

Domestic Food Safety Practices
Exploring what is happening behind our kitchen doors

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A Submission¹ for the degree of Doctor of Philosophy by Published Work at Newcastle
University²



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¹ The submission is made up of a copy of each (9) submitted publications, an accompanying doctoral statement and the required submission forms.

² No portion of the work referred to in this thesis has been submitted in support of an application for any other degree or qualification from this or any other university or institute of learning.

Preface

This submission lays out the prima facie case for the consideration of the award of Doctor of Philosophy by Published Work to Mary Brennan, School of Agriculture, Food and Rural Development, University of Newcastle upon Tyne.

The submission is made up of three parts:

Part 1: The Doctoral Statement

Part 2: The Set of Submitted Publications

Part 3: Additional Required Documentation

A set of nine publications have been chosen to represent the range of research undertaken. The articles are presented in a logical (though not necessarily chronological) order. Concise summaries of each publication, and a review of the research skills developed by the candidate are presented in section 2. The publications are summarised in the order in which the candidate suggests they should be read. The submission consists of two types of publications: Core and Supplementary (Table A). The set of six core publications was produced from one research project funded by Safefood – the Food Safety Promotions Board, Ireland. The project was entitled “Novel Food Risk Communication” and was conducted on the Island of Ireland (IOI) between July 2003 and July 2005. The project was jointly developed by the candidate and her co-investigator Dr Mary McCarthy (University College Cork, Ireland). In addition to Dr McCarthy, there were 4 other members of staff who contributed to the Safefood project: Professor Alan Kelly (Food Safety expert); Professor Chris Ritson (candidate's supervisor and specialist in food consumer and marketing research); Ms Martine De Boer (Research Assistant, 2003-2005, UCC); & (Dr Nicola Thompson (Research Assistant, 2004-2005, Newcastle University). All six of the core publications are joint authored papers.

The three supplementary publications comprise of two joint authored book chapters and one single authored paper. These supplementary publications were produced from two additional research projects that the candidate has been involved in between 2002-2010. Kusnesof & Brennan (2004), a book chapter, presents a review of food risk and safety research. It was produced from research conducted for a project funded by the Food Standards Agency entitled ‘Communicating Food Risk Uncertainty’. This project was key to the development of the candidate’s research skills and provided her with both the training and publications

record to successfully develop the Safefood project in collaboration with Dr McCarthy. Kuznesof and Brennan (2004) provided some of the academic base from which the Safefood project was developed. The second project entitled Quality Low Input Food (QLIF) was an EU funded 6th Framework integrated project. The candidate was part of the co-ordinating team that developed the full project and a member of the consumer sub project co-ordination team based at Newcastle. Ritson & Brennan (2008) and Brennan (2008) report on QLIF research findings. These three supplementary publications, linked by the candidates focus on exploring consumer attitudes to food and food safety, provide further evidence of the academic experience and skills the candidate has developed over the course of this doctoral period. Formal written confirmation from all co-authors of the candidate's contribution to each publication has been obtained and can be found in Part 3, Section 1.

Table A. Set of Submitted Published Work

Core Publications	Supplementary Publications
De Boer, M., McCarthy, M., Brennan, M., Kelly, A.L. & C. Ritson (2005). Public Understanding of food risk issues and food risk messages on the island of Ireland: The views of food safety experts. <i>Journal of Food Safety</i> , 25, pp. 241-265 (This article was chosen for the journals 2006 publicity campaign in the US and Canada).	Kuznesof, S. & M. Brennan (2004). Perceived Risk and product safety in the Food Supply Chain. In M. Bourlakis and P.W.H. Weightman (Eds) <i>Food Supply Chain Management</i> , Blackwell Publications, Oxford.
McCarthy, M., Brennan, M., Ritson, C., & M. De Boer (2006). Food hazard characteristics and risk reduction behaviour: the view of consumers on the island of Ireland. <i>British Food Journal</i> , 108(10), pp.875-891.	Ritson, C. & M. Brennan (2008). What does consumer science tell us about organic foods. In <i>Health Benefits of Organic Food: Effects on the Environment</i> . In I. Givens, S. Baxter, A.M. Minihand & E. Shaw (Eds), CAB International.
McCarthy, M., Brennan, M., Kelly, A.L., Ritson, C., De Boer, M., & N. Thompson (2007). Who is at risk and what do they know? Segmenting a population on their food safety knowledge. <i>Food Quality and Preference</i> , 18(2), pp. 205-217.	Brennan, M. (2008). Greening the Food Chain: The Consumer's Story. In <i>Aspects of Applied Biology</i> , Vol. 86 – Greening the Food Chain 1.
Brennan, M., McCarthy, M. & C. Ritson (2007). Why consumers deviate from best practice food safety advice? : The case of 'high risk' consumers on the island of Ireland. <i>Appetite</i> , Vol. 49, pp. 405-418.	
McCarthy, M., Brennan, M., De Boer, M. & C.	

Ritson (2008). Media Risk communication – what was said by whom and how was it interpreted. <i>Journal of Risk Research</i> , 11 (3), pp. 375-394.	
McCarthy, M. & M. Brennan (2009). Food Risk Communication; Some of the problems and issues faced by communicators on the island of Ireland (IOI). <i>Food Policy</i> , 34, pp. 549-556.	

The doctoral statement, presented in Part 1, aims:

1. To set in context the topic under investigation – *Food Borne Illness and Domestic Food Safety Practices* - from an academic and policy perspective (Chapter 1).
2. To present a summary of the submitted body of published work and to outline the interrelationship between the publications (Chapter 2).
3. To present a summary of the research skills developed by the candidate (Chapter 2)
4. To critique the submitted body of work and assess the intellectual contribution it makes to the current state of knowledge and research into domestic food safety practices (Chapter 3 and 4).
5. To propose an innovative conceptual framework (future routemap) from which to guide and support future research into domestic food safety practices (Chapter 4).

Acknowledgements

Success is the good fortune that comes from aspiration, desperation, perspiration and inspiration.

Evan Esar

The personal and professional journey that this PhD by Published Work has taken me on has been both an intellectual and emotional rollercoaster. I have learnt so much about my capacities, my creativity, my limitations and my dogged will to succeed. It has been an intensely personal journey but one that I would never have started or finished with the help, support and advice of the following people:

Professor Chris Ritson

Chris,

You took a leap of faith appointing me to my first job and first academic post in July 1999. You have been with me every step of the way. You have watched over my development and have never lost faith in my ability to deliver. This submission is a testimony to your perseverance and commitment to me both as a person and as an academic.

Liz Oughton

Liz,

Having the opportunity to watch you, listen to you, debate with you and work with you has been an immense privilege. Your commitment to academic excellence and integrity has taught me so much about the academic and person I aspire to be. Through your example and advice, you have challenged me to become a more creative and self reflective academic. This submission owes so much to the time you have given me to talk about, explore and consider the ideas/concepts/disciplines I have been wrestling with.

Sharron Kuznesof

Sharron,

You have travelled this journey with me from day 1 and through that you have encouraged, supported, carried, and inspired me with your compassion, selflessness, intellect and unwavering confidence in me. I will be forever grateful and look forward to our future work together.

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Angela,

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Chapter 1.

Food Borne Illness and Domestic Food Safety Practices: Setting the Context

1.1 Introduction

The food scare headlines, and much of the food risk and safety social science research over the past two decades, have been dominated by high profile and dramatic food risk crises (Hawkes & Rowe, 2008, Frewer *et al.*, revisions submitted). Categorized mainly as technological and production related risks, the majority in fact posed little real risk to human health, though engendered great fear and concern amongst the general public (Sandman, 1985; McCarthy *et al.*, 2006). Such technological risks included: the BSE crisis (Shaw, 2003; 2004); the GM food crisis (For example, see Frewer *et al.*, 2004; Costa-Fonta *et al.*, 2008 for reviews); and most recently the controversy over cloned animal products entering the EU food supply chain¹. However, a more serious food safety crisis was playing itself out in domestic kitchens around the world. The “real” food safety story should have been related to microbiological food risk and the rising incidence and associated health and economic costs associated with food borne illness. Microbiological food risk is the risk to human health posed by the presence of naturally occurring food-borne pathogens that develop within food. Their development is directly influenced by how we transport, store, prepare, handle, cook, serve and dispose of food. Despite the clear scientific link between the microbiological safety of food and our food related practices (Kennedy *et al.*, 2010), much of social science research conducted on microbiological food risk before 2004 was limited to investigating whether the public had heard of different food borne pathogens and whether they considered themselves to be at risk of becoming ill from food borne illness (Frewer *et al.*, 1994; Parry *et al.*, 2004; Redmond & Griffith, 2003). Very little research has investigated how people manage the microbiological safety of their food once they have purchased it, what they know about microbiological food safety and whether their current practices are in line with best practice guidelines. This is despite the health and economic costs associated with

¹ Paul, 2002; Cobb & Macoubrie, 2004; Gaskell *et al.*, 2004.; Priest, 2006; Currall *et al.*, 2006; Siegrist *et al.*, 2007; Creative Research, 2008; Kahan *et al.*, 2008; Butler, 2009

food borne illness being considered by many experts and public policy makers to pose a significant challenge to our food supply today².

The submitted publications and doctoral statement attempt to address this lack of behavioural research into the domestic food safety practices of the general public and to explore in detail the link between domestic food safety practices and food borne illness.

To begin with Chapter 1 sets the submission in context and illustrates the importance of researching microbiological food risk and the associated food borne pathogens. Chapter 1 provides a concise review of: 1) the causes, incidences and consequences of food borne illness internationally; 2) the global attempts to reduce the incidence and burden of food borne illness; and 3) the state of the art understanding of: a) what the public know about microbiological food risk; b) what they perceive to be the risks associated with it; and c) the domestic food safety practices that they engage in.

1.2. Food Borne Disease – An Introduction

Acute gastroenteritis relates predominantly to indigenous infections of the gut. The major causes of such indigenous infections are: infectious intestinal diseases (including food poisoning associated with food borne disease and poor microbiological food safety); food poisoning associated with toxins (e.g. mercury; mycotoxins; nitrosamines; & dioxins); chronic health problems (such as Crohns disease and ulcerative colitis); and individual reactions to such things as alcohol, drugs and food intolerances (Adak, 2007). The majority of infectious intestinal disease (IID) episodes result in the victim suffering from a bout of acute gastroenteritis with the main symptoms including: nausea; abdominal pain and cramping; and diarrhoea (Cumberland *et al.*, 2003).

Thus, while not all cases of acute gastrointestinal diseases are caused by food borne disease, and food borne disease does not always result in acute gastroenteritis, food is known to represent an important vehicle for pathogens causing acute gastroenteritis (Flint, VanDuynhoven, Angulo, DeLong, Braun, Kirk, Scallan, Fitzgerald, Adak,

² Mossel & Drake, 1990; Griffith *et al.*, 1998; Miles *et al.*, 1999; Fischer *et al.*, 2005; Brennan *et al.*, 2007; Newell *et al.*, 2010.

Sockett, Ellis, Hall, Gargouri, Walke & Braam, 2005). Studies determining the burden of acute gastroenteritis are regularly used to provide a baseline for estimating the likely burden of specific pathogens commonly transmitted by food (Flint *et al.*, 2005).

Specifically, a food borne intestinal infectious disease is one defined as “a disease, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food” (WHO, 2007). Globally a variety of methods are used to manage the surveillance of food borne disease. Flint *et al.* (2005) reviewed a selection of national and international systems used to estimate the national, regional, and global burden attributed to food borne disease. Such systems were found to vary from non-formal surveillance systems to integrated food chain surveillance systems (Flint *et al.* 2005). The UK, Netherlands, and USA were among the first countries to embark on specific studies to understand the burden of diseases commonly transmitted by food (Wheeler *et al.*, 1999; IID Study Team, 2000; de Wit, Koopmans *et al.*, 2001; CDC, 2005; Flint *et al.* 2005). Countries such as Australia, Canada and Ireland (both North and South) closely followed suit (Fitzgerald *et al.*, 2004; Majowicz *et al.*, 2004; Hall *et al.*, 2005; Flint *et al.*, 2005).

In the UK, an Intestinal Infectious Disease (IID) study funded by the Food Standards Agency (FSA) in 2000 estimated that over 1.3 million cases of food borne IID's occurred in England and Wales (approx 14% of the total 9.4 million estimated cases of IID). In total, 1.5 million (of the 9.4million) IID cases presented themselves to their GP and between 268,000 (18%) – 750,000 (50%) cases (these numbers represent the range from confirmed to possible cases) were found to be suffering from food borne disease (FSA, 2000; Adak *et al.*, 2002; Health Protection Agency (HPA), 2005; Hughes *et al.*, 2007). Using annual data collected by the HPA for England during the period 1992-2003, Hughes *et al.* (2007) analysed the total number of general outbreaks of IID between 1992-2003, where a general outbreak is defined as affecting members of more that one household or an institution. In this review period, 7620 general outbreaks of IID were reported, with 23% (1729) being confirmed as food borne in transmission. For the food borne IID outbreaks identified, 39,625 people were infected, 1573 were hospitalised and 68 died as a direct result (Hughes *et al.*, 2007). Similar work was undertaken in the USA where a variety of data was used to

estimate that 76 million (36%) of the annual 211 million estimated episodes of acute gastroenteritis/year in the USA were caused by food borne pathogens (Mead *et al.*, 1999; CDC, 2005).

In parallel, a number of key policy initiatives were launched specifically to address the need for, and importance of, developing more robust and reliable systems of surveillance and data capturing of food borne disease statistics. In October 1998, the EU Parliament and Council passed a decision to set up a network for the epidemiological surveillance and control of communicable disease in the Community (Decision 2119/98/EC, OJL 268, 3.10.1998, p.1), of which food borne disease was included. The aim of this directive was to reach a point where compulsory, comparable data could be collected across member states on all communicable disease, including food borne disease, in order to support better regulation, policy and advice and reduce the associated health and economic burden. In 2000, upon its creation and in response to directive 2119/98/EC, the newly formed Food Standards Agency (FSA) in the UK identified that the rising incidence of food borne disease and the emergence of new microbial threats to the UK food chain was one of its major concerns (FSA, 2001). As a result, the FSA set up the Food Borne Disease Strategy Group in 2001 and tasked it with delivering the newly developed FSA Food Borne Disease Strategy 2001-2006 (Hughes *et al.* 2007). In the US, similar developments took place with the Centre for Disease Control (CDC) establishing a number of initiatives including: 1) the Food Borne Diseases Active Surveillance Network (FoodNet) as the principal food borne illness component of the CDC's Emerging Infections Program in 1996; and 2) the International Collaboration on Enteric Disease Burden of Illness Studies in 2004. In 2006, the World Health Organisation (WHO) established the Food Borne Diseases Burden Epidemiology Reference group. The EU finally launched in 2005 (Decision 2119/98/EC) a mandatory EU reporting system. The EU Taskforce on Zoonoses Data Collection, responsible for the reporting system, agreed on a set of harmonised reporting guidelines for food borne outbreaks in November 2007 and tasked the European Food Safety Authority (EFSA) with analysing all collected data and publishing annual community summary reports on food borne outbreaks. All member states are now obliged to collect relevant, applicable and comparable data for food borne outbreaks, where a 'food borne outbreak' is defined by the directive 2003/99/EC as "an incidence, observed under

given circumstances, of two or more human cases of the same disease and/or infection, or a situation in which the observed number of human cases exceeds the expected number and where the cases are linked, or are probably linked, to the same food source” (EFSA, 2009). It should be noted though that some variance, at a national level, still exists with respect to the surveillance of food borne outbreaks (EFSA, 2010). Two annual Community reports have since been published (EFSA, 2009; EFSA, 2010).

1.3. Food Borne Pathogens - The Big Five

The FSA estimate that 5 food borne pathogens account for the majority of food borne IID episodes in the UK: These food borne pathogens are: Salmonella; Campylobacter; Escherichia coli 0157:H7; *Listeria monocytogenes*; and Clostridium Perfringens (Food Borne Disease Strategy Group, 2000). These 5 food borne pathogens have been deemed a priority either because they cause a lot of cases of IID's, and/or severe disease. Hughes *et al.* (2007) reported that of the 1729 reported food borne IID outbreaks between 1992-2003, 60% were attributed to Salmonella, Campylobacter and Escherichia coli. To set each pathogen in context, Table 1.1. has been constructed and provides an overview of: 1) the number of reported incidents between 2000-2005 for each of these 5 key pathogens in UK; 2) the % of incidents attributed to food borne transmission; 3) the key associated foods; the infective dose levels; main symptoms and average duration of illness associated with each food borne pathogen and 4) the chronic/acute health related problems (Sequalae) that can be triggered in people who suffer from a IID caused by these 5 food borne pathogens.

Table 1.1. Overview of³ the 5 Key Food Borne Pathogens

Pathogen	Total Reported Incidents in UK ('00-05)	% Food-Borne Transmission	Key Associated Foods	Infective Dose Level	Main Symptoms	Typical Duration of Acute Symptoms	Chronic/Acute sequelae and clinical syndromes (Lake <i>et al.</i> 2010)
Campylobacter	332,423	80%	Poultry	Low	Diarrhoea & abdominal pain	Several days -2 weeks	Reactive Arthritis, Guillain Barre Syndrome Irritable Bowel Syndrome (IBS)
Salmonella	95,094	90%	Poultry, pork, red meat, eggs and milk	Mixed evidence	Diarrhoea; vomiting and abdominal pain	3-7days	Reactive Arthritis, IBS, Meningitis Septicaemia
E-Coli 0157:H7	1,326	50%	Milk, dairy products, red meat, water, salads and sprouted seeds	Low	Diarrhoea; haemorrhagic colitis	5-10days	Renal disease
Listeria monocytogenes	1,126	99%	Widespread in environment – cooked meats; packed salads; unpasteurised dairy products	Low	Flu like symptoms followed by septicaemia and/or meningoencephalitis	Variable	Meningitis Septicaemia Perinatal loss Pneumonia in surviving neonates
Clostridium Perfringens	6,011	90%	Bulk cooked meat and poultry; caused by errors in cooking/reheating	High	Diarrhoea & abdominal pain	24hours	

³ This table has been compiled by the candidate (FSA, 2001; Food Borne Disease Strategy Group, 2000 & 2006; Adak, 2007; FSA, 2007, ACMSF, 2009)

In 2006, EFSA reported the total number of people infected, hospitalised and killed by pathogens for both general (GO) and household outbreaks (HO) combined. It should be noted that the data returned by the UK, Italy and the Czech Republic was for general outbreaks only and as a result it is likely that the total number of household outbreaks is a significant underestimation (EFSA, 2007). Table 1.2. presents the aggregated data for the five key food borne pathogens as well as the total number of outbreaks across all reported food borne pathogens.

Table 1.2. Number of EU Outbreaks and Human Cases for a selection of Food Borne Pathogens in 2006

Pathogen	N	% of Total No of EU GO & HO	Total No of GO	Total No of HO	Total No of individual cases	Total No of people hospitalised	Total no of deaths
Campylobacter	400	6.9	116	284	1304	65	0
Salmonella	3131	53.9	1520	1611	22,705	3,185	23
Escherichia coli	48	0.8	25	23	750	103	1
Listeria monocytogenes	9	0.2	5	4	120	89	17
Clostridium	81	1.4	55	26	1651	44	2
Total (EU)	5706	98.2	3000	2706	53546	5523	50

Source: Adapted from EFSA (2007)

Sixty four percent of all the reported 2006 EU outbreaks for food borne pathogens were attributable to the five key food borne pathogens and these outbreaks accounted for 63% of all hospitalisations and 86% of total deaths. It is important though to note that this EFSA data does not provide the full European food borne story. Take the UK for example. In 2006, the UK reported to EFSA that a total of sixty six general outbreaks occurred in England and Wales. These outbreaks involved 1138 people, 67 of whom were hospitalised and 2 of whom died (EFSA, 2007). These figures, while serious to those directly affected, do not appear to justify the significant financial, time and regulatory investment being made to reduce food borne illness. However, the true number of deaths associated with food borne illness is estimated to be much higher (when all possible incidences are considered) than that reported in the EFSA data. For 2007, the FSA estimated that 375 UK citizens died from IID's associated with the five key food borne pathogens (Wadge, 2010). This is significantly more than is reported for all member states combined in the official EU statistics (50 deaths) (EFSA, 2007).

This example highlights the significant underestimation that is built into the EFSA data due to its exclusion of sporadic incidents and its concentration on outbreaks. Interestingly, the UK and EU data presented in Tables 1.1. & 1.2. also raises some disagreement about which of the five key pathogens is the most prevalent. While Table 1.1. reports that *Campylobacter* is the most prevalent pathogen (with 332,423 estimated incidences between 2000-2005), the EFSA data reports that *Salmonella* is the most prevalent food borne pathogen (with 3131 general and household outbreaks reported in 2006).

For the US, Lynch, Panter, Woodruff & Bracken (2006) reviewed the number of food borne outbreaks for the time period 1998-2002. They used data collected via the newly developed Food Borne Disease Outbreak Surveillance System, implemented by the CDC in 1998. A total of 6,647 food borne outbreaks were reported across the USA during that time period with 75% of all reported deaths being attributed to the 5 key food borne pathogens (Lynch *et al.*, 2006).

For the Island of Ireland (IOI), where the Safefood project took place (from which the core publications of this submission were derived), the surveillance of food borne disease is complicated by the political situation, which has resulted in two separate food surveillance systems being applied on the IOI. Surveillance of food borne diseases in Northern Ireland (NI) falls under the jurisdiction of the UK Government, the Food Standards Agency and the Communicable Disease Surveillance Centre. In the Republic of Ireland (ROI), various public agencies are involved in the surveillance of food borne disease. The Health Protection Surveillance Centre works on behalf of the different governmental agencies including Safefood – the Food Safety Promotions Board and the Food Safety Authority of Ireland (FSAI) collating, analysing and reporting on all reported cases of food borne IID's in ROI. Table 1.3 presents a summary of the Infectious Disease Notifications in the ROI with the potential to be transmitted by food and water from 2004-2009 for the 5 key food borne pathogens. It was not possible to obtain comparable data specific for NI from the aggregated UK data.

