary Schools (all figures in parenthesis are percentages).

Fifty-one per cent of teachers give instruction on food preparation to their pupils. The majority of them (84%) teach it between 1 and 4 times a year (Table 4.3)

while 70% stated that nutrition was covered to a similar extent. A large percentage of respondents (85%) claim to teach food hygiene, of which 68% gave lessons on this topic 1-4 times a year. Only a small number teach these subjects more frequently than this.

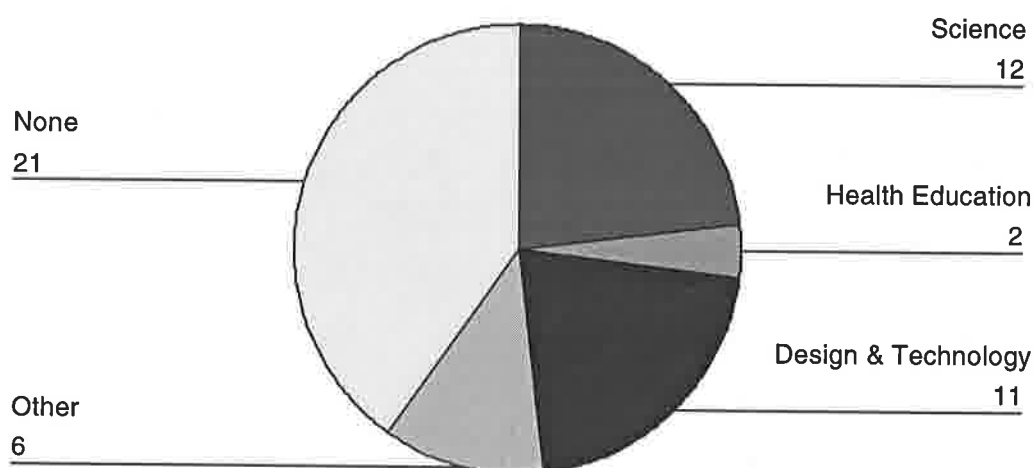


Figure 4.4 The main subjects in which food preparation instruction is provided



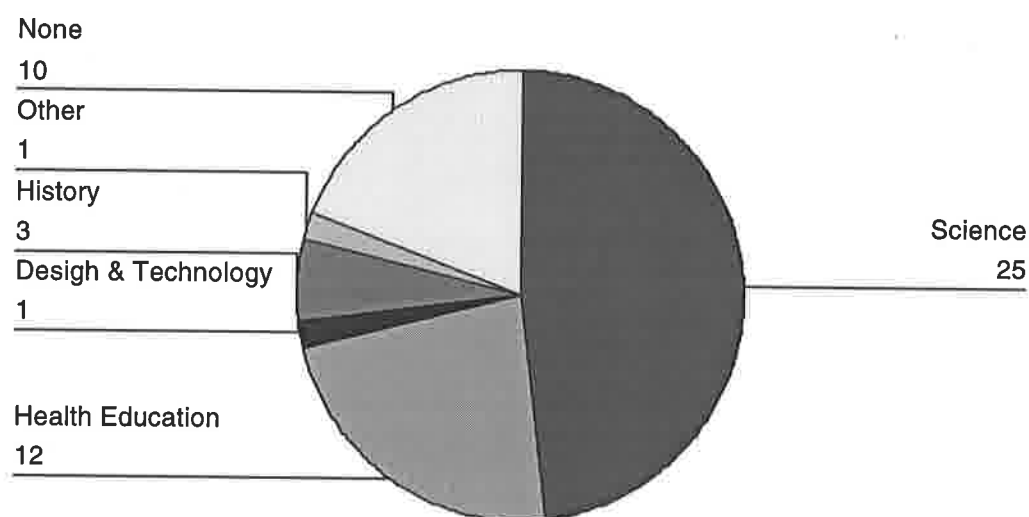


Figure 4.5 The main subjects in which nutrition is taught

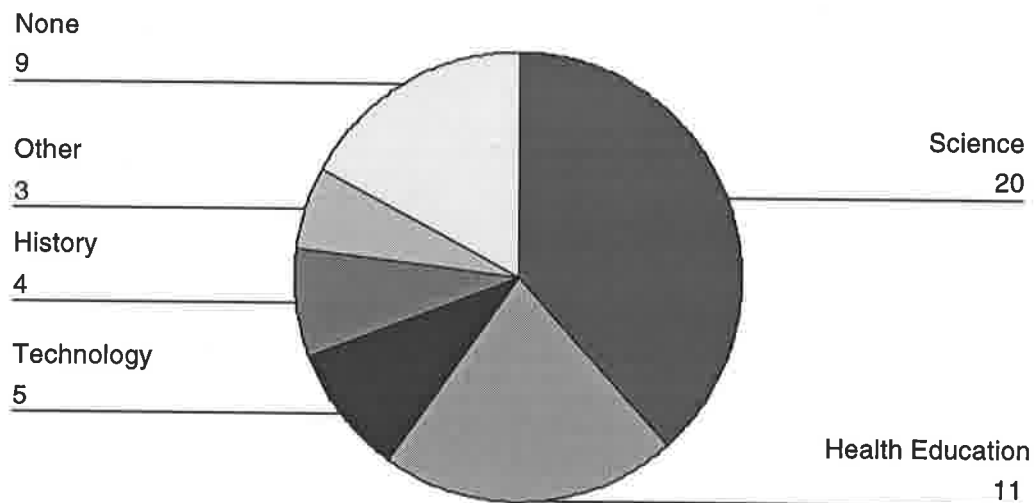


Figure 4.6 The main subjects in which food hygiene is taught

Food hygiene is mainly taught in science classes, which would also appear to contain the highest percentage of teaching in key stage 2 for all three food related areas (see also Table 4.1).

In question 10 respondents were asked to list what if any audio-visual material they used in the teaching of food preparation, nutrition and food hygiene, the results can be seen in figure 4.7.

	Books	Videos	Other	Pamphlets
Food preparation skills	32	20	20	24
Nutrition	58	48	30	63
Food hygiene	45	32	27	27

Table 4.4 The audio-visual materials used in the teaching of food topics, expressed as percentages (the totals equal more than 100 as subjects could use more than one item in their provision of information).

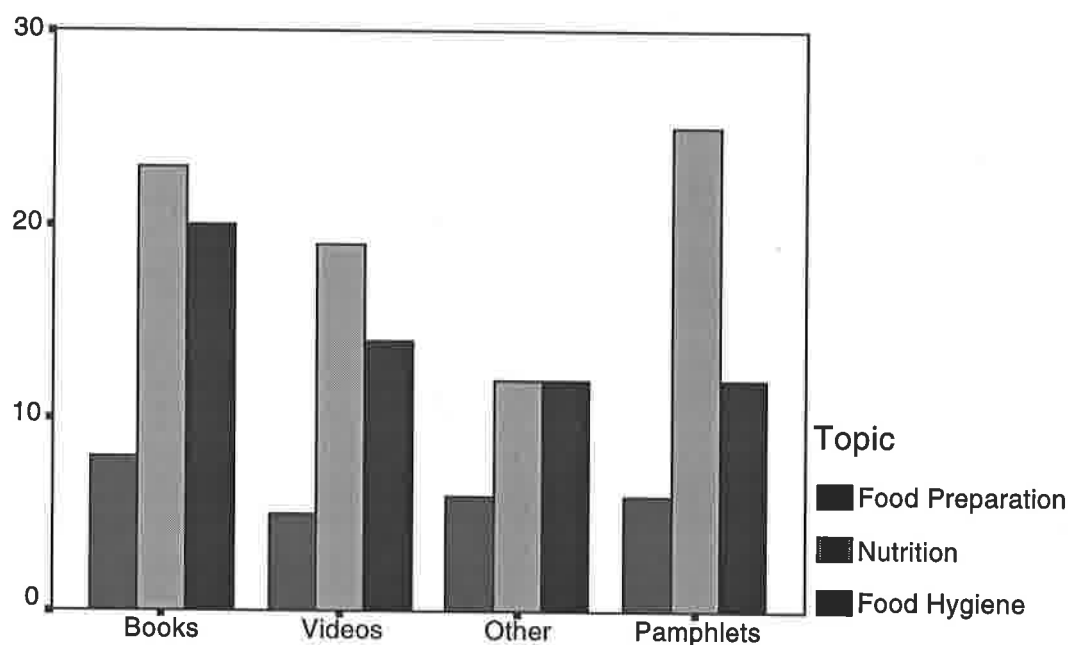


Figure 4.7 The total number of respondents who used audio-visual aids in the teaching of food related topics

Audio-visual materials were not used as aids in work on food preparation, as extensively as in the nutrition and food hygiene fields. Only 8 teachers used books, 5 videos and 5 some other materials in teaching food preparation skills (Figure 4.7). Audio-visual aids were used more often in nutrition than food hygiene, particularly videos and pamphlets.

	Use cooking equipment safely	Correctly reheat ready made meals	Know when to use a fridge	Select foods for a balanced diet	Maintain good personal hygiene	Select high fibre foods	Prepare simple snack meals	Know when food is cooked	know the relationship between diet and disease
Very important	61	43	39	66	74	17	12	56	60
Fairly important	31	33	51	24	22	58	49	34	32
Neither important nor unimportant	6	20	8	10	2	23	35	8	8
Fairly unimportant	2	4	2	0	2	2	40	2	0

Table 4.5. The importance, according to teachers, of children having certain specific food related skills

	Use cooking equipment safely	Correctly reheat ready made meals	Know when to use a fridge	Select foods for a balanced diet	Maintain good personal hygiene	Select high fibre foods	Prepare simple snack meals	Know when food is cooked	know the relationship between diet and disease
0-25%	41	56	27	40	26	53	25	47	41
26-50%	30	31	32	26	36	24	39	38	17
51-75%	23	9	30	17	29	19	32	9	33
76-100%	6	4	11	17	9	4	4	6	9

Table 4.6. The percentage of children leaving Primary School, who according to their teachers, had specific food related skills

In question 14 teachers were asked to state which if any skills they believe it is important for a child to develop by the age of 11 (Table 4.5). Those considered most important by respondents were a) 'maintain good personal hygiene' (74%)

and b) 'safe use of cooking equipment'. The skills considered least important were 'the ability to select high fibre foods' (17%) and to 'make simple snack meals' (12%). Moreover, when asked to consider what skills the children actually have on leaving school 56% of the respondents believe that no more than a quarter of children can 'select food with high fibre content' upon finishing primary school, and 35% of teachers believe that more than half of their pupils can 'prepare meals using good personal hygiene'.

	Food preparation	Nutrition	Food hygiene
Very important	13 (28)	33 (66)	27 (30)
Fairly important	22 (47)	12 (24)	18 (52)
Neither	10 (21)	5 (10)	6 (18)
Fairly unimportant	2 (4)	0 (0)	0 (0)

Table 4.7 The importance placed by teachers on the teaching of food related topics (All figures in parenthesis are percentages.)

None of the subjects who responded to this question believed any of the food topics to be very unimportant. The vast majority of teachers believed nutrition to be important (very or fairly) (90%), with slightly less for food preparation (75%) and food hygiene (83%). Approximately one fifth of teachers considered instruction in food preparation (21%) and food hygiene (18%) neither important nor unimportant.

#### **4.4.2 Statistical tests**

In this section the specific skills listed in table 4.5 were divided into three categories, dependent upon whether they were related to food preparation, nutrition or food hygiene. These skills were then related to the teaching of each

subject to determine whether or not there was a significant difference between the teaching of the subject and possession of the specific skill.

The importance given to food preparation, nutrition and food preparation was then related to the skills to determine what relationship if any existed

The teaching of food preparation &	Mann-Whitney	Significance
Use of cooking equipment safely	U=109	p< 0.016
Prepare simple snack meals	U=148.5	NS

Table 4.8 The results of a test of difference between whether or not food preparation was taught and the two related skills.

There was a significant difference between whether or not food preparation was taught and the percentage of children who could 'prepare food safely' but not for the percentage of children who could 'prepare snack meals'. This indicates that where teachers provided instruction about 'using cooking equipment safely' they were more likely to believe that children leaving their school possessed this knowledge than those teachers who did not instruct on food preparation. The same did not hold for 'preparation of snack foods', where there was no difference, between the beliefs of teachers providing information on food preparation and those who did not.

Whether or not Nutrition was taught &	Mann-Whitney	Significance
Prepare meals for a balanced diet	U=76	p< 0.012
Choose high fibre foods	U=89.5	p< 0.027
Understand the relationship between diet and disease	U=99	NS

Table 4.9 The results of a test of difference between whether or not nutrition was taught and the three related skills.

There was a significant difference between whether or not nutrition was taught and the percentage of children who, in the teachers' opinion, could 'prepare meals for a balanced diet' and also for the percentage of children who could 'choose high fibre foods' but not, however, between whether or not nutrition was taught and the percentage of children who 'knew the relationship between diet and disease'.

Whether or not Food hygiene was taught &	Mann-Whitney	Significance
Use a fridge correctly	U= 54	p< 0.05
Prepare meals using good personal hygiene	U=31.5	p< 0.004
Know when food is cooked sufficiently.	U=78	NS
Reheat ready made meals	U=82	NS

Table 4.10. The results of a test of difference between whether or not food hygiene was taught and the four related skills.

Teachers who taught food hygiene considered that the children leaving their school had greater knowledge, of how to 'use a fridge properly' and how to 'prepare meals using good personal hygiene', in comparison to those teachers who did not teach the subject. Conversely there was no significant difference on teachers' instruction in food hygiene and 'cooking food sufficiently' and 'reheating ready made meals'.

The final test that was performed on this data was to determine the relationship between the importance teachers placed on a particular skill and food preparation, nutrition and food hygiene as applicable. The results are illustrated in tables 4.10, 4.11 and 4.12.

Food preparation &	Spearman	Significance
Use of cooking equipment safely	$\rho=.0502$	NS
Prepare simple snack meals	$\rho=.1607$	NS

Table 4.11 The relationship between two food preparation related skills and the importance placed by the teachers on food preparation.

Nutrition &	Spearman	Significance
Prepare meals for a balanced diet	$\rho=.1951$	NS
Choose high fibre foods	$\rho=.1598$	NS
Understand the relationship between diet and disease	$\rho=.2005$	NS

Table 4.12 The relationship between nutrition skills and the importance placed by the teachers on nutrition

Food hygiene &	Spearman	Significance
Reheat ready made meals	$\rho=.0296$	NS
Use a fridge correctly	$\rho=.3286$	$p<0.05$
Prepare meals using good personal hygiene	$\rho=.4774$	$p<0.01$
Know when food is cooked sufficiently.	$\rho=.2757$	$p<0.05$

Table 4.13 The relationship between the importance placed by the teachers on food hygiene and the skills related to food hygiene

There was no relationship between the teachers' beliefs about the importance of food preparation and nutrition and the individual skills linked to these two areas. There was, however, a significant correlation between the respondents' beliefs about the importance of food hygiene and the importance they place on 'using fridges correctly' and 'knowing when food is cooked properly'. There was also a correlation, which is both significant and of reasonable magnitude, between food hygiene and 'preparing meals whilst using good personal hygiene'.

## 4.5 Discussion

### 4.5.1 Introduction

The results obtained from primary school teachers regarding the teaching of food related subjects will be discussed here. The three main elements food preparation, nutrition and food hygiene will be considered with respect to the relevant literature in the area.

### 4.5.2 Teaching all food related subjects

Food hygiene, nutrition and food preparation are all taught in Primary schools at key stage 2, most frequently as part of science lessons but often in technology periods. It is generally accepted that the teaching of food preparation in schools is declining (Geen, 1993; Lang & Baker, 1993) and evidence to support this contention was apparent in this study, with 47% of teachers not teaching food preparation. Much smaller numbers claimed that they failed to cover nutrition (18%) and food hygiene (14%).

Although some facilities are available for the teaching of food preparation, almost half of the teachers surveyed said that lack of facilities was a major obstacle. However, the greatest deterrent to the teaching of food related topics was lack of time. Other impediments can be more easily overcome but with increasing pressures on teachers due to changes in and implementation of the national curriculum it is unlikely that those who do not at present cover food subjects will do so in the future (Leith, 1997).

Half of those questioned believed that children are likely to obtain information about food from magazines and this agreed with the observations of Moore et



al. (1992 cited in Griffith et al, 1994) who found that magazines were the most important source for information on nutrition and food habits for adults. Griffith, Mathias, & Price (1994) also reported 46% of adults in their survey stated that they would consult magazines for information on food safety in spite of the fact that the majority did not convey food safety information adequately or indeed at all in many cases. In the present study two thirds of teachers believe that children will obtain information about food from television and radio. Griffith et al. (1994) found a similar position in relation to television and radio as with the print media concerning limited cover of food hygiene. So it would seem that if children are relying on sources (similar to those used by adults) apart from school to obtain information about food then this information may not be available. However with increasing media interest in food hygiene it is possible that coverage of this topic has increased, although this has yet to be determined empirically. The impact of provision of food hygiene information without reinforcement from other sources cannot be calculated, however, as with other Health Education areas the general consensus is that it is ineffective (Stone, 1996). Children are also likely to obtain food hygiene information in the home and this point will be further considered in chapter 8.

A particular difficulty with the teaching of food subjects is that of teaching of any element in isolation. Children aged between 10 and 11 are at a stage in life where knowledge now gained will have an important effect on later knowledge acquisition, so that learning about food hygiene or nutrition in schools without hands on experience could result in the practical not being linked with the theory. Baddeley (1990) found that if subjects learned in one environment and recalled in another then there was 40% less recall than if subjects had learned

and recalled in the same environment. Whilst for some environments the effects are sufficiently small not to warrant too much apprehension, he suggests that where environments are very different then the need for concern about the ability to transfer learning increases. Thus while children may learn about maintaining good personal hygiene if this is taught separately to the preparation of snack meals, for example, then there is the risk that the skill of food hygiene will not be transferred to the actual preparation of food outside of school. The results from chapter 3 indicate that children between 10 and 11, prepare food on a regular basis, if they have not sufficient food hygiene skills then they are placing themselves and others for whom they cook at risk.

#### **4.5.3 Teaching food preparation**

Teachers generally did not place much emphasis on the teaching of food preparation, perhaps because although they believe food preparation skills to be important they may not consider them to be important by age 11.

Alternatively, the actual skills listed in question 14 may not be thought by this group to be the particular skills that were considered to be important for children to possess. It is also feasible that the respondents were influenced by the fact that they did not often teach food preparation skills, thus influencing their beliefs about the importance of food preparation for children up to age 11. This might explain also why there was no obvious relationship between the proportion of children leaving the school unable (in the respondents' opinion) to carry out any of the suggested food preparation behaviours and the importance that the respondents actually placed on the skill. However, despite this, 53% of teachers believed that the teaching of food preparation was very important. In chapter 3,

it was found that majority of this age group are involved in food preparation on a regular basis. If they are not obtaining food preparation skills at schools then they must be obtaining such skill somewhere else. The role of the primary care giver is important here both as a teacher and as a role model, yet according to Leith (1997):

*"Once, perhaps, children learned at mother's knee. But now mother's knee is out working p. 16.*

#### **4.5.4 Teaching nutrition**

With respect to studies of nutrition, nutrition was considered important by the respondents in this study. Most (81%) teachers taught nutrition but unlike food preparation, discussed above, 43% of teachers believe that the teaching of nutrition was neither particularly important nor unimportant. It is possible that the nutrition factors listed in question 14 may not have been considered by this group to be ones that were of particular importance for children, but since these factors were those suggested by teachers when designing the questionnaire this is perhaps an unlikely explanation. The results could also be influenced by the difficulties faced by teachers of nutrition where the home environment is not conducive to changes in nutrition practices. Thus teachers may realise that although they have provided information this may be outweighed by other influences. For example, a recent advertisement campaign for real cream used the slogan "Naughty but nice". The implicit suggestion in this statement is that the pleasure obtained is more important than the long term health risks.

The Health of the Nation (Department of Health, 1991) considers improvements in nutritional practice one of its aims. In chapter 5 nutrition teaching in secondary schools will be considered.

#### **4.5.5 Teaching food hygiene**

Food hygiene is not mentioned in the National Curriculum in England and Wales. This in contrast to the Scottish school curriculum where the teaching of food hygiene is explicitly mentioned within the documentation.

Nevertheless, in this work which took place in South East Wales 85% of teachers said that food hygiene was taught. There is a significant relationship between the importance that teachers place on food hygiene and specific food hygiene skills that they consider it important for children to possess, but not, however, between the importance that teachers place on food hygiene and the proportion of children leaving school with food hygiene skills. This could imply that while teachers consider food hygiene to be important they are aware that they do not believe they are imparting sufficient knowledge.

Fox (1970) found that only 16% of the schools that were surveyed by him taught food hygiene whereas in our study 85% of teachers did so. If this 5 fold increase in the past 3 decades reflects a realistic situation then a decrease in incidence of food borne illness may have been expected. Instead, the opposite has occurred. There are a number of possible reasons for this. One possibility is that the knowledge is being provided but is not affecting behaviour. However, information from knowledge surveys, for example (FDF, 1995) would suggest that knowledge is not being supplied. Another is that children are not obtaining the necessary information to keep food safe to eat. So while more food hygiene

is being taught it may not be of an appropriate type or standard for their learning ability. This point will be further explored in chapter 6. Another probable explanation, however, relates to the age of the children, in that they are still too young to affect the present statistics. This would also help to explain why food poisoning incidents in Scotland remain high, in spite of the fact that food hygiene is included in the Scottish National Curriculum.

The relationship between knowledge, attitudes and behaviour will be fully explored in subsequent chapters, however, it must be noted here that one of the suggested ways to influence or change behaviour is by forming or changing attitudes. Thus suggesting that the provision of knowledge alone is seldom sufficient to change behaviours and, moreover, Showers (1995) submitted that:-

*“the idea that if educators simply present scientific content, students will form desirable attitudes toward science-related issues, is not supported by this or other research” p.40.*

It may be suggested therefore that provision of food related information in primary schools is not necessarily enough to lead to appropriate food related behaviour.

## 4.6 Conclusions

While nutrition was considered more important than food hygiene, food hygiene in turn was considered more important than food preparation. As mentioned in the introduction there is a danger in teaching either food hygiene or nutrition in different contexts to those in which they are practised i.e. teaching in the school and expecting transfer of skills to the home environment.

In chapter 3 it was found that half of those aged between 10 and 11, i.e. primary school age, prepared food at least once a day.

It would appear from the findings of this survey that primary school teachers do teach food hygiene and most considered it to be important. However, conversely, the respondents believed that the majority of children leaving their schools did not have the skills necessary to keep food safe to eat. This raises the question of whether enough food hygiene is taught to equip these children with the skills considered by their teachers to be important. However, even where food hygiene is taught it may be that this knowledge may not be changing attitudes and behaviour.

It may be suggested that the secondary school environment is likely to be more conducive to the teaching of food related topics. This will be investigated in chapter 5 where a comparison between primary schools and secondary schools, with respect to teaching about food, will be made.

## **CHAPTER 5**

**The teaching of subjects containing a food  
element in Secondary Schools in South East  
Wales, at Key Stages three and four.**

## 5.1 Introduction

In chapter 4 the teaching of food related subjects in Primary Schools was examined, in this chapter food related subjects in Secondary Schools will be considered. Although food related topics are taught in schools, after the GCSE exam it can be generally considered that unless students choose subjects that contain a food element e.g. Home Economics or Food Science their formal food related education will end at approximately 16 years of age or earlier, as young as 13; further, not all children will do a GCSE in a food related area. Thus the emphasis of this chapter is on key stages 3 and 4 (approximately ages 11-15). Food as a material in design and technology is optional after key stage 2 (Bender, 1994; Mortimore, 1996). At key stage 3 in design and technology pupils can use "*compliant materials and/or food*" (Department of Education, 1995). There is no mention of food in key stage 4. There has been criticism of this by numerous groups including the IFST (Bender, 1994; Mortimore, 1996) and teachers groups (Cushing, 1994)

Home Economics is the subject in which the majority of food related teaching takes place. However, recent changes in the National Curriculum have provoked concern about the role of Home Economics in schools (Lang & Baker, 1993). Rather than being treated as a subject in its own right, Home Economics has become incorporated into Design and Technology, thus changing the way that food topics are taught in schools (Geen, 1993). As food topics are only part of Home Economics changes of this order lead to questions regarding what is now being taught in schools in this area, and whether these topics are being adequately covered.

As mentioned in chapters 3 and 4 food hygiene and nutrition are considered



very important by food experts and therefore need to be studied. Additionally, food preparation needs to be considered as it provides the context for much of the teaching of nutrition and food hygiene, thus these are the focus of the present work.

In chapter 3 the food handling behaviour of children and young adults was considered. One of the main findings was that as children get older there is a change in the type of food preparation in which they engage. In Primary Schools, food preparation was taught by 51% of those surveyed, notably less than for food hygiene and nutrition. The MORI poll (FDF, 1993) found that ability to cook amongst children was less than that for other activities, e.g. playing computer games. Thus, in this chapter the teaching of food preparation in Secondary Schools, with respect to the frequency, will be evaluated.

A review of the literature would suggest that nutrition has received relatively more attention than hygiene, (Griffith, Mullan, & Price, 1995), generally (Charny & Lewis, 1987; Donkin, Tilston, Neale, & Gregson, 1992; Moon & Twigg, 1988) and specifically in education (Edwards, Acock, & Johnston, 1985; Anon, 1985) and with teenagers (Axelson & Del Campo, 1978). Instruction in nutrition was provided by the majority of Primary School teachers surveyed (Chapter 4).

Therefore, nutrition will be considered both in terms of the frequency of its teaching and in comparison to the teaching of food hygiene.

In general, malnutrition is considered more dangerous than inadequate food hygiene, however, experts in the area believe that the risk is equal for both (Gormley, Downey, & O'Beirne, 1986; Wheelock, 1988). However, malnutrition is perceived by the consumer to be more important, and from the literature it would appear that schools consider nutrition more important. However, it may

be postulated that one reason for this is that changes in food hygiene are possible and changes in nutrition impossible or very difficult. It has also been suggested that changes in nutrition can result in more visible outcomes than changes in food safety behaviours, thus encouraging people to continue modifying their behaviour (Mortimore, 1996)

A further point to consider is whether it signifies that Home Economics is being marginalised, as it has been argued that food hygiene and nutrition are not being taught adequately. According to Wheelock (1989):

*“food nutrition and nutrition are not covered effectively in the National Curriculum. This is a major deficiency of the education system and it is particularly worrying that Home Economics is likely to be squeezed out of the National Curriculum” p.36.*

Fox (1970) found that food hygiene was only taught directly in 16% of Primary Schools which had increased to 90% by Secondary School. A survey in 1995 found that 85% of Primary School teachers in South Wales taught food hygiene (Chapter 4), representing an extensive increase since the work carried out by Fox in 1970, thus provoking the question of whether the figure for Secondary Schools has changed.

## 5.2 Aims

- To discover the frequency of the teaching of food related topics in Secondary Schools in South East Wales.
- To determine the perceived relative importance of these topics according to the teachers.
- To catalogue what food safety audio-visual aids are used by the teachers.
- To ascertain the relationship between the importance of the topics, food preparation, nutrition and food hygiene and the individual factors which make up these areas, for example 'prepare meals from raw ingredients'.
- To determine if the importance that teachers placed on food preparation, nutrition, and food hygiene was related to the skills they believed it was important for children to develop by the age of 16.
- To consider differences, if any, between the expectations of teachers of children who have or have not studied food related topics.
- To determine if there was a statistical significant difference between the beliefs of teachers about the amount of food knowledge children have on leaving school, dependent on whether those children had studied food related subjects.

## **5.3 Method**

### **5.3.1 Design**

A questionnaire was designed based on 6 interviews with Secondary School teachers, including a meeting with the Home Economics Advisor for South Glamorgan. These interviews were informal and unstructured. The aim of these sessions was to elicit information about the teaching of food related topics to pupils at Key Stage 3 and Key Stage 4. This preliminary information helped to ensure that the appropriate parameters were used in designing the questionnaire which was then piloted on a small number of teachers and some minor adjustments were made. A copy of the final questionnaire can be seen in Appendix 3.

The questionnaire contained 5 main sections. The first looked at academic subjects which may contain food themes, and the frequency of instruction in such subjects. The middle 3 sections investigated the teaching of food preparation, nutrition and food hygiene, and included questions about the audio-visual aids used to teach food hygiene. The final section examined teachers' beliefs about the importance of specific food related skills, and their beliefs about whether the children in their school possessed these skills.

### **5.3.2 Procedure**

The Head Teachers of all Secondary Schools in South Wales were contacted and their participation in the study requested. Although none of the schools refused to participate at this point, all Head Teachers said that responses were at the discretion of the individual teachers. The Head Teachers and Local

Authority Advisors provided the names of the Heads of Department for either Design and Technology or Home Economics, as appropriate, who were approached directly.

The questionnaires were administered by post to the Heads of Department who were asked to complete them or to pass them to the appropriate member of their team. The questionnaire was accompanied by a covering letter explaining the importance of the research and requesting participation in the study.

Stamped addressed envelopes were enclosed to facilitate returns. A follow-up letter was sent out two weeks later to those who had not initially responded.

### **5.3.3 Subjects**

All the Secondary Schools in Glamorgan and Gwent were approached. Of the 118 schools who were contacted 46 of them responded, giving a response rate of 39%. As a number of schools had more than one teacher for each Key Stage more than one questionnaire was returned for some schools, bringing the total number of questionnaires to 76. A response rate of 39% is relatively low so non-respondents were telephoned, in a way similar to that outlined in Chapter 4, which elicited similar findings.

### **5.3.4 Analysis**

SPSS for windows was used to analyse the data. Descriptive analysis was performed initially and these results are presented and discussed in the first section. Spearman correlations were chosen as the data were ordinal and non-parametric and Wilcoxon tests were executed for these reasons and because the data were related, and the results are presented in subsequent sections.

For the correlations certain behaviours were related to certain specific activities. 'Prepare meals from raw ingredients' and 'prepare simple snack meals' were correlated with food preparation.

The following were correlated with nutrition 'select low sugar foods', 'select high fibre foods', 'select foods for a balanced diet' and select low fat foods.

Finally, food hygiene was correlated with 'prepare meals with good personal hygiene', 'correctly reheat ready made meals', 'store raw foods correctly', 'store cooked foods correctly' and 'clean food surfaces correctly'.

In the final section an examination of the texts used in the teaching of food hygiene took place. The aim was to determine the extent to which the text books presently in use in the teaching of food hygiene provide knowledge and understanding of food hygiene and foodborne illness in light of the ICMSF recommendations of what the consumer should know (ICMSF, 1988). Nine factors were used, based on factors believed by ICMSF to be the basic knowledge required by the general public and can be found in table 5.1

These factors were then used to judge the books on a nine point scale which went from 1 - no mention at all, to 9 - all the detail necessary included, with 5 as the mid point.

1. The cause and effect relationship of individual actions on food safety and spoilage
2. Practical measures to ensure the safety of the foods they prepare, process or store
3. Proper processing and home preservation methods (e.g. home canning of foods, fermentation) and the consequences of using improper procedures
4. That improper food holding practices, such as leaving foods in ovens at low temperatures or at room temperatures or placing large containers of unchilled foods in refrigerators, will allow bacteria to multiply to high numbers.
5. The heating procedures necessary to kill vegetative forms of pathogens in raw foods of animal origin and left over chilled foods.
6. That raw foods (e.g. Meat, poultry, fish, shell eggs) carry pathogens when they enter kitchens.
7. That by handling raw foods, microbes can pass to hands and then to other foods.
8. That cloths, sponges and brushes used to clean food preparation surfaces can transfer microbes from raw foods to equipment and surfaces that will be used for cooked foods.
9. That cooked foods should not pass over the same surfaces or through equipment that have been in contact with raw foods unless those surfaces have been properly cleaned" p. 134.

Table 5.1 The basic knowledge that the ICMSF believe the public should have about food safety

## 5.4 Results

### 5.4.1 The teaching of subjects containing a food element at Key Stages 3 and 4.

In question 2 respondents were asked to say which of the listed subjects they taught at key stages 3 and 4 and the results are presented in Table 5.2. Design and Technology is the most frequently taught subject of those mentioned at both Key Stages. Catering is taught frequently at Key Stage 4 but not at Key Stage 3. These results are in keeping with the present National Curriculum where Design and Technology is compulsory and Home Economics and Catering optional.

	Home Economics		Design & technology		Catering		Personal & social education	
	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4
YES	26 (39)	37 (55)	44 (66)	45 (67)	3 (4)	32 (48)	10 (15)	11 (16)

Table 5.2. The frequency of instruction in specified subjects at Key Stages 3 and 4 (All figures in parenthesis are percentages).

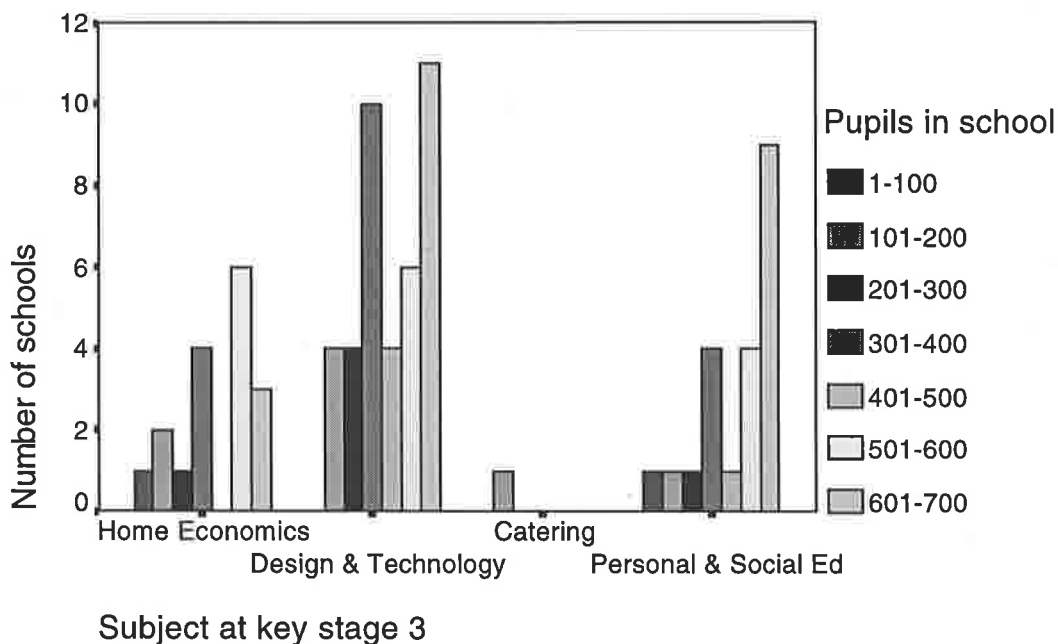


Figure 5.1 The total number of students at Key Stage 3 who study any of the listed subjects

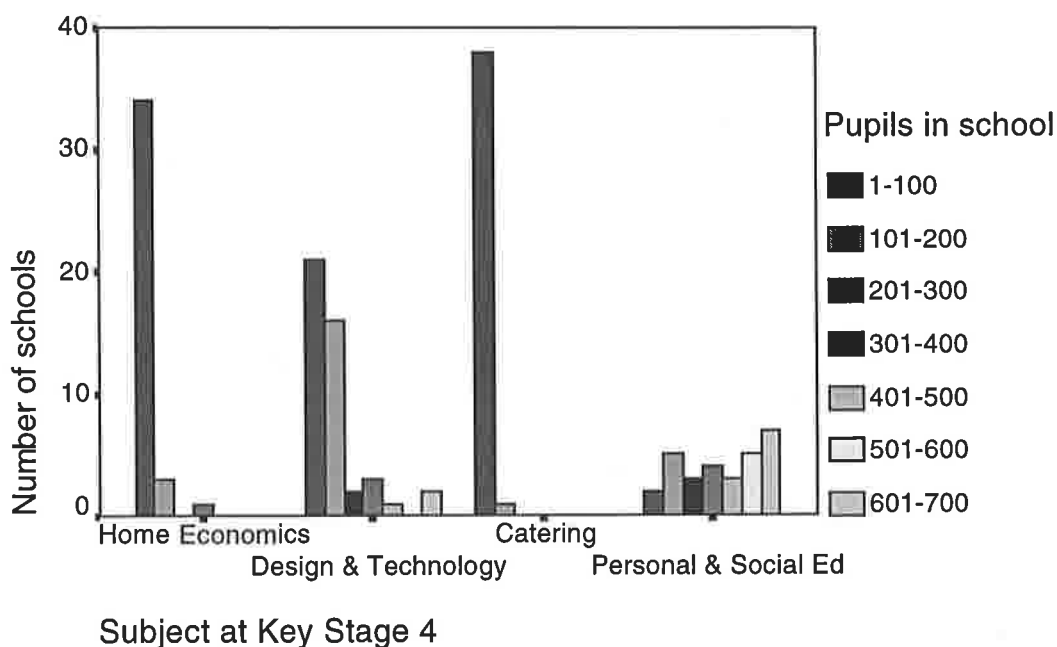


Figure 5.2 The total number of students at Key Stage 4 who study any of the specified subjects

The number of pupils who study Personal and Social Education at Key Stage 3 and Key Stage 4 appears to be evenly distributed across the key stages. This position is very different for the other subjects listed in which there were generally smaller numbers of pupils taught at Key Stage 4 than at Key Stage 3. While the numbers of pupils tend to be smaller at Key Stage 4 (reflecting greater specialisation at this level) a greater number of teachers covered these subjects.

Home Economics		Design & technology		Catering		Personal & social education	
Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4
24 (38)	32 (48)	48 (74)	50 (75)	4 (6)	41 (61)	14 (21)	13 (19)

Table 5.3 The number of respondents who said that specified subjects contained a food element at Key Stages 3 and 4 (All figures in parenthesis are percentages).

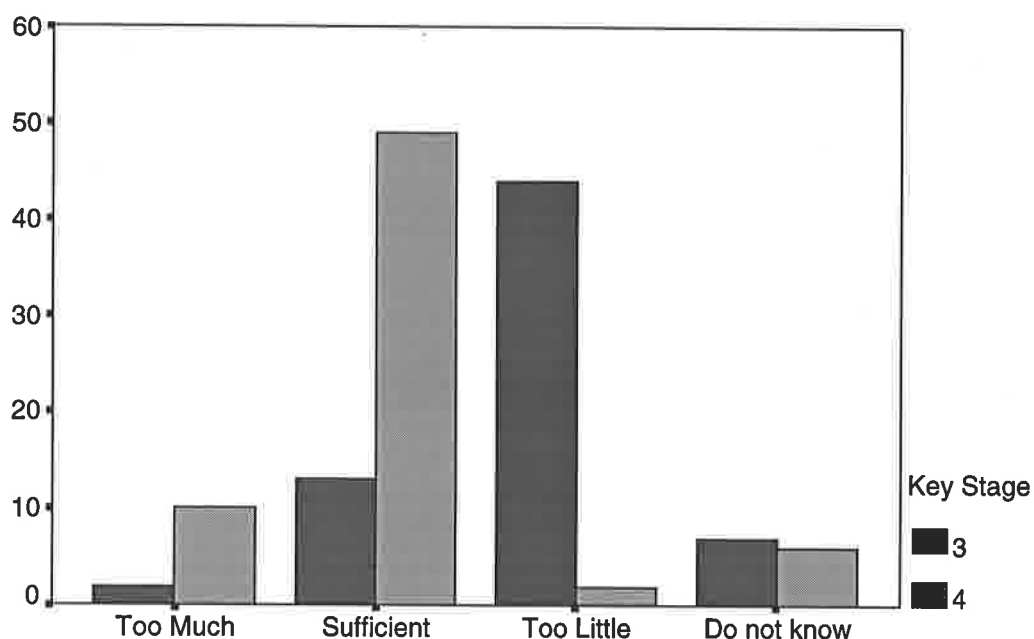


Not all the subjects mentioned contained a food component at both Key Stages. No more than 48% of subjects believed that Home Economics contained instruction in food topics. Design and Technology was most frequently reported as containing a food element and PSE the least. The apparent disparity in catering is due to this subject generally not being taught at all at Key Stage 3.

	Home Economics		Design & technology		Catering		PSE	
Percentage	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4	Key Stage 3	Key Stage 4
1-25	9 (13)	8 (32)	28 (60)	15 (33)	2 (20)	3 (9)	12 (92)	10 (71)
26-50	10 (15)	2 (8)	17 (36)	25 (54)	3 (30)	1 (3)	1 (8)	0 (0)
51-75	6 (9)	7 (28)	2 (4)	0 (0)	1 (10)	3 (9)	0 (0)	1 (7)
76-100	42 (63)	8 (32)	0 (0)	6 (13)	4 (40)	26 (79)	0 (0)	3 (21)

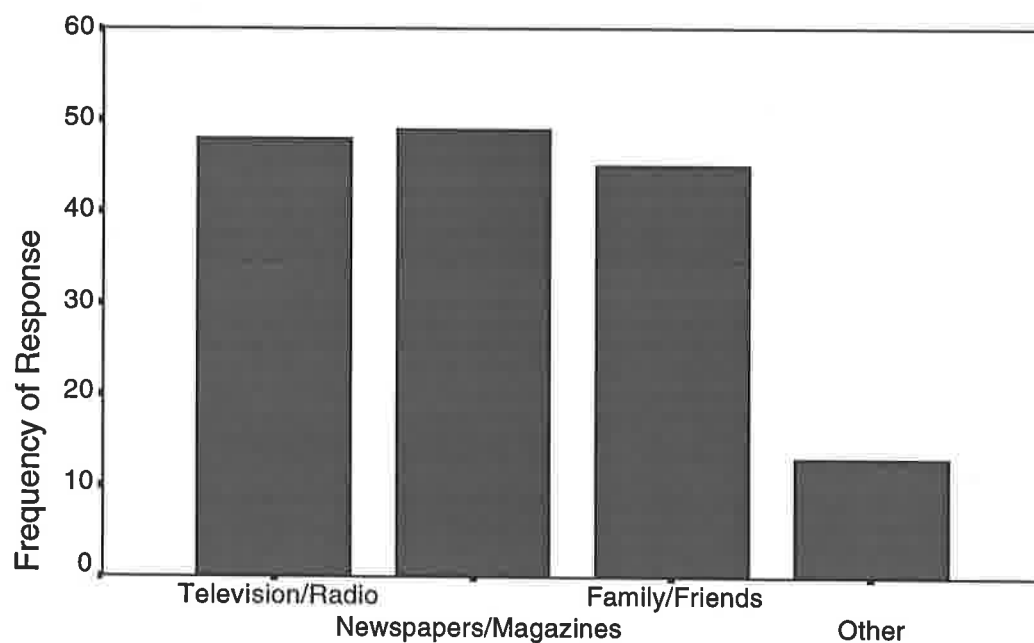
Table 5.4 Proportion of specific subjects relating to food at Key Stage 3 and at Key Stage 4 (All figures in parenthesis are percentages).

In table 5.4 the proportion of each of the aforementioned subjects, which relates to food at both Key Stages, is indicated. At Key Stage 3 more than 60% of respondents believe that three quarters of a Home Economics course pertained to food, by Key Stage 4 only 30% of respondents believed that it was this large.



**Figure 5.3 Beliefs about the quantity of food related topics taught at Key Stages 3 and 4**

Results shown in figure 5.3 indicate that almost 66% (44) of the sample believe that insufficient food information is provided at Key Stage 3, whereas 88% of respondents (49) think that food is sufficiently covered at Key Stage 4.



**Figure 5.4 Other sources of information about food**

The most common extra-curricular source of information about food is believed

to be newspapers and magazines (49) with television and radio a close second (48), Figure 5.4. Subjects could choose more than one alternative.

#### 5.4.2 Teaching food preparation, nutrition and food hygiene at key stages 3 and 4.

When asked if food preparation was taught, all 67 who answered the question gave a positive response. Of the subjects who responded to this question 89% taught food preparation between one and eight hours a term at Key Stage 3 and 11% taught food preparation 9 hours or more. At Key Stage 4 food preparation was being taught for 9 hours or more by 28% of respondents, and 8 hours or less by 72% of respondents.

	Key Stage 3			Key Stage 4		
Hours a term	Food preparation	Nutrition	Food hygiene	Food preparation	Nutrition	Food hygiene
1-4	28 (44)	45(78)	48(84)	17 (29)	45(63)	35(71)
5-8	29 (45)	10(18)	7(12)	25 (43)	20(28)	12(25)
9-12	4 (6)	1(2)	1(2)	6 (10)	4(6)	1(2)
More than 12	3 (5)	1(2)	1(2)	10 (18)	3(3)	1(2)

Table 5.5 The frequency of teaching of food preparation, nutrition and food hygiene.

Whether pupils were taught nutrition was the subject of the next question. All 64 who answered responded affirmatively. Eighty seven percent, of those who teach nutrition, teach it for between one and 8 hours a term at Key Stage 4, compared to 96% at Key Stage 3. Respondents were asked whether pupils were taught food hygiene. Sixty-four of those who answered the question answered 'yes', only one answered 'no'. Food hygiene is taught between one

and 8 hours a term at Key Stage 3 by 55 teachers' and by 47 at Key Stage 4.

Only two at each Key Stage teach it 9 or more hours a term.

	Food preparation	Nutrition	Food hygiene
Very important	61	61	65
Fairly important	1	1	2
Neither important nor unimportant	0	0	0
Fairly unimportant	4	2	0
Very unimportant	1	1	0

Table 5.6 The importance of teaching food preparation nutrition and food hygiene in the opinions of respondents

Ninety one percent of those who responded think the teaching of food preparation is very important, and only 7% (5 teachers) considered it unimportant. Ninety four percent of the respondents think that teaching nutrition is very important. Only 5% considered it to be unimportant or very unimportant. All the teachers who responded to the particular question believed teaching food hygiene to be either very important or fairly important.

	Text books			Videos			Other		
Yes	52	54	45	37	35	42	47	38	38
No	1	2	1	26	28	18	16	22	1

Table 5.7 The audio-visual materials used by teachers

Ninety six percent of respondents use text books, 55% use videos and 63% some other audio-visual materials in the teaching of food preparation. All but one of the respondents said that they use text books to teach nutrition, 58% use videos and 75% use other audio-visual materials. Seventy percent of

teachers use videos to teach food hygiene, 98% use text books and 97% use some other audio-visual materials.

### 5.4.3 Specific food related skills

In this section results of questions about specific food skills are presented.

Teachers were asked to choose from a list the 5 things they believed were the most important skills for a child to develop by the age of 16. The results are presented in table 5.8. Respondents ranked skills according to their perception of their importance, with 1 signifying the most important, and 5 those of lesser importance.

Rank	1	2	3	4	5	Total
Prepare meals with good personal hygiene	13	18	13	4	4	52
Prepare meals from raw ingredients	5	6	8	8	3	30
Select low sugar foods	1	1	1	3	6	12
Correctly reheat ready made meals	4	4	9	9	6	32
Store raw food correctly	4	5	7	9	7	32
Select high fibre foods	0	3	3	0	4	10
Store cooked foods correctly	0	5	7	8	10	30
Prepare simple snack foods	2	6	0	2	2	12
Select foods for a balanced diet	0	0	0	0	0	0
Clean food surfaces correctly	0	2	2	6	7	17
Select low fat foods	2	2	2	4	0	10

Table 5.8 The frequency of respondents placing an item which was considered important by them in teaching about food, in their ranked top five items

'Prepare meals with good personal hygiene' was the most frequently cited response in the number one position and also in total for the top five responses.

The least important overall was 'select foods for a balanced diet', which appeared neither in the top 5 responses nor as a number one choice. In general the factors related to nutrition were not considered important skills for children to have by the age of 16. The statements related to food hygiene were considered most important. Of the food preparation skills 'preparing meals from raw ingredients' was considered important and 'prepare simple snack meals' less so.

In the next three sections the specific skills related to food preparation, nutrition and food hygiene were correlated with the relevant subject area.

#### **5.4.4 The importance of food preparation**

There was no significant relationship between the importance placed by teachers on food preparation and on the specific elements listed below.

Further, the less important the factor 'prepare simple snack meals' was believed to be, the more important food preparation was considered.

Prepare meals from raw ingredients	$\rho = .1594$	NS
Prepare simple snack meals	$\rho = -.1618$	NS

Table 5.9 The measurement of the relationship between food preparation and the specific food related behaviours

#### **5.4.5 The importance of Nutrition**

There was no significant relationship between the importance placed by teachers on nutrition and on the specific elements listed below. Moreover, all the relationships were negative, thus the more important teachers conceived nutrition to be the less important they considered these specific elements.

Select low sugar foods	$\rho = - .1156$	NS
Select high fibre foods	$\rho = - .1152$	NS
Select foods for a balanced diet	$\rho = - .0778$	NS
Select low fat foods	$\rho = - .1228$	NS

Table 5.10 The measurement of the relationship between nutrition and specific food related behaviour

#### 5.4.6 Importance of Food Hygiene

There was no significant relationship between the importance placed by teachers on food hygiene and on the specific element 'clean food surfaces correctly', moreover, the relationship that existed was negative suggesting that as food hygiene increased in importance, the importance of this factor decreased. There was a relationship for all the other factors. All were of strong positive magnitude. The highest was for the factor 'store raw foods correctly'. The lowest was 'correctly reheat ready made meals'. These results are comparable to those displayed in table 5.8 where of all the specific factors related to food hygiene. 'Clean surfaces' was the one of least importance.

Preparing meals with good personal hygiene	$\rho = 0.5941$	$p < 0.0001$
Correctly reheat ready made meals	$\rho = 0.5614$	$p < 0.0001$
Store raw foods correctly	$\rho = 0.6492$	$p < 0.0001$
Store cooked foods correctly	$\rho = 0.6174$	$p < 0.0001$
Clean food surfaces correctly	$\rho = - 0.2584$	NS

Table 5.11 The measurement of the relationship between food hygiene and specific food related behaviour

#### 5.4.7 Study of food preparation, nutrition, food hygiene.

The next section looks at whether, in the respondents' opinion, there was a significant difference in the skills possessed by children who have studied food and those who have not. These results were obtained by asking teachers whether they believed that children who had studied food related subjects had the skills listed, and then asking them whether they believed that those who did not study food had the skills listed, these results were then tested using a Wilcoxon test for related samples.

Prepare meals with good personal hygiene	Z= - 4.17	p<0.0001
Prepare meals from raw ingredients	Z= - 4.19	p<0.0001
Select low sugar foods	Z= - 3.40	p<0.0007
Correctly reheat ready made meals	Z= - 3.50	p<0.0005
Store raw foods correctly	Z= - 3.80	p<0.0001
Select high fibre foods	Z= - 3.51	p<0.0004
Store cooked foods correctly	Z= - 3.89	p<0.0001
Prepare simple snack foods	Z= - 4.38	p<0.0001
Select foods for a balanced diet	Z= - 4.37	p<0.0001
Clean food surfaces correctly	Z= - 4.62	p<0.0001
Select low fat foods	Z= - 4.20	p<0.0001

Table 5.12 The measurement of the degree of significance for specific food related behaviour

According to the respondents, for all the factors listed, there was a significant difference between those who had studied the topic and those who had not. Therefore, it can be seen that teachers believe that the teaching of food related subjects can make a difference to the skills that children possess. This point will be considered in section 5.5.5.



#### **5.4.8 Texts used in teaching food hygiene.**

Three main books were used specifically for the teaching of food hygiene.

Other books included sections on food hygiene as well as nutrition and food preparation. A total of eight texts were suggested by the respondents in an open question. These were texts believed to be in use for teaching food hygiene. These were

1. Finding out about food; Jenny Ridgewell.
2. Food for health; Dobie Roe.
3. Better cooking; Aileen King.
4. The food hygiene handbook; IEHO/Richard Sprenger.
5. Food safety; Food safety advisory centre.
6. Essential food hygiene; RJ Donaldson
7. Principles of catering; Coller & Sussams
8. Focus on Home Economics; Backer, Kimmings & Phillips.

The books were graded by the researcher on a scale of 1 to 9 on the degree to which they contained information about the 9 factors listed in section 5.2, where 1 meant no mention at all, and 9 meant that the information provided adequately covered the topic. These results were then spot checked by an associate to insure that the points allocated were consistent. The results are presented in table 5.13

<b>Factors</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<i>Book 1</i>	5	5	1	5	4	3	3	4	1
<i>Book 2</i>	2	2	1	3	1	1	2	1	1
<i>Book 3</i>	3	2	1	1	3	2	1	4	5
<i>Book 4</i>	9	9	1	6	7	9	9	9	6
<i>Book 5</i>	9	9	9	9	9	9	9	9	9
<i>Book 6</i>	9	9	1	9	9	9	3	9	9
<i>Book 7</i>	5	5	1	5	4	8	6	7	7
<i>Book 8</i>	2	3	1	5	2	1	1	2	3

Table 5.13 Scoring of Home Economics texts books on the degree to which they contain ICMSF principles.

As can be seen from the above table of results the books range from very good to poor. For example, book 2 in the table obtained no higher than a score of 3, on any factor, with the average less than 2. At the other extreme book 5 received the maximum score in all areas. However, considering that there were three specialist food hygiene books included (i.e. The Food Hygiene Handbook (book 4); Food Safety (book 5); Essential Food Hygiene (book 6)), Food Safety (book 5) was the only one to obtain top marks, the other two fell short in some of the areas of assessment. Thus, although three of the texts were written specifically for the teaching of food hygiene, only one of them provides what ICMSF (1988) recommended as the minimum information that the general public should have.

## 5.5 Discussion

### 5.5.1 Introduction

Due to an overall low response rate and ceiling effects on some questions (for an example see table 5.5) caution must be exercised in interpreting these results. Consideration must also be given to the fact that all the respondents in this survey were from South East Wales thus it could be difficult to claim that these results were representative of Great Britain as a whole. The major constraint proposed by non respondents, for not responding, was lack of time. Therefore it is possible that the results may be more typical than they may have been, had other reasons been given. Further, while regional differences are found by the FDF in their surveys they are generally not significant, so it could be argued that if food related behaviour does not vary much regionally then it is possible that teaching of food related subjects does not either. The one exception to this should be the teaching of food hygiene in Scotland where there is explicit mention in their documentation and food hygiene is compulsory. For example, it is stated in the Scottish National Curriculum that children between 5 and 14 should know:

*“the importance of hygiene in storing, preparing, and consuming food and drink, e.g. Correct procedures when handling food, observation of storage instructions on packaged foods, causes of food contamination, correct storage of perishable foods” p.63.*

This is in contrast to England and Wales where there is no mention of food hygiene in the National Curriculum, thus suggesting that there may be differences between results for Scotland compared to England and Wales.

### **5.5.2 Teaching subjects containing a food element at Key Stages 3 and 4**

Design and Technology was the most commonly taught subject at Key Stages 3 & 4 of those mentioned, and it was also believed by the respondents to be most likely to contain a food element. Changes in the National Curriculum have resulted in schools incorporating Home Economics into Design and Technology and the teaching of catering or Home Economics at GCSE is optional, as is including a food element at these key stages (Mortimore, 1996).

Although there are ample opportunities available in Personal and Social Education for the teaching of food related topics e.g. nutrition (Wilson, 1988), these opportunities do not seem to be taken. In general the teachers surveyed had a positive opinion regarding food topics and considered them important and at Key Stage 3 did not feel that sufficient was being taught. However, being Home Economics teachers this should not be unexpected as food related subjects make up a large element of their teaching.

According to the respondents, their pupils also examined the subject of food through the media and in discussion with friends and family. In the previous chapter, teachers in Primary Schools were considered. A comparison between those results and these suggests that Primary School children rely less on the print media than Secondary School students, in the teachers' opinion. As children mature there are more magazines aimed specifically at them, thus, if these documents contain information on food issues then this tendency can be explained. Concerns expressed in Chapter 4 (Griffith et al, 1994) regarding the inadequacy of the media for information regarding food hygiene are equally valid here.

### **5.5.3 Food Preparation, Nutrition and Food Hygiene**

All respondents taught food preparation and nutrition in Secondary Schools (Key Stages 3 & 4), with only one school not teaching food hygiene. This compared with Primary teachers where only approximately half provided classes in food preparation, but the majority nevertheless gave instruction in nutrition and hygiene. Food preparation was most frequently taught for between 1 and 8 hours a term with half to three quarters of the group surveyed falling into this category. The comparable figures for nutrition were between 86% and 96%, and for food hygiene 96%. Where food related lessons were provided in Primary Schools a similar situation exists.