Table 1.3. Infectious Disease Notifications in Ireland, with the potential to be transmitted by food and water in the ROI 2004-2009

Pathogen	2004	2005	2006	2007	2008	2009*	Total/pathogen
Campylobacter	1,687	1,797	1,811	1,890	1,747	1,817	10,749
Salmonella	415	345	422	456	449	334	2,421
EColi	67	134	174	192	238	255	1,060
Clostridium Perfringens	5	1	0	0	1	1	8
<i>Listeria monocytogenes</i>	11	12	7	21	13	10	74
Total (for 5 Key pathogens)	2,185	2,289	2,414	2,559	2,448	2,417	14,312

Source: Adapted from HPSC & HSE (2010) (2009* data is provisional 11/6/10)

As with the data presented in Table 1.1., campylobacter is estimated to be the most prevalent of the five key pathogens in the ROI.

1.4. Estimating the Cost of Food Borne Illness

In 2000 the FSA estimated that, based on the number of reported cases for the 5 key food borne pathogens, the total economic cost associated with these 5 pathogens was £1,669 million ((Food Borne Disease Strategy Group, 2006; FSA,2007). To put these figures into a wider food policy context, this estimate (when adjusted to reflect England only - £1,339 million) equates to approximately 41% of the total estimated costs attributed to obesity in England (including direct and indirect costs), which in 2002 was estimated to be between £3,340-3,724 million/year (Jebb *et al.*, 2007; Butland *et al.*, 2007). Comparative figures for the IOI are currently unavailable for both food borne illness and obesity. In order to improve the quality of national, regional and global systems of surveillance and estimation of food borne disease burden, the WHO Department of Food Safety and Zoonoses (FOS) launched an initiative in 2006 to estimate the *Global Burden of Food Borne Disease* in collaboration with multiple partners (Kuchenmüller, 2009). This initiative is ongoing and is primarily concerned with developing a robust evidence base from which to enable global, regional and national policy-makers and other stakeholders to set appropriate, evidence-informed priorities in the area of microbiological food safety (Kuchenmüller, 2009). This initiative is due to deliver a Global Report and Global Atlas on Food Borne Disease

morbidity, disability and mortality in 2011. As the outputs from this and other initiatives (including those focused on obesity and other food related illness) emerge, the candidate intends to undertake a comprehensive and comparative analysis in order to put into a wider global food and health policy perspective the importance of reducing the incidence of food borne illness.

In 2000, the FSA outlined their Food Borne Disease Strategy 2001-2006. Contained within this strategy was a 20% target reduction in the incidences of food borne illness in the UK (Hughes *et al.*, 2007). A total of £21.2million was dedicated by the FSA to this strategy (FSA, 2007). This figure was supplemented where appropriate with funds from Food Standards Agency Wales and Scotland. While a reduction of 19.2% (across the 5 monitored key food borne pathogens) was achieved the majority of the reduction was seen for Campylobacter and Salmonella. Table 1.4 presents the total number of reported cases for each of the five key food borne pathogens between 2000-2005 and the estimated total economic associated with these 5 key food borne pathogens.

Table 1.4. Overview of all Laboratory Reported Cases of the big 5 Food Borne Illnesses in the UK between 2000-2005

	2000	2001	2002	2003	2004	2005	Total/row	% change 00 to 05
Salmonella	16,989	18,410	15,828	16,422	14,713	12,732	95,094	-25.1
Campylobacter	63,370	62,912	53,535	51,366	49,471	51,769	332,423	-18.3
EColi 0157:H7	1,147	1,049	851	876	927	1,161	6,011	+1.2
Listeria monocytogenes	113	162	160	239	232	220	1,126	+48.6
Clostridium Perfringens	181	161	60	78	527	319	1,326	+43.3
Total Cases/year	81,800	82,694	70,434	68,981	65,870	66,201	435,980	-19
Total Estimated Costs/year	£1,669m	£1,669m	£1,669m	£1337m	£1,624m	£1379m	£9,347m	
Estimated saving/year based on		£0m	£0m	£332m	£45m	£290m	£667m	

Source: Adapted from Food Borne Disease Strategy Group (2006)

A cumulative cost saving of £667 million was estimated based on the difference/year between the annual estimated costs and the £1669m estimated cost for 2000, which acted as the benchmark metric for this strategy (Food Borne Disease Strategy Group, 2006). What is striking about Table 1.4 is how those £667million worth of savings were made. While a reduction in Campylobacter and Salmonella of 25.1% and 18.3%

respectively was achieved, varying levels of increase in the number of reported cases of *Escherichia coli* 0157:H7 (1.2%), *Clostridium Perfringens* (43.3%) and *Listeria monocytogenes* (48.6%) were observed. The clear rise (48.6%) in the number of case of *Listeria monocytogenes* since 2000 is of particular interest as the rise could not be explained by outbreaks recognised during that time period (ACMSF, 2008; 2009). The HPA reported the increase to the Advisory Committee on the Microbiological Safety of Food (ACMSF) and the FSA in September 2005 (HPA, 2005; FSA, 2007; ACMSF, 2008; ACMSF, 2009; FSA SSRC, 2009). The increase was confirmed to have continued by the HPA in 2007 (ACMSF, 2008; 2009) and further investigation by the HPA highlighted that the increase was primarily associated with a rise in cases amongst the over 60s in the UK (ACMSF, 2008). This increase reflects a growing international concern about the high mortality rate associated with relatively few reported cases and outbreaks of *Listeria monocytogenes*. Lynch *et al.* (2006) reported that 43% (n=38) of all deaths from food borne outbreaks in the US between 1998-2002 were attributed to *Listeria monocytogenes*. Recent EFSA and country specific data has also raised concern and in particular highlighted the growing risk to the over 60s population in Europe (EFSA, 2007; 2009; 2010).

1.5. Reducing Food Borne Illness – A complex web from Farm to Fork

Reducing the incidence of food borne illness is a complex and demanding task. It involves addressing the complex web of production, processing, logistical, retail and food preparation (both domestic and out of home) practices that contribute to both the presence and level of food borne pathogens within the food we eat.

At the farm, industry and retail level, a number of key targeted food borne reduction programmes have been initiated. For example in the UK, the *Campylobacter* Evidence Programme was developed as a direct result of the creation of the FSA Food Borne Disease Strategy Group in 2001, the development of the FSA Food Borne Disease Strategy 2001-2006 and the subsequent FSA Strategic Plans for 2005-2010 and 2010-2015. This programme was developed to address the high incidence of *campylobacter* being detected in chicken at the UK retail level. In 2001, an FSA survey at retail level found *campylobacter* present in 50% of the fresh chicken samples tested (ACMSF, 2005). This survey was followed up in both May 2007 and Sept 2008, when *campylobacter* was found to be present in 65% of the fresh chicken samples tested

(FSA, 2009a; DEFRA, 2010). The Campylobacter Evidence Programme encompasses a range of projects targeted at different points across the food chain from farm to retail and is considered central to achieving the planned reductions in food borne illness as outlined in the newly released FSA Strategic Plan 2010-2015 (FSA, 2009b). A similar programme to address Salmonella in pig meat products was developed and in 2008 the Zoonoses National Control Programme (ZNCP) for Salmonella in pigs was launched (DEFRA, 2008). This programme is supported by a range of key stakeholders including the: British Pig Executive; British Meat Processors Association; Department for the Environment, Food and Rural Affairs (DEFRA); National Pig Association; Pig Veterinary Society; Food Standards Agency (FSA) and Veterinary Laboratory Agency. The programme takes a whole chain risk based approach to tackling Salmonella in pork (DEFRA, 2010).

Much of the reported decrease in cases of campylobacter and salmonella presented in Table 1.4 can be attributed to these reduction programmes in the food supply chain. While reducing the levels of food borne pathogens within the food chain is vital to protecting the public from food borne illness, efforts should not end there. For some products and pathogens (including some of the Big Five), no amount of food chain control and management can totally eliminate from food sold for human consumption the presence of, and/or risk from, certain food borne pathogens (Fisher *et al.*, 2006). As a result, the food consumer who buys, transports, stores, prepares, cooks and serves food for domestic consumption must be acknowledged as playing a significant role in the protection of themselves and their household from food borne illness.

While the estimates vary, research has reported that many cases of food borne illness originate in the domestic environment (Scott, 1997; FDF, 1996; Worsfold & Griffith, 1997; Griffith *et al.*, 1998; Redmond *et al.*, 2004; Mullan *et al.*, 2010) and that the public are increasingly considered to be the weakest link within the food chain (Terpstra *et al.*, 2005). Despite it being considered very unlikely that the overall contribution of domestic food safety practices to sporadic and outbreak cases of food borne IIDs will ever be accurately determined (FSA, 2001), it is estimated that in Europe 40% of all food borne outbreaks originate within the home (FAO/WHO, 2002).

1.6. Food Borne Illness, the general public and domestic food safety practices

While developments in the food supply chain can be evaluated and compared with past performance and historical data, it has not been possible to undertake such a comparison for the general public. Due to an almost complete absence of baseline data detailing public levels of knowledge about microbiological food risk/safety and what sorts of domestic food safety practices people engage in and consider personally acceptable/safe (FSA SSRC, 2009), it has not been possible to observe whether knowledge levels and behaviours have changed over the past decades. Instead, the majority of food risk and safety social science research has focused on measuring levels of public attitudes, perceptions and concern about different food risk issues (Fischer *et al.*, 2007). These food risks have included production related (i.e. BSE in cattle; salmonella in eggs); technological (i.e. genetic modification of food; use of nanotechnology in food production; animal cloning); chemical (pesticide residues in food); lifestyle (obesity) and microbiological (food borne illness) risks.

In general, the public are less concerned about microbiological food risks and the associated consequences of food borne illness (i.e. food poisoning) than they are about technological, chemical and production related risks, in particular those that are characterised by scientific uncertainty (Slovic *et al.*, 1980; Sandman, 1987; Lechowich, 1992; Flynn *et al.*, 1994; Wandel, 1994; Department of Health, 1998; Bennett & Callman, 1999; Frewer *et al.*, 2004; McCarthy *et al.*, 2006). They consider microbiological food risk: 1) to be well known and understood by science; 2) to pose less risk to them individually as they feel they have greater control over their own individual and/or household exposure, especially when it comes to food prepared and consumed at home; and 3) to result in less severe and long lasting consequences than other food risks, in particular those that are characterised by uncertainty (Sandman, 1987; Department of Health, 1998; Bennett & Callman, 1999; McCarthy *et al.* 2006).

In addition, the general perception is that illnesses caused by food borne pathogens are the result of out-of-home consumption rather than the food purchasing, transportation, handling, preparation, storage, cooking, disposal and other associated hygiene practices

in the home⁴. This is further compounded by the phenomenon known as optimistic bias where people estimate that they are individually less at risk from contracting food poisoning than comparable other people⁵.

In general, little food risk perception research has considered and measured: 1) what the public actually know about different food risks (i.e. knowledge levels of best practice; products associated; knowledge of how to avoid particular risks); 2) what practices they engage in when they are purchasing, transporting, preparing, handling, storing, cooking, serving, eating and disposing of food; and 3) how what they say they know about different microbiological food risks corresponds to their self reported domestic food safety practices⁶. Instead, the dominant social psychological models (psychometric paradigm and the theories of reasoned action and planned behaviour) have relied on the assessment of behavioural intention as a proxy for predicting how people are likely to behave when faced with different food risks. As such, research into how best to communicate about different types of food risks has generally been based on an understanding of how the public perceive these food risks and how they predict they would behave if faced with these risks rather than on what they actually know about these risks and how they actually behave when faced with these risks.

Recent research has begun to try to address this gap by exploring domestic food safety knowledge and practices using an expanded range of social psychological constructs and by drawing on a wider range of disciplinary perspectives (i.e. marketing; sociology; anthropology; cultural theory). This expanded disciplinary range is beginning to demonstrate how through the application of different theoretical and methodological approaches we can begin to build up a more holistic understanding of the range of domestic food safety practices that people engage in and why⁷.

⁴ (Frewer *et al.*, 1994; Fife-Schaw & Rowe, 1996; Woodburn & Raab, 1997; Miles *et al.*, 1999; Sparks & Shepherd, 1999; Miles & Frewer, 2001; McCarthy *et al.*, 2006).

⁵ Weinstein, 1987; Frewer *et al.*, 1994; Sparks & Shepherd, 1994; Peterson & DeAvila, 1995; Weinstein & Klein, 1996; Woodburn & Raab, 1997; Griffith *et al.*, 1998; Miles *et al.*, 1999; Levy, 2002; Yeung & Morris, 2002; Redmond & Griffith, 2004; Parry *et al.*, 2004; Fischer & DeVries, 2008; Fischer & Frewer, 2008

⁶ For the purposes of this doctoral statement, the term domestic food safety practices refers to the food related and hygiene behaviours people engage in in their own homes.

⁷ Rusin *et al.*, 1998; Griffith *et al.*, 1998; Daniels, 1998; Kennedy *et al.*, 2005; Fischer *et al.*, 2005; Martens & Scott, 2004; Fischer *et al.*, 2007; McCarthy *et al.*, 2007; Brennan *et al.*, 2007; Jevsink *et al.*, 2008; Fischer & De Vries, 2008; Fischer & Frewer, 2008; FSA SSRC, 2009; Newell *et al.*, 2010; Mullan *et al.*, 2010

Evidence is emerging that it is not a general lack of knowledge and understanding of domestic food safety that is causing food borne illness in the home but instead the inconsistent application of known and understood best practice domestic food safety guidelines⁸. The following deviating domestic food safety practices have been identified as contributing significantly to the development and survival of dangerous food borne pathogens in the food we eat in our own homes⁹:

1. Transporting food purchased from retailers to home under temperature conditions that support microbial growth of food borne pathogens.
2. Inappropriate storage of both uncooked and cooked ambient, refrigerated and frozen food.
3. Inconsistent refrigeration and freezing temperatures.
4. Defrosting food at ambient temperatures (i.e. on the counter in the kitchen at room temperature).
5. Cross contamination in the handling and preparation of food.
6. Poor kitchen and personal hygiene (i.e. hand-washing; cleaning of surfaces; dishwashing).
7. Inadequate cooking or reheating of food and leftovers.
8. Consuming food which is beyond its' stated use-by-date.
9. Presence and feeding of pets in the kitchens.

This unfolding picture of the range and extent of such deviating practices, the role these practices are estimated to play in causing food borne disease and the fact that the public do not recognise that their domestic food safety practices play any real role in causing food borne illness poses a very difficult dilemma for food policy makers who have been deemed it essential from a public health, safety and cost perspective to reduce the incidence of food borne disease. This PhD by Published Work attempts to tackle this

⁸ Williamson *et al.*, 1992; Griffiths *et al.*, 1998; Altekruse *et al.*, 1996; Raab & Woodburn, 1997; Angelillo *et al.*, 2000; Angelillo *et al.*, 2001; Fischer *et al.*, 2007; Mc Carthy *et al.*, 2007; Brennan *et al.*, 2007; Fischer & DeVries, 2008; Fischer & Frewer, 2008; Nauta *et al.*, 2008; Kennedy *et al.*, 2010.

⁹ Djueric *et al.*, 1996; Evans *et al.*, 1998; Miles *et al.*, 1999; Humphrey, 2001; Gorman *et al.*, 2002; Redmond & Griffith, 2003; Beumer & Kusumaningrum, 2003; Anon, 2003; Martens & Scott, 2004; Christensen *et al.*, (2005); Bolton *et al.*, 2005; Terpstra *et al.*, 2005; Jackson *et al.*, 2007; Fisher *et al.*, 2007; James *et al.*, 2008; DeJong *et al.*, 2008; Nauta & DeJonge, 2008; EFSA, 2009; EFSA, 2010; Kenndey *et al.*, 2010.

dilemma through the summary of the nine publications and the accompanying critique which starts to interrogate the dilemma in order to explore:

1. Public levels of knowledge of microbiological food safety and the consequences of poor domestic food safety practices
2. What sort of domestic food safety practices people engage in in their own kitchens?
3. Why people behave as they do when practicing domestic food safety?
4. How can different types of people be encouraged, supported and facilitated to consider changing their deviating domestic food safety practices in order to comply with best practice domestic food safety guidelines?

An interdisciplinary inspired route-map (Table 4.3) for future domestic food safety research and policy development is proposed. This route-map outlines the ways in which domestic food safety practices can be: 1) better researched and understood in the context of the domestic environment in which they are performed; and 2) influenced and/or changed by food policy makers in order to reduce the economic, societal and individual costs associated with food borne illness.

Chapter 2.

A Review of the Published Submission

2.1. Introduction

In response to a tender request from Safefood – the Food Safety Promotions Board, Ireland in 2003, Dr Mary McCarthy (University College Cork) and Mary Brennan developed and submitted a collaborative proposal for a project entitled: “Novel Food Risk Communication Strategies”. There was a 50:50 split of effort between McCarthy & Brennan in the development of this proposal. The project was awarded to McCarthy and Brennan in mid 2003 and ran from July 2003 to July 2005. The project consisted of five distinct work packages. All academic and administrative decisions across the project tasks were made collectively by McCarthy & Brennan. Two research associates (DeBoer in Cork; Thompson in Newcastle) were employed on the project to support McCarthy & Brennan. Professor Alan Kelly (Cork) and Professor Christopher Ritson (Newcastle) provided expert guidance throughout the project. McCarthy & Brennan had primary responsibility for designing and managing the data collection, data analysis, interpretation and dissemination on the project. The majority of research outputs (reports; conference presentations; peer reviewed articles) were initiated, led and completed by McCarthy and Brennan. Six peer reviewed journal articles have been published from this project to date. All form part of the core submission of this PhD by Published Work. Table 2.1. presents a concise summary of the 5 work packages including the primary purpose, key sample information and the published articles for each work package. The subsequent doctoral critique undertaken by Brennan for this PhD by Published Work has been discussed with McCarthy and Ritson (in his capacity as the candidates PhD supervisor). Three further publications are planned for submission in 2011.

As outlined in the preface, three supplementary publications complete this submission. These supplementary publications were produced from two further research projects that the candidate was a co-investigator on between 1999-2010 and which provide further evidence of the academic skills and development of the candidate.

Table 2.1. Summary of the Safefood Project

Work-packages	Primary Purpose	Key Sample Information	Relevant Publications (All from core submission)
Media Audit	To provide baseline information on the reporting of specific food risk issues.	Articles on salmonella & GM potatoes from 8 IOI newspapers + two television broadcasters were reviewed	McCarthy <i>et al.</i> (2008)
Expert Survey	To explore expert perceptions of: 1) the lay publics understanding and assessment of risk; 2) the barriers to food risk communication & 3) the role of scientists in food risk communication	143 experts completed an online survey	De Boer <i>et al.</i> (2005)
Pre-Survey Focus Groups	To explore the public's perspective of the key risk characteristics associated with food hazards.	12 focus groups totalling 96 respondents. Semi structured interview guide	McCarthy <i>et al.</i> (2006)
Knowledge Survey	To assess present levels of food safety knowledge and identify high risk groups	Survey of 1025 which was representative of the IOI population. Face to Face interviews were utilised	McCarthy <i>et al.</i> (2007)
Post survey workshops with at-risk groups	To investigate the communication issues and preferred communication methods of the identified high risk groups.	12 interactive focus groups (4/per high risk group). Semi-structured interview guide.	Brennan <i>et al.</i> (2007)

Table 2.2 details the nature of the journal/book for each of the nine submitted publications, the formal confirmed % contribution of Brennan (the candidate) (See Part 3 for signed formal co-author confirmation), the available citation statistics from the Web of Science database, the impact factor and finally the RAE/REF status of each submitted publication.

Table 2.2 Summary of Submitted Publications

Submitted Publications	Primary Publications	National/International Journal	% Brennan	Citation Statistics	Impact Factor (IF)	RAE 2008
Core Submission						
De Boer <i>et al.</i> (2005)	Journal of Food Safety (Wiley Interscience)	American Based International Editorial Team multidisciplinary research	25%	14	0.646 (2009)	Yes
McCarthy <i>et al.</i> (2006)	British Food Journal (Emerald Group Publishing)	UK Based Editorial Team Multidisciplinary research	40%	10	0.752 (2009)	No
McCarthy <i>et al.</i> (2007)	Food Quality and Preference (Elsevier)	International Editorial Team multidisciplinary research	35%	16	2.336 (5yr IF)	Yes
Brennan <i>et al.</i> (2007)	Appetite (Elsevier)	International Editorial Team multidisciplinary research	47.5%	6	2.966 (5yr IF)	Yes
McCarthy <i>et al.</i> (2008)	Journal of Risk Research	Journal of the European Association of Risk Analysis International editorial team multidisciplinary research	40%	6	0.569	REF 13/14
McCarthy & Brennan (2009)	Food Policy (Elsevier)	International editorial Team multidisciplinary research	50%	2	2.044 (5yr IF)	REF 13/14
Supplementary Submission						
Kuznesof & Brennan (2004)	Food Supply Chain Management Edited	Edited Book Chapter. UK based editorial team.	50%	n/a	n/a	No

	byMBourlakis andP.W.H Weightman.					
Ritson & Brennan (2008)	Health Benefits of Organic Food: Effects on the Environment. Edited by I. Givens, S. Baxter, A.M. Minihand & E. Shaw, CAB International	Edited Book Chapter. UK based editorial team. International publisher.	50%	n/a	n/a	No
Brennan (2009)	Aspects of Applied Biology	Journal of the Association of Applied Biologists, UK Based Editorial Team International, multidisciplinary research	100%			No

A summary of each publication is provided in 2.2.-2.10. The summaries are presented in the order in which the candidate suggests they should be read. A review of the research methods, analytical techniques and dissemination activities undertaken by the candidate in the course of this doctoral submission is presented in 2.11.