In both Primary Schools and Secondary Schools audio-visual materials were used most frequently in the teaching of nutrition. However, for instruction in food preparation more audio-visual materials were used at Key Stage 2 than at Key Stages 3 & 4. This may be related to the lack of constraints at Secondary level compared to those in Primary School, for example, it would appear that teachers in Primary Schools are more likely to teach food preparation using a video as they do not have the equipment to demonstrate the techniques directly. Most Secondary Schools have kitchens available for use when teaching food preparation, whereas half of the Primary School teachers considered lack of facilities a major constraint.

In both the Primary and Secondary School surveys reported here it was discovered that the most important skill that it was believed that children should have was good personal hygiene. However, it must be argued that this is more a social comment than a realistic judgement of effective food hygiene practices. Good personal hygiene when cooking was also considered to be the most

important of all the skills listed both for Key Stages 3 & 4 and at Key Stage 2. While hand washing can greatly reduce the risk of gastro intestinal disease, it has a smaller role to play in the prevention of food poisoning. Further, when hand washing is considered, it is the washing of hands before the start of food preparation that is portrayed as important rather than the risk of cross contamination between raw and cooked food using the hands. The FDF(1995) reported that hand washing was the topic most likely to be explained to children by parents, however, only 37% of those questioned, in the FDF survey, considered personal hygiene to be of high importance on a personal level. There are a number of reasons why this is significant. Firstly, the children in question are likely to notice the disparity and deduce that it is what their parents do rather than what they say that is important. Secondly, the question that must be asked, is why parents are insistent that it is important for children to learn about hand washing if they themselves do not consider it an important practice. One possible answer to this question is that parents do not have sufficient knowledge about food hygiene to know of a more appropriate alternative upon which to place emphasis.

Investigations into the epidemiological causes of foodborne illness suggested that personal hygiene did not appear to contribute significantly to incidents of foodborne illness (Bryan, 1988; Roberts, 1982), however this data relates only to outbreaks where factors are known (Ryan et al., 1996). Thus while it is considered important by parents and teachers to provide instruction on personal hygiene such behaviour may have only minimal effect on food safety (FDF, 1995). Nonetheless, hands can be implicated both in incidents of cross contamination, and where the food handler is infected, and both these factors

were implicated by Ryan et al. (1996) in general outbreaks of foodborne illness. The 1996 FDF survey found that, of respondents with children under 15, 62% believed that children should learn about food safety at school but 72% believed that they should be taught at home. This compares with 75% of children who say they had been taught about food safety at home and 51% at school in the same survey. Although, the work by the FDF (1996) considered a different age group to the one in the present study, it is of interest to note the difference between where adults believe that children should learn versus children's beliefs. Also, only half of these children report learning about food safety at school, in comparison to the much higher numbers of teachers in our surveys who report teaching in this area. While it must be acknowledged that our response rate was low and the results compiled purely from teachers in South Wales such a disparity is surprising. However, the results would appear to indicate the teachers who responded were the most interested in the subject of food thus this could have skewed the results.

#### **5.5.4 Food Hygiene at Key Stage 3 & 4.**

Fox (1970), WHO (1986) and Pennington (1997) have all recommended that food hygiene be taught to students in schools. Only one respondent out of a total of 65 in this survey said that food hygiene was not taught to key stage 3 and 4 pupils. However, 1 out of 65 is still 1.5 percent. With Wales having 227 Secondary Schools and England a further 3494, it can be seen that potentially there are 66 schools in England and Wales where food hygiene is not taught. As mentioned however, due to the relatively low response rate this type of argument may be defective, nonetheless it raised doubts about the quantity of

teaching of food hygiene while it is not part of National Curriculum.

Although no surveys similar to this one have been conducted there are existing data that can be compared. Data from the FDF survey (1995) suggested that while mothers are considered the main source for information about food hygiene for younger children, as they got older schools assumed more importance. In chapter 7, research into the importance of peers and parents on children's attitudes will be considered. While the present studies demonstrated only a slight increase in the instruction in food hygiene between Primary and Secondary Schools, it is to be expected that older children rely more on normative influences outside the home. This provides a partial explanation for the proposed diminishing importance of maternal influence with age seen in the FDF results. According to teachers, other than schools, the media are the largest providers of information to children, with family and friends the next.

#### **5.5.5 Relationships between specific food related skills and food hygiene, nutrition and food preparation.**

Correlations were detected between how important teachers considered food hygiene to be and the importance they placed on 'preparing meals with good personal hygiene', 'correctly reheating ready made meals', 'storing raw foods correctly' and 'storing cooked foods correctly'. As mentioned above, the results for Primary School teachers indicated that they considered 'maintaining good personal hygiene' to be the most important food hygiene skill for children, leaving Primary School, to have. The results from the FDF surveys also support this assumption with 29% of respondents citing poor personal hygiene as the main reason for foodborne illness in the home (FDF, 1993). Ryan et al (1996)



found that a more than a third of general outbreaks of food poisoning were caused by either cross contamination or an infected food handler, both of which could be decreased as risk factors if appropriate hand washing took place.

Similarly, there was evidence both from the FDF surveys (FDF, 1993-1996) and Ryan et. al. (1996) to support the importance that teachers placed on storing food at appropriate temperatures, and heating food adequately.

There was no correlation between how important teachers considered food hygiene to be and 'cleaning food surfaces correctly'. This is in contrast to the 1993 FDF survey where 20% of respondents considered cleaning surfaces as one of the ways to decrease the risk of foodborne illness. Inadequate cleaning can lead to cross contamination which is a major factor in outbreaks of foodborne illness (Roberts, 1982; Bryan, 1988). Further, Ryan et al. (1996) found that cross contamination was implicated in 28% of general outbreaks of food poisoning in England and Wales, between 1992 and 1994. While there are many other ways for cross contamination to occur, surfaces not cleaned properly is a notable one.

The positive relationship between the importance placed upon specific hygiene skills and the food related topic was not replicated for nutrition or food preparation. In the area of nutrition such a result is unexpected. Recent reports in nutrition stress the importance of choosing food that is low in sugar and fat, high in fibre and also of being able to choose foods for a balanced diet as recommended in the COMA report (Anon, 1988) however, measurement of these actual skills did not correlate with the general importance of nutrition. Possible explanations for this are difficult to envisage and further investigation may be needed. Competency in the areas of food preparation and nutrition

suggested in this questionnaire were evidently not the skills considered important by those teaching the subject.

The respondents in this survey generally believed that there was a difference in skills between those who had studied food related areas and those who had not. This could be considered a positive finding as it provides evidence that teaching in these subjects is believed to be beneficial. However, there are a number of difficulties with extrapolating from these findings. Firstly, as these are the opinions of the teachers they may not reflect the actual position. Secondly, as schools are not the only source of information about food, schools may not be as strongly influential as teachers believe. Thirdly, teachers may need to believe that their students know more than those who have not studied the topics. However, even if teaching in schools is as significant as teachers believe it could still be argued that learning in schools is context specific, thus reducing or even nullifying the importance of this finding.

Only 47% of Primary School teachers surveyed taught food preparation to their pupils at Key Stage 2, the majority taught food hygiene but most did not consider it to be very important. However, the respondents believed that the majority of children leaving their schools did not have the skills necessary to keep food safe to eat. It is possible that the teacher's ambivalence was affecting their ability to provide the relevant information. This is in stark contrast to the results, from Secondary Schools, discussed above.

Although caution must be taken when extrapolating from this data due to the low response rate, it would seem to be accepted that the teaching of food preparation is declining (Geen, 1993; Lang & Baker, 1993). Thus, if more than half of the teachers surveyed do not teach food preparation consideration must

be given to the question of where the large majority of children who prepare snacks and sandwiches regularly, or the 45% who prepare meals from raw ingredients acquire their skills. Moore et al (1992) and Griffith et al (1994) have considered the use of media information as a means of acquiring knowledge about food. They found that the print media is used extensively despite the fact that it provides insufficient or incorrect information, specifically about food hygiene. Thus, it can be suggested that despite the large numbers of Primary School children who prepare food that they may have insufficient information to do so.

Of the areas suggested to the teachers as important the five most commonly cited were 'Prepare meals with good personal hygiene', 'correctly reheat ready made meals', 'store raw foods correctly', 'store cooked foods correctly' and 'prepare meals from raw ingredients'. As can be seen these factors are all food hygiene related and in chapter 6 will be compared with those obtained from children and young adults using a free form statement.

#### **5.5.6 Texts used in the teaching of food hygiene**

Although a wide range of the available publications contain information on food hygiene, it must be concluded that both the quantity and the quality of this information is below that recommended by ICMSF (1988). A small number of the texts examined provide greater than average information on food hygiene and foodborne illness, however, none of the general Home Economics texts in use in South East Wales at the present time provide sufficient material for proper understanding of the subject. There are three main conclusions that arise from this. The first is that if teachers are using these books in the belief

that they are providing the appropriate level of teaching then they are in error, which may mean that retraining of teachers may be necessary. However, a small proportion of the teachers had received training in food hygiene e.g. basic food hygiene certificate, and others said that they used audio visual materials as well as personal teaching packs, so it is unlikely that the teachers relied totally on the text books. Therefore it would appear that a more important priority for the publishers of text books to improve their provision of information on food hygiene.

The second point that can be considered relates to students obtaining food hygiene information from other sources. If the students in South East Wales are not being provided with sufficient information in schools and if they are not receiving information from other sources then they are unlikely to know enough to implement safe food practices.

Thirdly it may be suggested that if changes are not made to the present system of teaching food hygiene then this may have an affect on the incidents of foodborne illness.

## 5.6 Conclusions

Design and Technology is the main subject in which food related topics are taught. The teachers surveyed considered that provision of instruction in food preparation, nutrition and food hygiene to be almost equally important.

Preparation of meals using good personal hygiene was believed to be the most important skill that children could have. Teachers believed that there was a significant difference in the skills base of those who studied food related areas and those who did not. In general, the beliefs of teachers about the areas that children should have knowledge, correspond to those suggested in the equivalent parts of the FDF (1993-1996) surveys. In chapter six these beliefs will be compared to those obtained from the children themselves.

## **CHAPTER 6**

**The food hygiene beliefs of children and young  
adults in South East Wales.**

## 6.1 Introduction

In this chapter the food safety beliefs of children and young adults will be assessed. These beliefs will be compared to the literature in the area, and will be used to form the attitude scale used in chapter 7. The results of chapter 3 and 4 about teachers' beliefs about food safety will be compared to the beliefs of children and young adults. Further the results will be considered in light of the food preparation practices measured in chapter 3 to examine the possible impact that incorrect beliefs could have.

A number of recent surveys have considered the practices that people can undertake to keep food safe. One of the most important groups of studies is that of the FDF (1993-1996), as reported in chapter 2, Table 2.5, which was conducted by MORI. Over the four years of this study the most commonly held belief was that if food was not cooked properly it could cause food poisoning. No information was provided about the criteria used by MORI to devise their questions and further, in all these surveys the respondent was shown a pre determined list of factors from which to choose. This has two implications, firstly, all the factors chosen were believed by those who compiled the list to be instrumental in food poisoning, therefore it was impossible for the respondent to be wrong. The second implication is that the order in which they were presented may have influenced people to respond in a particular way. Another problem with these surveys is that the respondents were asked a hypothetical question, rather than what they themselves were likely to do i.e.;

*"Which of the following do you believe are most likely to cause food poisoning in the home?" (FDF, 1996, p.5).*

The epidemiological data reported in chapter 2 (table 2.4 and table 2.5) also

contains factors that are believed to cause foodborne illness. The difficulty with concluding that this is what consumers do is that these figures are based on retrospective analysis of food poisoning incidents which have been notified to the authorities and do not include any consideration of whether these are the same factors which influence unreported incidents.

There has been very little research into what children's beliefs about food hygiene are, the exception being the 1995 and 1996 FDF surveys but with the same methodological difficulties as outlined above.

The purpose of this section therefore was to produce a method of collecting data which would overcome all the above mentioned difficulties, and would allow comparison. Thus, a free form statement was devised which enabled the collection of data which could both avoid the imposition of bias from the type of practices listed and could be compared to the FDF data.

However, there was also a second purpose to this piece of research and that was to determine the beliefs of children and young adults about food hygiene in South East Wales, so that a questionnaire based on the theory of reasoned action could be developed.

According to the Theory Of Reasoned Action, attitudes are made up of beliefs about outcomes and evaluation of those outcomes, (Ajzen & Fishbein, 1969; Conner & Norman, 1996). Ajzen & Fishbein (1980) recommend that the modal salient beliefs of the population under investigation be used to formulate the questionnaire.

The generally accepted method of obtaining these is by a pilot study (Towriss, 1984), that is, a pilot study is used to determine the beliefs of the group which are then used to construct the questionnaire.



## 6.2 AIMS

- To determine the beliefs held by children and young adults about food safety practices.
- To compare the beliefs about food safety practices held by the different age groups.
- To compare these beliefs to behavioural practices obtained from studies of food poisoning outbreaks.
- To obtain the modal salient beliefs necessary to construct a questionnaire based on theory of reasoned action.

## 6.3 Method

### 6.3.1 Design

After much consideration and investigation of the relevant literature an open ended statement was produced. This format was chosen for three reasons. Firstly, the beliefs that were held by respondents, whether based on correct knowledge or not, were wanted, and it was felt that using closed or multiple-choice questions would not allow this. Secondly the format of all previous surveys into knowledge about food hygiene was such that respondents had to choose their answer from those provided. A comparison with such surveys was considered important to determine the extent to which the type of questionnaire used may bias the answers. Thirdly, the results obtained from this procedure were to form the basis of the application of the theory of reasoned action to food hygiene, therefore the procedure that Ajzen & Fishbein (1967) recommended was used.

The statement that was put to the respondents was:-

If we do not eat we will starve and die. Sometimes, however, the food we eat makes us sick. Please list the six most important things you think you can do to make food safe to eat.

This statement was piloted on a small group (n=12) representative of the main sample, and no changes were deemed necessary (appendix 4).

### 6.3.2 Procedure

Primary and secondary schools within the South East Wales area were randomly selected to participate in this study. Stratified sampling was used to ensure that both urban and rural schools were included, as well as schools with a broad catchment area representing all socio-economic groups. All schools who were asked agreed to participate. Permission from the Local Education Authority and the head teachers was obtained before the teachers were approached. Two classes of primary school students were chosen, and four differing age groups from two secondary schools were also selected. Students in a college of the University of Wales were also questioned. The question was administered to the sample in groups of approximately 30 within the school or university setting. The question took between 10 and 15 minutes to complete.

### 6.3.3 Subjects

A total of 438 subjects participated in the study. A breakdown of age and gender of participants is provided in table 6.1. For the purposes of analysis the subjects were divided into the same age groups as those used in chapter 3, so that comparisons could be made. Thus respondents ranged in age from 10 to 21.

Age	Male	Female	N
10-11	55	63	118
12-15	63	65	128
16-18	36	69	105
19+	29	58	87
Total	183	255	438

Table 6.1. Age and gender of subjects

#### **6.3.4 Analysis**

SPSS PC for windows was used to analyse the data. As a free form question was used a structured coding system was implemented using 16 response groups. A separate category was created for any non-responses. As the answers were not ranked all six responses were included, so the results are the most frequently occurring answers taking no account of the order in which they appeared. Chi square tests were performed on the data to determine if there was any relationship between beliefs and age.

## 6.4 Results

Results for the group as a whole will first be presented, followed by results according to age and finally by the Chi square analysis.

Cook properly	301	69%
Wash hands	249	57%
Best before date	219	50%
Keep refrigerated	198	45%
Keep covered	165	38%
Clean surfaces	123	28%

Table 6.1 The top six results for the whole group according to the frequency of their occurrence and expressed as percentages

The most frequently occurring answer was 'cook food properly', with more than three hundred of the respondents including this in their top six preventive measures that can be undertaken to keep food safe to eat. Two answers related to cleanliness which were 'wash hands' and 'clean surfaces'.

More than half of all respondents considered cooking food properly, washing hands when preparing food and checking the best before date to be important practices to undertake to ensure food was safe to eat.

Age	9-11	12-15	16-18	19+	Total
Check the best before date	1	5	3	2	3
Wash hands before cooking	2	1	2	4	2
Cook food properly	3	2	1	1	1
Keep food refrigerated	4	3	6	3	4
Keep food covered	5	4	4		5
Wash food before use	6				
Keep raw and cooked food apart			5		
Use good hygiene practices when cooking				6	
Clean surfaces		6	6	5	6

Table 6.2. Top six beliefs from sample according to age

The most commonly occurring response for the age group 9-11 was 'check the best before date', for the second age group it was 'wash hands', for the third and fourth it was cook food properly, which corresponds to that of the group as a whole. The youngest age group considered that washing food before use was important, which none of the other groups mentioned. The oldest age group considered that using good hygiene practice was important, and again none of the other groups mentioned this. However, it must be noted the this is a very comprehensive statement which may be too general to mean anything, in terms of its applications. The group 16-18 considered keeping raw and cooked food apart to be important.

$\chi^2$	df	p<	
29.93	3	.001	Cook properly
36.15	3	.001	Wash hands
11.94	3	.010	Best before date
15.51	3	.010	Keep refrigerated
30.10	3	.001	Keep covered
28.11	3	.001	Clean surfaces

Table 6.3 Chi-square tests across age

In this section the results for the age groups were compared and chi squares were calculated based on the frequency of response for each group. For each of the top six beliefs a separate test was calculated and the results are tabulated in table 6.3. The beliefs held by the various age groups differed significantly, with the factors 'best before date' and 'keep refrigerated' significant at the 0.01 level and the other 4 at the 0.001 level. It can be seen therefore that the age groups differed from one another in the frequency the factors were mentioned.

## **6.5 Discussion**

### **6.5.1 Introduction**

In the following discussion the results obtained will first be considered generally. This will be followed by consideration of the results as they apply to children of primary school age, then to those of secondary school age and finally to those in post compulsory education. Finally, the conclusions reached will be outlined.

### **6.5.2 The beliefs about food safety for the whole sample**

The number of subjects who consider cooking food properly to be an important practice to avoid foodborne illness increases with age. Using a different methodology the 1996 FDF report the most important perceived cause of food poisoning was food not heated/cooked properly. Although the pattern of responses for the other categories was not consistent, all showed significant differences between the age groups.

Only two categories of preventative behaviours, suggested by the subjects, are to be found in the data obtained from studies of actual outbreaks of foodborne illness (table 2.3 and table 2.4). These are cook properly and keep food refrigerated. This poor match between consumers' beliefs concerning specific food handling practices and those identified for food poisoning outbreaks is a cause for concern.

Beliefs about the importance of refrigeration were given more frequently by the younger children. FDF data suggest that this is a topic that is explained to children by their parents (FDF, 1995) although it does not seem to make a



lasting impression. This is also of consequence as refrigeration is important particularly in the storing of cooked foods.

Beliefs concerning hand washing are relatively consistently held by school children, but are of decreasing importance in the beliefs of those of 19 years old. One of the possible reasons for this is that hand washing is frequently mentioned to children both at home and at school (FDF, 1995). Whilst of importance in the prevention of gastro-intestinal diseases, e.g. dysentery, which are spread by direct hand to mouth contact, it was not mentioned in the epidemiological data mentioned above. Only 38% of adults in the FDF survey considered hand washing important yet 75% of parents told children about it and considered it an important thing for children to know.

#### **6.5.2 The beliefs about food safety of primary school children**

As with all other age groups no mention was made of the dangers of preparing food in advance of cooking which is one of the risk factors involved in food poisoning. While temperature control and the use of heat to render food safe to eat are represented which shows some understanding of the issues involved, there is no mention of cross contamination.

Hand washing when mentioned was hand washing before cooking. This is important as the majority of teaching in this area tends to involve teaching children to wash their hands before handling food. Yet, washing hands before handling raw food is generally of little importance if the food is to be cooked soon after, firstly as bacteria will not have a chance to multiply and secondly as raw food invariably contains microbes. What should be taught to children is to wash their hands **after** handling **raw** food, but **before** handling **cooked** food or food that is to be eaten without cooking. In chapter 4 the beliefs of Primary

School teachers were measured, the most important food safety belief was that it was important for children up to age 11 to be able to maintain good personal hygiene. This combined with the FDF results mentioned above about the importance that parents place on hand washing could explain why this age group considered hand washing so important.

Covering food was considered very important. An informal consideration of the actual answers given would point to a lack of understanding of how bacteria travel. For example, one child mentioned the importance of keeping the bathroom door closed to prevent bacteria from entering the kitchen, and more than one child considered keeping food covered important because of "bugs in the air", while this could mean flies or other flying insects, it does imply a lack of understanding about how microbes travel as airborne food contamination in the home is unlikely.

In the 1996 FDF report the most important perceived cause of food poisoning was food not heated/cooked properly. This compares to the highest answer for the total group in the present study and supports the results. A higher proportion of children than adults in the FDF report considered use by/best before dates important which would support the present results. Thus, it would appear that food safety information is being learned but it would seem to stress the aspects that do not appear when outbreaks of foodborne illness are considered.

### **6.5.3 The beliefs about food safety of secondary school children**

In chapter 3 it was seen that 61% of 12-15 year olds prepared meals from raw ingredients on a regular basis, and 69% reheated ready made meals with the same frequency. Storage of food properly and preparing meals with good

personal hygiene were the food safety aspects considered important.

A comparison with the results of chapter 4 would indicate that both teachers and pupils agree on the importance of hand washing (part of personal hygiene). However there is disagreement on storage and cleaning surfaces. Students, but not teachers, considered cleaning surfaces important, and vice versa for storage at correct temperatures. While part of this may be explained by the difference between the questionnaires it does suggest that students may not be attending to the messages teachers are imparting, or that they doubt their importance, and also that they are obtaining contradictory information from other places or people. The FDF 1996 report found that 80% of the respondents aged between 11 and 15 prepared food. While slightly more of the children in the present survey claimed to prepare food, it is a similar response. In the FDF report children were asked whether they always observed safe food practices. Only 37% of children ensured food was always piping hot, only 47% claimed to always wash their hands, and only 50% never ate food past the sell by date. This compared to 55%, 33% and 23% respectively who believed that these factors were the causes of food poisoning in the home. So it would appear from the FDF report that there was a disparity between the knowledge that children had and their self report of behaviour. In the present study the percentages of children who believed that these factors would keep food safe to eat were 64%, 70% and 43%. Thus more children in this survey considered these factors important.

#### **6.5.4 The beliefs about food safety of children in post compulsory education**

Between the age groups 16-18 and 19+ a difference in the importance placed upon the different factors associated with food safety was found, however, the factor "cook food properly" was the most popular answer for both groups as it was for the group as a whole. The FDF 1996 report considered a sample of adults aged 15+ which while different to this sample can be considered comparable. The FDF report found that food not cooked properly was considered the most probable cause of food poisoning in the home (61%).

Altekruse et al. (1995) found that for the age group 18-29 for the factor "adequate cooking" 68% believe it important to cook meat correctly and 73% do so. It can be seen from these results that the majority of respondents to this type of survey believe that "cooking food properly" would help prevent foodborne illness. Bryan (1988) and Roberts (1982) report that undercooking food was responsible for only 15% or less of food poisoning, other factors were also highlighted in their studies, including "inadequate reheating". Ryan et al. (1996) found that inadequate heating was implicated in 35% of general outbreaks of food poisoning. If it is understood that to many people reheating food is cooking then there is less of a disparity between the survey data and the epidemiological data.

The age group 19+ make mention of "preparing food according to hygiene rules". While it implies an understanding that was not apparent in the younger age groups this term is all encompassing and may, therefore, be considered meaningless. Good personal hygiene were mentioned by 33% of respondents in the 1996 FDF survey respectively, and it is similarly too broad a term to have enough real meaning.

In a MAFF (1988) study, other than check the packaging, checking the best before date was seen as the most important thing to do to keep food safe. Although only a small number in the 1996 FDF survey considered using food after the best before date to be a cause of food poisoning 64% claimed they always checked it before buying food. This may suggest that at the point of sale customers inspect the food but that once purchased believe it to be safe. In the present study "check the best before date" was considered one of the most important things people could do to keep food safe to eat, but no mention was made as to whether this should be before purchase or before eating, thus the results could be comparable with the FDF (1996).

Refrigeration of food featured in the top six ways to keep food safe to eat for all age groups. The results of the FDF report suggest that the majority of their respondents did not know the correct temperature at which a refrigerator should run, and even more disturbingly the response given as to why the refrigerator should be run at this temperature was to stop food going off. This implies that food spoilage is considered more important than growth of pathogens. The implications of this are twofold. Firstly, although refrigeration is believed to be important it appears that very little consideration is given to temperature control once food has been stored, the suggestion being that refrigerators automatically operate at the correct temperature, thus, providing a false sense of security. Secondly, if, as the FDF report implies, the majority of people believe that refrigeration is important to stop food going off, then it raises the question as to whether people realise that

- Food that is visually spoiled is generally microbial safe and
- Microbes are invisible to the naked eye thus it is impossible using ones senses to detect food that could cause food poisoning.

The results listed in table 6.5 are from a survey by Mathias (1995) using the same statement upon which this work was based.

Wash hands	73
Keep work surfaces clean	65
Cook food thoroughly	48
Use clean utensils	47
Store food correctly	45
Buy fresh food	45

Table 6.5 The six most commonly occurring responses from a sample of adults in South East Wales, expressed as percentages

These responses differ substantially from those obtained by the total sample in this group and from those obtained by the oldest age group. They also differ from those obtained from the FDF surveys.

Nonetheless, hand washing again appears to be one of the most important beliefs that people have about food safety rules, The results of the FDF (1993-1996) support this statement as do the results from chapters 3 and 4 where teachers mentioned personal hygiene and hand washing as very important. However there are discrepancies both between what people want their children to learn as discussed in 6.5.2 and between what people say and what they do. Altekruze et al. (1995) found that for the age group 18-29 81% of respondents believed that hand washing before preparing food decreased the risk of food poisoning, but only 58% of respondents washed their hands after handling raw poultry. This discrepancy between beliefs and actions will be explored further in chapter 7.

## 6.6 Conclusions

Significant differences were found across age for each of the top six beliefs concerning food safety.

The beliefs held by children differ from those held by adults.

The results of this study for the group as a whole are similar to those of the FDF surveys (1993-1996).

The majority of commonly occurring answers proposed by this sample differ from epidemiological data.

The most commonly occurring belief was "cook food properly".

The modal salient beliefs of the age group 11-19 were obtained and will be used to construct an attitude questionnaire based on the Theory of Reasoned Action (Fishbein & Ajzen, 1975).

## **CHAPTER 7**

### **The application of the Theory of Reasoned Action to food hygiene.**



## 7.1 Introduction

### 7.1.1 Investigations into food hygiene practices

One of the consequences of increases in food poisoning (Maurice, 1993) has been the development of interest in looking at people's knowledge, beliefs, and practices. Of particular importance is the series of National Food Safety Reports (FDF, 1993-1996) which examine these concepts, highlighting, however:

*"the anomaly that while most people are aware of the need for good food hygiene, they do not always practice it" (FDF, 1994, p.1).*

The above demonstrates one of the biggest problems for anyone involved in Health Education, which is the disparity between knowledge and practice. Other work has been done in America (Albrecht, 1995; Altekruze et al., 1995) and in Great Britain (Walker, 1996) relating knowledge to practice. The general results of these studies indicate that knowledge of food safety practices does not directly relate to good food handling processes. It should be noted that all these studies rely on self-report as the measure used to determine behaviour. (See chapter 2 for further details as to limitations with this form of data collection). Also, with the exception of the two most recent FDF reports none of these studies considered children younger than 15. As this population are now, and may be preparing food for themselves in the future, it can be postulated that their attitudes to food hygiene will have an impact on future incidents of food poisoning.

The use of psychological theories and models in the area of health promotion appears to be on the increase (Conner & Norman, 1996). A major reason for this is that it is believed that the use of models or theories will make health promotion more effective. Despite the call by a number of experts in the area of food hygiene (Griffith et al., 1995) very few of these studies base their questionnaires on or around any theory or model.

### 7.1.2 Use of models or theories in the study of food hygiene

Within the area of health promotion there are two main reasons for applying models, one is to theoretically understand the area under consideration, the second is to plan interventions. Social cognition models are used for both these purposes, as use of the model may help to identify the variables involved, and from this the cognitions underlining unhealthy behaviour can be identified and interventions planned (see chapter 2 for further discussion of this area).

Rennie (1995) discussed the possibilities of using health models, specifically the Health Action Model, in the teaching of food hygiene in industry but no empirical study has been undertaken. Ackerley (1990) has suggested the application of the Health Belief Model for use in food hygiene teaching and has claimed to have had some success with this model in explaining food hygiene behaviour (see chapter 2 for details). However, it will be contended here that another model is also suitable for use in this area i.e. the Theory of Reasoned Action (see chapter 2). The Theory of Reasoned Action has been found to be slightly superior to the Health Belief Model in the amount of variance in behaviour explained (Oliver & Berger, 1979, Rutter, 1989), however, the converse has also been found to be true. For example, in an investigation into factors predisposing women to take precautions against breast and cervical cancer, Hill, Gardner & Rassaby (1985) compared the Theory of Reasoned Action with the Health Belief Model and found that ;

*"neither model, as judged by the size of  $R^2$  is clearly superior" p. 64*

Hill et al. (1985) further suggest that the advantage of the Theory of Reasoned Action is that it is more parsimonious with less components than the Health Belief Model, thus making it easier to use. Nonetheless, Stroebe & Stroebe (1995) suggest that where psychological models can be used they are to be preferred to specific health models in looking at health behaviour as it is not economically sensible to continue to use specific theories of health unless their

predictive success was greater than that of general models of behaviour, which has not been found to be the case.

### **7.1.3 The Theory of Reasoned Action**

Despite the general application of the Theory of Reasoned Action to certain other health behaviours (see chapter 2 for full details) it has never been applied to food hygiene. It has been applied with some success to the area of food choice (Conner & Norman, 1996). For example, an investigation into dietary change using the Theory of Planned Behaviour attitudes, subjective norm and perceived behavioural control explained 41% of the variance in intention, and intention and perceived behavioural control 5% of behaviour

There are a number of reasons why The Theory of Reasoned Action is believed to be appropriate in the area of food hygiene:-

- As it is very specific it may be a stronger predictor of behaviour than other models (Wallston & Wallston, 1984).
- It has been applied successfully in areas as diverse as voting behaviour and breast feeding (Fishbein & Middlestadt, 1987; Hoogstraten et al, 1985; Cochran & Mays, 1993; Conner & Norman, 1995; Eagly & Chaiken, 1993), and for a complete overview see chapter 2 (literature review).
- It is useful for comparisons across groups as it can be applied to significant others in the individual's social sphere.
- It is also suitable for use with children (Schaalma et al, 1993) and the normative influences are very relevant to children due to the peer pressure that is prevalent in society (Wallston & Wallston, 1984).
- The Theory of Reasoned Action/ Planned Behaviour has been used extensively in the area of food choice (Shepherd & Stockley, 1987; Shepherd, 1995; Raats, Shepherd & Sparks, 1995; Conner & Norman, 1996; Frewer et al., 1995). As the area of food choice may be seen to be similar to food hygiene behaviour it was deemed important to be able to compare the two.

#### **7.1.4 Self-report Versus observations of Behaviour**

As mentioned in chapter 2 questioning on a particular topic may lead the respondent to answer questions in a particular way. For example, if a subject answers questions about their attitudes to a particular entity, this may lead to over or under estimation of the frequency of their behaviour or even to falsehoods, however, the inverse is also true where a respondent may judge their attitudes on what they observe about their own behaviour (self-perception theory, Bem, 1965).

The majority of studies into the Theory of Reasoned Action have relied on self-report measures of behaviour (Ajzen & Fishbein, 1980; Conner & Norman, 1996; Eagly & Chaiken, 1993; Stroebe & Stroebe, 1995), and the majority of work into food hygiene relies on this method of data collection (Albrecht, 1995; Altekruuse et al., 1995; Walker, 1996). On the whole, little distinction is made between the different possible measures of behaviour either in health behaviours or attitude behaviour research generally (Stroebe & Stroebe, 1995, Eagly & Chaiken, 1993, Conner & Norman, 1996). In some areas (e.g. condom use) it appears obvious that self-report is the most practical way of measuring behaviour, however, even in areas where observations are possible (e.g. mothers' infant feeding, Manstead et al., 1983) it still appears that questionnaires are chosen. No comparisons appear to have been carried out to compare self-report and observations of behaviour as they relate to the predictiveness of the Theory of Reasoned Action. This deficiency in the study of the Theory of Reasoned Action partially explains why both measures of behaviour are used in the present study. The main reason relates to studies of food hygiene where observations have been carried out, which highlight inconsistencies between what people say they do and what they actually do, for example, consideration of fridge temperatures in the 1994 FDF report (FDF, 1994). Worsfold endeavoured to determine what exactly people do when preparing food and how this related to self-reports of behaviour. Her findings denoted an apparent disparity between self-report of behaviour and observation

in the area of food hygiene, indicating the need for concurrent measurement of behaviour using both methods (Worsfold & Griffith, 1995).

## 7.2 Aims

- To measure attitude, subjective norm, intention and self-report of behaviour with respect to food hygiene.
- To analyse the relationship between the different components of the model.
- To determine how useful the Theory of Reasoned Action would be in the prediction of food hygiene behaviour.
- To compare self-report of behaviour with observations of behaviour for specific food preparation practices.

## 7.3 Method

### 7.3.1 Design A (Self-report)

A questionnaire was designed based on Ajzen and Fishbein's Theory of Reasoned Action (1969). This procedure is recommended by a number of authors (e.g. Conner & Norman, 1996) as the most appropriate method for use in implementing the Theory of Reasoned Action, and was followed here.

According to the theory, measures of intention, attitude, subjective norm and behaviour should be devised based on the salient beliefs of the group being surveyed, or a similar group. The first step, therefore, was to determine the modal salient beliefs held by the sample group. These were obtained by a pilot study which is the generally accepted method (Towriss, 1984).

#### 7.3.1.1 Measures

##### Salient beliefs

The beliefs for this questionnaire were obtained by using an open question concerning the things children believed they could do to keep food safe to eat (see chapter 6 for a full outline of this procedure). The most commonly occurring six beliefs were chosen and are shown below:-

1. Cook food properly
2. Wash hands
3. Check the best before date
4. Keep food refrigerated
5. Cover food
6. Clean work surfaces

Table 7.1 The food hygiene beliefs elicited from a sample of children and young adults in South East Wales

These six beliefs were the most frequently suggested causal factors of food poisoning for the sample as a whole, as it was deemed important to use the same questionnaire over the entire age range to ensure that comparisons between ages could be made. These were combined with the six most common factors obtained from epidemiological data on the causes of outbreaks of food poisoning. The six beliefs elicited from subjects as mentioned in chapter 6 were not the most commonly quoted risk factors as determined by epidemiological research (Roberts, 1982; Bryan, 1988). Due to this inconsistency it was decided to include the most common causes of foodborne illness in the questionnaire.

This served a dual purpose :

1. it would enable a comparison to be made between modal salient beliefs and actual causes of food poisoning as factors leading to behaviour and
2. as measures based purely on salient beliefs may not gauge behaviours which could actually contribute to foodborne illness, the addition of other factors would provide people's attitudes, subjective norms, intentions and behaviours towards causal factors of food poisoning.

The final 12 salient beliefs used are listed below in Table 7.2

1. Clean all work surfaces after handling raw food
2. Check the best before date
3. Cover cooked food
4. Wash my hands before preparing cooked food
5. Reheat food until it is very hot
6. Wash my hands after preparing raw food
7. Quickly cool food after cooking
8. Clean surfaces before handling cooked food
9. Keep cooked foods in the fridge
10. Defrost food properly before cooking
11. Cook food until it is very hot
12. Keep raw food in the fridge

Table 7.2 The Final twelve salient beliefs used in the construction of the questionnaire.

For a copy of the questionnaire see appendix 5, and below find an outline of the standard procedure for scoring responses.

### Attitudes, behavioural beliefs and outcome evaluations

Using the salient beliefs outlined above, behavioural beliefs and composite scores of attitude were calculated. Two separate behavioural beliefs were measured, how advisable or how safe the practices were considered.

E.g.                               Next time I prepare food  
If I clean all work surfaces after handling **raw** food it will be  
Very safe.....Very unsafe.

The same format was used for 'advisable'. These beliefs were chosen after the elimination of unworkable ones in the pilot study and subsequent to intense debate with teachers and other experts as to appropriate terms for use.

A separate behavioural belief measure was utilised in the computation of the attitude score.

E.g.                               Food will be safe to eat next time I cook if I  
Clean all work surfaces after handling **raw** food  
Very likely.....Very unlikely

Outcome evaluations measured how safe food was believed to be if certain actions were practised.

I.e.                               Performing the above food handling behaviours is  
Very important.....Very unimportant.

Attitude was computed by multiplying the score on the outcome evaluation scale by the sum of the scores on the behavioural belief scale, i.e.  $\sum b_o$  where **b** equals behavioural beliefs and **o** equals outcome evaluations (see Figure 2.2).

### Subjective norm, normative influences and motivation to comply

The choice of parents and friends for normative influences followed the same procedure as outlined above. Further evidence in support of the choice of these two groups comes from Lau et al. (1990), who claim that parents and peers are;



*"the two most obvious socialising agents" p.241*

The resulting questions were thus

Next time I cook my parents think I should

Clean all work surfaces after handling **raw** food.

Very likely.....very unlikely

and

Next time I cook my friends think I should

Clean all work surfaces after handling **raw** food.

Very likely.....Very unlikely.

Motivation to comply was measured by asking how often in general

respondents did what they believed their friends/parents wanted them to do

I.e. How often do you do what your friends/parents want you to do?

Very often.....Very seldom.

Subjective norm was calculated by summing the normative influences and

multiplying by the motivation to comply, i.e.  $\sum nc$ , where **n** equals normative

influences and **c** equals motivation to comply (see Figure 2.2).

### Intention

According to Ajzen and Fishbein (1969), the main precursor to behaviour is

intention, thus they believe that intention must be measured in any attempt to

predict behaviour. Consequently, the first section of the questionnaire dealt with

intention to perform the behaviours based on the 12 factors outlined in the

previous section.

For Example, Next time I prepare food I intend to

Clean all work surfaces after handling **raw** food

Check the best before date

Response options ranged across a five point scale on this and all subsequent components of the questionnaire. These ranged from very likely to very unlikely I.e., Very likely.....likely.....neither.....unlikely.....Very unlikely

### Behaviour

Self-report of behaviour was measured with the following question.

When preparing food how often do you do the following?

Clean all work surfaces after handling **raw** food

Check the best before date

very often.....very seldom

etc.

### **7.3.1.2 Scoring**

All individual items in each component of the questionnaire were scored from -2 to +2 except motivation to comply and normative influence which were scored 1-5 as they were multipliers, and thus could not contain a zero. In addition to the individual scores for each component part, four separate scores were calculated and are discussed below.

### Attitude to food safety

Attitude scores were calculated using the formula  $\Sigma bo$  where b equals behavioural beliefs and o equals outcome evaluations. As there were 12 separate behavioural beliefs the final scores ranged from -120-+120.

For example

Food will be safe to eat next time I cook if I

Clean all work surfaces after handling **raw** food

Very likely	Likely	Neither	Unlikely	Very unlikely.
-2	-1	0	①	2

Performing the above food handling behaviours is

Very important	Important	Neither	Unimportant	Very unimportant.
1	2	3	4	⑤

If a respondent scored as demonstrated above, the score for that one item would be

$5 * 1 = 5$ , and for the scale would be the sum of this and of the other 11 items.

### Subjective norm

The scores for subjective norm ranged from -240 to +240, and were obtained by using the formula  $\sum nc$  where  $n$  equals normative influences and  $c$  equals motivation to comply, in a similar way to the method used in the above section. In the case of subjective norm however, as there were two normative influences listed (parents and friends), the total score was the sum of both scales.

For example

Next time I cook my parents think I should

Clean all work surfaces after handling raw food

Very likely	Likely	Neither	Unlikely	Very unlikely.
-2	-1	0	①	2

How often do you do what your parents think you should do

Very often	often	Neither	seldom	Very seldom
1	2	3	4	⑤

If a respondent scored as demonstrated above, the score for that one item would be

$5 * 1 = 5$ , and for the scale would be the sum of this and of the other 11 items.

### Intention to behave and food safety behaviour

Both intention and behaviour scores ranged from -24 to +24 and were obtained by adding together the 12 points on each scale, with negative scores indicative of disfavour to food safety and positive scores the converse.

For example

Next time I cook I intend to

Clean all work surfaces after handling **raw** food

Very likely	Likely	Neither	Unlikely	Very unlikely.
-2	-1	0	①	2

If a respondent scored as demonstrated above, the score for that one item would be 1, and for the scale would be the sum of this and of the other 11 items.

#### **7.3.2 Procedure A (Self-report)**

Four primary and three secondary schools in the South Wales area were approached and agreed to participate in the study. Students from a college of the University of Wales also participated. This questionnaire was administered at the same time as the questionnaire mentioned in chapter 3 thus the procedure followed the same format, except for the time, with this part of the research taking respondents between 15 and 35 minutes to complete.

#### **7.3.3 Subjects A (Self-report N=267)**

The breakdown of subjects is the same as that presented in chapter 3, and a visual breakdown is provided in Figure 7.1.

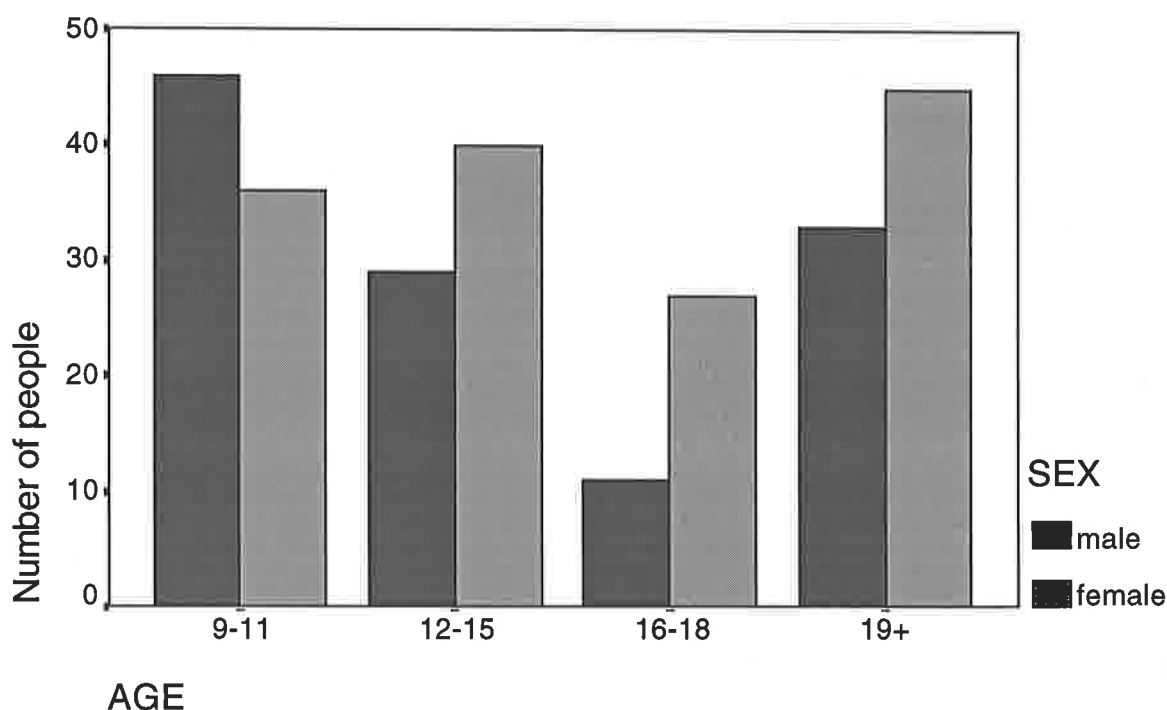


Figure 7.1 Subjects A (Self-report N=267) Breakdown by age and gender

### **7.3.4 Design B (Observations)**

A second study was undertaken based around the questionnaire (appendix 5) described in design A. It was decided to compare the results of self-report of food hygiene practices with observations of such practices. Thus a simple recipe (appendix 6) was chosen and the questionnaire modified in accordance (appendix 8).

#### **7.3.4.1 Measures**

It was believed that the recipe chosen had to fulfil certain requirements if it was to be a worthwhile procedure. They were as follows:-

- It had to be short, taking less than 30 minutes to complete.
- It had to involve some degree of cooking.
- The practices used had to include high risk activities as defined by food hygienists (Sprenger, 1993).
- It had to contain some high risk foods (Worsfold & Griffith, 1995).

- It had to be simple enough so that even those with very little cooking ability would be able to participate.
- It had to include performance of some of the activities that young adults said they could do to keep food safe to eat.

The recipe chosen was egg and tomato sandwiches as this fulfilled all the above conditions. Several factors from the first questionnaire had to be discarded as irrelevant at this stage e.g. components mentioning the reheating of food. The wording of the others was changed slightly to be specific to the occasion e.g.

*keep food refrigerated*

became

*keep mayonnaise in the fridge.*

One additional factor was added as it was suggested in the pilot study of this stage as relevant to this exact method. This was 'check egg shells aren't cracked'. Thus the final version consisted of 7 food safety factors specific to preparing egg and tomato sandwiches. To disguise the purpose of the experiment questions relating to nutrition and food preparation were included, increasing the total number of components in each scale to 17.

A 21 point observation check list (appendix 7) was designed based on the HACCP philosophy (Griffith & Worsfold, 1994). All items were scored on a simple dichotomous scale, i.e. if the food safety behaviour was engaged in one point was scored, if the behaviour was not observed zero points were scored.

There was one exception to this and that was hand washing. For measurement of hand washing there were 2 opportunities at which respondents should have washed their hands and at both opportunities there were 4 variables, the use of hot water, the use of soap, hands washed thoroughly, and hands dried thoroughly. For all 4 variables the respondent could score 1 if they performed the behaviour and zero if not and this was repeated at the second hand washing opportunity. (Hand washing had higher weighting than the other factors for a number of reasons. Firstly, according to many researchers (e.g. Ryan et

al., 1996; Wall et al., 1996) cross contamination and hand washing are potentially very hazardous. Secondly, according to respondents in chapter 6 hand washing was deemed very important when preparing food, and thirdly, there were two obvious opportunities to wash hands. ) Thus the total possible score was 27 which was the sum of all 19 individual observations plus a possible 8 for hand washing. For a copy of the questionnaire see Appendix 5.

#### **7.3.4.2 Scoring**

Thus the final questionnaire contained:-

1. An observation checklist with scores ranging from 0 to 27, with 0 indicating that no food safety behaviours were performed and 27 the converse.
2. A measure of intention with scores ranging from -14 which represented no intention of executing any food safety to 14 indicating every intention of doing so.
3. A measure of self-report of behaviour which was also on a -14 to +14 scale with -14 indicating that food safety behaviours were not performed and +14 the inverse.
4. Measures of subjective norm and attitude which were measured from -70 to +70 with the lowest scores indicative of negative subjective norm/attitude and positive scores the converse. These were calculated using the formulae  $\sum b_o$  and  $\sum n_c$  as mentioned in section 7.3.1.1.

#### **7.3.5 Procedure B (Observations)**

Students were drawn from a College of the University of Wales. The researcher approached students who were not studying food related courses to request volunteers. The experiment took place in the college domestic kitchens, with ingredients and utensils being provided. The subjects were informed that they would be observed but they were not at this point aware of why, as the observer did not wish to prejudice their behaviour. Knowledge of the purpose of the research could have affected the subjects' behaviour in a number of ways. For

the same reason it was not until after completing the cooking exercise that the students were asked to complete the questionnaire which is the way recommended by a number of researchers (Sherman, 1980; Baubaker & Fowler, 1990).

#### **7.3.6 Subjects B (Observation N=30)**

Students were drawn from the population of a college of the University of Wales. The researcher approached the students of all non food related courses to request volunteers. No payment was offered for their time although, if desired they could take their sandwiches with them after the session. Students were requested to sign a time table and turn up at the stated time, on a one to one basis. A total of approximately 70 students initially agreed to participate, however, only 30 students eventually participated. Although it was anticipated that there would be a number of people who did not attend, this response rate was disappointing. Some possible reasons included forgetfulness and the approach of exams, further, no follow up visits to remind students of the exercise were carried out, thus ensuring no coercion took place. No attempt was made at this stage to sample with regard to age or gender for two main reasons. Firstly, as a preliminary study it was believed that these variables were not as important as having a sufficient sample size, and secondly, because of the difficulty in obtaining sufficient subjects it was decided that introducing more restrictions on participants could render it impossible to obtain sufficient volunteers. The eventual breakdown of subjects is provided below in Figure 7.2



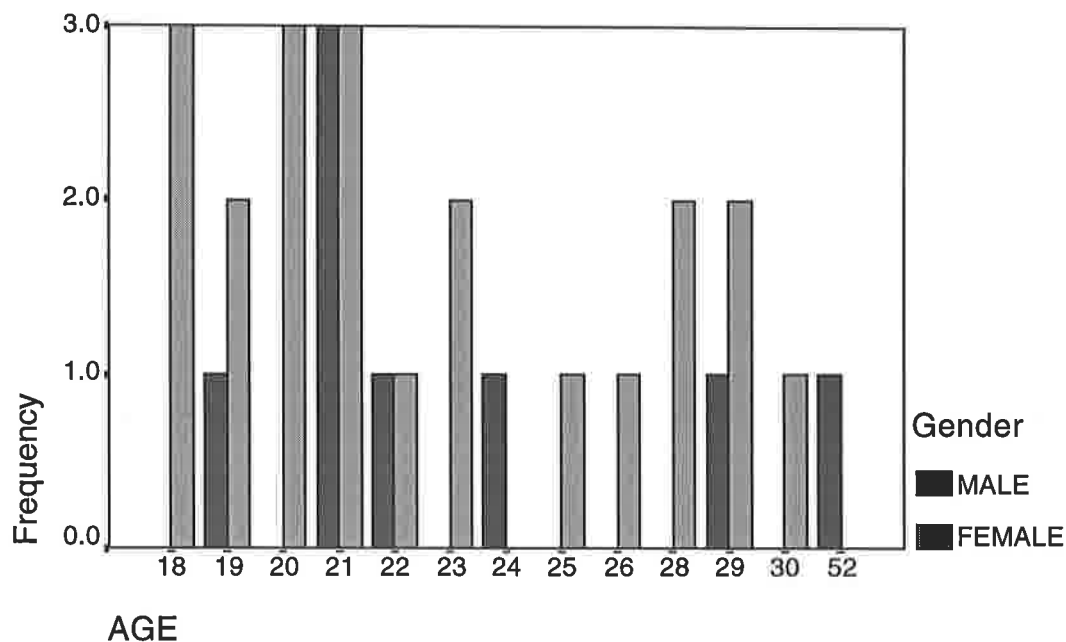


Figure 7.2 Subjects B (Observation N=30) Breakdown by age and gender

### 7.3.7 Analysis A and B (Self-report and Observations)

Descriptive analysis was initially performed on the data, using measures of central tendency and skewness. Because of the degree of skewness it was decided that the median would be used in preference to the mean as it is less affected by skewness. This skewness also affected the choice of inferential tests chosen. Although it could be argued that the data collected with this questionnaire were interval data, it was decided against using parametric statistics for two reasons. Firstly, the data were very negatively skewed. Secondly, as the data were drawn from an unstandardised scale, it was believed to be more correct for the data to be considered ordinal. Thus the correlations used were Spearman's Rho, and the tests of difference the Mann-Whitney. These tests are unaffected by extreme scores and no assumptions about the interval properties of the scale are made.

According to Fishbein and Ajzen (1969) correlations are the most appropriate way of measuring the relationships between the various different determinants of behaviour in their model. However, with recent advances in computers and the resulting ease of use of certain statistical tests it has been suggested that

regression analysis should be used when considering the model as a whole, with correlations being used when considering the component parts (Conner & Norman, 1995).

Thus, regression analysis was performed on the composite scores of behaviour, intention, subjective norm and attitude and on the data after grouping by age and by gender.

Next correlations were performed on the twelve factors which made up the questionnaire.

Finally, tests of significance of difference for groups were calculated for measures of attitude, subjective norm, intention and behaviour using the variables age and gender.

## 7.4 Results A (Self-report)

This section begins by providing a descriptive summary of the data obtained. The second stage involves examination of the model using regression analysis. Thirdly, the individual components of the model are correlated to judge the part played by each in the predictive success of the model. Finally, results of scores on attitude, subjective norm, intention and behaviour are compared to determine if they differ significantly across age and gender.

### 7.4.1 Descriptive statistics (Self-report)

#### Attitude

Attitude scores could range between 120 and -120. However, while the maximum recorded score was 120 the minimum score noted was -25 (Figure 7.3). While the median was 80, the mode was actually 120. There was a negative skew of 0.36. These scores are represented visually in Figure 7.3.

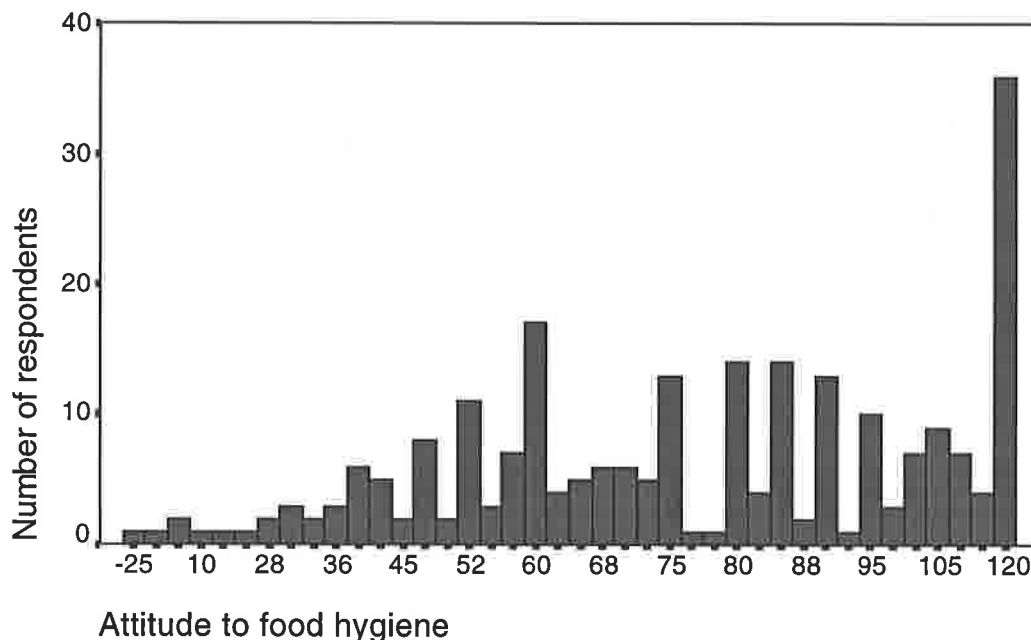


Figure 7.3 Attitude to food hygiene by number of respondents (A)

It can thus be seen that for all subjects the general attitude to food safety is positive. For example, only 2 subjects scored either 0 or less. This means that less than one percent of scores were negative. Whilst this may be considered an unusual spread of scores it is consistent with the positive scores generally

held about food hygiene as can be seen in figures 7.7, 7.5 and 7.6. There may be a positive response bias operating, but this will be considered further in section 7.6.4.

#### Subjective norm

The possible range of scores for this variable was -240- +240. However, the minimum reached was -60. The median was 108 and the mode 144 (Figure 7.4). There was a skew factor of .073. While the general pattern of scores are still positive (Figure 7.4), they were not as positive as the attitude results, and there were more negative subjective norm scores.