For the purposes of this doctoral statement, the term risk is used in a number of different contexts. This was not necessarily the intention of the candidate but was a consequence of the use of the term in different ways throughout the *Safefood* project and publications. Table 2.3 outlines the different ways in which the term is referred to and presents a short assessment of the reasoning behind the use of the term in each case and the type of data upon which the reasoning was based.

Table 2.3. Analysis of the use of the term “risk” in the submitted publications and doctoral statement

Term	Type of Data	Assessment	Why this term?
“At Risk”	Qualitative and Quantitative data drawn from the Expert study and reported in De Boer et al., 2005.	Using qualitative insights and quantitative data, a strong theme emerged from the expert study. While the experts surveyed felt that food safety should be of importance to all people and that all people could potentially become ill from food borne illness as a result of poor food safety practices, it became clear that they rated the level of risk for certain sub-groups as higher than that for the general population. These sub groups were considered to be more “at risk” from food borne illness as a result of their: level of education; age; and personal risk assessments.	The term “at risk” was used to refer to the identified sub groups as it reflected the expert judgement that certain demographic and personal characteristics were putting people within these groups at greater risk than the general public. The experts were of the opinion though, that they did not have objective evidence to back up these opinions. These judgements were based on their expert beliefs that an individual’s ability to understand food risk issues and messages is significantly affected by their level of education and age.
“At risk”	Quantitative data collected from the survey stage and reported in McCarthy et al., 2007).	Drawing on our recommendations from De Boer <i>et al.</i> , (2005), we sought to segment the IOI population in order to consider whether there were any specific “at risk” sub groups. Participant’s performance on the range of knowledge based statements for best practice knowledge; general food safety and food science were used as the primary segmentation basis in this analysis. The socio-demographic profiles of the 4 identified clusters were then examined.	As the term “at risk” had been used in the expert study to describe sub groups of the population who were considered to be more “at risk” from food borne illness as a result of their age and level of education, the decision was taken by McCarthy & Brennan to use the same term to describe the identified cluster in which the lowest levels of knowledge of best practice and general food safety and food science knowledge were identified. The socio-demographic analysis confirmed that, compared to the total sample population, this cluster contained: more men, more people aged 18--

			<p>24 and 65+, more people classified as single and falling into social class D/E, more people with only primary education and who had no home economics training and more retired people than the other three clusters. These interesting socio-demographic insights, alongside the knowledge scores, provided compelling evidence that there were sub groups who appeared to be likely to be at more risk than the general population from food borne illness as a result of a combination of their knowledge levels and socio-demographic profile.</p>
<p>“High Risk”</p>	<p>Quantitative and qualitative data drawn from the Post survey workshops with selected ‘at risk’ groups and reported in Brennan <i>et al.</i>, 2007.</p>	<p>Drawing on inspiration from the findings reported in McCarthy <i>et al.</i>, (2007) and De Boer <i>et al.</i>, (200%), Brennan & McCarthy identified the need for a comprehensive study to: 1) profile and identify sub groups on the IOI who were considered to be at higher risk from food borne illness than others as a result of the domestic food safety practices. Specifically, Brennan & McCarthy were interested in exploring whether their approach to assigning risk based on knowledge levels was in fact an appropriate and accurate way of consider the risk status of such sub groups. More sophisticated segmentation analysis was conducted on the sample to explore whether sets of socio-demographic variables were interacting with each other and the knowledge scores. A set of 5 three way interactions were identified which highlighted a number of sub</p>	<p>To distinguish the four selected groups from the broad “at risk” group discussed in McCarthy <i>et al.</i>, (2007), Brennan & McCarthy choose to refer to these four groups as “high risk” groups. While this different term was used, the basis for it was identical to the early decision about how to classify sub groups as “at risk”. Lower than average knowledge levels about best practice, food safety and food science continued to be the main determinant of inclusion within the four identified “high risk” groups.</p>

		groups who all had a modified population marginal mean score of 70 or below. A mean score of 70 was chosen as significant as the lowest mean score observed for the total sample was 73.03 for males. Using this analysis, the insights gained from the cluster analysis, the expert findings and existing literature, four groups were selected for further investigation.	
“Deviating domestic food safety practices ”	Doctoral Statement	The candidate used both “at risk” and “high risk” within the doctoral statement as per where it matched the published work she was discussing, especially in Chapter 2. In Chapter 3 & 4, the emphasis changed as a result of the behavioural analysis undertaken by the candidate. The emphasis changed from the concept of people being at “high risk” to the concept that people are willing, despite best practice knowledge, to engage in deviating domestic food safety practices which may result in them being at a higher risk from food borne illness as a consequence of the identified deviating practices. In addition, the qualitative research reported in Brennan <i>et al.</i> , (2007) and further developed within chapters 3 & 4 highlights the strategies that the Widowed/Divorced/Separated men over 65 will employ to ensure they have to do as little cooking as possible. From this we can deduce that while their knowledge levels indicate they may be “at risk”, their strategies for coping with being on their own mean that they are likely to be less “at risk” than first thought as they are not in fact engaging in much food storage, preparation, handling, cooking practices on a day to	The term “deviating domestic food safety practices” was chosen to represent those practices that were less than ideal from a food safety perspective and which can lead to an increased objective risk of contracting a food borne illness. The term deviation was chosen instead of less than ideal in order to reinforce the core findings that people were choosing to engage in these practices not because they didn’t have the knowledge and understanding of best practice guidelines (in the majority of cases) but because of the array of reasons identified in Brennan <i>et al.</i> , (2007) and on which chapters 3 & 4 of the doctoral statement are primarily focused.

		day basis, instead relying on families, friends, service providers to deliver their main meal of the day.	
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The candidate acknowledges that the inconsistent use of the terms within the Safefood project, associated publications and consequently in this doctoral statement has the potential to detract from the coherency of this body of work. She will ensure that future publications make very clear what is meant by the use of the term “risk”, the reasoning behind the choice of terms used and make clear reference to when a term is referring to: 1) objective, measured scientific risk and 2) subjective, person and context specific risk assessments/judgements based on perceptions, optimistic and reasoning bias and past experience.

2.2. Kuznesof, S. & M. Brennan (2004). Perceived Risk and Product Safety in the Food Supply Chain. In M.A. Bourlakis & P.W.H. Weightman (Eds) Food Supply Chain Management. Blackwell Science Ltd (Supplementary Publication; Part 2, Section 1).

A succession of food crises in the UK (Salmonella; BSE; Foot & Mouth) over the past two decades have placed food risk and safety firmly onto the political, food supply chain, and public agendas. A decline in public confidence and trust in the safety of food, the food industry and the Government's ability to adequately regulate, manage and communicate food risk information resulted. In response, the UK Government took the decision to separate out public food safety interests from food production interests, both of which had traditionally been under the remit of the Ministry of Agriculture, Food and Fisheries (MAFF). MAFF was disbanded and the Food Standards Agency (April 2000), a new independent, statutory agency dedicated to food safety and consumer protection, and the Department of Environment, Food and Rural Affairs were created. The power of negative consumer perceptions had already been seen in the widespread public rejection of food irradiation (Henson, 1995) and GM Foods (OECD, 1989). Negative public reaction to the Salmonella in eggs scare in 1988 and the public fear of contracting *Salmonellosis* from egg consumption was estimated to have cost the industry £70 million in lost income.

Research into consumer attitudes and perceptions of food and food safety intensified in the period after these scares. Research conducted on behalf of the FSA explored an array of public concerns about food and food safety amongst the UK population. Differences were identified in relation to the degree of importance that different people attached to the various food concerns explored and in how food was prioritised as an issue of concern within their daily lives.

When compared, food safety experts and the public have often been shown to rank the relative importance of risks differently (Sandman, 1987; Slovic, 1987). This position has led some food safety experts to believe that the public are not capable of dealing with the concept of food risk (Fessenden-Raden et al., 1987). This stance fostered the development of the so-called 'deficit model' of risk communication, whereby it was assumed that the public was in some way ignorant of the scientific truth about technical

risk assessment and probabilities. This model of risk communication sought to rectify the knowledge gap between the originators of scientific information (the scientific elite - food safety experts in the case of food risk/safety communication) and the subsequent literacy of the audience or recipients of the information (Higartner, 1990). Despite attempts to move away from the deficit model approach, recent research for the FSA examining the communication of the concept of uncertainty in food risk communication has highlighted that many members of the scientific community still ascribe to it (Frewer et al., 2001). By comparison, in the same study, consumer attitudes towards food risk uncertainty found the reverse to be true. The public were accepting of the concept of uncertainty, wanted to be informed of uncertainty in food risk information and admissions of uncertainty by the government were likely to increase the credibility of the message and trust in the information sources (Frewer et al., 2001).

Two theoretical approaches were presented to explain why individuals have particular beliefs about food risk. The first approach is the “psychometric paradigm”. Derived from social psychology, the psychometric paradigm is based on the assumption that risk itself is a subjectively defined quality, and socially constructed in that it is influenced by a variety of factors: psychological; institutional; social and cultural (Frewer et al., 2001). It is these factors that are considered important determinants in lay responses to risk information and thus explain the differences in scientific and lay perceptions of risk (and indeed cultural differences in risk perceptions). The second approach is the behavioural theory of perceived risk. Within this approach, all forms of consumer behaviour are described as ‘risk taking’ behaviours to the extent that the consequences of any purchasing or consumption action cannot be foreseen with complete certainty (Bauer, 1967). Research indicates that an individual’s perception of risk and their subsequent purchasing behaviour are causally linked, with risk perceptions an important explanatory variable for the latter (Mitchell & Gretorex, 1990; Huang, 1993; Eom, 1994). To the extent that consumers may meaningfully order products with respect to perceived riskiness, trade-offs between product purchases can be made according to the benefits sought. Consumer perceptions of risk therefore stimulate information search and risk handling. In the case of BSE, the UK public were found to have reacted to the crisis in one of four ways: 1) Stopped buying beef altogether; 2) Modified their beef purchases; 3) Did not change their beef purchasing habits; 4) Bought more beef. It is imperative that the UK food supply chain educates itself about how the public perceive

food risk and how they behave in the face of different food risks. Improved information flow between the whole food supply chain and the public is essential in repairing the damage caused by the years of food scares and inadequate communication and information provision.

**2.3. De Boer, M., McCarthy, M., Brennan, M., Kelly, A.L. & C. Ritson (2005).
Public understanding of food risk issues and food risk messages on the Island of
Ireland: The views of food safety experts. *Journal of Food Safety*, 25, pp. 241-265
(Core Publication; Part 2, Section 2).**

Food safety experts have a key role in constructing food risk messages and thus their perceptions will influence how food risk issues are communicated to the public. This research examined the perceptions of food safety experts regarding public understanding of food risk issues and food risk messages on the island of Ireland (IOI).

Defining who was a “food safety” expert on the IOI, what type of expertise they had to offer and the role such expertise should play within this ‘expert’ study was both intellectually and practically challenging. To begin with McCarthy & Brennan, in collaboration with *Safefood*, developed a database of individuals who were involved in the management, regulation, compliance and day to day professional practice of food safety on the IOI. The project team used a variety of sources to compile the list of experts including: university and research institute websites; professional contacts; Safefood contacts/distribution lists; and industry contacts. The decision was taken that an individual would be regarded as a “food safety expert” if food safety was a significant component of their professional responsibilities. An initial assessment of each individual’s suitability for inclusion onto the database was conducted by the project team based on job title and the organisation for whom each suggested expert worked for. From here, a final database of 400 “food safety experts” was constructed and the final online questionnaire was sent out to the full database. As part of the questionnaire, all participants were asked to classify themselves in one of five occupational categories. This was used to assess from where the sample of experts were coming from. It was very difficult to fully assess the representativeness of the final sample of 143 “food safety experts” as no baseline population estimates were available for: 1) the total number of people working in food safety on the IOI; and 2) the distribution between different food safety roles/activities. It is the opinion of the candidate that the sample achieved did represent a good range of IOI expertise. The candidate acknowledges that none of the participants were asked to provide evidence of their suitability or level of expertise in food safety before participating in the study and therefore it is difficult, with any confidence, to be sure that they all had a level of

expertise in food safety that warrants them being titled as “food safety experts”. Also, it was not possible to do any comparative assessment between participants, with respect to the level and quality of their expertise. On reflection, and in particular after the completion of Paper 7 (where one reviewer required McCarthy & Brennan to engage much more intellectually with the developing debate on expertise and in particular expert risk perceptions) and her associated expert committee experience, the candidate has become much more aware and intellectually engaged in the broader debate around “expertise” and how so called expert opinion can and should be sought, considered and handled within research projects. Unless there is a transparent and fair mechanism in place to objectively assess the expertise of “food safety experts” (as is the case in the appointments process to public committees), the candidate now feels that the term “food safety stakeholder” is a much more honest and fairer representation of the range of participants who completed the expert survey report in De Boer *at al.* (2005).

It also looked into expert views of the barriers to effective food risk communication and how to improve food risk messages. The questionnaire design was guided by the results of four in-depth interviews with food safety experts on the IOI. The experts contacted were drawn from scientific institutions, industry, government and public health institutions on the IOI. Of the 400 food safety experts contacted, 143 completed the online questionnaire (Response Rate: 36%). The findings indicated that most experts surveyed had little confidence in the public’s understanding of food risk issues, their assessment of food risks, their ability to deal with scientific information and their food safety practices. The experts were of the view that the public under-assess the risks associated with some microbiological hazards and over-assess the risks associated with other hazards such as genetically modified organisms (GMOs) and bovine spongiform encephalopathy (BSE). The experts believed that level of education and age are important determinants of the degree of understanding of food risk issues and messages amongst the public. The experts were of the view that early intervention via school curricula was the best method to improve public understanding of food risk messages in the long term. Furthermore, the experts were of the view that the media have the ability to improve awareness and knowledge about food risk issues but believe that the media tend to communicate information that is misleading. The majority of experts also believed that they should communicate uncertainty but were not confident

that the public is able to cope with this uncertainty. Many of the experts also indicated a desire for training on how to interact with the media.

In addition, the candidate has also begun to appreciate much more the value of so called 'lay expertise' in helping to better understand the reasons why people behave as they do with respect to food, especially in the privacy of their own homes. In essence, what the candidate is arguing, as she goes into chapter 3 & 4, is that to understand better, and potentially influence behaviour within domestic homes, we need to engage much more actively with those who are expert in such behaviour – the general public themselves who are 'experts' in their own day to day lives. The candidate is currently pursuing a range of projects in which expertise is considered fundamental and will endeavour to use her doctoral and this current work to add to the debate about the type, range and level of food safety expertise input required for modern food policy.

2.4. McCarthy, M., Brennan, M., De Boer, M. & C. Ritson (2008). Media Risk Communication – what was said by whom and how was it interpreted. *Journal of Risk Research*, 11 (3), pp. 375-394 (Core Publication; Part 2, Section 3).

The media have long played a vital role in the communication of various types of risks to the general public (Frewer, Raats, and Shepherd 1993/94; Atterstam, 1995; FAO/WHO 1998; Mac Intyre, Reilly, Miller & Eldridge; 1998; Bennett 1999; Lindsay, Zhou & Halstead 2000; Frewer, Miles & Marsh 2002; Wakefield & Elliott 2003). Many from the scientific community view the media as a pipeline that is responsible for the transmission of their scientific messages on their behalf to the public (Nelkin, 1987). They view the media as a channel through which they can, under their editorial control, have their scientific findings accurately converted into messages that can be easily digested, understood and, where appropriate, acted upon by the public (Nelkin, 1987). This view does not take any account of the conditions under which media professionals, and in particular news journalists have to operate. This has resulted in a lack of trust and understanding developing between the scientific and media communities. The realities of the world in which media professionals operate mean that stories tend to be considered newsworthy, not because scientists consider their research findings (stories) to be important and in the interest of the public, but because they are considered by media professionals to be economically, politically or culturally relevant (Mythen *et al.* 2000).

The aim of this paper was to provide some insight into the level and type of media coverage that food risks received and to consider the translation of press releases into media articles. It reports on a media audit of the content of newspaper articles, TV and radio reports, and official press releases on two selected food safety related issues namely Salmonella and Genetically Modified (GM) potatoes. The sources examined were all based on the IOI. For each item identified, the source, type, tone and title/headline of the message; the presence or absence of guidance on how to deal with the risk in the message; and the relationship between the release of an official press release and the number of media messages generated were analysed. Based on the findings of the audit, it was clear that IOI journalists are generally balanced with regard to their reporting on Salmonella. In most cases where press releases could be linked to the newspaper articles, the press release was represented fairly accurately. This brings

into clear focus the need for those issuing press releases to be very clear on the meaning of their message. Journalists are using the press releases as the basis for articles therefore vague terms and overemphasis on a particular finding can result in what may appear as a sensational article. In the case of GM Potatoes, more sensational hooks were used to draw attention to the articles.

In the context of this media audit, the negative views that scientists held about journalists (as noted by Hartz & Chappell 1997; De Boer *et al.* 2005) were not supported, at least in the case of microbiological hazards. Thus communicators need to be aware of the characteristics of the risk they are communicating about when designing and delivering a risk message.

As McCarthy & Brennan were designing the *Safefood* project in 2002, the decision to include a media study was driven by the experiences they had had in a range of earlier food risk projects that they were involved in. Often, the media was cast as the villain in science/food risk communication by experts who felt that the media did not pay enough attention to ensuring that science was accurately reported (and interpreted). As the project was focused on the development of novel food risk communication strategies, both McCarthy & Brennan felt it was important for the project to gain a much better appreciation of the IOI media environment and how food safety was being reported. Neither McCarthy nor Brennan had extensive experience of media analysis and therefore the decision was taken to design and conduct a very basic media audit involving the collection of media messages for two selected food risk issues. Primarily, McCarthy & Brennan were interested in assessing the way in which, and how accurately, food safety press releases were reported in the media. This framework allowed them to assess whether expert perceptions of the media were indeed accurate with respect to misleading and inaccurate reporting of food risk issues. As such, the media messages collected were analysed using a very narrow and simple analytical framework. The candidate acknowledges that as a result the media analysis was very content driven, with words/phrases/sentences being the primary classification mechanism used to classify the messages with respect to tone (positive/neutral/negative) and from which broad themes were considered. This over reliance on the matching and interpretation of words/phrases/sentences resulted in the media messages being under exploited from a media analysis perspective. The

candidate acknowledges this as a weakness of the study and argues that she (and others) must consider the use of a wider range of media analysis techniques going forward. The candidate explicitly calls for the use of media analysis both at a population and household level in Tables 4.4a/4.4b/4.4c and the analytical techniques she is currently learning and considering include: discourse analysis; semiotic analysis; sociological analysis; and conversational analysis. Through these techniques and as a result of the technological media revolution, a much broader array of ‘medias’ can be incorporated into studies to see how a ‘media conversation’ about specific topic develops and the role such conversations have in framing how people think about and respond to issues such as food risk. For example, a print article discussing the outbreak of a food borne illness in Dublin is published one day in a daily newspaper. This story is picked up on the same day by the morning news/discussion radio programmes. It filters simultaneously onto social media platforms before making the TV and radio news programmes at lunch time and remaining part of the online and radio discussions till drive time. By this stage, the media message first presented in the newspaper article in the morning has changed and augmented through the variety and diversity of formats in which the story has been discussed. Analysing both how the media messages develop and augment and the media responses would add such depth and richness to our understanding of the role of media in food risk communication. At the level of the household, understanding what media people are using and when and how they are interpreting and assimilating different messages/information into their day to day lives is of the utmost importance to researchers and policy makers who are interested in engaging the general public in a day to day conversation about food safety.

Taking all this on board, the candidate feels it is important to highlight that one of the major challenges of engaging in such interdisciplinary research is the time/effort/resources required to exploit the full value of data collected. The candidate is determined to address these constraints by building more extensive research partnerships with a wider and more diverse body of social scientists with whom she can work together to exploit the full value of the data collected. She sees as one of her research strengths her creative ability to identify and exploit the potential of different social science disciplines/techniques in helping her coordinate a better exploration and exploitation of the different types of data she has collected and intends on collecting

into the future, while still maintaining the disciplinary integrity of the different disciplinary approaches and techniques employed.

2.5. McCarthy, M., Brennan, M., Ritson, C., & M. De Boer (2006). Food hazard characteristics and risk reduction behaviour: the view of consumers on the island of Ireland. *British Food Journal*, 108(10), pp.875-891 (Core Publication; Part 2, Section 4).

Some interesting questions about the determinants of food risk perceptions on the island of Ireland (IOI) have been raised in recent research that indicate that the food risk perceptions of the Irish population appear to differ from those found in the UK. Miles *et al.* (2004) found that British consumers were most worried about the use of pesticides, hormones, antibiotics, and genetically modified organisms (GMOs) in food production. Interestingly, in an Irish context, research suggests that microbiological hazards, in contrast with findings from the UK, are the source of greatest concern (O’Keeffe, 2000; McCarthy & Henson, 2004). As such a more detailed examination of the food risk characteristics of the IOI population was considered to be warranted. This paper reported on the findings of a qualitative study (12 focus groups; 96 people) that explored the influences that affect which risk characteristics dominate the formation of individual food risk perceptions on the IOI. The study also explored the risk reducing behaviours that the IOI public engage in to minimise their likely exposure to the food risk hazards investigated. By gaining a more detailed understanding of how food risk perceptions are formed, the role and influence of key risk characteristics in risk perception formation and the type of risk reducing behaviours that the Irish public are engaging in to minimise their likely exposure, more effective and salient risk communication strategies, messages and advice can be developed which explicitly addresses the issues which the IOI public associate with the variety of food risk hazards under investigation.