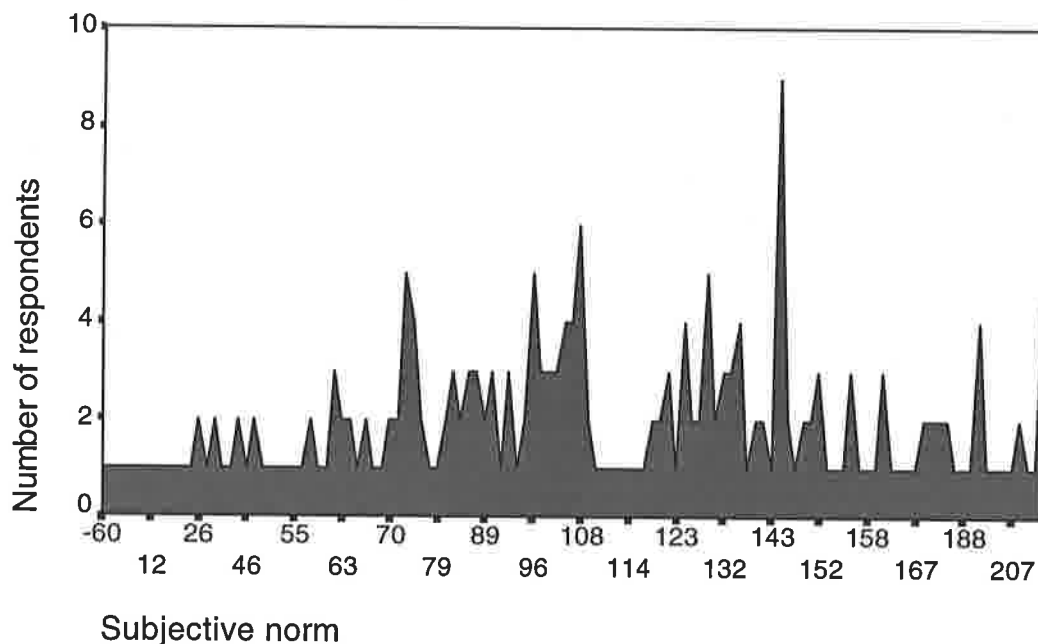


Figure 7.4 Subjective norm for food hygiene by number of respondents (A)

Thus while respondents generally have positive attitudes to food safety, for subjective norm either their normative influences are not positive or they are not motivated to comply, or some combination of the two. Generally, there was no obvious pattern to the scores.

### Intention

For intention, scores could range from -24 to +24, but the minimum reached was -19 (Figure 7.5). There was a median of 14, and a mode of 12. There was a skewness of -.969. These scores more closely resemble the attitude scores than scores for subjective norm. The scores highlight that respondents in general intend to perform food safety practices. The data were again skewed negatively with 50% of respondents scoring 11 or above.

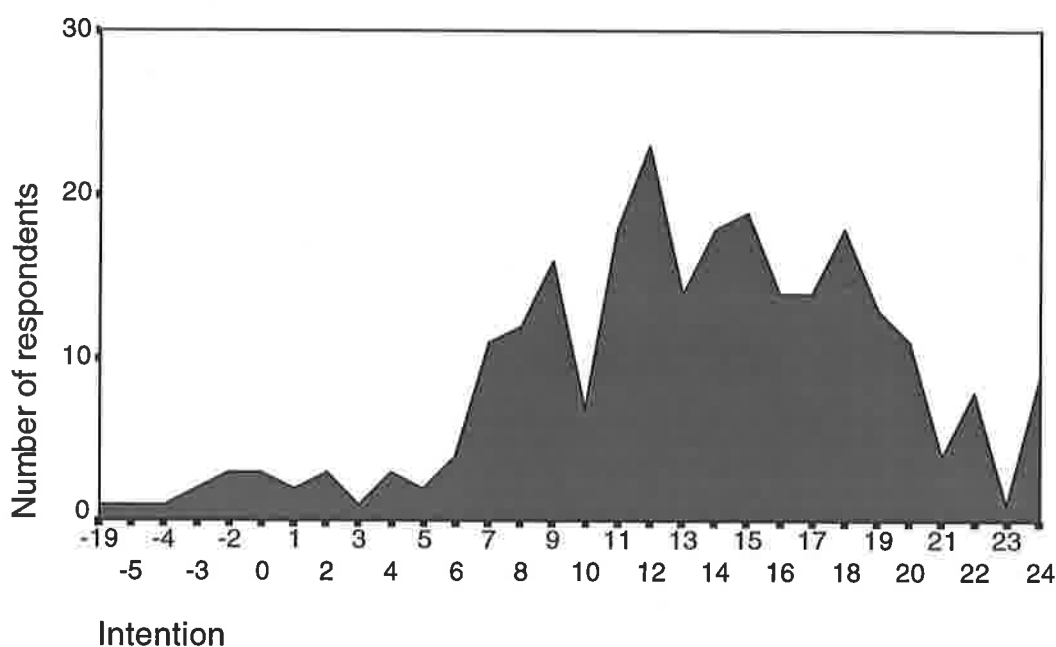


Figure 7.5 Intention to perform food hygiene behaviours by number of respondents (A)

It is possible as mentioned that a positive response bias may have occurred, but it is more probable that respondents have positive intentions regarding food hygiene behaviours.

### Behaviour- Self-report

For behaviour the range of possible scores was the same as that of intention, -24 to +24, with a median of 15 and a mode of 14 and skewness of -1.17 (Figure 7.6). The behaviour scores were the most strongly skewed with the majority of

scores falling between 11 and 24. Thus it would appear that respondents generally believe that they perform food safety practices.

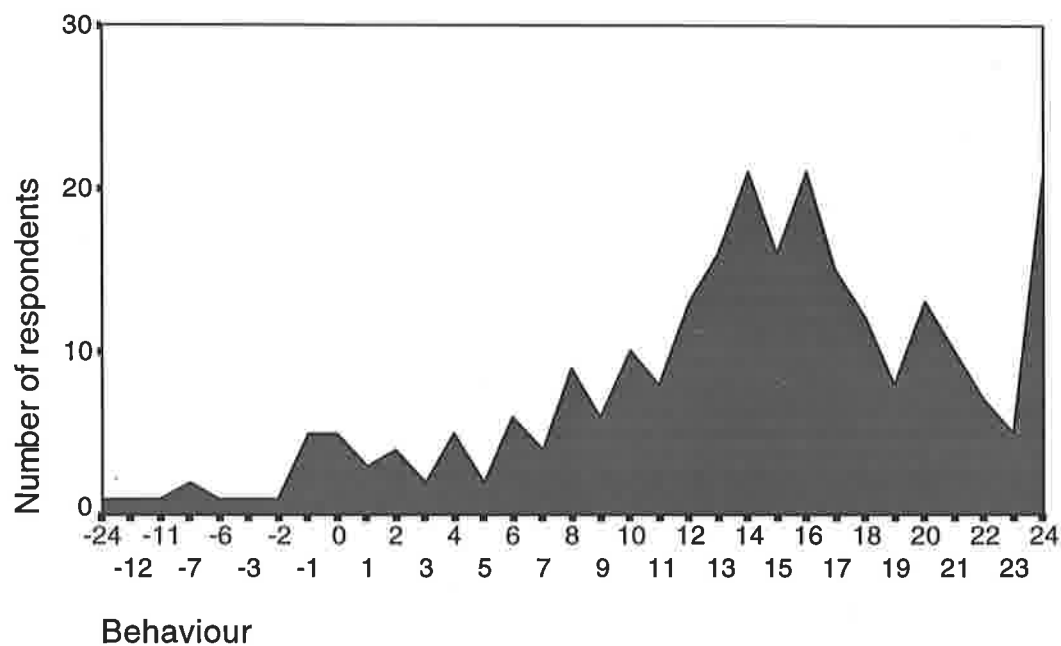


Figure 7.6 Food hygiene behaviours by number of respondents (A)

It can be seen therefore, that the majority of respondents in this survey believed that they behaved hygienically when preparing food

To conclude, respondents have positive subjective norms to food safety but their attitudes are even more positive. Subjects on the whole intend to perform food hygiene behaviours, but believe that they already behave in ways consistent with positive food safety practices.

#### 7.4.2 The Theory of Reasoned Action as it relates to food hygiene (A- Self report of behaviour)

In this section, regression analysis will be applied to the composite scores of attitudes, subjective norms, intention and behaviour. The aim is to determine the degree to which behaviour can be predicted from intention, and intention from subjective norm and attitudes.

##### Total Group

Multiple regressions of intention to attitudes and subjective norms were calculated. The final beta coefficients showed that both variables exerted a predictive effect on intention (Table 7.3). Thus both subjective norm and attitude are significantly related to intention to behave. These variables explain 31% of the variance.

Attitude Subjective norm ↓ Intention	Attitude Subjective norm Intention ↓ Behaviour
$r = 0.56$ $R^2 = 0.31$	$r = 0.71$ $R^2 = 0.51$

Table 7.3 Regression analysis for the whole group N=267 (A)

When combined with intention, attitude and subjective norm explain more than half the variance in behaviour (Table 7.3).

The relation between intention and behaviour was also significant and at 0.42 could be considered of a high magnitude (Figure 7.7).

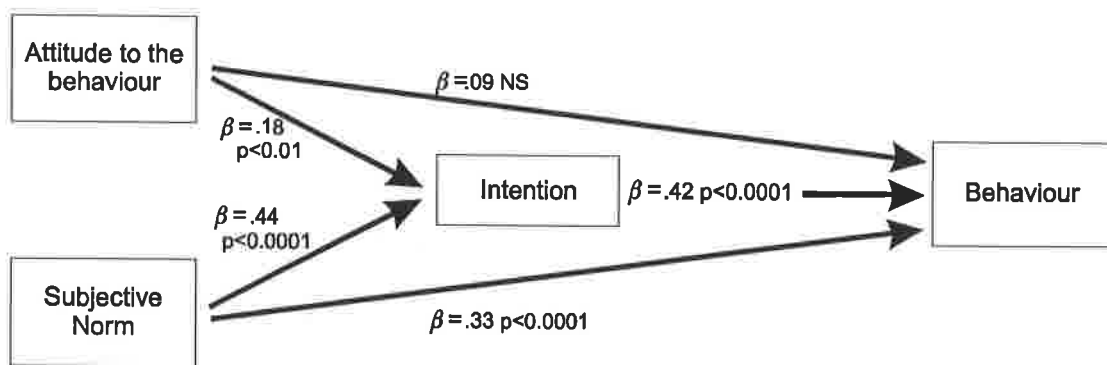


Figure 7.7 Regression analysis on the elements of the Theory of Reasoned Action with total sample N=267 (A)

Both attitude and subjective norm have an independent predictive effect on intention. There is however, a direct relationship between subjective norm and behaviour. This implies that subjective norm directly impinges on behaviour, which conflicts with the assumptions of the Theory of Reasoned Action.

Having considered the results for the whole sample in the previous section, the following section will consider the results for groups divided by age.

#### Age 9-11

Attitude	Attitude
Subjective norm	Subjective norm
↓	Intention
Intention	↓
	Behaviour
r = 0.54	r = 0.61
R <sup>2</sup> = 0.30	R <sup>2</sup> = 0.37

Table 7.4 Regression analysis for age 9-11 (N=82)



Attitude and subjective norm in combination explain 30 % of the variance in intention for this age group (Table 7.4). Combined with intention, attitude and subjective norm explain 37% of variance in behaviour. These figures are less than those obtained for the whole sample.

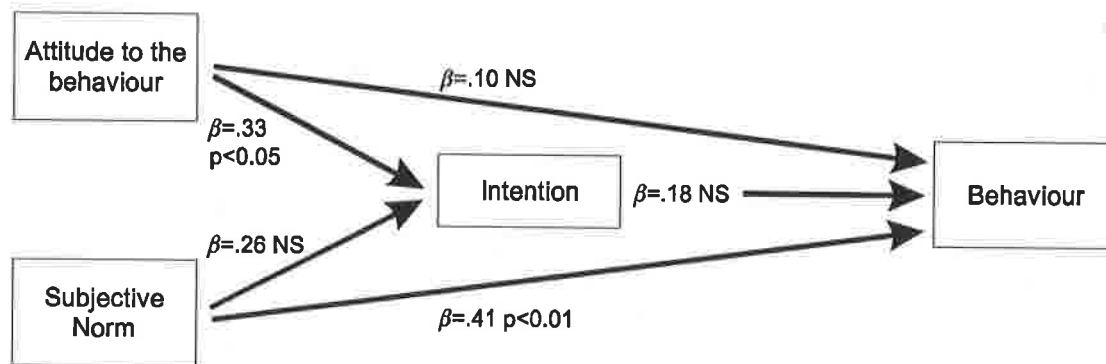


Figure 7.8 Regression analysis on the elements of the Theory of Reasoned Action for age 9-11 (N=82)

The final beta coefficients show that attitude exerts an independent predictive effect on intention (Figure 7.8). As with the group as a whole there was a significant relationship between subjective norm and behaviour. Also, subjective norm was not related to intention. This suggests that for this age group the subjective norm interacts directly with behaviour instead of with intention as the Theory of Reasoned Action would propose. Intention was not significantly related to behaviour.

Age 12-15

<p>Attitude</p> <p>Subjective norm</p> <p>↓</p> <p>Intention</p>	<p>Attitude</p> <p>Subjective norm</p> <p>Intention</p> <p>↓</p> <p>Behaviour</p>
<p><math>r = 0.66</math></p> <p><math>R^2 = 0.43</math></p>	<p><math>r = 0.85</math></p> <p><math>R^2 = 0.72</math></p>

Table 7.5 Regression analysis for age 12-15 (N=69)

Attitude, subjective norm and intention together explain 72% of the variance in behaviour, with attitude and subjective norm accounting for 43% of variance in intention (Table 7.5).

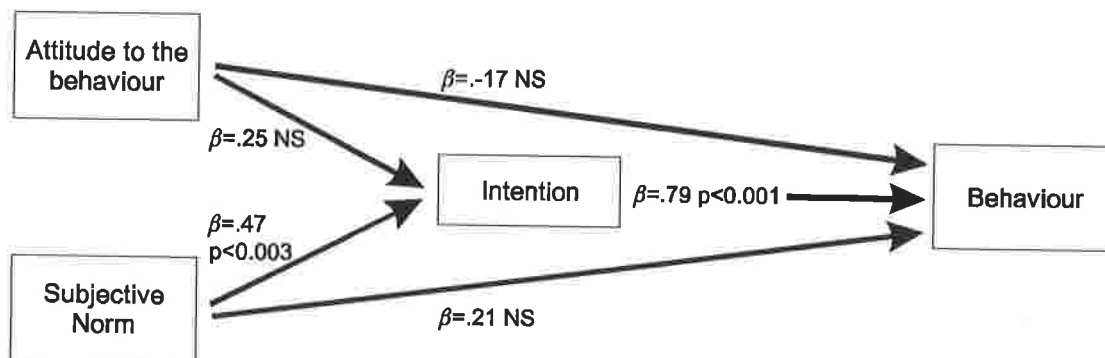


Figure 7.9 Regression analysis on the elements of the Theory of Reasoned Action for age 12-15 (N=69)

For this group (12-15) the attitude was related neither to intention nor to behaviour (Figure 7.9). Further, subjective norm was not related to behaviour, it was however, directly related to intention (0.47). Although attitude and subjective norm explain 43% of the variance in intention, consideration of the

beta coefficients suggest that it is some link between them that is important as only subjective norm is individually correlated with intention. Intention is strongly related to behaviour (0.79), and attitude, subjective norm and intention explain 72% of variance in behaviour (Figure 7.9, Table 7.5).

#### Age 16-18

<p>Attitude</p> <p>Subjective norm</p> <p>↓</p> <p>Intention</p>	<p>Attitude</p> <p>Subjective norm</p> <p>Intention</p> <p>↓</p> <p>Behaviour</p>
<p><math>r = 0.50</math></p> <p><math>R^2 = 0.25</math></p>	<p><math>r = 0.71</math></p> <p><math>R^2 = 0.60</math></p>

Table 7.6 Regression analysis for age 16-18 (N=38)

Attitude and subjective norm in combination explain 25% of the variance in intention (Table 7.6), and with intention explain 60% of variance in behaviour.

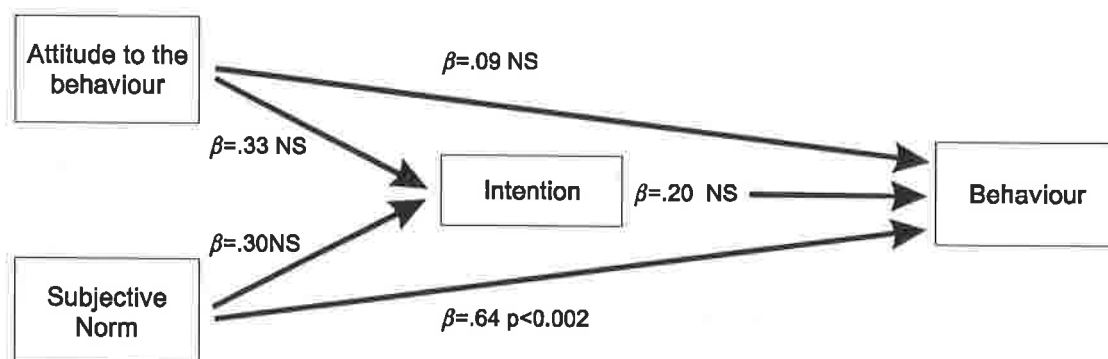


Figure 7.10 Regression analysis on the elements of the Theory of Reasoned Action for age 16-18 (N=38)

For the age group 16-18 the Theory of Reasoned Action appeared least useful as a predictive model. Neither attitude nor subjective norm was related to

intention, nor was attitude related to behaviour (Figure 7.10). Subjective norm appears to be the element of the model which contributes to the variance as the beta coefficient between subjective norm and intention is the only one which is significant. Considering that attitude, subjective norm and intention can explain 60% of the variance in behaviour, and attitude and subjective norm alone only 25% of the variance in intention, intention would appear to have an impact on the predictive ability of the model. Nonetheless, the beta coefficient between intention and behaviour is not significant. This suggests that subjective norm may be of importance as it is the only beta coefficient that is significant.

#### Age 19+

<p>Attitude</p> <p>Subjective norm</p> <p>↓</p> <p>Intention</p>	<p>Attitude</p> <p>Subjective norm</p> <p>Intention</p> <p>↓</p> <p>Behaviour</p>
<p><math>r = 0.52</math></p> <p><math>R^2 = 0.27</math></p>	<p><math>r = 0.72</math></p> <p><math>R^2 = 0.52</math></p>

Table 7.7 Regression analysis for age 19+ (N=78)

Attitude, subjective norm and intention explain just over 59% of variation in behaviour for this age group, and 27% of intention is explained by attitude and subjective norm (Table 7.7).

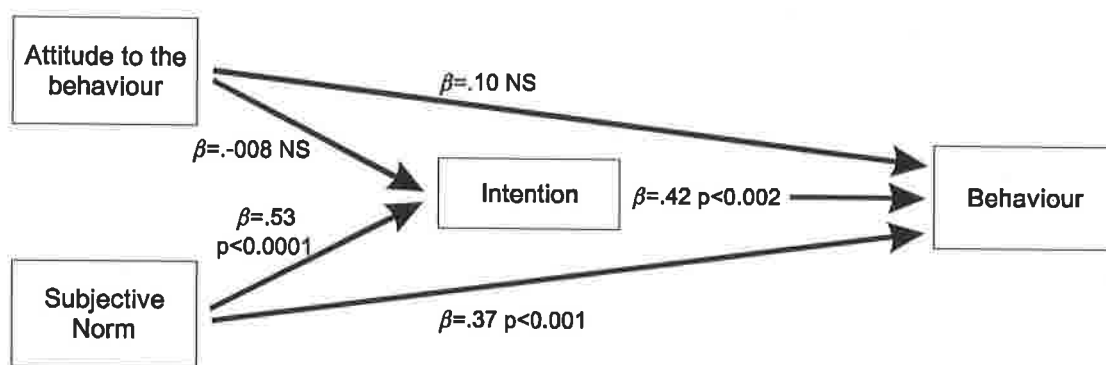


Figure 7.11 Regression analysis for the elements of the Theory of Reasoned Action for age 19+ (N=78)

There are significant relationships between subjective norm and intention and between subjective norm and behaviour. Attitude is not significantly related to either. There is a significant relationship between intention and behaviour (Figure 7.11). Subjective norm would appear to be very important at this age as it is significantly related to both intention and behaviour. As a group, this group is most similar to the 12-15 age group with the exception of the relationship between subjective norm and behaviour. This group also most resembles the group as a whole (Table 7.8) with the only difference being the relationship between attitude and intention which is not significant for the age group 19+ but is for the group as a whole

To summarise, attitude and subjective norm explain between 25 and 43% of the variation in intention, dependent on which group is considered. The results for behaviour range from 37 to 72%.

	Attitude/ intention	subjective norm/ intention	attitude/ behaviour	subjective norm/ behaviour	intention/ behaviour
All	significant	significant	not significant	significant	significant
9-11	significant	not significant	not significant	significant	not significant
12-15	not significant	significant	not significant	not significant	significant
16-18	not significant	not significant	not significant	significant	not significant
19+	not significant	significant	not significant	significant	significant

Table 7.8 A summary of the results of the regression analyses for all groupings used

As can be seen from the summary table presented above there are no consistent pattern of relationships across the different age groups except that, attitude never relates significantly with behaviour.

#### 7.4.3 The relationship between attitude, subjective norm, intention and behaviour for the individual components of the food hygiene scale.

In this section correlations were calculated for the individual components which made up the composite scores for attitude, subjective norm, intention and behaviour.

	correlations of attitude with intention for safety and advisability	correlations of subjective norm with intention for parents and friends	correlation of intention with behaviour
Clean all work surfaces after handling <b>raw</b> food	r= .1575 p<0.05 r= .1070 NS	r= .1098 r= .0036 NS	r= .3551 p<0.01
Check the best before date	r= .1734 r= .3472 p<0.01	r= .2647 r= .2565 p<0.01	r= .5331 p<0.01
Cover <b>cooked</b> food	r= .2445 r= .2595 p<0.01	r= .2048 r= .2109 p<0.01	r= .3039 p<0.01
Wash my hands before preparing <b>cooked</b> food	r= .1562 p<0.05 r= .1105 NS	r= .2950 r= .2152 p<0.01	r= .3519 p<0.01
Reheat food until it is very hot	r= .5464 r= .5013 p<0.01	r= .4027 r= .4939 p<0.01	r= .5028 p<0.01
Wash my hands after preparing <b>raw</b> food	r= .1382 p<0.05 r= .2858 p<0.01	r= .2272 p<0.01 r= .0960 NS	r= .3855 p<0.01
Quickly cool food after cooking	r= .1862 r= .2721 p<0.01	r= .2269 r= .2295 p<0.01	r= .3873 p<0.01
Clean surfaces before handling <b>cooked</b> food	r= .2293 r= .2052 p<0.01	r= .3244 r= .1862 p<0.01	r= .4593 p<0.01
Keep <b>cooked</b> foods in the fridge	r= .4361 r= .4428 p<0.01	r= .4538 r= .4889 p<0.01	r= .5379 p<0.01
Defrost food properly before cooking	r= .3403 r= .4011 p<0.01	r= .3580 r= .3461 p<0.01	r= .4108 p<0.01
Cook food until it is very hot	r= .4779 r= .5845 p<0.01	r= .5174 r= .4658 p<0.01	r= .5384 p<0.01
Keep <b>raw</b> food in the fridge	r= .4461 r= .5183 p<0.01	r= .5445 r= .4919 p<0.01	r= .5062 p<0.01

Table 7.9 Individual relationships between the elements which made up the measures of food hygiene for the whole sample

### Cleaning surfaces

It can be seen that for 'cleaning work surfaces after handling raw food', attitude and subjective norm are not related to intention but intention is significantly correlated with self-report of behaviour. Consequently, it can be suggested that respondents who intend to engage in the activity are most likely to claim that they perform the behaviour regularly, but the degree to which they consider the activity advisable or safe, or the degree to which significant others believe they should engage in the behaviour does not affect their intention to perform the behaviour. For the second 'cleaning surfaces' statement all determinants of behaviour are significantly correlated to intention, and intention in turn is correlated significantly to behaviour. This differs substantially from the results of the previous cleaning surfaces question, where neither subjective norm nor attitude is related to behaviour.

### Best before date

For the factor 'check the best before date' there are strong positive correlations between the different determinants of behaviour. All are of a significant magnitude, although explain little of the variance i.e. the  $r$  values range from .17 to .53 meaning they only explain between 3% and 28% of the variance. Of the attitude factors, how advisable the behaviour was considered correlated higher with intention than did safety issues, whereas both normative influences are equivalent in the degree to which they relate to intention. There is a strong relationship between intention and behaviour, as there is for the factor 'cleaning surfaces after handling raw food'.

### Covering food

All three determinants of behaviour are significantly positively correlated for the subject of covering cooked food. Nevertheless the correlations are low. The highest relationship is again between intention and behaviour.

### Washing hands

For the component 'wash hands before preparing cooked food' there is not a significant relationship between attitude and intention, but there is between both normative influences and intention and between intention and behaviour. There is a strong positive relationship between intention and behaviour. Whilst, however, there is a relationship between how advisable respondents consider washing their hands after preparing raw food and their intention to do so, there is not a relationship for safety considerations. For normative influences the respondents friends but not their parents exert a normative influence. This differs from the other 'hand washing' factor where neither attitude component is related to intention but both normative groups are.

### Reheat food until it is very hot

There are strong positive correlations between all determinants of behaviour within the element reheating food until it is very hot. There is a higher relation between the safety attitude than for the advisable, moreover, this relationship is higher than the relationship between intention and behaviour.

### Cooling food

When considering cooling food after cooking, the determinants of behaviour are low but significant. Normative influences are of a larger magnitude than attitudes scores, although again all are significant.

### Refrigeration

For refrigeration of both raw and cooked foods attitude and subjective norm are significantly correlated with intention and intention to behaviour. The magnitude of the relationship of attitude and subjective norm to intention is higher for refrigeration of raw food than that for cooked food. Conversely, the relationship of intention to behaviour is lower for raw than cooked food refrigeration.



### Defrosting food

Correlations between attitude and subjective norm to intention for defrosting of food and cooking food until hot were positive and significant, as was the relationship between intention and behaviour.

### Cooking food until hot

There are strong positive correlations between all elements of the model for this factor. The strongest relationship is between the advisability of performing the behaviour and intention to behave.

#### 7.4.4 The relationship between determinants of behaviour measured across age

##### Age 9-11

	correlations of attitude with intention for safety and advisability	correlations of subjective norm with intention for parents and friends	correlation of intention with behaviour
Clean all work surfaces after handling <b>raw</b> food	r= -.0403 r=.1056 NS	r= -.1048 r=-.1412 NS	r= .1897 NS
Check the best before date	r= .1995 NS r= .2936 p<0.01	r= .2581 p<0.05 r= .2884 p<0.01	r= .3289 p<0.01
Cover <b>cooked</b> food	r= .3081 r= .3355 p<0.01	r= .2536 p<0.05 r= .2930 p<0.01	r= .0512 NS
Wash my hands before preparing <b>cooked</b> food	r= .1868 r= -.0392 NS	r= .2012 r= .1680 NS	r= .3182 p<0.01
Reheat food until it is very hot	r= .4675 r= .3857 p<0.01	r= .4534 r= .4578 p<0.01	r= .3611 p<0.01
Wash my hands after preparing <b>raw</b> food	r= .0489 r= .1454 NS	r= .0850 r= .1179 NS	r= .2971 p<0.01
Quickly cool food after cooking	r= .1560 NS r= .2540 p<0.05	r= .3186 p<0.01 r= .2408 p<0.05	r= .2701 p<0.05
Clean surfaces before handling <b>cooked</b> food	r= .2508 p<0.05 r= .1082 NS	r= .3149 p<0.01 r= .0118 NS	r= .3796 p<0.01
Keep <b>cooked</b> foods in the fridge	r= .4355 r= .5279 p<0.01	r= .5048 r= .5695 p<0.01	r= .5553 p<0.01
Defrost food properly before cooking	r= .2957 r= .3761 p<0.01	r= .3873 r= .4511 p<0.01	r= .3573 p<0.01
Cook food until it is very hot	r= .1933 NS r= .3553 p<0.01	r= .4027 p<0.01 r= .2603 p<0.05	r= .2785 p<0.05
Keep <b>raw</b> food in the fridge	r= .5391 r= .5291 p<0.01	r= .6574 r= .5374 p<0.01	r= .4621 p<0.01

Table 7.10 Correlations between attitude, subjective norm, intention and behaviour across the 12 factors used to measure food safety for the age group 9-11.

##### Cleaning surfaces

For cleaning surfaces there were no relationships between attitudes, subjective norm and intention. Similarly there was no relationship between respondents' intention to clean surfaces after handling raw food and behaviour, although there was for cleaning surfaces before handling cooked food.

### Best before date

For the factor 'best before date' for children between 9 and 11 there was no relationship between how safe they believed it would make food if they checked the best before date and their intention to do so. There was, however, a significant relationship between how advisable they thought checking the best before data was and their intention to do so. Similarly, both normative influences were related to intention to check the best before data, and intention was related to behaviour.

### Covering food

At this age children's intention to cover food was not related to their behaviour. However, both attitude measures and both normative influences were related to their intention to cover food.

### Washing hands

For both 'washing hands' factors neither attitude nor subjective norm were related to intention. Conversely, intention for both factors was related to behaviour.

### Reheat food until it is very hot

For this factor all relationships were positive and significant. The variance explained ranged from 13%, for the relationship between intention to behave and behaviour to 22%, for the relationship between children's intention to reheat food and whether or not they thought reheating would make food safer. This is one of the most significant factors for this age group.

### Cooling food

### Cooking food until hot

There was a relationship between subjective norm and intention for both these factors and for children's intention to 'cool food/ cook food until hot' and how advisable they thought it would be to do so but not between intention and how

safe it would be to 'cool food/ cook food until hot'. Intention was also significantly related to behaviour.

### Refrigeration

The factors relating to refrigeration were very positively related among all variables. The normative influence of parents and intention was particularly strongly and positively related to intention (explaining 43% of the variance), although all the other relations were strong.

### Defrosting food

Again all the relationships for this factor were positive, though not of the same magnitude as those for refrigeration.

'Reheat food', 'refrigerate' both raw and cooked food and 'defrost food properly' were the factors that appeared most significant for this age group, suggesting that this age group is particularly aware of temperature control. There are no relationships between intention and behaviour for covering food, cooking food until it is very hot, and cooling food quickly. Of interest is the fact that while reheating food shows strong relationships cooking food does not.

## Age 12-15

	correlations of attitude with intention for safety and advisability	correlations of subjective norm with intention for parents and friends	correlation of intention with behaviour
Clean all work surfaces after handling <b>raw</b> food	r= .3491 p<0.01 r= .2148 NS	r= .1943 r= .0735 NS	r= .3964 p<0.01
Check the best before date	r= .2139 NS r= .3893 p<0.01	r= .2760 r= .3038 p<0.05	r= .6306 p<0.01
Cover <b>cooked</b> food	r= .2903 p<0.05 r= .3172 p<0.01	r= .2565 p<0.05 r= .1517 NS	r= .5320 p<0.01
Wash my hands before preparing <b>cooked</b> food	r= .3109 p<0.01 r= .1486 NS	r= .2319 r= .2345 NS	r= .3205 p<0.01
Reheat food until it is very hot	r= .6286 r= .4833 p<0.01	r= .4093 r= .3500 p<0.01	r= .4809 p<0.01
Wash my hands after preparing <b>raw</b> food	r= .2499 p<0.05 r= .3483 p<0.01	r= .2210 r= .0871 NS	r= .3611 p<0.01
Quickly cool food after cooking	r= .3409 r= .3177 p<0.01	r= .1933 r= .1440 NS	r= .3956 p<0.01
Clean surfaces before handling <b>cooked</b> food	r= .3376 p<0.01 r= .2067 NS	r= .2928 p<0.05 r= .2127 NS	r= .5454 p<0.01
Keep <b>cooked</b> foods in the fridge	r= .4513 r= .4467 p<0.01	r= .5487 r= .4827 p<0.01	r= .5311 p<0.01
Defrost food properly before cooking	r= .5515 r= .4905 p<0.01	r= .3350 r= .3948 p<0.01	r= .3902 p<0.01
Cook food until it is very hot	r= .7074 r= .6426 p<0.01	r= .5587 r= .4970 p<0.01	r= .5538 p<0.01
Keep <b>raw</b> food in the fridge	r= .2894 p<0.05 r= .3108 p<0.01	r= .3930 p<0.01 r= .2779 p<0.05	r= .5534 p<0.01

Table 7.11 Correlations between attitude, subjective norm, intention and behaviour across the 12 factors used to measure food safety for the age group 12-15.

### Cleaning surfaces

Both 'cleaning surfaces' factors show the same pattern of results for attitude, for this age group. There is a relationship between how safe they think cleaning surfaces will make food and their intention to do so but not for how advisable and their intention to do so. Neither normative influence correlates with intention for 'cleaning surfaces after handling **raw** food' but parental influence correlated

with intention for the factor 'cleaning surfaces before handling **cooked** food'. The intention to 'clean surfaces' was correlated to behaviour for both factors.

#### Best before date

There was a very strong relationship between intention and behaviour for this factor, with 40% of the variance being explained. All the other relations were positive and significant, except for the safety attitude and intention.

#### Covering food

The normative influence of friends did not correlate with intention for this factor. All the other relationships were significant. Thus, intention correlated with behaviour and attitude and parental subjective norm correlated with intention.

#### Washing hands

The normative influence of friends or of parents did not correlate with intention for these factors. Neither did the advisability factor correlate with intention for the factor 'wash hands before preparing cooked food', it did however, for the factor 'wash hands after preparing **raw** food'. For both factors the safety attitude correlated with intention and intention with behaviour.

#### Cooling food

Neither of the normative influences correlated with intention for this factor. Attitude correlated with intention and intention with behaviour.

#### Reheat food until it is very hot   Defrosting food   Cooking food until hot

For all of the above factors there were positive significant correlations between all the elements of the model, with the variance being explained ranging from 11% to 50%.

### Refrigeration

Both refrigeration factors also had significant correlations across all elements, although the variance explained was as low as 8%. Thus, attitude and subjective norm correlated with intention and intention with behaviour.

The strongest relationships between the component parts of the model are for both reheating and cooking food until it is very hot and for keeping cooked foods in the fridge. The main difference with the younger group being belief in the importance of cooking food until very hot. The similarity between both age groups lies in the fact that both groups saw temperature control as most important.

## Age 16-18

	correlations of attitude with intention for safety and advisability	correlations of subjective norm with intention for parents and friends	correlation of intention with behaviour
Clean all work surfaces after handling <b>raw</b> food	r= .1610 r= .0019 NS	r= .0979 r= .0274 NS	r= .1429 NS
Check the best before date	r= .2144 r= .1208 NS	r= .1647 r= .1344 NS	r= .2336 NS
Cover <b>cooked</b> food	r= .2004 r= .1085 NS	r= .2685 r= .0167 NS	r= .4341 p<0.01
Wash my hands before preparing <b>cooked</b> food	r= .0611 r= .1189 NS	r= .1679 r= .1474 NS	r= .1513 NS
Reheat food until it is very hot	r= -.0962 NS r= .3431 p<0.05	r= -.0167 r= .2131 NS	r= .3158 NS
Wash my hands after preparing <b>raw</b> food	r= .2152 NS r= .3288 p<0.05	r= .2872 r= .1478 NS	r= .4317 p<0.01
Quickly cool food after cooking	r= .3755 p<0.05 r= .6093 p<0.01	r= .3580 p<0.05 r= .3170 NS	r= .4898 p<0.01
Clean surfaces before handling <b>cooked</b> food	r= .2166 r= .2338 NS	r= .3976 p<0.05 r= .1799 NS	r= .2107 NS
Keep <b>cooked</b> foods in the fridge	r= .4349 r= .4386 p<0.01	r= -.0109 r= .2048 NS	r= .4104 p<0.05
Defrost food properly before cooking	r= .3205 NS r= .4186 p<0.01	r= .1386 r= .2753 NS	r= .3551 p<0.05
Cook food until it is very hot	r= .3485 p<0.05 r= .2665 NS	r= .1358 r= .2301 NS	r= .2172 NS
Keep <b>raw</b> food in the fridge	r= .3786 p<0.05 r= .6054 p<0.01	r= .3064 NS r= .6628 p<0.01	r= .2962 NS

Table 7.12 Correlations between attitude subjective norm intention and behaviour across the 12 factors used to measure food safety for the age group 16-18.

The relationships between the elements of the model for this age group are not well established. The only variable where there are consistent relationships across the parts is cooling food after cooking, which is the converse of the previous two age groups.



### Cleaning surfaces

There were no significant relationships between any of the components of the model for these two factors.

### Best before date

### Covering food

There were no significant relationships between attitude and subjective norm and intention for these two factors. There was also no relationship between intention and behaviour for 'best before date'. There was for 'cover food', and only 19% of the variance was explained.

### Washing hands

There were no significant relationships between any of the components of the model for 'wash hands before preparing cooked food'. For 'wash hands after handling raw food', neither of the normative influences were correlated with intention, nor was the safety attitude. The advisability attitude was significantly related to intention and intention was related to behaviour, explaining 19% of the variance.

### Reheat food until it is very hot

The only components related for this factor were the safety attitude and intention.

### Cooling food

This factor was consistently related across the components of the model, with the normative influence of friends and intention being the only area where there is no significant relationship.

### Refrigeration

Both attitudes are related to intention for both these factors. For 'keep cooked food in the fridge' neither normative influence is related to intention, whereas, for 'keep raw food in the fridge' friends was related explaining 44% of the variance. Intention was related to behaviour for cooked food but not for raw food.

### Defrosting food

The advisability factor was significantly related to intention, and intention to behaviour. None of the other relationships were significant.

### Cooking food until hot

The only significant relationship for this factor was that between the safety attitude and intention. This is in contrast to the other age groups where this is one of the factors where there are significant relationships of high magnitude.

	correlations of attitude with intention for safety and advisability	correlations of subjective norm with intention for parents and friends	correlation of intention with behaviour
Clean all work surfaces after handling <b>raw</b> food	r= .1494 r= .0589 NS	r= .2116 r= .0372 NS	r= .5164 p<0.01
Check the best before date	r= .1011 NS r= .4583 p<0.01	r= .2964 p<0.01 r= .2077 NS	r= .7024 p<0.01
Cover <b>cooked</b> food	r= .1039 r= .2216 NS	r= .0557 r= .2150 NS	r= .3815 p<0.01
Wash my hands before preparing <b>cooked</b> food	r= -.0313 r= .2022 NS	r= .4158 p<0.01 r= .1894 NS	r= .4338 p<0.01
Reheat food until it is very hot	r= .3418 p<0.01 r= .2217 NS	r= .1978 NS r= .3664 p<0.01	r= .3261 p<0.01
Wash my hands after preparing <b>raw</b> food	r= .0941 NS r= .3532 p<0.01	r= .3468 p<0.01 r= .0487 NS	r= .4731 p<0.01
Quickly cool food after cooking	r= .0380 r= .1673 NS	r= .2150 r= .1673 NS	r= .5148 p<0.01
Clean surfaces before handling <b>cooked</b> food	r= .0203 NS r= .2911 p<0.01	r= .2065 r= .2776 p<0.05	r= .5178 p<0.01
Keep <b>cooked</b> foods in the fridge	r= .4588 r= .3211 p<0.01	r= .5224 r= .4807 p<0.01	r= .5812 p<0.01
Defrost food properly before cooking	r= .1723 NS r= .3776 p<0.01	r= .4679 p<0.01 r= .2089 NS	r= .5044 p<0.01
Cook food until it is very hot	r= .0028 NS r= .3936 p<0.01	r= .3381 r= .3387 p<0.01	r= .4275 p<0.01
Keep <b>raw</b> food in the fridge	r= .4320 r= .5924 p<0.01	r= .5524 r= .5891 p<0.01	r= .5526 p<0.01

Table 7.13 Correlations between attitude subjective norm intention and behaviour across the 12 factors used to measure food safety for the age group 19+.

There appears to be the same lack of pattern between the constituent elements of the model for this group (Table 7.13) as there is for 16-18. There are two factors where all elements are significantly positively related these are 'keeping cooked food refrigerated' and 'keeping raw foods refrigerated'.

### Cleaning surfaces

There were no relationships between attitudes and normative influences and intention for the factor 'clean surfaces after handling raw food'. For 'cooked food' there were relationships between the safety attitude and intention and both normative influences and intention. For both factors intention was related to behaviour, explaining between 26 and 30% of the variance.

### Best before date

For this factor intention and behaviour were significantly related with 50% of the variance being explained. The advisable attitude was related to intention, but the safety attitude was not. Similarly, the normative influence of parents was related to intention but the normative of friends was not.

### Covering food

None of the precursors of intention were related to intention for this factor. Intention however, was related to behaviour, with however only 14% of the variance explained.

### Washing hands

For both these factors intention was related to behaviour. Similarly, the parental influence of parents was related to intention. The normative influence of friends was not related to intention. The attitudinal components of the model were not as consistently related, with the advisability attitude related to intention for 'raw food' but not for 'cooked food'. The safety attitude was related to intention for neither.

### Reheat food until it is very hot

Neither the advisability attitude nor the normative influence of friends were related to intention for this factor. Both of the other two components were, and intention was significantly related to behaviour.

#### Cooling food

Intention was related to behaviour but neither attitudes nor normative influences were related to intention for this factor.

#### Refrigeration

All the components of the model were significantly related for both there factors.

#### Defrosting food

Intention and behaviour were significantly related with 25% of the variance explained. Neither the safety attitude not the normative influence of friends was significantly related to intention. The other two components were significantly related to intention.

#### Cooking food until hot

The only non significant relationship for this factor was the safety attitude and intention. All the other relationships were significant.

#### 7.4.5 Tests of difference between attitude, subjective norm, intention and behaviour for age and gender

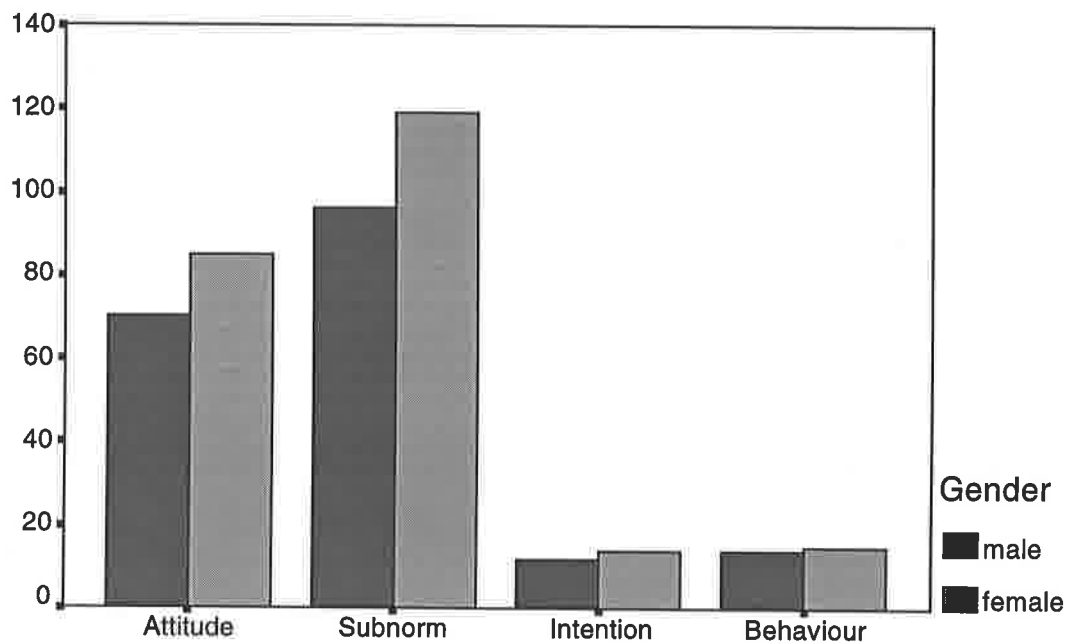


Figure 7.12 Median scores for attitude, subjective norm, intention and behaviour across gender

The range of scores for attitude was from -120 to +120, for subjective norm was from -240 to 240 and for intention and behaviour was from -24 to +24.

Therefore the results as illustrated in Figure 7.12 are on different scales thus the difference between intention scores and behaviour scores may be of greater magnitude that it would appear due to the scale.

Attitude	Subjective norm	Intention	Behaviour
Z= -4.16 p<0.001	Z= -1.69 NS	Z= -2.85 p<0.004	Z= -1.43 NS

Table 7.14 Mann-Whitney U test across gender

There are significant differences between males and females for attitude to food hygiene and intention to behave but not for subjective norm or behaviour, such that females have more positive attitudes and intentions to behave than males.

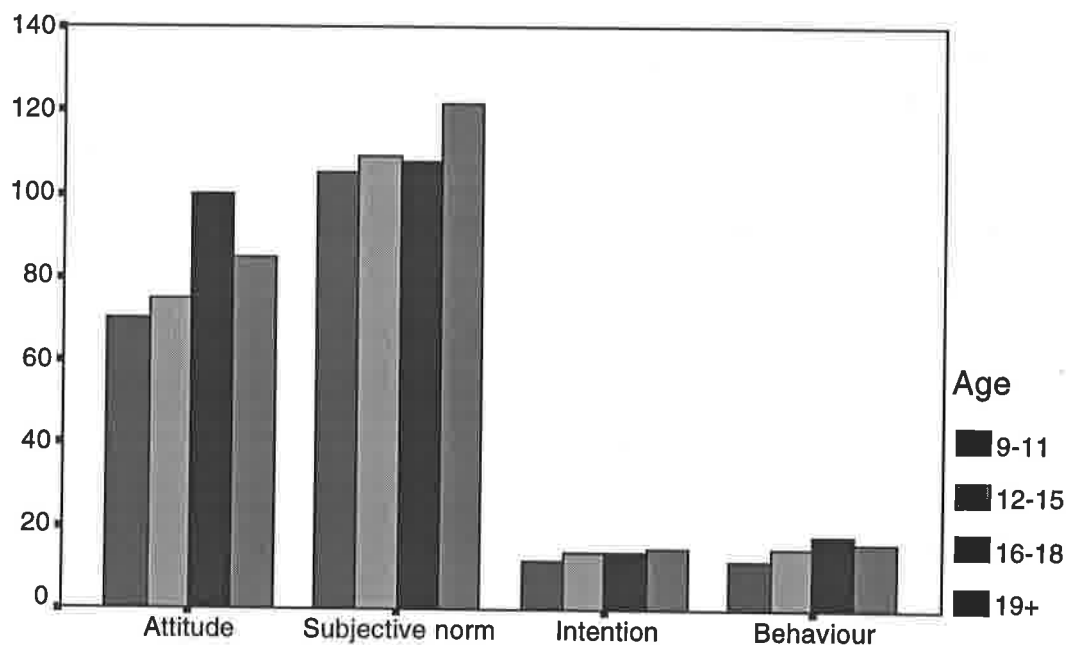


Figure 7.13 Median scores for attitude, subjective norm, intention and behaviour across age

Attitude	Subjective norm	Intention	Behaviour
$\chi^2= 20.54$ $p< 0.001$	$\chi^2= 1.02$ NS	$\chi^2= 5.83$ NS	$\chi^2=26.21$ $p<0.0001$

Table 7.15 Kruskal-Wallis H calculated across age

Across age there are significant differences for attitude and behaviour but not for subjective norm and intention. For attitude the most positive attitude was held by the age group 15-18, and the least positive by the youngest group. The pattern of scores for behaviour was similar to that for attitude. For subjective norm the youngest group again had the least positive score, but for subjective norm the oldest group had the highest score.

## 7.5 Results B (Observations)

### 7.5.1 Descriptive Statistics

#### Attitude

Attitude scores could range between 70 and -70. However, while the maximum recorded score was 70 the minimum score noted was -12 (Figure 7.14). The median and mode were both 56. There was a negative skew of 1.23. These scores are represented visually below. It can thus be seen that for all subjects the general attitude to food safety was positive. With respect to the pattern of responses these scores are similar to those obtained for attitude in the previous section. Whilst it is unfeasible to make comparisons because of the differences in the questionnaires used to obtain them, a visual scan will demonstrate the general positive attitude to food hygiene obtained from both scales.

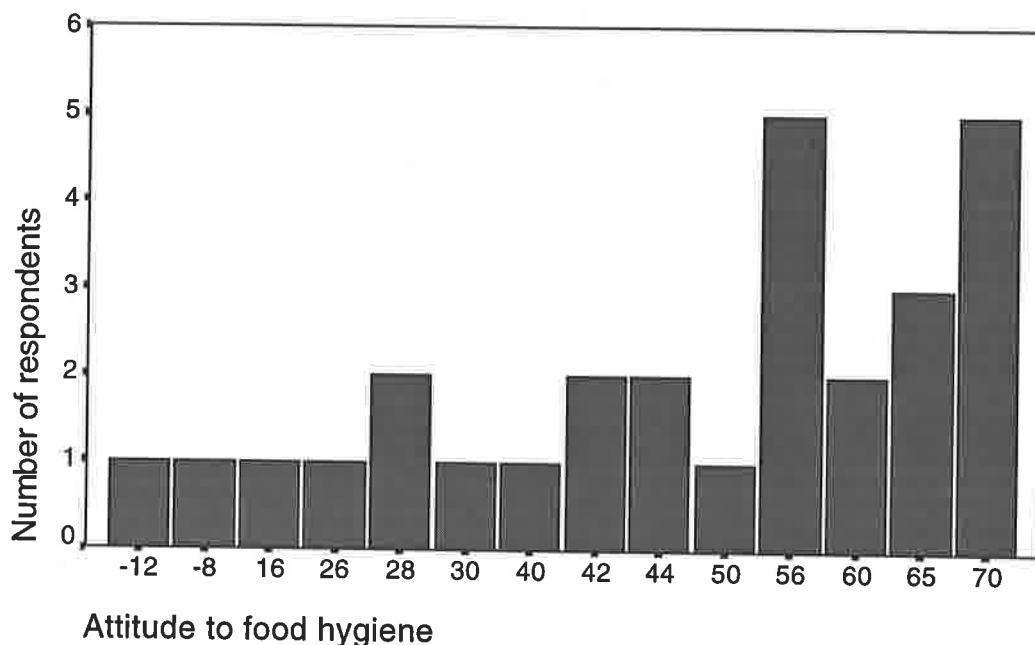


Figure 7.14 Attitude to food hygiene by number of respondents (B)

#### Subjective norm

The possible range of scores for this variable was -70- +70, however, the minimum reached was -42. The median was 21 and the mode 36 (Figure 7.15).



There was a skew factor of  $-.651$ . While the general pattern of scores are still positive, they were not as extremely positive as the attitude results, and there were more negative subjective norm scores. Thus where respondents generally have positive attitudes to food safety, in a similar pattern to the results portrayed in Figure 7.4 their subjective norm is less positive.

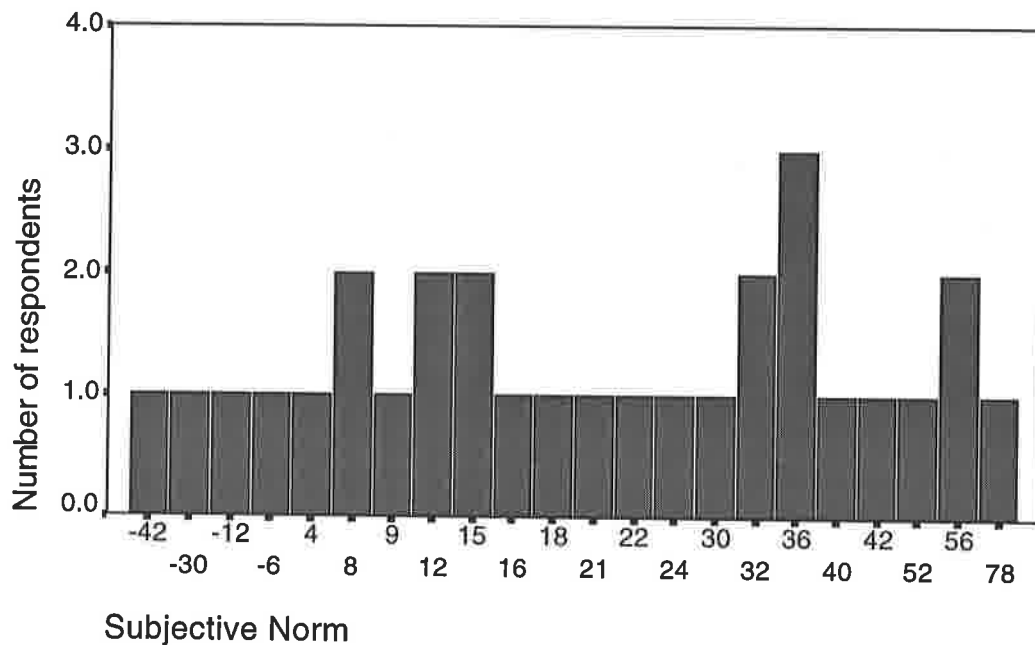


Figure 7.15 Subjective norm for food hygiene by number of respondents (B)

### Intention

For intention, scores could range from  $-14$  to  $+14$ , but the minimum score reached was  $-12$ . There was a median of 5, and a mode of 8 (Figure 7.16). There was a skewness of  $-.651$ . These scores more closely resemble the attitude scores than scores for subjective norm. The scores highlight that respondents in general intend to perform food safety practices. The data were again skewed negatively with 50% of respondents scoring 6 or above. The pattern of scores resembles those obtained using the self-report scores mentioned in the previous section. However, this should not be surprising as this part of the study also utilised a self-report measure.

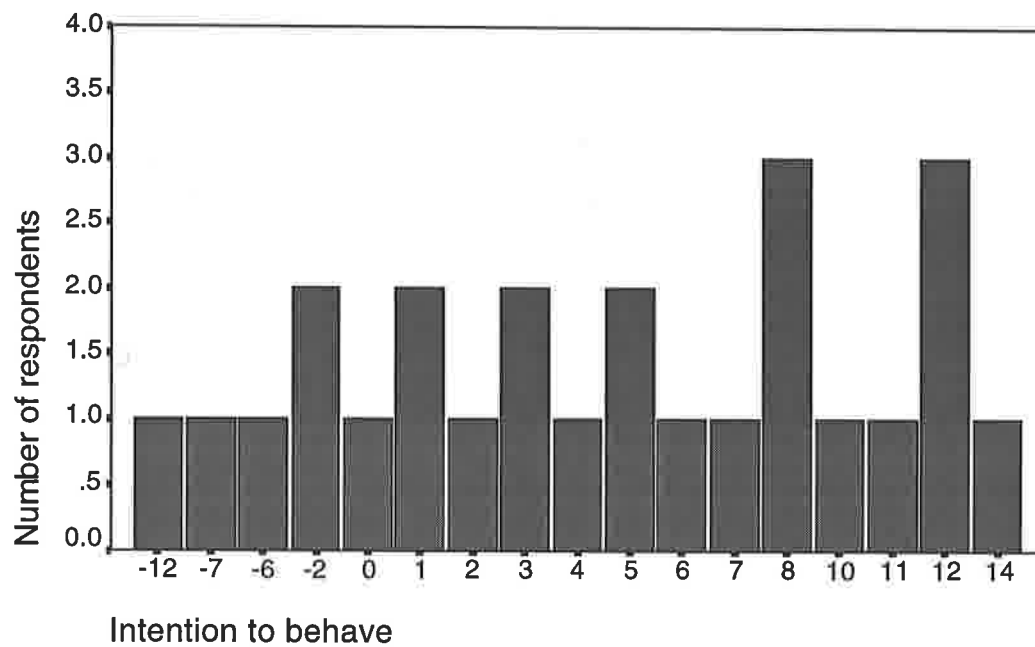


Figure 7.16 Intention to use food hygiene behaviours by number of respondents

(B)

#### Behaviour- Self-report and observations (N=30)

In this section two different measures of behaviour were used, self report and observation. The results are presented in Figure 7.17 and Figure 7.18.