Four hazard categories (lifestyle, (bio)technological, microbiological and farm orientated production) were identified and the risk characteristics and risk relieving strategies associated with these hazards were explored. The respondent’s risk perceptions were consistent with those defined by the psychometric paradigm. The risk characteristics of knowledge, control, dread, harm to health, freedom of choice, ease to identify were all mentioned, but their importance differed greatly depending on the hazards. For example, in the case of lifestyle hazards, personalisation of the risk, and thus dread, occurred when the individual had a health scare, while with microbiological

hazards, knowledge and familiarity resulted in increased confidence in ability to cope with the hazard in the home. The media was noted as having an influential role in individual risk assessment though the influence was dependent on the type of risk involved. Finally, the research highlighted that changing lifestyles were seen to be contributing to the increasing level of exposure to food risks amongst the population. Further investigation into the sources and consequences of these changing lifestyles is required to guide future food policy. While qualitative nature of the research limits the degree to which generalised conclusions can be drawn, these findings provide a deeper qualitative understanding of food risk perception issues on the IOI.

On reflection, the candidate would like to acknowledge a number of issues associated with the process of participant recruitment and the composition and moderation of the focus groups. This reflection is born out of her subsequent experience of designing, recruiting, moderating and analysing focus group and other types of qualitative data.

In the recruitment, potential participants were informed that the groups would be discussing food safety. This is outlined in McCarthy *et al.*, (2006). Current best practice would now argue against this approach and would recommend that you only tell participants broadly that the group is about food. In subsequent focus group recruitment activity, this approach has been employed and the candidate acknowledges that informing potential participants about the food safety theme of the focus group may have unduly influenced their responses.

The project team were required to undertake focus groups across the IOI, with participants representing different genders, age groups, geographical locations and social class. Due to time and financial constraints it was not possible to have distinct groups for all the variables mentioned. Instead group selection was chosen after due consideration of the proportions of various groups within the IOI population. Age and profession were given precedence over gender in some cases in order to ensure as diverse a mix as possible. This resulted in two mixed gender groups. While the groups were successful, the candidate (and moderator) noticed that both the atmosphere within the group and interaction between the participants was different in the mixed gender to the single gender groups. The task of moderation was made somewhat more difficult with the added variable of men and women being in the group. In general, the

candidate prefers the use of single gender groups though acknowledges that for certain issues and in certain circumstances the use of mixed gender groups can also be considered appropriate.

Coding and analysis followed a thematic approach with the primary aim being the categorisation of data under emerging themes, some of which had been pre hoc identified in the literature review stage. Coding was first undertaken by a coder who brought the initial set of codes to a project meeting. These were discussed in detail by the full project team. From here, the emerging themes and cross cutting issues were identified by the project team and refinements were made by the coder in order to complete the thematic analysis of the focus group data. The analysis reported in McCarthy *et al.*, (2006) represents a subset of the full analysis undertaken during the *Safefood* project. Since the completion of the *Safefood* project and McCarthy *et al.* (2006), the candidate has had the opportunity to consider and employ a broader array of qualitative data collection and data analysis techniques. She has used this experience to self reflect on how well she (and her project partners) both designed and executed the focus group study in the *Safefood* project. She believes that focus groups were the appropriate technique for the study but that greater care and precision should have been taken in the recruitment and design of the groups. Furthermore, more value should have and still can be extracted from the focus group data through the use of analytical techniques such as discourse analysis and through the secondary reanalysis of the qualitative data generated using different research lens (sociological; anthropological; behavioural). Using the insights gained from this doctoral statement and through her experience since, the candidate is confident that she is now much better placed to consider a wider range of analytical techniques appropriate to qualitative data when designing and completing future qualitative data analysis. As with the media analysis, the key is engaging with other social scientists that use similar types of qualitative data to consider and explore how one set of focus group data can be analysed using different techniques and research lens. Given research funding constraints, this greater exploitation of collected data will be a necessary part of all future social science research.

2.6. McCarthy, M., Brennan, M., Kelly, A.L., Ritson, C., De Boer, M., & N. Thompson (2007). Who is at risk and what do you know? Segmenting a population on their food safety knowledge. *Food Quality and Preference*, 18(2), pp. 205-217 (Core Publication; Part 2, Section 5).

Although the public is increasingly concerned about food-related risks, the rise in food poisoning cases suggests that people are still making decisions on food consumption, storage and preparation that are less than ideal from a health and safety perspective (O’Riordan *et al.*, 2002; Shaw, 2003; FSAI, 2004). Consumer knowledge has been cited by many studies as a factor that influences food risk assessment and thus behaviour (Frewer *et al.*, 1994; HMSO, 1995; Fife-Schaw & Rowe, 1996).

This paper reports on a quantitative study (n=1025) that examines the knowledge levels about food safety practices, food safety and food science amongst the population on the island of Ireland (IOI) and identifies food knowledge segments within this population. The findings suggest that the majority of the population on the IOI know what they should be doing in their kitchen from a food safety perspective but they are not, in many cases, following the best practice food safety guidelines and regard less than ideal food handling practices as acceptable and safe. Furthermore, while food safety knowledge levels were high, the level of food science knowledge was rather low.

The segmentation of the sample based on knowledge levels yielded some interesting findings. Four segments were clearly identified by Hierarchical Cluster Analysis and labelled: At-Risk – 13%; Food Safety Conscious (FSC) – 24%; Food Science Knowledge Deficient (FSKD) – 33%; and Informed – 30%. The At-Risk segment (13%) were of particular interest as members of this segment clearly have less than ideal food safety practices and when compared with the other segments also have significantly lower knowledge about what they should be doing, about food safety and about food science issues. Compared to the sample population (representative of the IOI population), those in the At-Risk segment were more likely to be male in the 18–24 or the 65+ age categories with a primary level education. Respondents in this segment were less likely to read broadsheet newspapers and to have completed a home economics course. The At Risk segment may require targeted promotions from food safety communicators though effective communication may prove difficult given their

demographic profile. In conclusion, this study has shed a very interesting light on what the IOI public considered safe food handling behaviours. It is clear that food risk communication needs to concentrate less on only educating the public about best practice food safety guidelines and more on understanding the reasons why less than ideal practices are considered acceptable and safe, especially amongst at risk individuals.

McCarthy & Brennan co-led the design and development of the *Safefood* questionnaire. The candidate was instrumental in highlighting the gap in academic understanding of what levels of knowledge the general public have about food safety best practice guidelines. She felt it was vital that the questionnaire facilitated the calculation of baseline knowledge estimates. These estimates could then be used to segment the IOI population on the basis of how knowledgeable different segments were about best practice food safety guidelines and general food safety/food science. This approach had not been widely considered in previous literature and thus required very careful consideration by the project team. McCarthy & Brennan collectively designed a questionnaire that facilitated this assessment of baseline knowledge. The design of the food safety statements was heavily influenced by the qualitative research (for which Brennan played a significant role both in the collection, analysis and interpretation of the data). The candidate played a significant role in the drafting, refinement, piloting and completion of the *Safefood* questionnaire.

McCarthy & Brennan discussed the analysis of the quantitative data collectively. McCarthy had extensive quantitative data analysis expertise and she led the analytical stage. Brennan worked alongside McCarthy and they discussed the range of techniques open to them based on the data collected, the pros and cons of each technique and how different techniques would contribute to the overall aims and objectives of this stage of the *Safefood* project. Brennan was present during the analysis of the data and was fully involved in the interpretation of the results. While the candidate has developed a good working expertise in quantitative analysis (and is now capable of employing the techniques used), her research strengths lie, not in the analytical stage, but in the interpretation stage. Using this strength, she was able to take a very active role in the both the interpretation and writing up of the questionnaire data (in both Paper 4 & 5). It should be noted that using an adapted version of the *Safefood* questionnaire, Brennan is

now supervising a FSA funded PhD student and providing all necessary advice and support on the quantitative data collection, analysis and interpretation of her questionnaire which is focused on food safety and the over 60s. This quantitative work is ongoing and due for completion in 2011.

2.7. Brennan, M., McCarthy, M. & C. Ritson (2007). Why consumers deviate from best practice food safety advice?-The case of ‘high risk’ consumers on the island of Ireland. *Appetite*, Vol. 49, pp. 405-418 (Core Publication; Part 2, Section 6).

Microbial food poisoning and the resulting group of illnesses associated are considered by many experts and public policy makers as one of the predominant risks associated with food supply today (Griffith *et al.*, 1998; Miles *et al.*, 1999; Mossel & Drake, 1990). Certain groups within society have been found to be ignoring or dismissing risk messages as not relevant to them (Miles & Frewer, 2003; Redmond & Griffith, 2004). In addressing these issues, a number of recent Irish studies have attempted to examine the public with respect to their food safety knowledge (Kennedy *et al.*, 2005; Mahon, Cowan *et al.*, 2006; McCarthy *et al.*, 2005). In a qualitative study on the island of Ireland (IOI) public, McCarthy *et al.* (2005) noted that potential ‘high-risk’ groups may include: school children; teenagers; students; lower-income groups; males; and people without home economics training. The reasons cited for the existence of these ‘high-risk’ groups included their: lack of interest in food and food safety; lack of financial resources and lack of formal education on food safety. Kennedy *et al.* (2005) segmented the Irish population according to their food safety knowledge and practices and the actual levels of contamination found within the respondent’s fridges. This resulted in the identification of three broad segments. One segment, named the *cavalier food handlers*, was found to be more likely to engage in poor food-handling practices and have lower levels of food safety knowledge (Kennedy *et al.*, 2005). These results suggested the need for a comprehensive study tasked with: 1) profiling and identifying ‘high-risk’ groups on the IOI; and 2) investigating, with these groups, their knowledge of microbiological food safety and the food safety practices they engage in.

This paper builds on the results of the quantitative study (n = 1025) reported in McCarthy *et al.* (2007) and summarised in 2.6. The identification of the ‘at risk’ knowledge segment in McCarthy *et al.*, (2007) confirmed that there were likely to be a variety of different types of high risk population groups on the IOI. The decision was taken to examine the sample in more detail in order to better identify the demographic profile and associated knowledge levels of these potential ‘high risk’ groups. Four high risk groups were identified using univariate analysis of variance: 1) 18-34 Single males, non-students, without home economics training; 2) 18-24 year old Female Homemakers

without home economics training; 3) 45+ Female Homemakers with home economics training; and 4) 65+ males who are either Widowed/Divorced/Separated (W/D/S). This technique allowed for the investigation of significant interaction effects between the demographic variables.

A qualitative study followed in order to conduct further in-depth analysis on these high risk groups. Time and financial constraints limited this qualitative investigation to three of the identified 'high risk groups' (1/3/4). Twelve focus groups (4 with each of the 3 chosen groups) were conducted and a blend of urban and rural participants was ensured. A set of contributory factors were identified that appeared to influence the participants' willingness to engage in deviating behaviours. These factors were classified under 3 broad headings: 1) Personal (overconfidence; lack of interest); 2) environmental (technological) and 3) lifestyle (time and energy investment). The 'personal' differed across gender groups in that the majority of the males expressed a genuine lack of interest in food, while the females in general demonstrated an overconfidence in their own judgement and decision-making with respect to their domestic food safety practices. All three groups acknowledged that habit and past experience were key influences on their current domestic food safety practices. Interestingly, the 'environmental' and 'lifestyle' characteristics were common for the 3 groups. It is felt that technological solutions could address these factors. For example, this study noted that the fridge and the lack of an in built thermometer prevented participants from implementing best practise food safety guidelines despite the vast majority knowing the correct temperature at which their fridge should be kept. The lifestyle characteristics were categorised by the time and energy investment required by the individuals to follow best practise food safety guidelines in the context of their lives.

The findings suggest that the tailoring of future food safety initiatives, in accordance with these personal motivations, is vital if sustainable and long-term behavioural change is to be achieved. Clearly the focus of such initiatives needs to be on breaking habits by encouraging these groups to question their past experience. In addition, food safety policy makers and communicators may be wise to think beyond the food risk message. They should give much more consideration to the wider situational context in which best practise food safety guidelines are practiced in the domestic kitchen.

On reflection, the candidate would like to acknowledge a significant flaw in the recruitment of focus group participants for the second wave of focus groups with the selected 'high risk' groups. No recontact consent was built into the *Safefood* questionnaire and therefore the project team were not in a position to recontact participants from the questionnaire who fell into the 4 identified "high risk" groups. This caused both practical difficulties in the recruitment of certain groups, in particular the 65+ W/D/S men as well as analytical difficulties in that while triangulation of the results between the survey and the focus groups was possible at an abstract level, it was not possible to compare directly the quantitative results provided by individuals with the richer qualitative discussions they engaged in. This would have been extremely useful from a practical perspective as well as making the findings more robust and intellectually convincing. Since learning this lesson the hard way, the candidate has incorporated the use of recontact consent in questionnaires where post qualitative work was/is involved. This has allowed her, in collaboration with partners, to be much more rigorous in their triangulation analysis of data and findings between techniques. The candidate is fully aware that going forward, and with her proposed incorporation of a greater array of social and natural science data collection techniques in her route map for future domestic food safety practices research (see chapter 4), the role and challenge of triangulating different types of data (both social and natural) will be one of the greatest intellectual challenges she (and partners) will face. Since the Safefood project, the candidate has been involved in a project, which required the triangulation of focus group, dietary intake and interview data and is currently managing a project in which quantitative data, microbiological data and ethnographic data are being collected for which a triangulation strategy is currently being developed. From the candidate's perspective, triangulation is a fundamental part of the interpretation of findings from mixed method studies. In particular it supports the critical reflection of the contribution of different techniques to the overall investigation of a chosen phenomena and promotes a greater understanding and consideration of the pros and cons of different techniques. It also supports the holistic interpretation of the findings of each stage at the level of the core themes of the study and from where policy/industry recommendations can be developed and suggested.

2.8. McCarthy, M. & Brennan, M. (2009). Food Risk Communication; Some of the problems and issues faced by communicators on the island of Ireland (IOI). *Food Policy*, 36(6), pp.549-556 (Core Publication; Part 2, Section 7).

This paper critiques, from a food risk communication perspective, the findings of a set of interlinked pieces of research conducted as part of the *Safefood* funded project.

The dominant view from within both the academic and wider risk community has been that public perceptions of risk are formulated from a very different perspective to those of experts, particularly with respect to the meanings attached to different risks and how they judge, prioritise and respond when faced with risks (Sandman, 1987; Fischhoff, 1989; Slovic *et al.*, 1979; Slovic, 1997). Traditionally, expert risk assessments and/or perceptions have been considered to be grounded predominantly in the technical and analytical information generated from the objective risk assessment process (Slovic, 1997). On the other hand, since the development of the psychometric paradigm by Paul Slovic and colleagues, it has been widely documented that public risk perceptions are influenced by a multitude of social, cultural, scientific, political and personal factors (Bush *et al.*, 2001; Hansen *et al.*, 2003). Sjoberg (2002) argued that to date the difference in how experts and the public perceive risk has in fact been poorly explained and has been largely reliant on the set of seminal Slovic *et al.* papers (1979; 1980; 1985). Sjoberg (2002) argued that there are a variety of possibilities that exist to explain the earlier reported differences by Slovic *et al.* (1979; 1980; 1985), which appear not to have been considered. The main areas of contention appear to be: 1) the process by which an individual is judged to be an expert (Wright *et al.*, 2002); and 2) the claim that experts are more truthful and accurate in their risk assessments than members of the public (Rowe & Wright, 2001). Wright *et al.* (2002) suggest that far from being homogenous in their risk perceptions, experts are as likely as the lay public to hold a range of heterogeneous risk perceptions. Furthermore, their study indicates that for less extreme hazards the difference in risk perceptions between experts and the lay public are likely to be much less than reported in previous studies. These ideas challenge the traditional conceptualisation of the expert-lay divide and are significant, in particular for risk communicators who act as the conduits between the expert and lay communities.

Mass media communication campaigns are regularly used in food risk communication campaigns including those focused on communicating best practice food safety guidelines to the public. Often these campaigns are driven and developed by the national food safety agencies that emerged as a consequence of the BSE crisis in Europe. The primary objectives of such campaigns appear to be twofold: 1) to improve baseline knowledge of domestic food safety; and 2) to encourage behavioural change within domestic kitchens. While there is growing evidence that the lay public are becoming more knowledgeable about domestic food safety (Worsfold & Griffith, 1997; McCarthy *et al.*, 2007), simply possessing such knowledge does not appear to be translating into the lay public being motivated to use this knowledge consistently in their own domestic kitchens. Instead the public are prepared to engage in domestic food safety practices that deviate from those communicated as best practice food safety guidelines (Brennan *et al.*, 2007). This led us to consider and unpick the key elements of the domestic food safety risk communication process in order to explore what was contributing to this perceived disconnect between expert risk advice and actual lay public behaviour.

Taking the three basic elements of a simple communications framework: the message sender; the channel through which the message is communicated and the receiver of the message, McCarthy & Brennan undertook a detailed critique of the contribution of their *Safefood* project to the state of the art understanding of how food risk is communicated to the public. The barriers to effective communication were explored and special reference was made to the barriers encountered in communicating about domestic food safety risk. The barriers could be broken down in three core categories: personal; infrastructural; and message related. They include lack of interest in food, lack of appropriate facilities and conflicting messages.

This paper makes clear that the process of communicating domestic food safety risk is complex and challenging. In the context of the IOI, there appears to be no longer a significant deficit in knowledge amongst the majority of the population, but instead the deficit appears to be one of practical implementation of this knowledge within domestic kitchens. Where does this leave the expert and risk communication community? Their remit is to address the rising incidence, impact and cost of microbiological food borne

illness, much of which is believed to originate in the domestic environment as a result of poor domestic food safety practices.

The paper argues that the future effectiveness of domestic food safety risk communication activities requires a much greater appreciation of the target audience(s).

A clear understanding of:

- 1) their current knowledge levels;
- 2) the physical facilities available to them to practice domestic food safety;
- 3) their past experience and the influence of habit
- 4) their everyday lifestyle and behavioural patterns

is needed. The onus now appears to be on the expert, food policy and risk communication communities to understand better the variety of personal and environmental factors that contribute to the public being unwilling/unable to change their domestic food safety practices, despite possessing the necessary knowledge and understanding of why such proposed changes would be beneficial to both them and their households.

2.9. Ritson, C. & M, Brennan (2008). What does consumer science tell us about organic foods. In Health Benefits of Organic Food: Effects on the Environment. In I. Givens, S. Baxter, A.M. Minihand & E. Shaw, CAB International, pp. 190-206 (Supplementary Publication; Part 2, Section 8).

This chapter reflects on consumer perceptions of the environmental and nutritional aspects of organically produced foods and the impact of these upon the market for organic products. To begin, recent developments in the UK market for organic food are outlined. This is followed by an analysis of market data to help explain what has caused the recent (rapid) growth in sales of organic food products. Next, there is a brief review of the reasons why consumers choose to purchase organic products, drawing mainly on various pieces of qualitative research conducted in the EU Framework 6 integrated project QLIF (www.qlif.org). Finally, the chapter reports on the UK results of a European consolidated consumer survey conducted as part of QLIF to examine consumer attitudes to organic and low input food products.

The rapid growth in the UK market for organic products reflects more than just a fundamental shift in consumer attitudes. The growth in demand for organic products has, in particular, been underpinned by growing health and safety related concerns in food consumption. It was noted that motivation for purchasing organic products can be divided into private (use) and public (non-use) values, and that most of the reasons given for not purchasing organic products represent search or experience attributes, whereas features which attract consumers to organic products are usually credence attributes.

A survey of 1012 UK consumers exploring their attitudes to safety and quality aspects of organic and low input foods was undertaken in Autumn 2006. The survey was also administered in five other European countries. Only the results of the UK data are reported in this chapter¹⁰. The questionnaire was adapted so that there were four product-specific versions: bread, tomatoes, eggs, or yoghurt. This was because earlier focus group research (Francoise, 2006) indicated that many food quality and safety attributes were very product specific. Overall, UK organic consumers (as determined by their self-reported organic food purchasing habits with respect to a range of food

¹⁰ For the full set of results across all countries see Ness *et al.*, (2008).

products presented) attached more importance than non organic consumers to the environmental aspects of food production (pollution, animal welfare, energy use) but their motivation to purchase organic was mainly driven by their own consumption values. Organic consumers were found to value the credence attributes of food products more than non organic consumers. They were less concerned about some search and experience attributes (range of types available; appearance), some of which may act as a deterrent to organic purchase. The perceived health benefits of organic food constitute a strong motivation for organic purchase, but concern about “chemical residues”, “additives” and “GM” appear to come ahead of “nutritional content”.

2.10. Brennan, M. (2008). Greening the Food Chain: The Consumers Story. *Aspects of Applied Biology*, Vol. 86 – Greening the Food Chain 1. (Supplementary Publication; Part 2, Section 10).

(This short single authored publication was written in response to a request from the Association of Applied Biologists to present at a conference entitled ‘What does green mean? Seeking to understand and meet conflicting aspirations for food?’. The candidate drew on her experience working on the QLIF project to develop this short paper. Additional secondary research was undertaken to support the QLIF findings).

There has been a growing interest and awareness in recent years amongst EU consumers in the so called ‘green agenda’. This ‘green’ agenda has brought to the fore, within political, academic, industry and consumer circles, issues associated with environmental protection and climate change. The impact has been strongly observed within the global food and drink industry, with the emergence of a growing market for environmentally friendly and ethically produced food and drink products. Consumers in general do not appear to consider environmental concerns in isolation. Instead they consider them alongside other personal concerns, about which they have become increasingly knowledgeable, such as the many ethical and health related concerns linked to food production, trade and consumption. Many of the prominent ethical and health concerns including fair trade, animal welfare and buying food locally are very often at odds with the solutions being put forward to cut the environmental impact of food. In this short paper, a summary of the UK’s ethical food market is presented. Next the ethical consumer’s story is outlined, in particular the emergence and identification of different types of ethical consumers whose motivations to buy ethical products are very different and who trade off between supporting social and environmental causes within their ethical consumption. Finally, using a food industry case study, the food and drinks industry is explored to see if it can respond both to the emerging ‘green’ agenda and the accompanying ethical dilemmas that many consumers are juggling, in what is becoming an ever more challenging, ethically complex and competitive marketing environment.

The ethical market for food has firmly established itself within UK retailers and on the shelves of millions of UK kitchens. It requires consumers to make complex, often conflicting food choices between environmental, ethical and social values that they both

hold and/or would like to hold. The UK Ethical Consumer though is rising to the challenge by becoming more sophisticated in identifying those companies, organisations and governments that are committed to playing their part in addressing the green and ethical issues being face today. The future development and success of the ethical food market, both in terms of commercial profit and its success in addressing green and ethical issues, is dependent on all those involved in the food supply chain including consumers, recognising the contribution and potential changes they need to make, both individually and collectively, in order to promote and support ethical consumption and business practices.

2.11. Review of Research Training, Skills and Activity of Candidate

Tables 2.4., 2.5. & 2.6. present a concise summary of the range of research methods employed (Table 2.4.), analytical skills developed (Table 2.5.) and the dissemination activities completed (Table 2.6.) by the candidate during the three research projects which have contributed to this PhD by published work. The methods, analytical skills and dissemination activities reported for the supplementary research only represent the activities that the candidate was directly involved with and as such is not a comprehensive summary of all research activity in those projects.

Table 2.4: Overview of the research methods employed

<i>Research Methods</i>	Core Research (<i>Safefood</i> Project)	Supplementary Research (FSA Uncertainty Project¹; QLIF Project²)
<i>Secondary Data Generation</i>		
1. Literature Reviewing	√	√ ¹ ; √ ²
2. Media Auditing	√	
<i>Primary Qualitative Data Generation</i>		
1. Focus Groups	√	√ ¹
2. Expert One on One Interviews	√	√ ¹
3. Expert Workshops	√	
<i>Primary Quantitative Data Generation</i>		
1. Face to Face Surveys	√	√ ¹
2. Telephone Survey		√ ²
3. Online Survey	√	

During this PhD by published work, the candidate has become experienced at selecting and applying a range of secondary and primary social science research methods. The FSA Uncertainty project provided the candidate with the opportunity to learn and develop a range of research skills (on a project that had been designed by others before she started working on it), while the *Safefood* and QLIF projects allowed the candidate the opportunity to contribute significantly (in collaboration with her research partners) to: 1) the design of the methodological strategies of each project; 2) further develop her understanding of, and skills, in designing research instruments; and 3) the management, application and completion of agreed methodological strategies.

Given the breath of research methods used across the projects, the candidate also had the opportunity to develop a range of accompanying analytical skills (See Table 2.4. below).

Table 2.5. Overview of the range of analytical skills developed

<i>Analytical Techniques</i>	Core Research (<i>Safefood</i> Project)	Supplementary Research (FSA Uncertainty Project¹; QLIF Project²)
<i>Analysis of Secondary Text (media; academic & grey)</i> <ol style="list-style-type: none"> 1. Content Analysis 2. Textual Analysis 3. Critical Analysis 	\surd (media) \surd (media/academic/grey) \surd (academic/grey/results & publications)	$\surd^{1}; \surd^2$ (academic/grey)
<i>Primary Qualitative Data Analysis</i> <ol style="list-style-type: none"> 1. Content Analysis 2. Thematic Analysis 	\surd ('High Risk' Focus Groups) \surd (Interviews/workshops/focus groups)	$\surd^{1};$ (Expert Interviews; Focus Groups)
<i>Primary Quantitative Data Analysis</i> <ol style="list-style-type: none"> 1. Descriptive Statistical Analysis 2. Factor Analysis 3. Cluster Analysis 4. Univariate Factorial Analysis of Variance 	\surd \surd \surd \surd	$\surd^{1}; \surd^2$ $\surd^{1}; \surd^2$ $\surd^{1};$

The candidate has learnt how to handle and analyse different types of data from a variety of analytical angles in order to explore the data generated to its maximum research potential. This was particularly evident in the *Safefood* project. The data generated in the different work packages was analysed using a selection of complementary analytical techniques. This approach supported the publication of the results of each work packages in standalone publications (See Part 2, Section 2-7), while also ensuring that the development and design of the project was fully informed by the results of the preceding work packages. For example, the choice of 'high risk'

groups to examine in the final qualitative stage was determined by the quantitative identification and profiling of ‘high risk’ groups from the data generated from the nationally representative survey (See Part 2, Section 6). In addition, the critical skills developed in the process of completing publication 7 (See Part 2, Section 7) were invaluable in showing the candidate how to interrogate significant bodies of work from selected research/policy angles. In particular, the candidate learnt valuable lessons about how to explore research from an interdisciplinary perspective through retrospectively challenging the disciplinary boundaries often imposed on data. While the *Safefood* project was predominantly designed using a social psychological research frame (common to much food consumer science research and explained in more detail in section 3.2), the candidate’s post graduate training in food marketing allowed her to consider behaviour from a wider academic perspective. Her attention was focused on exploring the deviating behaviours identified and the apparent knowledge-behavioural dilemma that was uncovered. Coupled with her technical training at undergraduate level (See Part 3, Section 2), this interdisciplinary academic background encouraged the candidate to ask questions of, and challenge, the underlying assumptions that had, up until then, been driving her exploration of how: 1) people perceive different food risks; and 2) how they behave when faced with such food risks on a daily basis. The extent to which the candidate has developed these critical skills of enquiry can be seen in: 1) how the candidate choose to critical reanalyse the *Safefood* research for this doctoral statement; 2) the insights proposed; and 3) the proposed route-map.

Research dissemination has been a very important part of the academic journey that the candidate has been on for the last 9 years. Drawing from the three research projects associated with this PhD by Published Work, Table 2.5 summarises the dissemination activities of the candidate.

In addition to gaining extensive experience in the traditional academic dissemination activities (conferences presentations; peer reviewed and other publications), the candidate has been very active in presenting her research to an array of interested stakeholders. She has accepted invitations to present to a diverse array of audiences, from dairy industry specialists to environmental health officers. These experiences have helped her to understand better the meaning and implications of her research from the perspective of the wider food policy, industry, and academic community as well as

the general public. In addition, her competitive selection as an expert member to the newly formed Food Standards Agency Social Science Research Committee (FSA SSRC) in 2008 provided her with invaluable experience (much of which she has brought back into her current research activities and this doctoral statement) in debating, critiquing, reflecting and proposing solutions to challenging food policy issues from an interdisciplinary perspective.

Table 2.6. Overview of dissemination activities

<i>Dissemination activities</i>	Core Research (<i>Safefood</i> Project)	Supplementary Research (FSA Uncertainty Project¹; QLIF Project²)
Conference Posters	√	√ ¹ ; √ ²
Conference Presentations	√	√ ¹ ; √ ²
Invited Presentations (See CV* for full details)	√	√ ¹ ; √ ²
Edited Conference Proceedings		√ ² (1) (Part 2, Section 9)
Project Reports	√ (1)	√ ¹ (1); √ ² (2)
Book Chapters		√ ¹ (Part 2, Section 1); √ ² (Part 2, Section 8))
Peer Reviewed Journal Articles	√ (Part 2, Section 2-7)	√ ¹ (3 – Part 2, Section 1*); √ ² (1 – Part 2, Section 8*)
Appointment to Expert Committees		
1. FSA Social Science Committee (FSA SSRC)	√	√ ¹ ; √ ²
2. FSA SSRC Working Party on <i>Listeria</i>	√	√ ¹ ; √ ²
3. International Life Sciences Institute (ILSI) Consumer Science Expert Committee	√	√ ¹ ; √ ²

* A full version of the candidates CV can be found in Part 3, Section 2.

Chapter 3:

Doctoral Critique

3.1. Introduction to Doctoral Critique

On completion of the submitted published work, a period of solo critical reflection was undertaken by the candidate. The process of writing the nine submitted publications, and in particular the six core Safefood publications, raised many questions. These were dominated by concerns about the nature of, and the reasons behind the deviating domestic food safety practices identified in Brennan *et al.* (2007) and by how researchers and food policy makers could begin to develop more effective behavioural change programmes aimed at reducing the number of cases of food borne illness originating in the domestic environment. Throughout this chapter (as with the preceding two chapters), the term domestic food safety practices refers to the food safety and hygiene related behaviours that people engage in when they transport, store, prepare, cook, serve, eat and dispose of food.

Critical analysis of the data, the submitted publications and associated literature reinforced the diversity of social science approaches that have been used to explore domestic food safety practices. Primarily, they fall into one of two disciplinary approaches: psychological and sociological. The Safefood project adopted a psychological research frame but it became evident that some significant sociological insights were embedded within the Safefood data. This presented both an intellectual opportunity and challenge to the candidate. She found that while the different disciplinary approaches often appeared to be addressing some of the same concepts and using similar language, the theoretical and intellectual positions from which they were approaching these concepts were diverse and at times in direct opposition with each other. For example, the concept of *Habit* has witnessed a recent renaissance in both psychological and sociological research circles (Bourdieu, 1990; 1994; Ouelette & Wood, 1998; Verplanken & Aarts, 1999; Neal *et al.*, 2006, Verplanken & Wood, 2006; Wood & Neal, 2007; Warde, 2006; Grenfell, 2008). “Habit” as a concept is also fundamental to this critique and a one which is referred to in the submitted publications (Brennan *et al.*, 2007; McCarthy & Brennan, 2009). To a psychologist, habit is defined as a “learned sequence of acts that have become automatic responses to specific cues

and are functional in obtaining certain goals or ends states” (Verplanken & Aarts, 1999, p. 10). While to Pierre Bourdieu, a leading sociologist, his concept of “habitus”, in which habit is embedded, is defined as a “social structure that comprises a system of dispositions which generate perceptions, appreciations and practices” (Bourdieu, 1990). These two descriptions are both intellectually and analytically quite distinct though not mutually exclusive. The challenge was to assess critically how such multidisciplinary insights could provide a platform for proposing an interdisciplinary inspired route-map for future research and policy development into domestic food safety practices. The candidate first developed a working model for changing domestic food safety practices. The model proposed eight conditions that need to be satisfied if the target audience of a food risk communication campaign are going to be encouraged, supported and facilitated to change their current domestic food safety practices. The development of this model was heavily influenced by the social psychological framing and risk communication focus of the Safefood project and its results. The development of this model (See Table 3.1 & 3.2) marked a significant turning point in the intellectual focus of this critique and of the candidate herself.

Table 3.1. Changing Domestic Food Safety Practices: A Working Model Part 1

Step No	Steps to Changing Domestic Food Safety Practices	What must happen?
1	The target must <i>encounter</i> the food risk communication message (<i>i.e. watch/hear/read the food risk message promoting how to defrost food safely</i>)	Message must break through noise and reach the target
2	The target must <i>listen</i> to the risk communication message they have encountered (<i>i.e. If the target is not interested in food or engages in very little domestic food safety practices, they are unlikely to consider a message about domestic food safety practices to be of interest or relevant to them personally</i>)	Message must break through the noise, reach the target and appear personally relevant to the target
3	The target must <i>engage</i> with the risk communication message in order to begin assessing the relevancy of the message to them personally (<i>i.e. If a person doesn't defrost food regularly they are unlikely to engage with the message and consider it relevant to them</i>)	The target must consider what the message is saying to them to be relevant to their everyday life
4	The target must <i>understand</i> the risk communication message and how what it is saying is personally relevant	The target must understand the best practice advice being presented and

	to them (<i>i.e. Defrosting food outside of the fridge is not considered safe as bacteria can grow rapidly leading to a higher risk of you contracting a food borne illness</i>)	they must be able to understand how such advice compares to their current practices
5	The target must believe the best practice advice that the message is advocating/promoting (<i>i.e. it is only safe to defrost food in the fridge and you should allow 24 hrs for food to defrost properly</i>)	The target must be convinced that the best practice advice advocated/promoted in the message is credible and believe that such advice is appropriate/possible.

It was at this point that the candidate began to realise the limitations of a communications only campaign (the premise upon which the Safefood Project had been built). From a communications perspective, the message component of this model should be deemed a success if the target segment(s) is still engaged at the end of step 5. The Safefood data however was clearly showing that the move from step 5 to actual behavioural change (Step 8) was significant and would require much more than a communications only based behavioural change programme (See Table 3.2.). Up until this point the candidate had been committed to the position that it was possible to achieve behavioural change through a communications only based programme if the right choice of message design and communication techniques were made. The development of steps 6-8 highlighted that in order to have a chance of changing domestic food safety practices, a much greater understanding of the nature of the practices (*i.e. are these habitual practices?*) would be required coupled with a better appreciation of how the target segment(s) values the proposed change to their practices (*i.e. the reduction in risk from food borne illness if they adhere to best practice*) and the costs to the target segment(s) of making the proposed behavioural changes.

Table 3.2. Changing Domestic Food Safety Practices: A Working Model Part 2

Stage No		What must happen?
6	The target must be motivated to change their behaviour by accepting/admitting that their current domestic food safety practices (<i>i.e. how they currently defrost food?</i>) are less than ideal from a food safety perspective and that these current practices may be putting them or their household at a greater risk of becoming ill from a food borne illness.	The target must be willing to publically (or at least within their household) admit that their current practices are less than ideal. The <i>Safefood</i> data indicated that this is likely to be a very tricky issue. For example, for our 45+ female

		homemakers to admit to their own family (& friends) that their current practices are less than ideal (which many were found to be), they may feel that their very identity as women and competent homemakers is being challenged.
7	The target must <i>believe that they are capable of performing</i> the advised domestic food safety practice.	The target must believe they have the necessary knowledge, skills, resources, facilities, time, and energy needed to successfully perform the advised practice (<i>i.e. what is needed to adhere to best practice defrosting guidelines?</i>)
8	The target must actually <i>change their existing domestic food safety practice(s)</i> in order to come in line with the advised practice(s) advocated in the initial food risk communication message (<i>i.e. Change from defrosting food on the counter to defrosting food in the fridge</i>).	The target must commit the time, energy and resources needed to change from their current domestic food safety practices to the advised practice (<i>i.e. extra time and energy required to defrost food in the fridge rather than just taking it out of the freezer in the morning of the day you wish to use it</i>)

It was at this point that the candidate began to consider the potential contribution that marketing theory could offer her examination of domestic food safety practices. She had repeatedly (in the writing of the submitted publications and the subsequent development of the proposed model above) found herself encountering language and themes within the data and results that were closely aligned with the core concepts of marketing namely: exchange; value and competition. She was drawn to explore more about how marketing theory could be applied in social change situations and began to investigate the concept of social marketing, an idea first introduced by Kotler & Zaltman in 1971. Defined as the “adaptation of commercial marketing technologies to programs designed to influence the voluntary behaviour of target audiences to improve their personal welfare and that of the society of which they are a part” (Andreasen, 1994), social marketing has recently become an essential public policy tool (Haffenden *et al.*, 2008). It is regularly being used in the design, development and delivery of

social change programmes such as those aimed at encouraging waste recycling (Grier & Bryant, 2005), reducing alcohol, tobacco and substance misuse (Stead *et al.*, 2006) and addressing rising obesity levels (Stead *et al.*, 2007; Stead *et al.*, 2007). To date though, its application to domestic food safety practices has been extremely limited (McDermott *et al.*, 2005) with the majority of recent food safety programmes continuing to maintain a communications only strategy (Milton & Mullan, 2010).

While ‘behavioural change’ was explicitly incorporated into the very heart of modern social marketing theory and practice by Andreasen (1994), the candidate has struggled intellectually with the boundaries between behavioural change and the development of products that encourage, support and facilitate the behavioural change advocated. During the Safefood project, the writing of the submitted publications and the completion of this doctoral statement, she regularly found herself grappling with peer reviewed literature and social marketing case studies which while advocating the application of the principles of marketing and the 4Ps to their social marketing research/programmes were also appearing to be substituting the ‘product component’ of the 4P’s for the behavioural change advocated. The candidate is of the opinion that much of this appears to be linked to the dominance of practitioners from a public health perspective who have little or no formal training or background in the principles of marketing but who nonetheless have adopted social marketing into their professional practice as a contemporary method of promoting public health without the necessary appreciation of where it differs from, and adds to, traditional health promotion and health education principles and techniques. Such practitioners and many social marketing academics are more often than not viewing the advocated behavioural change as the product in the social marketing mix. The candidate was bemused by this approach, the apparent departure from basic marketing principles and what appeared to be the lack of marketing theory in the development and application of social marketing. The candidate was firmly of the opinion that ‘behavioural change’ **can not** be viewed as the product component of a social marketing programme and she spent considerable time and intellectual energy going back to the very basic ideas/concepts of generic marketing to help her build up her arguments/reasoning behind this. In parallel to this, a debate within the social marketing community of academics and practitioners was beginning to address this very basic theoretical issue. It was started by an experienced American practitioner Bill Smith at the 1st World Social Marketing Conference in

Brighton in 2008 and followed up in a series of articles and responses in *Social Marketing Quarterly* in 2009 & 2010 (Smith, 2009; Rothschild, 2009; Merritt *et al.*, 2009; Lefebvre, 2009; Smith & Schneider, 2009; Smith, 2010; Schartz, 2010; Luca & Suggs, 2010). The candidate was particularly inspired by the response given by Michael Rothschild in 2009 in which he argued strongly for the need to separate social marketing products from the behavioural change advocated (Rothschild, 2009). Both Smith (2009) & Rothschild (2009) highlighted the need for social marketers to better understand their role and potential contribution of social marketing to the wider debate and practice of societal behavioural change, which they and the candidate argue can and should embrace and incorporate, where appropriate, educative and legislative behavioural change initiatives within long term behavioural change programmes. These articles further inspired the candidate to dissect food safety from a wider behavioural perspective and to then critically reflect on the potential role and contribution generic marketing theory could offer her understanding of why people engage in deviating domestic food safety practices. While the candidate is yet to be convinced by the efficacy of social marketing and its applicability to domestic food safety, she is confident that marketing could offer an innovative framework from which to explore critically domestic food safety practices through the eyes of the performer (of these practices) and their household. With its strong emphasis on behaviour and fanatical interest in the consumer (Andreasen, 1994), the candidate proposes that marketing offers the necessary intellectual and practical foundation from which to draw together the disparate yet interrelated contributions of psychology and sociology (the core disciplines to which marketing owes much of its development) to our understanding of domestic food safety practices while simultaneously maintaining a rigorous behavioural focus on both the practices themselves and those who are performing them as part of their everyday lives. The candidate intends to use this doctoral critique as the basis from which to better develop her understanding of social marketing theory and its application to food safety behavioural change programmes (incorporating where appropriate educative, social marketing and legislative initiatives) designed to reduce the incidence of food borne illness.

Understanding behaviour, and in particular the behaviour you are looking to influence or change with your market offering, is fundamental to the theory and practice of marketing. It is the foundation upon which successful, valuable and long lasting

marketing exchanges are built upon. Whether you are a commercial marketer promoting a new food product or a social marketer promoting a safer way of living, understanding the nature of the behaviour you are looking to influence and what changing that behaviour means to the lives of the people concerned must be the cornerstone of your research and development activity. As such the candidate placed the domestic food safety practices at the heart of her critique and using this behavioural lens reconsidered the Safefood data and publications. As such, she was able to assess the potential contribution marketing theory could make to a wider interdisciplinary investigation of the nature of, and reason behind, the deviating domestic food safety practices identified in Brennan *et al.* (2007). This statement will conclude with the candidate proposing an interdisciplinary route-map for undertaking future research into domestic food safety practices (See Table 4.3).

3.2. Applying a Behavioural Lens

The candidate developed a set of questions centred around the domestic food safety practices under examination and asked these questions of the Safefood data and associated publications. This exercise provided the platform from which this behavioural focused critique was launched. The critical analysis is presented in 3.3.

1. What type of relationships do different types of people have with the food they consume?
2. Do people consider themselves to be at risk from their own domestic food safety practices?
3. What, if any, consequences do people associate with poor domestic food safety practices?
4. What levels of knowledge do different types of people have about best practice domestic food safety guidelines?
5. What range of domestic food safety practices are people willing to engage in?
6. How does this range of domestic food safety practices correspond with the knowledge levels different types of people have about best practice domestic food safety guidelines?
7. Where deviation from best practice was observed, what were the reasons given for such deviating behaviour?
8. How do domestic food safety practices fit into the lives of different people?

9. What role does a persons' domestic environment, and the others within it, play in shaping the domestic food safety practices that a person is willing to engage in?
10. Under what circumstance would different types of people be willing to consider changing their domestic food safety practices?

In tandem, the candidate also reflected on how the body of submitted research had been framed and produced. Common across all the research involved was the use of a social psychological research frame. Social Psychology is concerned with generating insights into the psychological antecedents of socially relevant behaviours and the processes underlying them (Aarts *et al.*, 1998). As a discipline, it prioritises the individual and primarily uses cognitive style questioning (both qualitative and quantitative) to explore and determine at an individual level the afore mentioned psychological antecedents. The methods chosen for the Safefood research (as detailed in Table 2.4) corresponded with this psychological frame and reflect the conventions of using detailed cognitive style questioning techniques. Social Psychological research encourages the collection of complementary qualitative and quantitative data. This allows the researcher to measure quantitatively and explore qualitatively the range of constructs under consideration. This approach was adopted throughout the research presented in this submission (See Table 2.4). From an analytical perspective, the data generated was analysed using a range of techniques selected to correspond with the social psychological frame adopted (See Table 2.5). All analysis was conducted in accordance with the accepted protocols and conventions associated with each technique and through the peer review process the techniques applied were judged to be of an acceptable quality for academic publication.