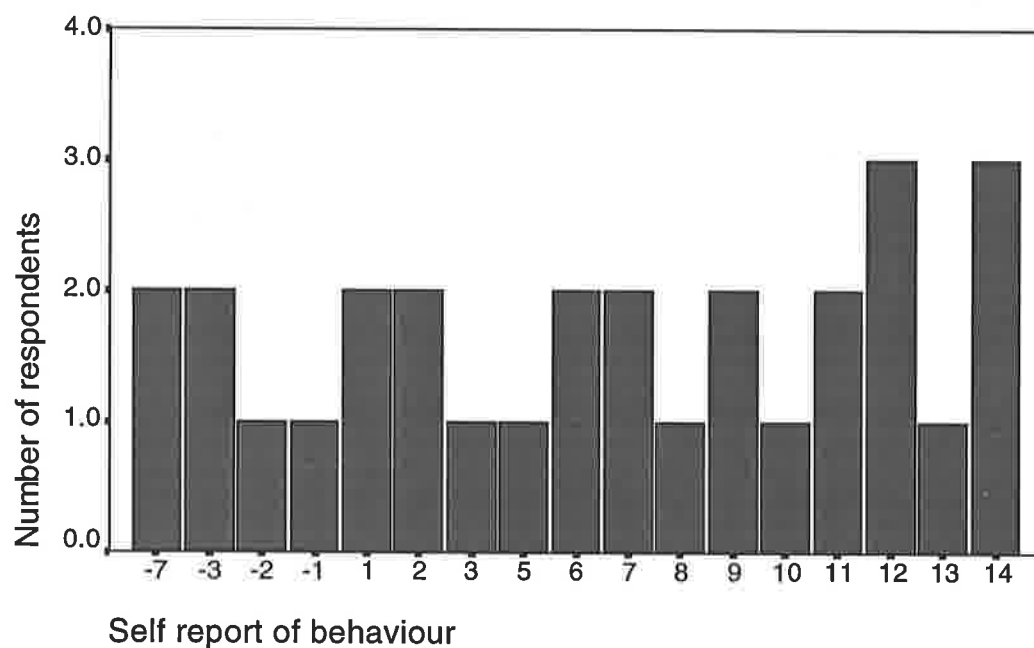


Figure 7.17 Respondents' self-report of behaviour by number of respondents

(B)

For behaviour the range of possible scores was the same as that of intention -14 to +14, with a median of 7 and a mode of 12 and skewness of -.481 and a minimum of -7 and a maximum of +14 (Figure 7.17). The majority of respondents believed that they performed food hygiene behaviours. However, this was not consistent with their actual behaviour as can be seen in Figure 7.18.

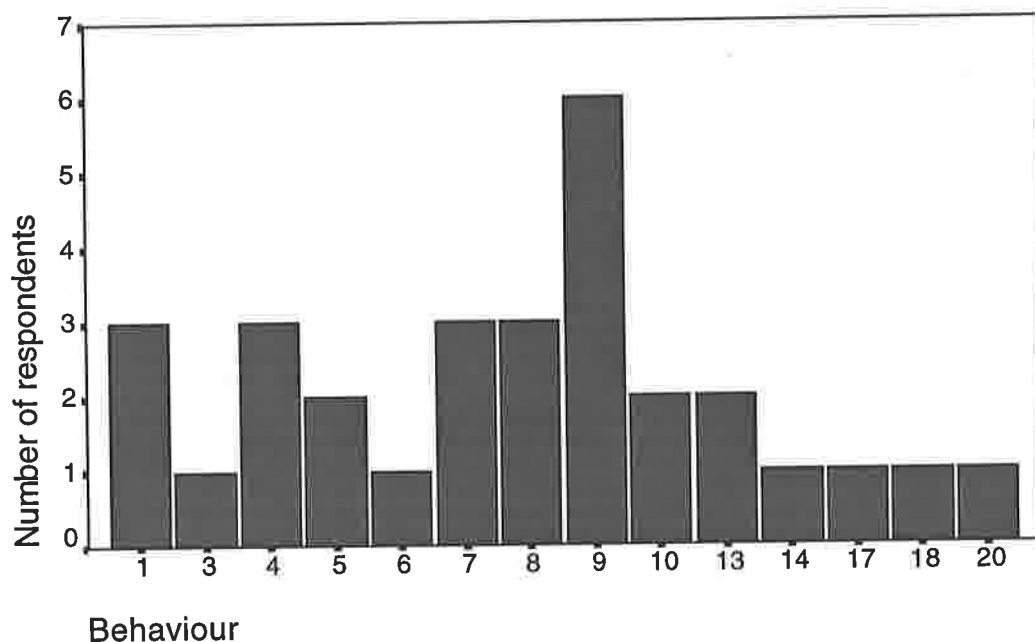


Figure 7.18 Observation of respondents' actual food hygiene behaviours. (B)

For observations of behaviour the range of possible scores was 1 to 27, with a median of 8 and a mode of 9 and skewness of .668. The minimum was 1 and the maximum score reached was 20. It can be seen from Figure 7.18 that no respondents obtained the total possible marks allocated to this section, and further half the scores fell below 8, which translated into respondents not performing at least 12 of the food safety behaviours (as hand washing could account for 8 of the marks).

### 7.5.2 The Theory of Reasoned Action as it relates to food hygiene

As attitude, subjective norm and intention are measured the same way regardless of the behaviour measure used the first parts of Tables 7.16 and 7.17 are the same as are the first parts of the Figures 7.19 and 7.20. Attitude and subjective norm explained 36% of intention (Table 7.16 and 7.17). Attitude was significantly related to intention but subjective norm was not (Figures 7.19 and 7.20). Using self report as the measure of behaviour (Table 7.16) attitude, subjective norm and intention explained 78% of the variance in behaviour.

<p>Attitude Subjective norm ↓ Intention</p>	<p>Attitude Subjective norm Intention ↓ Behaviour</p>
<p><math>r = 0.60</math> <math>R^2 = 0.36</math></p>	<p><math>r = 0.88</math> <math>R^2 = 0.78</math></p>

Table 7.16 Regression analysis on group B using the measure of self-report (N=30)

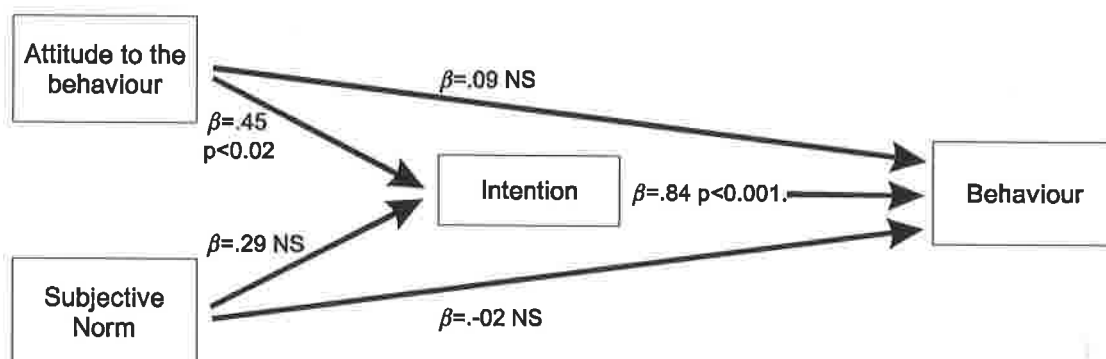


Figure 7.19 Regression analysis on the elements of Theory of Reasoned Action for group B using the measure of self-report (N=30)

Using self-report 78% of the variance can be explained, but this decreases to 8% when observation is the measure of behaviour (Tables 7.19 and 7.20).

As can be seen from the Table 7.17 and Figure 7.20 the Theory of Reasoned Action loses most of its predictive power with relation to food hygiene when actual observations are considered. None of the relationships are significant and thus it must be concluded that neither attitude, subjective norm nor intention predict observations of behaviour for food hygiene in this type of setting.

<p>Attitude Subjective norm ↓ Intention</p>	<p>Attitude Subjective norm Intention ↓ Behaviour</p>
<p><math>r = 0.60</math> <math>R^2 = 0.36</math></p>	<p><math>r = 0.30</math> <math>R^2 = 0.08</math></p>

Table 7.17 Regression analysis using a observation of behaviour on group B (N=30)

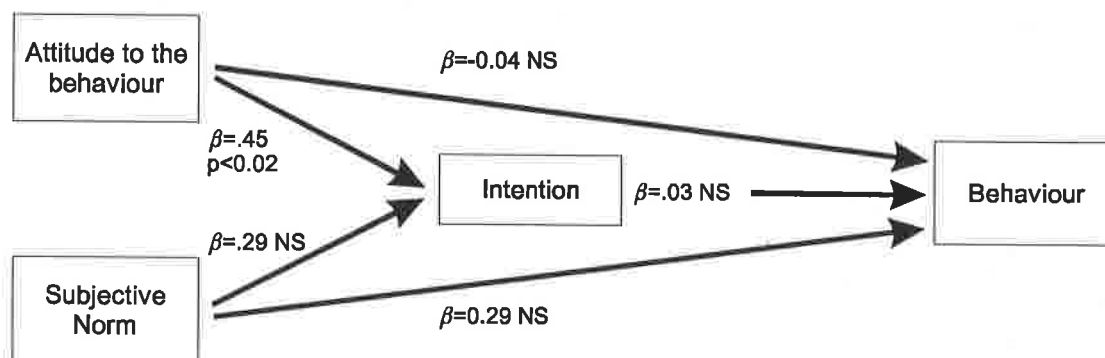


Figure 7.20 Regression analysis on the elements of the Theory of Reasoned Action using a observations as the measure of behaviour, Group B (N=30)

### 7.5.3 Tests of difference between attitude, subjective norm, intention and behaviour for gender

Attitude	Subjective norm	Intention	Self-report	Observations
Z=-1.28 NS	Z=-1.44 NS	Z= -.67 NS	Z=-1.52 NS	Z= -1.60 NS

Table 7.18 Mann-Whitney U test across gender

There are no significant differences between males and females for attitude, subjective norm, intention or behaviour.

The Theory of Reasoned Action appears to have strong predictive ability when a measure of self report is used, this ability decreases when observations are used as the measure of behaviour.

## 7.6 Discussion

### 7.6.1 Introduction

In this section the Theory of Reasoned Action was applied to food hygiene. Two methods of measurement of behaviour were used, self-report and observation. The components of the model were then considered to determine which if any played the greatest role in determining the relationship between the constituent elements of the model. Finally, the elements that were combined to make up the scales of the questionnaire were considered individually in an attempt to establish what part any of them may have contributed to the predictive utility of the model.

The Theory of Reasoned Action asserts that behaviour is a function of intention to perform that behaviour, and that intention can be predicted by measuring attitude and subjective norm. Further, Fishbein & Ajzen (1975) claim that demographic variables such as sex, age and socio-economic factors, will influence behaviour only through attitude or subjective norm, which interact directly with intention to predict performance of that behaviour. However, such factors can be used to divide groups and test the strength of different factors dependent on the group involved. For example, a study by Davidson & Jaccard (1975) found that for intention to use the contraceptive pill, the strength of subjective norm and attitude varied according to the religion of the respondent. This approach was replicated here with the same objective and differences were found. In the present work the importance of attitude, subjective norm and intention was considered for a group of young people in South East Wales. It was also used for specific age groups to determine if subjective norm and attitude varied according to age. From these results future interventions could then be designed to take into account the relative strengths of each element.

### **7.6.2 The Theory of Reasoned Action as applied to Food Hygiene**

The results for the Model as it applies to food safety behaviours demonstrated that intention to behave did not predict behaviour when using observation ( $\beta=0.03$  NS) but it did when using self report ( $\beta=0.42$   $p<0.0001$ ). Shepherd & Stockley (1987) used the Theory of Reasoned Action to consider fat consumption and found a correlation of  $r=0.69$  between intention and behaviour. Similarly, Conner et al (1994) found a significant relationship between intention and behaviour of  $\beta=0.16$ . Thus using self report the Theory of Reasoned Action explains a significant amount of the relationship between intention and behaviour, which is in keeping with similar studies in related areas. However, when observation is used as a measure a very different picture emerges, with no significant relationship being found between intention and behaviour.

For both studies, subjective norm and attitude were predictive of intention, and attitude was individually predictive of intention in the study using observations as the measure of behaviour. The Theory of Reasoned Action has not been applied to food safety before. It has been applied to food choice behaviours and the results generally demonstrated a positive relationship between intention and behaviour. The Theory of Reasoned Action has been used with considerable success in other areas of food behaviour (Conner & Norman, 1996; Frewer et al., 1995; Raats et al., 1995; Sparks et al., 1995). In this chapter it was hoped to determine if this success could be replicated for food hygiene.

With the introduction of observations the ability of intention to predict behaviour was statistically non significant, and attitude, subjective norm and intention explained only 8% of the variance in behaviour.

However, in one study by Conner et al (1994, using the Theory of Planned Behaviour) intention and perceived behavioural control explained only 5% of the variance in behaviour. Although this finding was statistically significant it means that 95% of the variance was not explained.



A further important difference between previous studies into food choice behaviours and the present work is that the measures used in previous work were all self report of behaviour, with one exception. Shepherd & Farleigh (1986) used the amount of salt in respondents urine to determine their salt intake and related this to the other elements of the model, and found that intention did predict the amount of salt in the urine. They also used pre-measured salt cellars to determine actual salt added to food. There are a number of differences between that study and the present one. The main difficulty with comparison however, relates to the subjects' awareness of the purpose of the study. In the present study into food safety, subjects were unaware of the purpose of the study so were unlikely to alter their behaviour to suit the researchers objectives, which may have happened in the Shepherd & Farleigh (1986) study.

It can further be argued that although superficially the areas of food hygiene and food choice are similar, in that they are both food related, it may be that this similarity is only skin deep. Firstly, most researchers into food choice behaviours (Conner & Norman, 1996) have considered the behaviours to be non volitional, whereas it has been contended here that food hygiene behaviours are volitional behaviours. Secondly, most food choice behaviours involve some type of sacrifice (e.g. cutting out fat, reducing calorific intake) whereas most food hygiene behaviours do not involve dramatic changes in behaviour (e.g. washing hands, cooking food until hot).

It may be concluded that the Theory of Reasoned Action is not as useful in the area of food safety as it may have appeared from consideration of previous research into similar areas, however, before dismissing use of the model a number of areas need to be considered. Firstly Ajzen & Fishbein (1969) indicate that different measures of behaviour need to be used, rather than a single measure. Thus the single incident used in the present study may have biased the results, thus future observations would need to include behaviour being measured over more than one occasion. Secondly, it may be that the

model in general is not predictive of behaviour except when self-report is used as the measure of behaviour which has implications for all future work with the Theory of Reasoned Action.

### **7.6.3 The factors that make up the measures of food hygiene on the relationship between intention and behaviour**

For the sample as a whole there were positive significant correlations for each of the 12 items that made up each scale on the questionnaire between intention and behaviour. It had been proposed that there would be a difference between those factors obtained from the salient beliefs of the group and those obtained from epidemiological data. This was not found. This has implications for the application of the Theory of Reasoned Action as it applies to food hygiene. If the beliefs obtained from the sample are no more likely to give positive relationships than ones obtained from other sources e.g. determined by the researcher, it would suggest that it is not always necessary to use salient beliefs in constructing the questionnaire. Salient beliefs are generally obtained from a pilot study, as was the case for 7 of the present beliefs. In studies where salient beliefs are obtained in this way there are generally positive relationships found, (e.g. Conner & Norman, 1996). Other studies where beliefs determined by the researchers have also achieved positive relationships include a study by Shepherd & Farleigh (1986). This further raised the issue of the importance of pre-determining the salient beliefs.

### **7.6.4 The factors that make up the measures of food hygiene on the relationship between attitude, subjective norm and intention**

With respect to the relationship between attitude to food safety and intention to behave, the majority of factors were positively correlated. The exceptions being the advisability of 'cleaning surfaces after handling raw food' and 'washing hands before handling cooked food'. Raw food is more likely to be contaminated with pathogens than cooked food (IFST, 1997)

Therefore it is important to find that while respondents believed that there was a relationship between the advisability of cleaning surfaces before handling cooked food and intention to do so, there was no such relationship for raw food. There are two possible explanations for this. The first, is that respondents are unaware of the mode of transport of pathogens, a point further explored in chapter 6. The second, that the salient belief obtained in chapter 6 relating to cleaning surfaces was 'clean surfaces before handling food'. This could suggest that the use of modal salient beliefs is necessary. Nonetheless there was no relationship between intention to behave and washing hands before handling cooked food. A further implication of this finding is that any applications of this theory to interventions would involve firstly trying to modify the beliefs of people with respect to what food safety behaviours are advisable. This finding further suggests that in future work into the Theory of Reasoned Action the elements that make up the scale should be investigated in this way to determine the impact that each factor has on the final results. It is possible that introducing two factors relating to hand washing and two relating to cleaning surfaces may have confused the respondents, as the two factors where there was no relationship between intention and peer subjective norm were washing hands and surfaces after handling raw food.

#### **7.6.5 The Theory of Reasoned Action across age**

*"people are not one amorphous group at which a food safety message is directed. This too is important, not only for the question of how to direct food messages, but also for developing social policies with relation to food safety"*

*(Maguire, 1994 p. 16).*

This statement is supported by the results of the present study where different elements of the Theory of Reasoned Action played greater or lesser roles dependent on age.

Certain factors appear more important to each age group and it may be that these factors are the ones upon which future work in the area would need to

concentrate. For example, there is a positive relationship between attitude and intention for the age group 9-11 which is not replicated for any of the other age groups. Similarly there are positive relationships between subjective norm and intention for the groups 12-15 and 19+ but not for the other groups. There was only a relationship between intention and behaviour for the groups 12-15 and 19+. Considering the younger age group it can be seen that intention was not predictive of behaviour, nor was subjective norm of intention. It may be that this age group do not have sufficient knowledge to form intentions to behave in a certain way. However, this is unlikely to be the case for two reasons. Firstly, the beliefs used in the construction of the questionnaire were obtained from the beliefs proposed by the group as a whole, but consideration of Table 6.2 will demonstrate that of the six most commonly mentioned beliefs of this age group 5 were included in the formation of the questionnaire, thus suggesting that this group have some knowledge about the subject. Secondly, a study by Shepherd & Stockley (1987) found that the correlations between knowledge and attitude and subjective norm were  $r=0.01$  and  $r=0.04$  respectively suggesting that knowledge is not necessary in the formation of attitudes and subjective norms. There is no obvious differences between or within the age groups that the modal salient beliefs are better related to intention or behaviour than those factors obtained from epidemiological data, thus suggesting that obtaining modal salient beliefs to construct the questionnaire (Ajzen, 1991) is unnecessary.

When the different age groups are considered, it can be seen that those aged between 16 and 18 have the most positive attitude to food safety and the most positive behaviour, whereas those ages 19 and older would appear to have the most positive subjective norm and the most positive intention. This would suggest that any interventions into this area could be aimed at these two age groups as they are already positive about the subject. Nonetheless the individual elements of the model did not have predictive power for this age (16-18) with intention not predicting behaviour nor subjective norm and attitude

intention, in spite of the fact that collectively attitude, subjective norm and intention explained 60% of the variance in behaviour.

However, when the observations of food safety behaviours are considered (which were for a group age 19 and older) intention to behave did not predict behaviour and the behaviour scores were not high. Thus before these results are used to design intervention strategies, the whole area of observation versus self report needs to be considered.

### **7.6.5 Conclusions**

Using a measure of self report, for the sample as a whole the Theory of Reasoned Action can be used to predict a percentage of the variance in behaviour from intention for food safety.

Using observation as a measure of behaviour, the model does not predict behaviour from intention.

The most positive attitude is held by those aged between 16 and 18, and the most positive subjective norm and intention to behave is found in those aged 19 and over.

Gender differences were found for attitude to food hygiene and intention to behave, with females holding more positive attitudes and intentions.

Modal salient beliefs were not better measures than those obtained from epidemiological studies.

The observation study would indicate that there is a disparity between the attitudes and subjective norms held by the respondents and their actual behaviour.

## CHAPTER 8

### Discussion

## **8.1 Introduction**

This chapter presents a synopsis of relevant research findings. It starts with a summary of the results and concludes with a discussion of the limitations of the research, the implications for future work and conclusions

In the recent past people's patterns of food preparation have undergone change (see section 3.1). The availability of convenience foods as well as social changes have lead to a decrease in traditional cooking. Working mothers are less likely to have time to educate their children about cooking and food hygiene practices, in a practical context. Additionally changes in the National Curriculum have prompted concerns about the teaching of food related issues in schools (Bender, 1994). This has occurred as the incidence of foodborne illness is increasing and with evidence that most outbreaks of food poisoning occur in domestic environments (see section 2.10). Recommendations have been made to educate the consumer in an attempt to reduce food poisoning. It has also been hypothesised that the consumer is being held responsible for increases in food poisoning at a time when greater food contamination is occurring. This was the situation generally existing in Great Britain, and believed to exist in South East Wales when the present work was started. The aims of this research, outlined in full on page 68, and the research questions, on page 6, will be considered here.

## **8.2 Summary of Findings**

In the present work the degree to which children and young adults in South East Wales were involved in cooking was investigated and the results were compared to those that were available about the larger population of Britain. It appears that children are involved in cooking although the amount and type

varies across age. Numerous suggestions were postulated to explain these differences including:

- the need of the older children to prepare meals for themselves.
- changes in society this century which have resulted in major changes both in how food is prepared and in the role of food as a means of keeping families together.
- differences in teaching between primary and secondary schools.

In short, it can be seen that children do prepare food both extensively and regularly and this has implications for what, when and how children are taught or learn about food hygiene. Where parents and teachers obtain their food hygiene knowledge thus becomes important.

The majority of respondents in the Primary and Secondary Schools surveys taught food hygiene and considered it important. If people are to practise good food hygiene it is important that they learn hygiene in conjunction with actual cooking practice. Children obtain much of their information from their parents/primary caregivers and if this information is incorrect it becomes more difficult to change at a later stage. It is important that accurate food hygiene information be provided at a young age due to the formation of attitudes during this period. The majority of children are receiving food hygiene information from their schools. If this information is sufficient and if it is provided in the proper context then it may be adequate to prevent poor hygiene practice seen elsewhere. Nonetheless, the attitudes that people form may be influenced by the importance that others place upon the activity in question e.g. hand washing, and if children see people important to them not washing their hands when preparing food, they may form a less than positive attitude towards it. Similarly, the strongest influences on children are their peers and parents so



the importance of parents in influencing the food hygiene learning process must be underestimated. Also, if the cycle of misinformation is to be broken then it would appear to be easier to control children's behaviour at school rather than attempt to change adults' behaviour in the home. Further, evidence from research suggests that it may also be possible for children to act as health promoters in their own homes (Rohde & Sadjimin, 1980).

Despite the belief of primary school teachers that the subject of food hygiene had been addressed in lessons the respondents believed that the majority of children leaving their schools did not have the skills necessary to facilitate good food safety behaviour. Conversely, secondary school teachers believed that there was a significant difference in the skills of those who studied food related areas and those who did not. Nonetheless, even if the information being provided to secondary school pupils is considered sufficient it may be that this is too little too late to change ingrained practices. Learning in schools may be context specific thus the information provided may not be transferred outside the learning environment.

Moreover, teachers need to be better informed. If teachers do not know the correct procedures necessary to keep food safe the appropriate educational change is difficult. As evidenced by the teaching materials used by the teachers it would appear that there is a possibility that they are imparting incomplete or out of date knowledge to their pupils. It would seem that one of the main considerations for education in this area need to be the education of the teachers. It would appear that training of teachers especially Primary School Teachers needs to be reassessed. Teachers, other than home economics teachers receive no specific hygiene training and can be regarded as ordinary members of the public and as evidenced by the FDF (1996) report there are

limits to the knowledge that most of the general public have. It would appear from the results of the surveys into what is being taught in the area of food hygiene in South East Wales that there is some disparity between what teachers consider important and what is considered important by experts in food hygiene. Consideration needs to be given to ways of changing the content of the food hygiene elements of teacher training courses, and of introducing at least basic food hygiene level courses to all teachers involved in instruction in food topics. Whilst there is no guarantee that changing knowledge will influence behaviour, it would seem important that teachers at least obtain factually correct information about food hygiene.

The evidence that is provided in the following areas in discussion of the Theory of Reasoned Action would suggest that teachers need to be made more aware of the importance of normative influences in their teaching.

### **8.3 The Theory of Reasoned Action and food hygiene**

Having determined the extent to which children and young adults in South East Wales prepare food, and their formal teaching about food, an investigation of food safety took place which involved the Theory of Reasoned Action being applied to food hygiene, which is a unique feature of the project. Using self-report as the measure of behaviour the model was found to be very effective in both predicting intention from attitude and subjective norm and behaviour from intention.

An additional component of the project is a comparison of the model's efficacy using self-report and observation as the measures of behaviour. In this , however, the ability of the model to predict observed behaviour from intention was ineffectual. In the opinion of the researcher the success of the model in

predicting behaviour using self-report and observation would potentially have implications for future research on food hygiene which would be of particular importance to the food industry. The results would also be extremely important for future applications of the Theory of Reasoned Action. This will be explored further in the ensuing sections.

It was believed important to understand food hygiene behaviour in the context of a theoretical framework. For the first time the Theory of Reasoned Action was applied to food hygiene. The results using self-report were very encouraging in providing new information about the area.

One of the most important findings of this work was the strength of the subjective norm. There are certain ages at which different age groups hold more positive attitudes and subjective norms and it is possible that at this stage interventions into changing behaviour would be successful (See section 7.4.2).

It would appear for food hygiene behaviours that subjective norm is an important variable in predicting behaviour. Therefore, interventions aimed at changing behaviour should concentrate on modifying subjective norm. A recent study into women's intention to take hormone replacement therapy found that subjective norm was more predictive than attitude (Quine & Rubin, 1997), and the authors further concluded that where health behaviours are performed publicly or where it is believed that the consequences of not performing a behaviour could affect the health of others that the subjective norm will be more predictive than attitude. In the present study into food hygiene this explanation would appear to be very valid, as food hygiene behaviours are often public and often have implications for the health of others.

Additionally, while attitude, subjective norm and intention explained 51% of the variance in behaviour there was 49% of the variance unexplained. Therefore, in

future studies consideration of other variables may prove beneficial. Bagozzi (1993) has argued that the variables outlined in the Theory of Reasoned Action are important but insufficient determinants of behaviour. Further, in an investigation into factors predisposing women to take precautions against breast and cervical cancer, Hill, Gardner & Rassaby (1985) compared the Theory of Reasoned Action with the Health Belief Model and found that:

*"neither model, as judged by the size of  $R^2$  is clearly superior" p. 64.*

They conclude that the attitudinal component of the Theory of Reasoned Action and the barriers component of the Health Belief Model should be combined as a measure. It may be unrealistic to expect any one model of health to account for the diversity of health behaviours that are researched, thus suggesting that each individual behaviour needs to be considered as different to all others.

Nonetheless, Fishbein & Ajzen (1980) have argued that the Theory of Reasoned Action is sufficient and additional variables are unnecessary, and it was found in the present work that intention can predict a large proportion of behaviour, when using self-report. Thus it is important that the sections of the model that have been found to work are used in future and that ways of improving the application of the model are considered before additional variables are added to it.

It has been suggested for health behaviour that past behaviour is a major predictor of future behaviour (Conner & Norman, 1996), and that if a measure of past behaviour is used in conjunction with other measures that any of the social cognition models will be improved. Ajzen (1988) has disputed this however, suggesting that past behaviour will influence beliefs, and therefore should already be included in the model.

With respect to the modal salient beliefs, although the work presented here used the method outlined by Ajzen & Fishbein (1980) some researchers have queried the method. Firstly, it has been argued that the beliefs for the group do not necessarily correspond to the beliefs for the individual, and that people should provide their personal beliefs (Budd, 1986 cited in Conner & Norman 1996). Another alternative suggested is that individuals rank the beliefs that are most salient to them from the list provided, and that only these beliefs are used to calculate the relationships (Rutter & Bunce, 1989 cited in Conner & Norman 1996). Whilst in future work in this area either of these positions may prove advantageous, in the present work there were a number of reasons for not adopting them. Firstly, a comparison across age groups was wanted and this would not have been possible if the salient beliefs had varied from individual to individual. Secondly, one of the purposes of the research was to compare beliefs of respondents with factors obtained from epidemiological studies, and again this would not have been possible if individual beliefs were utilised. It must be noted however, that the salient beliefs obtained in chapter 6 did not have better predictive success in comparison to the factors obtained from epidemiological data, suggesting that in food hygiene obtaining salient beliefs may not be necessary. Further Agnew (1998) suggested that while modal beliefs had marginally better predictive abilities in his study, he believed that the small gain in predictive ability was not sufficient to justify the effort involved.

#### **8.4 Observations Vs. Self-report**

It has been argued that formation of a behavioural intention is insufficient for successful enactment of the behaviour (Conner & Norman, 1996). A number of

theories have been proposed to explain the discrepancy between intention and behaviour.