3.3. Exploring Domestic Food Safety Practices through a Behavioural Lens

After applying the behavioural lens to the Safefood data/publications and asking the questions presented in 3.2., the candidate analysed the emerging insights from a marketing perspective. This section presents the results of this analysis and proposes how marketing theory can help to reorient the focus of domestic food safety research onto the practices concerned. Insights are provided into how the three core concepts of marketing (exchange; value; competition) could help support a more grounded and context specific understanding of the nature of, and reasons behind, the deviating

domestic food safety practices identified in Brennan *et al.* (2007). It is proposed that these marketing insights can help provide the foundation for an alternative way (to the dominant social psychological approach of the submitted Safefood publications) in which to conceptualise societal behavioural change.

The analysis is broken into five categories:

1. The Person and their relationship with food.
2. Knowledge of Best Practice Domestic Food Safety Practices: The importance of knowing what people know.
3. The Knowledge – Practice Divide.
4. Our Daily Lives: How domestic food safety practices fit into these lives?
5. The Domestic Environment.

3.3.1. The person & their relationship with food

At the heart the Safefood project and this doctoral statement has been the investigation of the relationship with, and role that, food plays in the lives of different types of people. A person's relationship with food starts from early childhood and constantly intertwines with the trajectory and significant events of their lives. Appreciating the dynamism of this relationship and role it plays in shaping our food related choices, skills and practices is central to our understandings of why people behave as they do with food including why they engage in the domestic food safety practices identified in Brennan *et al.* (2007). Take our female homemaker as an example. The Safefood data showed that food means much more to her than its component parts. She does not prepare food just to provide energy for herself and her family. Her food related practices are intertwined with her identity as a mother/caregiver/spouse and she publicly demonstrates her love, commitment and prowess as a wife/mother/sister/daughter through her daily food related practices (See Fig 3.1-3.3 for detailed hypothesised cases for each at risk group which further illustrate the complex relationship that people have with food).

Exploring the nature of these complex food relationships is consistent with the basic principles of marketing which require the marketer to develop a deep appreciation of the role their product/service plays in their customers' lives. Unpicking the bundle of benefits that different types of people get from the food they consume (on top of the

basic calories/energy) is an essential first step in the development of domestic food safety behavioural change programmes. For example, convenience and ease of preparation were two of the core benefits that drove the food choice decisions and related practices of the majority of the single 18-34 year old men interviewed. A behavioural change programme that is advocating they spend more time thinking about and practicing domestic food safety is in direct opposition with these core benefits and is unlikely to be viewed as reasonable or attractive to this particular high risk group.

3.3.2. Knowledge of Best Practice Domestic Food Safety Practices: The importance of knowing what people know.

As highlighted in a number of the submitted publications, policy makers very often assume that lack of knowledge drives deviant behaviour. Many are of the view that educating people in the correct ways of practicing domestic food safety will result in those people automatically accepting the need to change their current practices (if they are not in line with advice provided) and be motivated to enact those changes as quickly as possible. There is clear evidence from the Safefood data/publications to refute this position. The Safefood research shows that while an individual may be found to have good levels of knowledge and understanding about best practice domestic food safety guidelines, it can not be assumed that they will automatically apply this knowledge when actually performing domestic food safety in the privacy of own kitchen's (McCarthy *et al.*, 2007; Brennan *et al.*, 2007; McCarthy & Brennan, 2009). This corresponds with recent studies which have also identified a discrepancy between knowledge of correct food safety behaviours and the application of this knowledge (Redmond & Griffith, 2003; Wilcoky *et al.*, 2004; Byrd Bredbenner *et al.*, 2007; Unusan (2007); Mullan, Wong & O'Moore, 2010).

Such knowledge based assessments have not been normal practice in much of food risk and safety research, including that commissioned by national food safety agencies such as the Food Standards Agency, UK. Instead, measuring how individuals perceive different food risks and the associated level of concern they attached to these food risks has dominated food risk and safety research for decades. Grounded in the psychometric paradigm developed by Slovic & colleagues (see Kuznesof & Brennan, 2004; De Boer *et al.* 2005; McCarthy *et al.*, 2006; Brennan *et al.*, 2007; McCarty & Brennan, 2009 for relevant reviews and references to key authors), such research has acknowledged that

risk perceptions are multidimensional in nature and influenced by a myriad of social, cultural, scientific, political and personal factors (see McCarthy *et al.*, 2006). The varieties of psycho-social constructs/theories¹¹ developed are considered by many to be not only essential to explaining risk perceptions themselves but also to explaining the likely behaviour of the public when faced with different types of food risks. It is only recently that measuring knowledge levels of food risk under examination have begun to be incorporated into food safety/risk research. The absence of knowledge constructs within previous food safety/risk research appears to be explained (at least in part) by the prevailing (and in some quarters continuing) assumption of the “expert” food community that the public have very little knowledge about different food risks and even less capacity to handle information about how to manage their own personal exposure to food risks (Kuznesof & Brennan, 2004; De Boer *et al.*, 2005). In particular, it was believed that the public were not capable of assessing risk information in an objective and fair manner and that they were incapable of coping with the scientific uncertainty inherent in all food risk assessments (Kuznesof & Brennan, 2004).

Driven by a litany of food scares and the development of national agencies tasked with managing food safety (as detailed in Kuznesof & Brennan, 2004), there has been an exponential growth in the amount of, and investment in, food risk communication activities over the past two decades. It has now become a priority for food safety agencies around the world to ensure that the public are more educated about food and food safety. Much of this activity in food risk and safety communication has been myopically focused on trying to educate the general public about food safety (Milton & Mullan, in press). The dominant strategy has been to educate the public so that their risk perceptions and associated food related practices fall in line with expert opinion and advice on how to deal with different food related hazards (Kuznesof & Brennan, 2004). While many researchers have argued for a move away from this deficit model approach to risk communication (as outlined in Kuznesof & Brennan, 2004; McCarthy & Brennan, 2008), little noticeable change has been observed in food safety communications. Much of these education and communication related activities continue to be based on the underlying assumption that a better educated, more

¹¹ These psycho-social constructs include: perceived control over exposure to risk; knowledge of the consequences; perceived threat to future generations; perceived uncertainty; perceived naturalness of the risk; familiarity with the risk; level of perceived dread associated with the consequence; perceived ease of identification of the risk.

knowledgeable general public will automatically change how they behave with respect to food in their own homes and that consequently the incidence of food borne illness originating in the domestic environment will decrease. What is particularly striking is that while education has been and continues to be at the core of these programmes, little or no effort has been put into actually tracking whether there have been any changes in the baseline food safety knowledge levels of the targeted population. It could be argued that in fact we know as little now about what the public actually know about food safety as we did two decades ago, despite the mountain of food risk perception research and initiatives that have been completed in the mean time (including that which forms some of this submission).

This critique strongly argues that measuring knowledge levels must be a fundamental baseline activity for all food risk and safety research. Without developing a robust and longitudinal baseline measure of the population's food safety knowledge, it is impossible to judge the real impact (either positive/negative) such food safety programmes have on public knowledge levels of food safety. This issue was highlighted by a recent report from the FSA SSRC Working Party on *Listeria* (on which the candidate was an expert member) which considered the rising incidence of *listeria* in the over 60s (as outlined in 1.5). The absence of any baseline data on the knowledge levels of domestic food safety for the over 60's made it impossible to assess whether knowledge levels have changed (over the last 2 decades) and whether as a consequence the over 60's in the UK may be more at risk now from *listeria* than they were previously (FSA SSRC, 2009).

As with 3.3.1., these findings are consistent with a marketing approach that requires the collection of an array of data on which to build consumer profiles. Baseline data, both cognitive (i.e. brand awareness; knowledge of a product's attributes) and behavioural (i.e. value and volume sales; product usage), is routinely collected by marketers. They use this data as the basis on which they develop and evaluate their marketing strategies. Those engaged in food safety programmes aimed at reducing the incidence of food borne illness must also assess very carefully how to evaluate the efficacy of their programmes and ensure that the necessary baseline data is collected to allow such evaluation to be conducted.

3.3.3. The Knowledge – Practice Divide

The discrepancy between knowledge and actual practice highlighted in 3.3.2 raised significant questions both for the Safefood research team and for the candidate during this critique. The decision was taken to explore in detail the deviating practices identified in McCarthy *et al.* (2007) with three selected ‘high risk’ groups (Brennan *et al.*, 2007). Considerable time and academic consideration has been given to exploring, unpicking and reflecting on the selection of reasons identified as contributing to why respondents engaged in deviating domestic food safety practices. The insights obtained are considered by the candidate as fundamental to unlocking the identified divide between the levels of domestic food safety knowledge that people can be measured to have and the actual domestic food safety practices that they are willing to engage in. Inextricably tied up with these reasons are issues associated with how fearful people are of the consequences of poor domestic food safety (i.e. food borne illness); how at risk they perceive themselves and others to be from falling ill as a result of eating food that they have prepared; their past experience of food borne illness and how these link with their current practices; their interest and involvement with food; their perception of their own skills and ability in the kitchen; their personal and household circumstances and characteristics; and the likely habitual, unconscious nature of much of the domestic food safety practices that they engage in.

At its most basic level, the key function of a best practice domestic food safety guideline is to provide explicit advice to the public as to how they should safely transport, store, prepare, cook, serve, eat and dispose of food in their own homes. Implicit within such best practice domestic food safety guidelines is the assumption that the target population are both willing and able to spend the advised time and energy, and have access to the appropriate resources necessary, to comply consistently with the guidelines presented. It is worth noting that the same proposition is likely to hold true for other health, safety and environmental guidelines such as those relating to physical activity, healthy eating, alcohol consumption and waste recycling. It is this assumption that the candidate argues is at the crux of the knowledge-practice divide.

This raised many questions for the candidate and on further examination it was determined that in essence what is being proposed when best practice domestic food safety advice is given to the public is in fact an exchange; an exchange similar, in nature, to those offered by commercial marketers. An agent (the provider of the best practice food safety advice) has an entity of value to offer to a customer (the general public). The agent has determined there is a need for the entity on offer. The agent has determined that customer is likely to be willing to exchange some of their personal resources in return for the entity on offer. In the case of best practice domestic food safety advice, the exchange proposition is an offer to reduce the customer's (and their household's) risk of getting sick from food borne illness as a result of their own domestic food safety practices (the entity) in exchange for the time, energy and resources required to comply consistently with the best practice domestic food safety guidelines presented. For the customer (the general public) to even consider the exchange, the value to them personally of reducing their (and their households) risk of getting sick from food borne illness must be at the very least greater than the costs associated with the additional investment of time, energy and resources needed to comply consistently with the best practice domestic food safety guidelines presented.

In essence, the domestic food safety knowledge-practice divide could be argued to be a classic marketing dilemma. The general public do not appear to value sufficiently the exchange proposed. They are either unwilling or unable to spend the advised time, energy and resources required to comply consistently with the best practice guidelines and as such are prepared to engage in deviating domestic food safety practices on a daily basis. The general public are rejecting the exchange proposition being put forward to them in favour of their everyday, habitual, deviating domestic food safety practices. So let us delve deeper into what people meant when they talked about time, energy and resources in the context of performing domestic food safety practices and consider how such a critical examination can help us address this perplexing marketing dilemma.

Time

The general perception appears to be that it takes more **time** to adhere to best practice guidelines (i.e. having to use different chopping boards and utensils when preparing vegetables and meat leading to more washing up) and that of the groups investigated the

majority were neither willing nor able to spend extra time on their domestic food safety practices.

The critique indicates that those who were unwilling to spend extra time fell into one of two categories:

1. Those who had a genuine lack of personal interest in food, who viewed food as fuel and as something that you prepare as fast as possible or got others to prepare for you (This group was predominantly made up of our 65+ W/D/S/ Men and our 18-34 Single Men).
2. Those who believe that the time they currently spent was sufficient either because they:
 - a. Considered the guidelines to be too strict and therefore felt it was unnecessary for them to spend more time complying with them (i.e. retailers set use by dates for their own commercial benefit and as a result it is safe to eat food past its' use by date) (Mixed membership from across the groups);
 - b. Considered their current practices to be better than that those advised in the best practice guidelines and as a result safer. Therefore, they do not consider it necessary for them to spend more time (SafeFood project – 45+ female homemakers) on practising domestic food safety.
 - c. Have learnt/believe from past experience that their current practices are safe enough and that they (and their household) are unlikely to become ill as a result of the deviating practices that they engage in (i.e. defrosting food on the counter; washing hands in cold water; eating perishable food that has gone past its use by date) (Mixed membership from across the groups).

For those who considered themselves unable to devote more time to their domestic food safety practices, the common reason provided was that they perceived that they had no extra time available. This was mainly due to the fact that they were already juggling a range of work, family and other time commitments, which given their personal circumstances held a higher priority for them and their household. It may not necessarily be that these people do not want to improve and/or change their domestic food safety practices but as it stands they cannot see how they could actually make

changes given the existing perceived/actual time related demands on their current everyday lives.

Energy

As with time, the general perception emerging from this critique was that one would need to expend more **physical** (i.e. cleaning work surfaces, the fridge, utensils) and **psychological energy** (i.e. planning meals further in advance to allow time to defrost food in the fridge; worrying about the cleanliness of work surfaces and utensils) in order to comply consistently with best practice domestic food safety guidelines. As we learn how to prepare and cook food (both formally and informally), it can be argued that a lot of the associated domestic food safety practices become embedded within our broader repertoire of food and hygiene related practices and that these domestic food safety practices take on habitual behavioural characteristics (This will be expanded on in detail in 3.4). Much habitual behaviour is executed without much cognitive awareness or deliberation (Bargh, 1994; Verplanken & Aarts, 1999). In recent work conducted by Martens & Scott (2004), the video-ethnographers analysing the domestic food safety routines of ten real life kitchens, using extensive CCTV footage, struggled to map out the behavioural patterns and movements associated with certain key domestic food safety practices. Specifically, they encountered difficulties in tracking and mapping the movement of the *dishcloth*, so habitual and unconscious was its use by the participants. This study, coupled with the insights from the Safefood project, indicate that **many** of us do not even think about what we are doing and whether there is a food safety risk associated when we transport, store, prepare, cook, serve, eat and dispose of food. When a practice becomes habitual, whether it is a domestic food safety practice or not, little or no thought or psychological energy needs to go into its performance. People become committed to their habits as they support the functional, efficient, and pleasurable practice of everyday life (Bagozzi & Dholakia, 2005). To change a habit inevitably requires the expenditure of psychological energy and is fraught with difficulties as people have been shown to be creatures of habit (Charisarantis & Hagger, 2010). More thought and engagement with the practice is initially required in order to perform the new practice. Additional physical energy may also be required. The evidence critiqued indicates that there is likely to be a strong link

between energy and time expenditure. As with time, many of the respondents were found to be either unwilling or unable to devote extra energy (and the associated perceived extra time) to changing their current domestic food safety practices.

Resources

In addition to the time and energy resources discussed above, this critique also uncovered some additional resources that appear to be required to adhere consistently with best practice domestic food safety guidelines. The research submitted, and this critique, do not exhaustively cover all domestic food safety guidelines and therefore there are likely to be more resources required than are covered here.

Critical analysis of the range best practice guidelines (covered by the Safefood project) showed that very often key resources appear to be both explicitly and implicitly referred to within. For the Safefood project, two very basic yet vital resources required to adhere to best practice guidelines regularly came up. These resources were 1) regular access to hot running water; and 2) maintaining your fridge temperature between 0^c-5^c.

Access to Hot Running Water

Hot running water is essential for hand-washing and for the cleaning of kitchen utensils, dishes and kitchen surfaces. While the majority of homes in the UK and Ireland have access to hot water, the way in which hot water is delivered can vary significantly depending on the domestic water heating systems employed (i.e. Back boiler; Combi boiler; Aga type system etc.). This can result in access to hot water not being readily available at all times in a household when domestic food safety is being practiced. After careful examination, the candidate has assessed that many best practice domestic food safety guidelines assume that hot running water is readily available on demand in domestic kitchen in the UK and Ireland. This may be an erroneous assumption and one that could account for a certain proportion of the identified deviating practices involving hand-washing and cleaning in domestic kitchens. Where people find themselves without instant access to hot water, an alternative may be to make do with cold water or just the dishcloth/tea towel for cleaning hands/surfaces/utensils. To illustrate, McCarthy *et al.* (2007) reported that 25%

of the IOI population surveyed considered it acceptable to clean their hands by rinsing them in cold water after they had handled raw meat, poultry or fish and that for the identified 'at risk' segment this rose to 37%. It is therefore essential when researching domestic food safety practices that we include a comprehensive analysis of the systems used and level of availability of hot water in different domestic households.

Fridge Temperature

Maintaining a fridge temperature between 0^c-5^c is considered fundamental to protecting oneself (and ones' household) from the growth of the food borne pathogens (in particular the Key 5 outlined in Section 1) that cause the majority of food borne illness in the UK. Best practice domestic food safety guidelines relating to the storage of perishable goods; leftover food; and use by dates all implicitly assume that the refrigeration temperature at which the associated goods are stored is between 0^c-5^c (the recommended refrigerator temperature range). Interestingly, a recent meta analysis of domestic fridge temperature studies concluded that 61.2% of all refrigerators throughout the world run at a mean temperature of above 5^c (Peck *et al.*, 2006; James *et al.*, 2008). In addition to the average mean temperature, there is evidence that temperatures can vary significantly between different parts of the fridge (James *et al.*, 2008) and that this can be more pronounced in different styles of fridges (James *et al.*, 2008). The majority of existing domestic fridges do not contain in-built thermometers, as it is only recently that the high end producers have started to develop refrigerators with such in-built temperature monitoring capacity. As such, unless the general public go out of their way to purchase a separate thermometer for use in their fridge (or in fact a thermometer for each shelf of their fridge), there is no other accurate way for them to assess whether their fridge is complying with best practice temperature guidelines than to use their own personal judgement.

Across the three 'high risk' groups investigated in the Safefood project, while respondents had good knowledge of what temperature their fridge should be kept at, there was a lack of clarity as to how to check whether their fridges were

at the right temperature (Brennan *et al.* 2007). Respondents reported that they rely on the fridge dial and/or the touch/taste of the food to assess whether the fridge was operating correctly. On top of this significant basic problem, it is also important to note that there are a range of factors that can affect the temperature efficiency of a domestic fridge. These include: outside temperature (climatic/seasonal variations); the number and length of time a fridge is opened and closed; the amount and type of product that is stored in the fridge; the initial temperature of products when they are first stored in the fridge; and the age of the fridge. All of these factors can result in fridge temperature rising above the recommended level. This in turn can lead to increased microbial growth on the fridge surfaces and within the food stored. Developing a better understanding of how fridges are actually used once they enter the domestic kitchen is essential to our understanding of the role they play in contributing to, and mitigating against, the incidence of food borne illness originating in the home.

Other key resources necessary to comply consistently with best practice domestic food safety guidelines, though which were not covered in detail within the submitted research, may include: 1) a thermometer for measuring the temperature of cooked food, in particular meat; 2) multiple chopping boards, preparation space and utensils; 3) cleaning agents such as soap or detergent; 4) cleaning cloths and drying towels; and 5) transport that contains refrigeration storage solutions.

Assessing the necessary resources required for the proper consumption (not only the retail costs paid) of a product/service is an essential part of any good marketing strategy. Such assessments need to be factored into the development of appropriate marketing mix strategies that explicitly communicate and address the full range of resources/costs associated with a product/service. For example, the retail price paid for a car is only one of many costs associated with owning and running a car on a day to day basis. The others include: fuel; insurance; car tax; servicing. Car dealers and consumers are now much more aware of this range of additional costs and as such the car dealers provide consumers with a range of information and additional options on which to assess the overall value of their product offering. This assessment of resources should be an integral part of future research into domestic food safety practices. It should include a comprehensive assessment of how accessible and

available the resources required to perform the best practice guidelines are to people within the myriad of different domestic kitchens environments.

3.3.4. Our Daily Lives: How domestic food safety practices fit into our lives?

Based on the critique to date, it was becoming clear to the candidate that how people live their lives, where they live, with whom they live with and the household wide resources available to them are essential in helping to determine whether they are willing and/or able to comply consistently with best practice domestic food safety guidelines. The lifestyles people lead play a major role in determining how they prioritised food and decide on the time, energy and resource investment they are willing to commit it. Such lifestyle characteristics include: marital status; educational levels; the presence of children; type of job and work patterns; access to private transport; income level; health status; and life-stage.

Three hypothetical cases (a case for each of the 'high risk' groups investigated) have been developed to illustrate the complex and at times erratic nature of our daily lives. These hypothetical cases are not based on actual participants from the Safefood research, as the project did not involve ethnographic investigation of individual cases from the high risk groups. Instead the hypothetical cases have been developed using the array of insights gained by the candidate through both the Safefood and other research conducted over time period of this submission. The aim of presenting these hypothetical cases is to illustrate the daily competition for time, energy and resources that people juggle. This is complemented by illustrating: 1) the relationship that each case has with food; 2) some of the food preparation and consumption practices that each case engages in and 3) the trade offs each case makes in order to get through the day given the array of commitments they are juggling. While the hypothetical cases focused do not solely on food safety, a number of key domestic food safety practices are embedded within illustrating how the domestic food safety practices have been shown to fit into and around the daily lives of each hypothetical case.

Fig 3.1. Hypothesised Case Study of a Single Man under 35 with no home economics training

Michael has been working as a building labourer since he left school at 16 with few qualifications. He is now 25 and after completing his apprenticeship a couple of years ago has been working on short term contracts for different building firms all over Dublin. During the week, Michael lives in shared worker houses wherever the jobs take him. Usually he is sharing with about 5 other men ranging in age from 18-50. He regularly works 12 hour days and eats when and where he can. While he tries to bring lunch with him from home (or at least from the local deli/sandwich shop), he often ends up snatching a bacon buttie or burger from the onsite catering van. Most evenings Michael will pick up a pizza or ready made microwave meal at his local supermarket. The extent of his cooking is taking the pizza or ready made meal out of its packaging and putting it in the communal cooker or microwave. Kitchen hygiene is not high on the agenda of any of the men staying in these work houses. They rely on the weekly cleaner that is paid for by their employer to sort them out. At the weekends Michael returns to his family home in Limerick (120 miles from Dublin) where all his cooking and cleaning is looked after by his mother. He doesn't have to lift a finger and concentrates on catching up on his sleep, playing and watching football and meeting friends.

Fig 3.2. Hypothesised Case Study of a 45+ Female Homemaker with home economics training

Sarah has just celebrated her 50th birthday, and the 30th anniversary of her marriage to Jack. They were childhood sweethearts who met at school and have lived in the same town in County Donegal all their lives. Sarah and Jack have 5 children, two of whom still live at home. They recently became grandparents when Susie, their eldest daughter, gave birth to twin girls. Susie and her husband (Ed) live in the same town as Sarah & Jack and are regular visitors to the family home. Sarah has always been a housewife and is considered by all who know her to run a very organised and tidy house. She is the envy of many of her friends. She developed her love of cooking way back in school where she was required to take a home economics course. She was judged as the best baker in her class and was nominated by the school for a regional baking competition. This high regarded for her cooking skills has continued amongst her family and friends and Sarah loves nothing better than throwing dinner parties for the wide circle of friends that she and Jack have built up. They are very active members of their local community. Jack is club captain at the local golf club and Sarah is chairwoman of her local branch of the Irish Countrywoman's Association (ICA). Sarah finds herself regularly juggling her domestic and family commitments with those of her ICA and wider social commitments. At times she doesn't know where she finds the time and energy for it all. Despite this she has been looking after the twins twice a week just to give Susie a chance to catch up on some sleep and have a few hours on her own. She has also been making sure that Susie's freezer is always full with good wholesome meals so that Ed never has to worry about his dinner not being ready for him when he comes home from work. Back at her own home she is constantly cooking for and cleaning up after Jack and her two sons (Will & Christopher). One way to help her stay on top of all the cooking is to cook in bulk. All the family love her homemade chilli and lasagne. Once a week, Sarah will spend all morning cooking dinners to put in the freezer. As she knows exactly what is going in and out of the freezer she doesn't feel the need to label anything. Her freezer is the most used appliance in the kitchen. Each morning, after breakfast she will check what dinners are already prepared in the freezer and she will decide what to take out for the day ahead. She always defrosts on the kitchen counter as it is both fast and convenient. Both Will and Christopher are at college though they chose to stay at home rather than moving into Letterkenny. While the travel is not ideal for them, the comforts of having all their washing, cleaning and cooking done for them by Sarah is more than enough compensation. The kitchen is Sarah's personal domain at home and the boys rarely go into it never mind help with the cooking and cleaning. She prefers it that way as she can ensure it is done properly and safely and to her own exacting standards.

Fig 3.3. Hypothesised Case Study of a Widowed/Separated/Divorced Man over 65

Roger is a 68 year old widower. He sadly lost his wife of 45 years 18 months ago, soon after he retired as a Bus Driver. Elsie had been in good health and her heart attack was a big shock to all the family. They have three children, two sons and a daughter. One of their sons lives within 50 miles of their home which is 10 miles from Cork City. Elsie had been a housewife since she married Roger and was responsible for all the cooking, cleaning and domestic management of their home. On her death Roger was lost without Elsie especially when it came to feeding himself. He had rarely used the kitchen to prepare food and wasn't confident in using the cooker or the microwave. In the early days, his daughter in law used to make up meals for him and she showed him how to freeze, defrost and cook the meals in the microwave. This lasted for about 4 months after Elsie's death but then his daughter in law had a new baby and didn't have the time to do as much cooking for him. Roger realised he needed to sort out alternative arrangements if he was to have regular meals everyday. He enquired amongst friends and found out that his local working men's club (to which he had been a member on and off for years) was starting to provide daily cooked meals for its members and that the cost was very reasonable at €7 for a three course lunch. Roger figured this would be an ideal solution. The only shopping and food preparation he would have to worry about would be having some stuff for breakfasts and cold evening snacks. If he managed it right, he would never have to use the cooker or microwave again, both of which he was still struggling to master.

Through the critique of the Safefood data, insights were being gathered into the varying amount of time the respondents appeared to be spending each day worrying about, thinking about or engaging in domestic food safety. For some, this was almost no time at all (both the younger and older men). This appeared to contrast with the reported levels of concern that the public are often measured as having about different food risk issues (Sparks & Shepherd, 1994; Fife Schaw & Rowe, 1996; Miles *et al.*, 1999; Yeung & Morris, 2001; O'Riordan *et al.*, 2002; Frewer *et al.*, 2002; Hansen *et al.*, 2003; Shaw, 2004; Kuznesof & Brennan, 2004; Redmond & Griffith, 2004; McCarthy *et al.*, 2006; Frewer *et al.*, revision submitted). It appears that while the public may report, when asked directly, moderate to high levels of concern about the safety of their food, this concern does not always translate into them investing more time, energy and resources in their own domestic food safety practices. In fact it appears that even when people are performing domestic food safety practices, few may actually be that engaged or consciously aware of what they are doing. Many would not be accurately able to describe how they wash their hands or confirm whether they had washed the knife in

hot or cold soapy water between chopping the meat and the vegetables. As discussed in 3.3.3., much of our domestic food safety practices appear to be habitual in nature and unconsciously performed as part of our everyday lives. The hypothetical cases presented illustrate that no matter who you are or what your personal circumstances/skills/background are, we all lead complex, demanding lives. A range of personally relevant priorities vie daily for our time, energy and resources. We allocate the time, energy and resources we have available to us in a manner that allow us to satisfy as many of our own personal and household priorities as possible.

In essence, domestic food safety is in a daily competition for the time, energy and resources that each individual (and household) has to give to achieve their range of personally relevant priorities. Domestic food safety is competing for space amongst our work; family; other domestic; health; commuting; and social priorities to name but a few. Any changes/stresses/pressures that are placed on this carefully balanced juggling act will directly impact the time/energy/resource balance that we have negotiated. Those priorities that are lower down our priority list may suffer as a consequence.

This argument brings us back to the marketing dilemma proposed on pg 51 in 3.3.3. Alongside exchange and value, the remaining concept central to marketing is competition. Commercial marketers make their money by developing products that are rated by consumers as being better than those offered by competitors and which make their lives easier, more convenient and/or fun. While the marketing of health and safety advice (such as best practice domestic food safety) is very different to the marketing of commercial products, these core concepts still apply. Fundamentally, marketing comes down to understanding the nature of the exchange you are offering, how valuable that exchange is considered to be by your target customers and how your target customers rate your offering in comparison to the competing offerings. The major challenge for public sector marketers is unpicking and understanding who and what they are competing against when they are marketing their advice to different target segments. It is no longer sufficient (if it ever was) to attempt to use a communications only strategy which relies on mass media techniques to reach, engage, persuade or cajole the public into change their existing deviating practices. This critique opened the eyes of the candidate to the complex and nuanced competitive environment in which domestic food

safety is playing. This encouraged her to begin to consider more deeply how domestic food safety practices fit into the daily lives of different types of peoples.

Thus, key to encouraging and facilitating better domestic food safety practices is the development of a much deeper appreciation of how this daily competition for time, energy and resources works. Such insights could support the strategic development of products/services that can better support, facilitate and encourage the public to comply consistently with best practice domestic food safety guidelines. For example, significant progress in the amount of household waste that is recycle has occurred since the expansion of products/services which now provided households with multiple and convenient waste recycling opportunities. It is slowly becoming easier to recycle than not too.

The Fridge Temperature Conundrum

To illustrate let's think more about the fridge temperature conundrum presented in 3.3.3. This critique proposes that a basic flaw in the technology (i.e. the absence of an in-built thermometer) is preventing the public from being able to easily monitor the temperature of their domestic fridges. As it stands, the public has no way of accurately checking whether their fridge is maintaining the best practice advised temperature unless they go out and buy a separate fridge thermometer (or set of thermometers for each shelf) and commit to regularly checking it. Given that the Safefood data has shown that for the groups investigated many are not aware of, interested in or even concerned about the temperature of their fridge (relying understandably on the belief that the fridge they bought should be able to do the job it was designed for), it is highly unlikely (no matter how persuasive a food safety message is presented to them) that they will feel sufficiently motivated to spend the time, energy and money required to buy a fridge thermometer and regularly check how their fridge is performing. Due to the costs and logistics, it is unlikely that national food safety agencies are going to commit to national fridge thermometer distribution programmes that will pay for and deliver a fridge thermometer to every home. So in this case, what is the alternative?. Breaking the conundrum down leads one back to where the basic problem lies; the way in which product has been designed. One possible solution could be for national food safety agencies

(individually or collectively) to engage directly with fridge manufacturers (and other interested stakeholders) to explore why fridges currently don't have thermometers and ask them how they could be supported and incentivised to ensure that all newly manufactured fridges come with in-built thermometers. Such a product design adaptation could enable the public to more easily and more conveniently monitor the temperature of their domestic fridge without putting all the responsibility on to the public as currently is. While the candidate acknowledges that the roll out of fridges with in built thermometers could take a significant time period and may require regulatory intervention to ensure manufacturer compliance, such approaches to encourage, support and facilitate behavioural change need to be considered as legitimate behavioural change strategies within marketing oriented social change programmes. The public cannot be expected to shoulder all the responsibility for achieving the behavioural change advocated.

3.3.5. The Domestic Environment

While little of the submitted research explored and examined explicitly the domestic environment (including other members of the household) that the participants (across the projects) lived in, it has become clear from the critique that the domestic environment and the wider household are likely to play a significant role in determining an individual's everyday domestic food safety practices. Limited attention has been paid in food risk and safety research to the influence of both the domestic environment and the presence of other household members within that environment on individual domestic food safety practices. The candidate argues that this is primarily because of the social psychological framing of much of this previous research which prioritises the individual as a distinct and relatively autonomous entity who will, wherever possible, maximise their individual utility. From a food safety perspective, the assumption is that if an individual knows how they should behave and values the benefits of good domestic food safety practices then they would be considered likely to comply with best practice. While a measure of social norm (how the individual thinks others will respond if they behave in a particular way) is built into much of the social psychological models of behavioural intentions such as the Theory of Planned Behaviour (Ajzen, 1991; Mullan & Wong, 2010), the main concepts are individual in

nature and measurement and do not consider that the domestic environment (and those within it) is likely to significantly influence: 1) an individual's motivation/willingness/intention to practice good domestic food safety and 2) the resources available to the individual to comply with such practices. A series of questions (see Table 3.3.) were derived from the critical analysis and the previous discussion (3.3.1-3.3.4). The candidate has based her further analysis (Chapter 4) of the role and importance of the domestic environment in both determining current domestic food safety practices and encouraging, supporting and facilitating change to those existing practices on the questions presented in Table 3.3.

Table 3.3. Emerging questions on the interaction between Domestic Food Safety Practices and the Domestic Environment in which they are performed

<ol style="list-style-type: none"> 1. What is the range of daily domestic practices that take place within different types of households, with particular emphasis on those practices that take place within the kitchen? 2. Of the range of domestic practices identified, which are related to the transport, storage, preparation, cooking, serving, eating and disposal of food safely (i.e. domestic food safety practices)? 3. Do any of the identified domestic food safety practices take place outside of the kitchen? If so where? 4. How aware are the members of the household of how the domestic environment is being used for the performance of the identified domestic practices? 5. How consistently are the identified domestic practices performed within the household? 6. How does the design of the domestic kitchen within a household influence the range of practices performed and the way in which they are performed? 7. What resources (objects/things/time/energy/technology/other resources) in the kitchen are used to perform the identified domestic food safety practices? 8. How has the domestic kitchen environment within a household developed and changed over time? 9. What non food related domestic practices take place within the Domestic Kitchen? 10. How do these non-food related kitchen practices influence the food related practices performed within the kitchen? 11. Who has influenced the design of the domestic kitchen? 12. Who, if anyone, within the household controls what happens within the domestic kitchen? 13. How often is the domestic kitchen being used in the course of a day and who is using it when and for how long?
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3.4. The potential contribution of Marketing to changing domestic food safety practices

To conclude, this chapter has attempted to reconsider the Safefood Project from a marketing perspective. The uncovering of the knowledge-practice divide within the Safefood Project and reported in Brennan *et al.* (2007) convinced the candidate that it was necessary to re-examine the data from a behavioural perspective. To do this, and drawing on her academic background, she chose marketing, a discipline designed and driven by a desire to understand behaviour. She used marketing as both her theoretical compass and the intellectual platform from which to explore these deviating behaviours.

As we have learnt through chapter 3, the core concepts of marketing – exchange, value and competition – provided the candidate with an alternative way in which to conceptualise how people practice domestic food safety. From the perspective of exchange and value, this critique has highlighted the need for researchers and policy makers to understand better what is being offered to the public in exchange for the behavioural change being requested (via best practice domestic food safety advice) and whether the public actually value the exchange proposed. Unless the exchange proposed is considered valuable, it is highly unlikely that behavioural change will take place no matter how scientifically valid and convincing the best practice guidelines are. From a competition perspective, the critique argued that our domestic food safety practices are competing with all our other personal and household priorities for the limited amount of time, energy and other resources we possess. Better understanding how this competition for resources is managed and the trade offs that people are willing to make (between their everyday priorities and the associated practices they encompass) to ensure they can get through their everyday lives as easily and conveniently as possible, will allow us to better appreciate the reason why different types of people/households engage in deviating practices. If we can better understand these reasons, researchers, policy makers and stakeholders can then begin to consider how best to overcome these barriers to change. This may be as simple as the integration of thermometers into fridges.

The candidate argues that this reorientation of what best practice domestic food safety advice is from an information provision approach to a marketing approach (in which a risk reduction from food borne illness is offered in return for people spending more

time, energy and resources on ensuring that they adhere to best practice domestic safety guidelines) helps to support a better conceptualisation and understanding of the reality of, and priority given by different types of people/household to their daily domestic food safety practices. It demonstrates how marketing theory, through its core concepts of exchange, value and competition, can and does indeed offer a platform from which one can begin to unravel the knowledge-practice divide and develop a more grounded and context specific understanding of the nature of, and reasons behind, the deviating domestic food safety practices identified in Brennan *et al.* (2007).

What the candidate is yet to be convinced of though is the potential contribution that social marketing can make to changing domestic food safety practices. Before a judgement and position can be taken on this, the candidate argues that a much greater understanding is needed of how different types of people/households value domestic food safety and in particular the exchange of time, energy and resources required to achieve the proposed reduction in risk from food-borne illness if domestic food safety is performed in accordance with the best practice guidelines presented. She argues that only after the proposed route-map (Table 4.3) is completed will she have sufficient data on which to assess fully the daily performance of domestic food safety practices. Only from there can she begin to critical assess whether the application of social marketing to domestic food safety behavioural change programmes could be effective in encouraging, supporting and facilitating different types of people/households to change from their current repertoire of deviating domestic food safety practices to a repertoire of practices that adhere to the best practice guidelines and what combination of strategies/activities such behavioural change programmes may consists of.

Chapter 4

A Route-map for future research into Domestic Food Safety Practices

4.1 Investigating the Habitual Nature of Domestic Food Safety Practices

On completion of the initial critique (chapter 3) of the Safefood data using a behavioural lens, the candidate drew breath and stood back from the analysis. This allowed her to consider at a more conceptual level the ideas/concepts that were emerging out of her critical analysis. In order to achieve this broader conceptualisation she went back to the literature and broadened her search beyond her established group of authors who up until now have been her primary point of reference. All roads appeared to be leading her to the concept of habit. The nature and frequency of the practices, the commitment to established practices, the reluctance to change existing practices, the frequency and unconscious nature of the performance of the practices and the stability of the context in which many of the practices were performed indicated that the domestic food safety practices under examination were indeed exhibiting characteristics of habitual behaviour (Verplanken & Arts, 1999; Neal *et al.*, 2006). The candidate and her co-authors used the word habit to describe the type of behaviours they had been investigating (Brennan *et al.*, 2007; McCarthy & Brennan, 2009). They had identified habit as one reason given by the participants as an explanation for why they are willing to engage in deviating practices. On reflection this was done without due academic attention being paid to what is meant by the concept of habit and in particular what the characteristics of habitual behaviours are and the difficulties such characteristics pose when trying to change such habitual behaviours. What was clear from the critique though was that in order to rectify this gap in understanding it would be necessary to consider the concept of habit not only from a social psychological perspective. Wider sociological insights into gender, social status, the role and importance of an individual's social network and resources, the development of competencies and acceptable ways of behaving and past experience were all reported within the submitted publications. The candidate felt that they were also likely to contribute to the development of certain habitual behaviours. Thus the candidate felt it was important to consider both the psychological and sociological dimensions of habit. From this she felt better able to reflect on the contribution the Safefood data could make

toher wider understanding of the nature of domestic food safety practices and why people are willing to engage in practices that deviate from best practice guidelines.

Drawing on inspiration from a range of authors, the candidate constructed tables 4.1. & 4.2. These table presents a series of questions derived from a detailed review of a selection of key psychological¹² (See Table 4.1.) and sociological¹³ (See Table 4.2.) academic publications on habit. The candidate embedded the questions in a domestic food safety context and attempted to represent how the two perspectives approach the concept of habit. The questions represent her assessment of how the two perspectives would approach the investigation of the habitual nature of domestic food safety practices. The term ‘you’ has been used to stress the importance of the individual to the psychological perspective and ‘we/our’ to stress the importance of the social and the process of socialisation to the sociological perspective. This distinction will be further expanded on (Table 4.4.) in the discussion on future data collection strategies. The candidate has not exhaustively covered the available literature on habit but her attempts to draw together these two key social science perspectives and to consider them in the context of her data provides the foundation for her proposed interdisciplinary route-map for future research and policy development into domestic food safety practices.

Table 4.1. A Psychological Conceptualisation of Habit – The Case of Domestic Food Safety Practices

Psychological Perspective	Associated Psychological Dimensions of Habit
How cognitively are engaged are you on a day to day basis about the safety of the food you eat, and in particular the food prepared in your own home?	Goal directed behaviours Unconscious behaviours Automaticity Frequency and efficiency of Behaviour
What knowledge do you have of best practice domestic food safety guidelines?	Learned behaviours
How did you learn about food and what to do with it?	Learned behaviours
Who did you learn about food from and which sources for advice/learning about food do you continue to use?	Learned behaviours

¹² Trandis, 1977; Trandis, 1980; Aarts at al., 1997; Aarts et al., 1998; Ouellette & Wood, 1998; Betch et al., 1998; Bargh & Chartrand, 1999; Verplanken & Aarts, 1999; Verplanken et al., 2005; Verplanken & Wood, 2006; Neal *et al.*, 2006, Wood & Neal, 2007; Dijksterhuis, Chartra & Aarts, 2007; Mullan et al., 2010, Charisarntis & Hagger, 2010

¹³ Bourdieu, 1977b: 214; Bourdieu, 1990, Bourdieu & Wacqunt, 1992a, Bourdieu 1993a: 76; Bourdieu, 2005, Schatzi, 1996; Rechwitz, 2002; Warde, 2005; Grenfell, 2008

In what context (environment) did you learn about food and how does this affect what you know about domestic food safety and how you practice domestic food safety?	Learned Behaviours Learning Environment
How do your measured knowledge levels compare with your self reported practices?	Unconscious behaviours Automaticity Learned behaviours
How cognitively aware are you of how you practice domestic food safety? Can you describe what you do in your own kitchen?	Unconscious behaviours Automaticity
How do your self reported practices relate to your actual practices?	Goal directed practices Unconscious behaviours
How often do you perform your range of domestic food safety practices?	Frequency of behaviours Stability of behaviours
Do you engage in any domestic food safety practices more than others?	Hierarchy of behaviours Frequency of behaviours Efficiency
Do you consider certain domestic food safety practices as more important than others?	Hierarchy of behaviours Learned Behaviours
Do you practice domestic food safety in a consistent, stable way, time after time?	Stability of behaviours
What triggers you to engage in domestic food safety practices? Are these automatic responses to specific cues or actively decide to	Context cues Learned behaviours Automaticity
What is the main goal you are striving for when you engage in domestic food safety practices?	Goal directed behaviour
What resource investment have you committed to your domestic food safety practices and how did you reach this decision?	Efficiency of behaviours Learned behaviours Context cued
What factors would influence you to alter you domestic food safety practices?	Learned Behaviour (new information) Goal directed behaviours Context (changes to the environment) Stability of behaviours (changes both to how you cognitively assess the practice and the environment in which you perform it) Unconscious behaviours Automaticity

From a psychological perspective, table 4.1. illustrates that the key habitual concepts associated with domestic food safety practices (and which are common across many other habitual behaviours) revolve primarily around how cognitively engaged a performer is with the practices they are engaging in, the learning process involved, how frequently they perform the practice, how efficient and competent they have become at performing the practices, the end state/goals associated with the practices, the context in which the practices are performed and the stability of the performance of the practices over time. When these concepts are applied to domestic food safety practice, one can begin to see how important it is to collect a multitude of data from both the performer of the practice and the context in which the practices are performed. To explore properly these concepts, it is not sufficient to rely on self reporting and cognitive style assessments of the domestic food safety practices that are being performed as many of the concepts are argued to be unconscious/automatic/context cued in nature. It is clear that the collection of observational data is key to understanding better the environment in which habitual practices are performed so that comparisons between actual and self reported practices can be accurately made.