Bagozzi (1993) has proposed the Theory of Trying, suggesting that although people may form the intention to do something, impediments may intervene to alter the persons ability to perform the behaviour thus resulting in modification of the intention, and that a measure of the need to try is required. It is difficult to see how this would relate to the present observations of food hygiene behaviour. In the observation situation all facilities for performing the food hygiene behaviours were made available to the subjects, thus for hand washing for example, soap, hot water and a towel were all provided. No effort was needed to make use of these items. Nonetheless, within the domestic situation it may be that there are certain factors that intervene between correct hygiene practices and actual behaviour. For example, with an increase in the number of people who shop monthly (Evans, 1992) and due to the size of the domestic fridge, it may not be possible to always store raw food under cooked food. Similarly, it may be that hand washing becomes habitual over time, thus suggesting that an element of trying is needed to perform the behaviour correctly.

Using a sample of 30 aged 18 and older and with observation as the measure of behaviour attitude, subjective norm and intention explained only 8% of the variance in behaviour. Further, intention was not related to behaviour. This suggests as mentioned that using self-report as a measure of behaviour results in the Theory of Reasoned Action having some predictive power, however, using observation measures means that it has significantly less predictive power. The results using observation were disappointing. However, rarely in scientific studies are complete answers or solutions found at the first attempt.

There are many ways, given time, in which the model's use can be improved and this could form the basis for substantial work in the future.

Using self-report an intention/behaviour correlation of 0.42 was demonstrated whilst using observation a relation of 0.03 was achieved, Sheppard et al. (1988) reported intention/behaviour correlations ranging from 0.10 to 0.94, which demonstrates that using self-report as the measure of food hygiene behaviour provides results in keeping with those obtained in other studies. Two major reviews of the Theory of Reasoned Action (Sheppard et al., 1988; van den Putte, 1993 cited in Conner & Norman, 1996) into a variety of areas found correlations between subjective norm, attitude and intention between 0.66 and 0.68. In the study using both self-report and observation the results obtained was .60 and using the larger sample of 267 subjects it was .54. Thus although both results are slightly lower than the mean obtained by other researchers it would appear that the attitude and subjective norm are good predictors of intention.

The disparity between these results and the present ones using observation may be related to the data collection measures used. Neither review discussed the data collections used in the studies, other reviews of the Theory of Reasoned Action (Strobe & Strobe, 1995; Conner & Norman, 1996) do not either. It is proposed here that a distinction can be made between the utility and value of the Theory of Reasoned Action dependent on the type of data collection method used, i.e. where self-report of behaviour is used there will be a stronger correlation between intention and behaviour than where observations are the measure of behaviour. For example, Lambert et al (1997) found that the attitudes, subjective norms and intentions of doctors were not predictive of their actual prescribing behaviour. It is the contention of the

researcher however, that these results highlight a possible flaw in the Theory of Reasoned Action and thus the validity of studies using self-report need to be considered.

In studies where observations have been used in food hygiene (Worsfold & Griffith, 1995) there has been found to be a disparity between respondents knowledge and their actions. The history of attitude research is filled with the difficulty of predicting behaviour from attitudes (Eagly & Chaiken, 1993). It is possible that one of the reasons for the success of the Theory of Reasoned Action and other social cognition models is that as self-report is the preferred measure of behaviour, actual actions are not being measured thus creating an illusion of concurrence that does not in reality exist.

A further explanation for the low correlations in the observation case in the present study revolves around the design of the questionnaire used for measurement. Firstly, the food hygiene items were mixed with items about nutrition and food presentation in an attempt to disguise the purpose of the study, and secondly, the questionnaire was administered after the observation to ensure that the questionnaire did not bias the behaviour (Baubaker & Fowler, 1990). Thus respondents were unaware of the purpose of the task. It is possible that in other studies, even where other means of data collection were used, that as respondents knew the purpose of the study they consequently modified their behaviour. Shepherd & Farleigh (1996) used the salt content of urine as the behavioural measure in their study looking at salt intake, and positive correlations between attitude and behaviour were found. However, the subjects knew that they would have to provide samples of their urine so may have modified their behaviour accordingly.



Where comparisons of self-report and other measurements of behaviour have taken place (not using the Theory of Reasoned Action) the results are inconsistent. For example, in two studies into adolescents behaviour the results were contradictory. In a study into sexually transmitted disease, where records of incidents were available, self-report was poorly correlated with records (Clark et al., 1997). Conversely, in a study into sun protective behaviours self-report and observation of behaviour were strongly correlated (Lower et al., 1998). In a further study considering different measurements of behaviour Lusk, Ronis & Baer (1995) found that self-report and observation of behaviour were strongly related. Similarly, studies into driving behaviour showed strong correlations between observed and self-report of behaviour. Based wholly on the results of these studies it is possible to hypothesise that self-report and observation of behaviour can relate to each other. One possible factor that divides those that correlate well and those that do not may be the public nature of the behaviour (driving, sunbathing and factory hearing protection). Where behaviours take place in public people may be more inclined and/or able to accurately self-report, whereas it maybe that private behaviours are less easy to self-report. Similarly, where behaviours include a component of harm to self or others (STD's and food hygiene) respondents may be more predisposed to provide socially acceptable replies. Thus it is important that these suppositions be researched further.

### **8.5 Limitations of these studies and suggested future work**

Whilst the results obtained in the present study have important implications for future work in the area there are a number of limitations.

- The response rate for the two questionnaires to teachers-chapters 4 and 5 was lower than anticipated (50% for Primary schools and 39% for secondary schools) which in turn makes it less easy to extrapolate from the data. Any future work in the area would need to attempt to increase the response rate. Possible ways of achieving this would include offering an incentive to teachers for responding; working in conjunction with one of the teachers unions who would then be prepared to encourage teachers to reply; advertisements in "Modus"-a Home Economics teachers journal; using a shorter form of the questionnaire as time constraints were the main reason for non responses. Any or all of these could have the affect of increasing the response rate.
- Although the response rate to the beliefs survey was sufficient- chapter 6, certain modifications could be made in future work. A survey of teachers beliefs to compare free form answers, with those of the children, rather than the imposed ones obtained in the other questionnaire could have aided understanding of where children are obtaining their information about food safety. Similarly parents or primary care givers could have been surveyed as they are a major source of information about food safety.
- While there did not appear to be difficulties with the attitude questionnaire there are a number of ways in which it could have been improved. Firstly as with the observation questionnaire, statements about nutrition and food preparation/presentation could have been included to reduce any bias resulting from respondents knowing the purpose of the work. As recommended by Fishbein & Ajzen (1974) and Conner & Norman (1994) the behaviour could have been measured over different situations and at different times to ensure that behavioural tendencies rather than specific

instances of behaviour were being measured. Based on the results of the present work it should be possible to reduce the number of statements used in the construction of the questionnaire from 12 to less, by disregarding the statements that correlated least well across attitude, subjective norm, intention and self-report of behaviour.

- With respect to the use of observations as a measure of behaviour it is important to repeat the work to determine if the result obtained demonstrated a design flaw or methodological fault or whether the use of observations has highlighted a difficulty with the Theory of Reasoned Action. Further, a larger sample size could have improved prediction by reducing the possible effects of a subset of the sample behaving in an unanticipated manner. The use of a number of different recipes could also have provided information that would be useful and could be included in future work in the area. Preparation of food in an artificial setting may have affected the results and in future work, it may be possible to use a more natural setting e.g. the home. Another possible difficulty with the observations was having the observer present, thus in future work video recorders could be used. The behaviours that were scored on the observation check list could have had weights assigned as it is possible that some are more important than others with respect to food hygiene e.g. cross contamination. This in turn could have changed the magnitude of the relationships between intention and behaviour.
- A final disadvantage to the present work was the small geographical area that was covered, in future work stratified sampling across Britain could be used to examine regional differences, in particular any differences in

teaching, beliefs and attitudes between Scotland where food hygiene is part of the National Curriculum and England and Wales where it is not.

## 8.6 Recommendations

- That the professionals act at once to ensure that the teaching of food hygiene increases as suggested by the Pennington report (1997). However, in Scotland where food hygiene is part of the National Curriculum there does not appear to be significantly improved food hygiene, suggesting that the form that food hygiene takes within the national curriculum is important. [However, this is not the only possible explanation, Pennington (1997) has suggested that *E-coli* contamination in meat may be more prevalent in Scotland].

The results of the present work which point out the importance of subjective norm or attitude at certain ages could be used as one of the foundations for the formation of such a plan. Further, at different age groups, the individual statements about food hygiene again varied across age and could also be a basis for a revised plan of food hygiene in the curriculum. Similarly, the context of the teaching as mentioned is important and food hygiene needs to be taught in conjunction with food preparation.

Until the government make changes in the National curriculum as recommended by Pennington, schools could be encouraged to improve the teaching of food hygiene.

- That the colleges and universities increase the emphasis placed at present on food hygiene, by utilising the factors outlined above with regard to age appropriate attitude and subjective norm, to ensure that future graduates are

more aware of the importance of the area not just to health but to the national economy.

- That the present work is expanded and extended in the ways suggested above to determine further the appropriateness of the use of the Theory of Reasoned Action with food hygiene. For example, further research using observation and self-report of behaviour needs to be carried out to determine if the Theory of Reasoned Action is flawed. Alternatively, a study using observations of behaviour on more than one occasion could take place to see if this improved the relationship between intention and behaviour.
- That researchers into the Theory of Reasoned Action in other areas, use data collection methods other than self-report to determine whether the difficulties outlined above are specific to food hygiene.
- That possible types of behaviour e.g. whether performed in public or private be compared to see if the hypothesised relationship between self-report and observation of behaviour can be substantiated.
- That health educators consider the importance of subjective norm and attitude at different ages before designing their interventions to see if they can target different groups.

## **8.7 Conclusions**

- Although there were limitations to the present work, this is however, an important contribution to knowledge both within the area of food hygiene and for the use of the Theory of Reasoned Action. The use of the subjective norm component of the model in interventions into food hygiene would

appear to be very important and this information needs to be disseminated to all involved in the teaching of food hygiene.

- The Health of the Nation document (Department of Health, 1991) considered the importance of food poisoning and inadequate food hygiene training on the health of the people of England. It was concluded, however, that because of the difficulty of quantifying the extent of the problem that at that stage no further action would be taken. It is to be hoped therefore in light of the Pennington report and the setting up of a Food Standards Agency that food poisoning will be included in the next white paper on health. It is important therefore that before such changes occur that those involved in the area use the information available to them to describe the areas where it is believed that provision of money would be of most benefit to the nation. Therefore, it is important that the results of this and similar studies get disseminated widely and that future work uses this research as a framework.
- Using self-report of behaviour the model was very successful in predicting behaviour from intention and intention from its precursors. Further this work highlights the need to determine why the model was less successful in the area of food hygiene when using observation than when using self-report, as it may demonstrate a fault with the model, it may not be appropriate to apply the Theory of Reasoned Action to the area of food hygiene or it may be a fundamental flaw with the Theory of Reasoned action in that intention may only be predictive of behaviour when self-report measures are used.

- In conclusion, this work is the first to investigate the utility of The Theory of Reasoned Action as applied to food hygiene and although it raises future areas that need exploration, particularly the comparison of self-report and observation of behaviour, it also provides some important new information both on food hygiene and on the Theory of Reasoned Action.

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## APPENDICES

## Appendix 1

AGE ☐

MALE ☐

FEMALE ☐

Before we start the main questionnaire here are some questions that I would like you to answer. If you are not sure which you do, choose the answer closest to what you think you do. Please put a tick in the box.

	about once a day	more than once a week	about once a week	about once a fortnight	about once a month	less than once a month or never
How often do you prepare snack foods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you prepare sandwiches?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you make cakes or buns?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you heat up prepared meals?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you prepare food in advance of eating?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How often do you prepare meals using raw ingredients?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix 2

## TEACHING 'FOOD' IN THE NATIONAL CURRICULUM (KEY STAGE 2)

1. Which class are you mainly responsible for teaching?

Year 5 ☐ Year 6 ☐

2. In which of the following subjects does the teaching of food play an important role, Please state approximate proportions

	0-25%	26-50%	51-75%	76-100%
Technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Geography	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
History	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Curriculum Subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please specify Non-Curriculum Subject	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please specify				

3. Are you aware of any other means used by your pupils to examine food outside the national curriculum?  
(Please tick)

TV/Radio	<input type="checkbox"/>	Magazines/Comics	<input type="checkbox"/>
Family/Friends	<input type="checkbox"/>	Other please specify	<input type="checkbox"/>

4. Do you have any of the following facilities for teaching food?

Cooker	<input type="checkbox"/>	Cooking utensils	<input type="checkbox"/>
Fridge	<input type="checkbox"/>	Food processor	<input type="checkbox"/>
<input type="checkbox"/>	Other please specify	<input type="checkbox"/>	Microwave

5. Are any of the following constraints in teaching food in your school?

Lack of time	<input type="checkbox"/>	Lack of interest	<input type="checkbox"/>
Lack of facilities	<input type="checkbox"/>	Other please specify	<input type="checkbox"/>

6. Do you teach any of the following?

	Yes	No
Food preparation skills	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	<input type="checkbox"/>	<input type="checkbox"/>
Food Hygiene	<input type="checkbox"/>	<input type="checkbox"/>

If No, go to question 11.

7. If Yes, how frequently each year do you teach them?

	TIMES			
	1 - 4	5 - 8	9 - 12	13+
Food Preparation skill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food Hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Which is the main subject in which the following are taught?

Food preparation skills

---

Nutrition

---

Food Hygiene

9. Are the following dealt with in any other subject? Please specify

	Yes	No
Food Preparation Skills	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	<input type="checkbox"/>	<input type="checkbox"/>
Food Hygiene	<input type="checkbox"/>	<input type="checkbox"/>

10. Are the listed audio visual material used in teaching?

	Food Prep Skills		Nutrition		Food Hygiene	
	Yes	No	Yes	No	Yes	No
Text books	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Videos	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other teaching aids	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supermarket pamphlets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Please list any others that are used						



11. How important do you believe the teaching of the following to be

	very important	important	neither important nor unimportant	unimportant	very unimportant
Food Prep Skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Food Hygiene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. Do you believe that your pupils have sufficiently covered the subject of food in preparation for secondary school?

Yes ☐ No ☐ Don't Know ☐

13. Do you have any food-related contact with any secondary school teachers.

A lot ☐ A little ☐ None ☐

Please detail any contact

14. Which if any of the following skills are important for a child to develop by the age of 11.

	very important	important	neither important nor unimportant	unimportant	very unimportant
Maintain good personal hygiene whilst cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods for a balanced diet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Correctly reheat ready made meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Know when to use a fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select high fibre foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prepare simple snack meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Know when food is cooked sufficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Understand the relationship between diet and disease in later life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use cooking equipment safely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. What proportion of the children leaving your school do you think can actually do the following:

	0-25%	26-50%	26-50%	76-100%
Maintain good personal hygiene whilst cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select foods for a balanced diet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Correctly reheat ready made meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Know when to use a fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Select high fibre foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prepare simple snack meals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Know when food is cooked sufficiently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Understand the relationship between diet and disease in later life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use cooking equipment safely	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To ensure there is a demographic mix of respondents would you please assist by answering the following questions. All details will be treated in confidence and names will not be used in any reports.

Name \_\_\_\_\_

Name of school \_\_\_\_\_

Age            20-40      ☐            41+            ☐

Gender            Male      ☐            Female            ☐

THANK YOU FOR YOUR TIME AND CO-OPERATION.

Please feel free to make any comments you feel are relevant e.g. extra information regarding your answers, problems with questionnaire etc.

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## Appendix 3

# TEACHING 'FOOD' IN THE NATIONAL CURRICULUM (KEY STAGE 3 AND KEY STAGE 4)

1. Which school group are you mainly responsible for teaching?

Key stage 3 ☐

Key stage 4 ☐

2. Do you teach any of the following?

	Key Stage 3	Key Stage 4
Home Economics	<input type="checkbox"/>	<input type="checkbox"/>
Design and Technology	<input type="checkbox"/>	<input type="checkbox"/>
Catering	<input type="checkbox"/>	<input type="checkbox"/>
Personal and Social Education	<input type="checkbox"/>	<input type="checkbox"/>

3. How many pupils in your school in total study the following subjects?

	Key Stage 3	Key Stage 4
Home Economics		
Design and Technology		
Catering		
Personal and Social Education		

4. What proportion of pupil time is spent on each of these subjects in each school year?

	Key Stage 3				Key Stage 4			
	0-25	26-50	51-75	76-100%	0-25	26-50	51-75	76-100%
Home Economics								
Design and Technology								
Catering								
Personal and Social Education								

5. Do you teach design and technology  
Yes ☐ No ☐

If Yes, which strand of Design and Technology do you teach?

- Food ☐  
Textiles ☐  
Graphic Media ☐  
Combined ☐ please specify

6. In which of the following subjects is there a food element in your school?

	Yes	No
Home Economics	<input type="checkbox"/>	<input type="checkbox"/>
Design and Technology	<input type="checkbox"/>	<input type="checkbox"/>
Catering	<input type="checkbox"/>	<input type="checkbox"/>
Personal & Social Education	<input type="checkbox"/>	<input type="checkbox"/>

7. What proportion of each subject relates to food:

	Key Stage 3				Key Stage 4			
	0-25	26-50	51-75	76-100%	0-25	26-50	51-75	76-100%
Home Economics								
Design and Technology								
Catering								
Personal and Social Education								

8. Do you think too much or too little is taught?

	Too much	Sufficient	Too little	Don't know
Key stage 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Key stage 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Do any other subjects cover food?

	Key stage 3	Key stage 4
Yes	<input type="checkbox"/>	<input type="checkbox"/>
No	<input type="checkbox"/>	<input type="checkbox"/>

If Yes, please specify and identify the main areas of input / overlap.

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10. Do you know of any other sources that your pupils use to examine the subject of food outside the national curriculum?

- Television / Radio ☐  
Newspapers / magazines ☐  
Family / friends ☐  
other please specify ☐

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11. Do you teach your pupils how to prepare food?

Yes ☐ No ☐

If No, go to question 17.

12. If Yes, how frequently is food preparation taught?

	Key stage 3	Key stage 4
1-4 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
5-8 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
9-12 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
more than 12 hours a term	<input type="checkbox"/>	<input type="checkbox"/>

13. Please list any text books you use to teach food preparation?

Key stage 3		Key stage 4	
Title	Author	Title	Author

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14. Do you use videos to teach food preparation?

Yes ☐ No ☐

If Yes, please list

Key stage 3

Key stage 4

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15. Do you use any other teaching aids to teach food preparation?

Yes ☐ No ☐

If Yes, please list

Key stage 3

Key stage 4

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16. Do you believe that teaching food preparation is

very important

important

neither important  
nor unimportant

unimportant

very unimportant

☐☐☐☐☐

17. Do you teach nutrition

Yes

☐

No

☐

If No, go to question 23.

18. If Yes, how frequently?

Key stage 3

Key stage 4

1-4 hours a term

☐☐

5-8 hours a term

☐☐

9-12 hours a term

☐☐

more than 12 hours a term

☐☐

19. Please list any text books you use to teach nutrition.

Key stage 3

Key stage 4

Title

Author

Title

Author

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20. Do you use videos to teach nutrition?

Yes ☐

No ☐

If Yes, please list

Key stage 3

Key stage 4

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21. Do you use any other teaching aids to teach nutrition?

Yes ☐

No ☐

If Yes, please list

Key stage 3

Key stage 4

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22. Do you believe that teaching nutrition is

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. Do you teach food hygiene? Yes ☐ No ☐  
If No, go to question 29

If Yes, how frequently?

	Key stage 3	Key stage 4
1-4 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
5-8 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
9-12 hours a term	<input type="checkbox"/>	<input type="checkbox"/>
more than 12 hours a term	<input type="checkbox"/>	<input type="checkbox"/>

25. Please list any text books you use to teach food hygiene.

Key stage 3

Key stage 4

Title

Author

Title

Author

26. Do you use videos to teach food hygiene

Yes ☐ No ☐

If Yes, please list

Key stage 3

Key stage 4

27. Do you use any other teaching aids to teach food hygiene

Yes ☐ No ☐

If Yes, please list

Key stage 3

Key stage 4

28. Do you believe that teaching food hygiene is

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. Which, if any, of the following skills are important (Imp.) for a child to develop by the age of 16.

	very important	important	neither important nor unimportant	unimportant	very unimportant
Prepare meals with good personal hygiene					
Prepare meals from raw ingredients					
Select low sugar foods					
Correctly reheat read made meals					
Store raw food correctly					
Select high fibre foods					
Store cooked foods correctly					
Prepare simple snack foods					
Select foods for a balanced diet					
Clean food surfaces correctly					
Select low fat foods					

Please rank 1 - 5 the 5 items you believe to be most important.

30. Of the children leaving your school who have studied the food subjects above mentioned, what proportion do you think can do the following:

	0-25%	26-50%	51-75%	76-100%
Prepare meals with good personal hygiene				
Prepare meals from raw ingredients				
Select low sugar foods				
Correctly reheat read made meals				
Store raw food correctly				
Select high fibre foods				
Store cooked foods correctly				
Prepare simple snack foods				
Select foods for a balanced diet				
Clean food surfaces correctly				
Select low fat foods				

31. Of the children leaving your school who **have not** studied the food subjects above mentioned, what proportion do you think can do the following?

	0-25%	26-50%	51-75%	76-100%
Prepare meals with good personal hygiene				
Prepare meals from raw ingredients				
Select low sugar foods				
Correctly reheat read made meals				
Store raw food correctly				
Select high fibre foods				
Store cooked foods correctly				
Prepare simple snack foods				
Select foods for a balanced diet				
Clean food surfaces correctly				
Select low fat foods				

To ensure we have a demographic mix of respondents would you please assist by answering the following questions. All details will be treated in confidence and names will not be used in any reports.

NAME \_\_\_\_\_

NAME OF SCHOOL \_\_\_\_\_

AGE     20-40 ☐     41+     ☐

GENDER                   MALE     ☐     FEMALE     ☐

THANK YOU FOR YOUR TIME AND CO-OPERATION.

Please feel free to make any comments that you feel are relevant. e.g. extra information regarding your answers, problems with the questionnaire etc..

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## Appendix 4

Food is needed for survival sometimes however  
the food we eat makes us sick. Please list six  
things you think you can do to keep food safe to  
eat

1.

2.

3.

4.

5.

6.

## Appendix 5

# EXAMPLE

All the questions in the questionnaire should be answered in the same way. You must tick the box under the statement you most agree with, for example, if the questionnaire was about road safety then a question might be

Next time I cross the road I intend to

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
look both ways before crossing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you think that next time you cross the road you are very likely to look both ways before crossing you would tick the box like this

Next time I cross the road I intend to

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
look both ways before crossing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you think it's neither likely nor unlikely that you will look both ways next time you cross the road you would tick the box like this

Next time I cross the road I intend to

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
look both ways before crossing	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I will be here while you are doing the questionnaire so if you have any questions please ask me.



## Next time I prepare food I intend to:

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Clean all work surfaces after handling raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands before preparing cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickly cool food after cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep cooked foods in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defrost food properly before cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cook food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep raw food in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Next time I prepare food

	very safe	safe	neither safe nor unsafe	unsafe	very unsafe
If I clean all work surfaces after handling raw food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I check the best before date it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I cover cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I wash my hands before preparing cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I reheat food until it's very hot it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I wash my hands after preparing raw food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I quickly cool food after cooking it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I clean surfaces before handling cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I keep cooked foods in the fridge it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I defrost food properly before cooking it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I cook food until it's very hot it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I keep raw food in the fridge it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Next time I prepare food

	very advisable	advisable	neither advisable nor inadvisable	inadvisable	very inadvisable
If I clean all work surfaces after handling raw food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I check the best before date it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I cover cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I wash my hands before preparing cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I reheat food until it's very hot it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I wash my hands after preparing raw food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I quickly cool food after cooking it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I clean surfaces before handling cooked food it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I keep cooked foods in the fridge it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I defrost food properly before cooking it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I cook food until it's very hot it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If I keep raw food in the fridge it will be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Next time I cook, my friends think I should:

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Clean all work surfaces after handling raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands before preparing cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickly cool food after cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep cooked foods in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defrost food properly before cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cook food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep raw food in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	very often	often	neither often nor seldom	seldom	very seldom
How often do you do what your friends think you should do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Next time I cook, my parents think I should:

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Clean all work surfaces after handling raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands before preparing cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickly cool food after cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep cooked foods in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defrost food properly before cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cook food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep raw food in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	very often	often	neither often nor seldom	seldom	very seldom
How often do you do what your parents think you should do?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Food will be safe to eat next time I cook if I:

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Clean all work surfaces after handling raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands before preparing cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickly cool food after cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep cooked foods in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defrost food properly before cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cook food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep raw food in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Performing the above food handling behaviours is:

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## When preparing food how often do you do the following?

	very often	often	neither often nor seldom	seldom	very seldom
Clean all work surfaces after handling raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cover cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands before preparing cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reheat food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quickly cool food after cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep cooked foods in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Defrost food properly before cooking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cook food until it's very hot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep raw food in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Age

Male ☐

Female ☐

## Appendix 6



## Recipe 1 Egg and tomato sandwiches

### Method

1. Boil the eggs, cool, shell and chop finely.
2. Slice the tomato and mix with egg and mayonnaise
3. Spréad the butter on the bread.
4. Divide the egg mixture into four and cover four slices of bread evenly.
5. Place a slice of bread on top of each covered slice.

## Appendix 7

1. Boil the eggs, cool, shell and chop finely.

	YES	NO
Boiling water used for eggs		
Check egg shells aren't damaged		
Check date of eggs		
Wash hands after handling raw eggs		
Clean surfaces after raw eggs		
Eggs Hard boiled (minimum 8 minutes)		
Eggs cooled before use		

2. Slice the tomato and mix with egg and mayonnaise.

Wash hands before handling cooked eggs		
Wash tomato		
Check date of mayonnaise		
Keep Mayonnaise in fridge		
Temperature check of egg mix		

3. Divide the egg mixture into four and cover four slices of bread evenly.
4. Spread the butter on the bread.
5. Place a slice of bread on top of each covered slice.

Clean chopping board		
Check knife clean		
No tasting (licking of fingers)		

6. Cut sandwiches into four, and serve or store.

Temperature check of egg mixture		
Stored in fridge		
Covered before storing		
Clean plate used		
Surfaces cleaned after use		
Utensils cleaned after use		

	1st	2nd
SOAP		
HOT WATER		
THOROUGHLY DRIED		

## Appendix 8

Occupation of Head of Household \_\_\_\_\_

MALE ☐

AGE \_\_\_\_\_

FEMALE ☐

How often do you make the following sandwiches?

	very often	often	neither often nor seldom	seldom	very seldom
egg sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
salad sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ham sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
tuna sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cheese sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
chicken sandwiches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Do you prepare sandwiches in advance of eating?

very often	often	neither often nor seldom	seldom	very seldom
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How long in advance do you prepare them?

Less than an hour	<input type="checkbox"/>
Between 1 and 4 hours	<input type="checkbox"/>
More than 4 hours but less than 8	<input type="checkbox"/>
8 hours or overnight (whichever is shorter)	<input type="checkbox"/>
More	<input type="checkbox"/>

When next I prepare sandwiches I intend to

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check egg shells aren't cracked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use salt in the boiling water for the eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Next time I make sandwiches people who are important to me think  
I should

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check egg shells aren't cracked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use salt in the boiling water for the eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How often do you do what people who are important to you think you should  
do?

very often	often	neither often nor seldom	seldom	very seldom
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sandwiches will be nutritionally balanced next time I cook if I

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check egg shells aren't cracked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use salt in the boiling water for the eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

When making sandwiches how important is performing the above behaviours?

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Sandwiches will be safe to eat next time I cook if I

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check egg shells aren't cracked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use salt in the boiling water for the eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

When making sandwiches how important is performing the above behaviours?

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sandwiches will be look good to eat next time I cook if I

	very likely	likely	neither likely nor unlikely	unlikely	very unlikely
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

When making sandwiches how important is performing the above behaviours?

very important	important	neither important nor unimportant	unimportant	very unimportant
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

When you make sandwiches how often do you do the following?

	very often	often	neither often nor seldom	seldom	very seldom
Remove crusts from bread before eating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skin tomatoes before using	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean all work surfaces after handling raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low fat spread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use the crust slice of the loaf of bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check the best before date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use wholemeal bread	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Check egg shells aren't cracked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use salt in the boiling water for the eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Core tomatoes before use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Clean surfaces before handling cooked food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Keep mayonnaise in the fridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use low calorie mayonnaise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wash my hands after preparing raw eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Season sandwich mix with salt and/or pepper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>