Table 4.2. presents an overview of the sociological view on habit.

Table 4.2. A Sociological Conceptualisation of Habit – The case of domestic food safety practices

Sociological Perspective	Associated Sociological Dimensions of Habit
How do we come to an understanding of what is required to practice domestic food safety?	Socialisation (including education) Conventions of behaviour Social/Family role/status/network Capital resources
How have our domestic food safety practices develop/change over time?	Conventions of behaviour Societal and technological change Capital resources
How do the criteria for effective and excellent domestic food safety practices develop within society and what is their relationship with the scientifically determined best practice guidelines?	Conventions of behaviour
How are domestic food safety practice criteria passed through social groups/families/households?	Socialisation (including education) Conventions of behaviour Social/Family role/status/network Capital resources

What level of commitment do we display to different domestic food safety practices and are certain domestic food safety practices more prevalent?	Conventions of behaviour Social/Family role/status/network Capital resources
Are certain practices consider more important and valuable; easier to perform; less resource intensive than others? Is their a hierarchy of domestic food safety practices?	Socialisation Societal and technological change Conventions of behaviour Social/Family role/status/network Public vs Private Capital resources
What range of domestic food safety practices do we engage in?	Socialisation Conventions of behaviour Social/Family role/status/network Capital resources
What are the typical patterns or combination of domestic food safety practices that we engage in when we are transporting, storing, preparing, cooking, serving, eating and disposing of food?	Conventions of Behaviour Capital resources
How do our different domestic food safety practices interact with and affect each other?	Socialisation Conventions of behaviour Social/Family role/status/network Capital resources
How does the context in which we perform domestic food safety practices shape that performance?	Socialisation Conventions of behaviour Public v's private Social/Family role/status/network Capital resources
What role do others in our lives (family/friends/peers) play in shaping how we practice domestic food safety?	Social/Family role/status/network Capital Resources
What array of capital (social, cultural, symbolic; economic) do we have available to practice domestic food safety?	Capital resources Socialisation Social/Family role/status/network
How do changes in our available capital affect how we practice food safety?	Capital resources Social/Family role/status/network Conventions of behaviour

From the sociological perspective, the development of habitual behaviours is shaped by the socialisation process that we have experienced (including our educational

opportunities), our adoption of behavioural conventions and our determination, through our multiple sources of capital (social/cultural/economic/symbolic), to maintain/improve our social role/status/network within the social groups to which we are members. Our habits capture our past history and development, how our outer (social) and inner (individual) have become intertwined over time, the way in which we bring this history into our present circumstances and how we use this history to make choices to behave in certain ways and not in others (Grenfell, 2008). Exploring domestic food safety practices and the habitual nature of them from a sociological perspective allows us to open our eyes to the wider social world around us and how it shapes and influences the way in which we behave. The wider social world affects how we assess what is competent/excellent practice, the appropriate investment of capital in practices, the information that we take on board about practices and how we assess the personal impact that changing practices will have on how we are viewed/assessed by our wider social role/status/network. To illustrate, let us take our 45+ female homemakers as an example. Providing for their families is central to who they are as women and how they are perceived as mothers/spouses/daughters within their social group(s). As such they have invested significant capital resources into developing their skills and competencies as homemakers and food providers. Those around them rely on them and learn from them about domestic food safety practices. They are considered by their family and wider social group(s) as experts in food related practices. Challenging this expertise, by advising such women that they are engaging in deviating domestic food safety practices, involves questioning their expertise and competency to provide for their family, their main priority. When considered from this angle, it is not surprising that such woman were found to dismiss/ignore/reject such behavioural advice as inappropriate, patronising or irrelevant to them.

4.2. A Route-Map for researching Domestic Food Safety Practices

To conclude this doctoral critique an interdisciplinary inspired route-map (drawing on all the work conducted to date) is proposed to guide future research and policy development on domestic food safety practices. The term ‘domestic food safety practices’ has been defined within this doctoral statement to date as the food safety and hygiene related behaviours that people engage in when they are transporting, storing, preparing, cooking, serving, eating and disposing of food. For the development of this proposed route-map, the candidate elected to widen this definition in order to allow for

the route-map to embrace both the psychological constructs of the inner (individual) and the sociological construct of the outer (the social). This encourages a more interdisciplinary approach to the exploration of practices, one which explicitly recognises the contribution of both the inner and the outer to the development and sustainment of the type of habitual practices that domestic food safety practices have been shown to be. The candidate drew particular inspiration from the writing of Schatzi, Rechwitz and Warde on the theory of social practice (Schatzi, 1996; Rechwitz, 2002; Warde, 2005) and Pierre Bourdieu's seminal work on the concept of Habitus (Bourdieu, 1990; Grenfell, 2008). They helped her refocus the behavioural lens both conceptually and empirically which supported the development of the route-map and the accompanying analysis of research techniques proposed in Tables 4.4a, 4.4b, 4.4c & 4.5.

Rechwitz defined practices as "routinised types of behaviours which consist of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know how, states of emotion and motivational knowledge" (Rechwitz, 2002: 249). What appealed to the candidate was how this definition appears to embrace both the psychological and social aspects of our everyday practices, while at the same time ensuring a strong focus on the behavioural aspects of the associated practices. This allowed the candidate to continue viewing the domestic food safety practices through her adopted behavioural lens while explicating recognising the presence and importance of key psychological and sociological constructs (in particular those associated with habitual practices outlined in Table 4.1 & 4.2) to future research on domestic food safety practices.

Central to this, the candidate argues, was her recognition that domestic food safety, for the majority of people, is not the primary goal/end state of people's food related practices. Using the Safefood data as her reference, she determined that in fact the primary goal/end state is the nutritional nourishment of the individual/household/family. The practices of all three high risk groups all centre on the goal of nutritional nourishment, with their domestic food safety practices fitting in according to their circumstances/priorities. It was becoming clear that domestic food safety practices are deeply embedded within the wider food provisioning and hygiene

related practices that people engage in and are not an explicit goal/end state in themselves. That said, the practice of domestic food safety is an essential part of the overall practice of nutritional nourishment. Domestic food safety practices need to be co-ordinated with the other related practices in order to satisfactorily deliver the overall practice of nutritional nourishment (Rechwitz, 2002). By adopting this stance the candidate was finally able to position herself in a way that supported her initial proposition (as she discussed was her intention in 3.1) that domestic food safety practices need to be examined through the eyes of the performer and from within the context/environment in which they are performed.

At the core of the theory of social practices is the idea of performance. It is through performing the doings and sayings that practices are actualised and sustained (Schatzki, 1996; Rechwitz, 2002; Warde, 2005). As with any performance, the agent (in this case the individual/household performing food and hygiene related practices in their own home) does not always perform the practices in an identical way time after time or as advised. Instead they very often adapt, improvise and/or experiment (Schatzki, 1996; Warde, 2005). For example, from the Safefood findings, it was shown that while an individual may know how to wash their hands in accordance with best practice and may report that they often adhere to this guidance, a sizeable proportion were also willing to report that they also deviate from best practice guidelines and engage in less than ideal hand-washing practices. The reasons given included a lack of time and/or access to hot running water. The range of deviating hand-washing practices considered begin to show the extent to which individuals may be willing to adapt, improvise and experiment with the performance of domestic food safety practices on a daily basis.

Using this performance metaphor, the candidate has considered in detail how one would approach the exploration of the performance of domestic food safety practices through the eyes of the performer. This has allowed her to develop a much more grounded, context specific and interdisciplinary inspired route-map from which to consider and appreciate the nature of, and reasons for, the deviating domestic food safety practices identified in Brennan *et al.* (2007). This route-map has been inspired by the psychological, sociological and marketing insights that the candidate has encountered, explored and developed during the course of the Safefood research and the completion of this doctoral critique.

Designed as a series of questions, which were all related to the performance metaphor, this route-map proposes how the different characters, environments, processes and things involved in the practice of domestic food safety intertwine and rely on each other to support the daily performance of domestic food safety practices. The candidate has applied the set of derived questions to domestic food safety practices and proposes a series of questions that need exploring if one is to build up a comprehensive understanding of how, why, where, with whom and by whom domestic food safety is practiced.

Table 4.3 A Performance Inspired Route-Map for researching Domestic Food Safety Practices

Key Questions	Performance Analogy	Domestic Food Safety Practices Perspective
What is the nature, role and value of the practices to the performer?	The Lead Actor	<ul style="list-style-type: none"> • What relationship does the performer have with the domestic food safety practices being performed? • How cognitively aware are they of their own practices and how they perform them? • Are their domestic food safety practices habitual in nature? • How involved/interested are they in domestic food safety? • How are their domestic food safety practices associated with their own self identify, esteem, concept, confidence, role as a person? • How important is it to them as a performer that they adhere to best practice guidelines? • How important is it to them that they are considered to be competent in their performance of domestic food safety practices by their household and wider social group(s)?
How is the practice intended to be performed?	The Script	<ul style="list-style-type: none"> • How knowledgeable is the performer of the best practice guidelines on how to perform domestic food safety?
Who supports the performer(s) to perform a practice as instructed?	The Director	<ul style="list-style-type: none"> • Who is responsible for, and how are, best practice guidelines developed? • Who does the performer get advice from about how to perform domestic food safety? • Who highlights any problems to the performer in

		relation to how they perform domestic food safety?
The Story of the Practice(s)?	The Rehearsal and Performances	<ul style="list-style-type: none"> • How does a person perform a chosen domestic food safety practice? • Does their performance deviate from best practice? • Are there certain practices that are more regularly performed/dominant than others? • Do they perform a practice in isolation or in tandem with other practices? • Can they describe how they perform a practice accurately (are they consciously aware of their performance)? • Do their self-reported practices align with their actual performances of domestic food safety practices? • How stable are their performances of domestic food safety practices? • Do they perform it in the same way time after time?
In what environment is the practice performed?	The Stage	<ul style="list-style-type: none"> • In what environments do people perform practices associated with domestic food safety? i.e. • The Kitchen • Other rooms in the house in which food is stored, prepared, cooked, eaten, disposed of and in which personal hygiene is managed. • The Car (transportation of food) • Public Transport (transportation of food)
Who is present during the performance and what impact do they have on the performer and the performance?	The Audience	<ul style="list-style-type: none"> • Who sees how (though is not directly involved) the performer performs their domestic food safety practices? • What influence do they have on the performance of the domestic food safety practices? • Do people perform domestic food safety practices more carefully and adhere more closely to best practice if other people are present when they are performing?
What objects/technologies does the performer require to perform the practice?	The Props	<ul style="list-style-type: none"> • What objects, equipment and technology are required for a performer to practice best practice domestic food safety? • What objects, equipment and technology does the performer actually have access to when performing domestic food safety practices?

		<ul style="list-style-type: none"> • What objects, equipment and technology does the performer actual use when performing domestic food safety practises?
Who is supporting and/or participating in the performance of the practice	The Supporting Cast	<ul style="list-style-type: none"> • Who provides support, advice, lends a hand to the performer when they are performing domestic food safety practices? i.e. • Household members/family • Friends • Peers • Media • Government • Food Manufacturers • Domestic equipment/technology manufacturer
What is the background of the performer and what training in the performance of the practice did they receive?	Background and Training of the Performer	<ul style="list-style-type: none"> • What is the background of the performer? • What general training/education have they received about food and food safety? • What training in food related and domestic food safety practices have they received over the years? • Who did they learn how to perform with food and food safety from? • When and where did they learn about how to perform with food and food safety? • What is their family/religious/cultural background? • How does their background/training with food influence how they currently assess whether a practice is appropriate/good/safe/ethical/acceptable?
What investment has the performer been required to make in order to be able to performing a practice?	The Investment	<ul style="list-style-type: none"> • What resources must the performer commit to the performance in order to adhere to best practice guidelines? • What resources does the performer actually commit to the performance of different domestic food safety practices? • Are certain domestic food safety practices more resource intensive than others? • Do people prioritise the use of certain resources over others when deciding how to perform a practice (Trade off)? • Resources include: Physical (Time/Energy); Psychological (Thought/Stress/Worry/Planning); Social (associated with their social networks and

		how they are viewed by their family/friends/peers); Financial
What would the performer have to do and how much would it cost for them to change the way in which they perform a practice?	The Rewrite	<ul style="list-style-type: none"> • What changes would the performer have to make to how they currently perform domestic food safety in order to adhere to best practice guidelines? • How much would it cost the performer to make these changes? • What extra/new resources/equipment/technology (both investment and props) would the performer need to make these changes? • How could the performer be supported to make these changes to their current performance of domestic food safety practices

While the proposed route-map is primarily focused on advising future social science research, the candidate proposes that appropriate scientific data, such as microbiological and temperature data, should be collected and combined with the collection of the array of psychological and sociological data (including ethnographic¹⁴ data) that can contribute to a wider interdisciplinary appreciation of how domestic food safety is performed by different types of people/households. Such social science techniques should include: knowledge based surveys; household based observational research; domestic environmental audits (objects; equipment; resources); time use studies (domestic kitchen); food diaries; life history interviews; household discussion groups; and media and educational analysis.

Tables 4.4a; 4.4b and 4.4c present the proposed range of different types of data that should be collected, the two broad levels at which this range of data should be collected, the range of different research/disciplinary lens (see far left column) which will be applied to the data in order to maximise the value from the research and the array of analytical techniques that can and should be considered for use on the different types of data proposed. These tables illustrates how the route-map can be brought to life

¹⁴ Ethnographic research is a form of social science research (mainly practiced by sociologists and anthropologists though which is now being used by marketing and journalism) that involves the systematic observation and, where possible, participation in the lives (or aspects of the lives) of the participants being studied (Madden, 2010, p1). Ethnographic data in the context of this proposed route-map would involve in-depth interviewing and household discussion groups as well as detailed observational techniques such as those employed by Martens & Scott (2004).

through an interdisciplinary inspired collection of verbal, written, visual, observational and scientific data.

Table 4.4a Summary of mix of proposed types of data and collection methods at the population level of analysis

Disciplinary Lens	Verbal Data	Written Data	Visual Data	Observational Data	Scientific Data
Psychological Lens	Interviews	Questionnaires (public/stakeholder)	Photographic representations (i.e. domestic kitchens; kitchen technology)	Stakeholder shadowing	Microbiological sampling (i.e. fridges; work surfaces; dishcloths)
Sociological Lens	Discussion Groups	Media Messages		Purchase/Panel/Census Data	
Behavioural/Marketing Lens	Media Messages	Reports/Literature			Temperature Sampling (i.e. fridges; freezers; car boots; domestic kitchens)
Scientific Lens (Microbiological)	Stakeholder workshops				
	Oral Diaries/Life stories		Media images/messages		

Table 4.4b Summary of mix of proposed types of data and collection methods at household level of analysis

Disciplinary Lens	Verbal Data	Written Data	Visual Data	Observational Data	Scientific Data
Psychological Lens	Household Interviews	Diaries – Stories – poems – prose	Video Diaries (participant led)	Kitchen based observations (including remote and observer present)	Microbiological sampling (i.e. fridges; work surfaces; dishcloths)
Sociological Lens	“Kitchen Table”	Media messages	Videoed Household Interviews (researcher led)	GPS Tracking	Temperature Sampling (i.e. fridges; freezers; car boots; domestic kitchens)
Behavioural/Marketing Lens	Discussion Groups	Environmental Audits – written check list		Accompanied Observations (i.e. video on the shoulder)	
Scientific Lens	Media Messages			Purchase data tracking at household level	
	Oral Diaries/Life stories		Photographic representations		

Table 4.4c Summary of range of different types of analytical techniques applicable to each category of data

Disciplinary Lens	Analysis of Verbal Data	Analysis of Written Data	Analysis of Visual Data	Analysis of Observational Data	Analysis of Scientific Data
Psychological Lens	Content Analysis	Multivariate Analysis	Semiotic Analysis	Time Use analysis	Microbiological analysis
Sociological Lens	Discourse Analysis	Economic Analysis	Content Analysis	Resource Use analysis	Temperature analysis
Behavioural/Marketing Lens	Thematic Analysis	Analysis	Thematic Analysis	Environmental Analysis	
Scientific Lens	Grounded Theory Analysis	Content Analysis	Thematic Analysis	Geographical Analysis	
	Conversational Analysis	Discourse Analysis	Analysis	Economic Analysis	
		Thematic Analysis	Analysis	Trends analysis	
		Analysis	Analysis	Longitudinal Analysis	
		Grounded Theory Analysis		Behavioural Analysis (i.e. mapping of practices)	
		Conversational Analysis			
		Analysis			

Table 4.5 has been developed to integrate the key questions posed in the route map (Table 4.3) with the proposed mixed data and analytical strategies outlined in Tables 4.4a, 4.4b and 4.4c. Drawing on inspiration from Johnson, Onwuegbuzie & Turner, (2007), Table 4.5 proposes an Interdisciplinary Analytical Strategy. It illustrates in detail how to maximise the value of the proposed data mix, enshrines the value of both disciplinary and interdisciplinary analysis of the mixed data sets, provides a framework for triangulating the results from different types of data, analytical techniques and disciplinary perspectives and proposes how to integrate multiple data insights into an overarching, multidimensional and interdisciplinary inspired 'practice' driven assessment of domestic food safety practices.

Table 4.5 Summary of Proposed Interdisciplinary Analytical Strategy

Key Questions (Table 4.3.)		The site of analysis	Mixed Data and Interdisciplinary Analytical Strategy			
			Verbal Data	Written Data	Visual Data	Observational Data
What is the nature, role and value of the practices to the performer?	The individual performing the practice (The lead actor)	Central to this question is the disciplinary and interdisciplinary analysis of the range of proposed data, both at the population and household level. This multi-way analysis will support the development of a rich and detailed understanding of the individual who is engaging in the domestic food safety practices under investigation. Using the population data we will be able to compare and contrast the nature, role and value of the practices to different types/segments of performers. The analysis of the household data will allow us to determine how in the domestic environment these practices are actually performed, make an assessment of how these practices fit into the everyday lives/routines of different types of performers and consider how different types of performers could be better encouraged, supported and facilitated to engage in better domestic food safety practices. Through combining the outputs of the mixed data population and household analysis with the proposed analysis using multiple research lens (as proposed in Tables 4.4a and 4.4b), an interdisciplinary inspired, multidimensional practice based assessment of the nature, role and value of the domestic food safety practices at the level of the performer can be completed..				
How is the practice intended to be performed?	The performer, their household/wider social network and domestic Food Safety stakeholders (The Script)	This question aims to determine, using the mix of proposed data and analytical techniques, a blueprint of how the domestic food safety practices under investigation should be performed from the perspective of the performer and their wider household/social network. To determine this blueprint, an integrated analysis of the environment, available resources/technologies, best practice guidance and the role of others in the performance will need to be completed.				

		<p>Consideration of visual, verbal, written, observational and scientific data will allow for the development of a ‘real life’ blueprint that gives due consideration to the array technological/personal/environmental/social resource constraints that influence how well domestic food safety is practiced. From this interdisciplinary informed platform, recommendations can be derived as to how such resource constraints contribute to deviating practices and provide insights from which food policy makers can design programmes to maximise the performance of best practice domestic food safety and reduce the incidence of food borne illness originating in the domestic environment.</p>
<p>Who supports performers to perform a practice as instructed?</p>	<p>Domestic Food Safety Stakeholders. (The Directors)</p>	<p>This question requires analysis, across the range of data proposed, of the key stakeholders who support the practice of domestic food safety. This will require consideration of the stakeholders associated with all the aspects of the practice and its performance including: food policy makers; food retailers; fridge manufacturers; and food producers to name a few. Identifying the range of support (and associated resources) that they provide will be essential to understanding how and where in the chain the most significant improvements can be made. An example of where this type of analysis will contribute significant is in the fridge temperature conundrum presented in 3.3.4.</p>
<p>The Story of the Practice(s)</p>	<p>The performer and their household/social network (The rehearsal and performance)</p>	<p>This question is primarily concerned with reporting on how the performance of domestic food safety practices are played out in different types of homes/kitchens who have different household compositions/profiles. Population data will allow use to identify and profile different types of households and through recontact consent give us access to different households from which to conduct detailed ethnographic research with. The household level data will give us a behind the kitchen door look at the ‘real life’ goings on in the different households investigated and will help bring the population data to life. The main intellectual challenge will be in linking the different levels and types of insights gained at through the population and household analysis and using</p>

		these insights to inform the development of both future research instruments/strategies, food policy and behavioural change programmes.
In what environment is the practice is performed	The domestic environment and those who use it (The stage)	This question is very focused on the analysis of the environment in which domestic food safety is practiced. The analysis will be dominated by household level analysis though it will be very important to link this household level analysis to a wider population analysis of how the domestic kitchen (and its associated resources) is represented in visual, written, oral and scientific data.
Who is present during the performance and do they impact on the performer and the performance?	The domestic environment (The audience)	Linking population data (primarily self reported data though not exclusively) with household data (primarily observational though not exclusively) will support a robust assessment of how others (within the domestic environment) influence how a performer performs domestic food safety behind their closed kitchen doors and the impact other people (within their domestic environment) have on how well the performer performs the practice with respect to the best practice food safety guidelines
Who is supporting and/or participating in the performance of the practice?	Household/Wider social network/Other support agents (The Supporting Cast)	Analysis will require a detailed examination of population and household data to build up a picture of the strength, size and diversity of support network and the role they play in supporting the day to day performance of different domestic food safety practices. Support networks may play a very significant role in the domestic food safety practices of certain types of household's i.e. older people who rely on family/friends and/or social services to deliver and prepare food for them. In some cases, it will be the support network that needs to be targeted with programmes to improve adherence to best practice rather than the individual they are supporting.
What is the background of the performer and what training in the performance of the practice did they	The performer and their household (Background and training)	Combining background population level lifestyle data (including socio-economic data) with the detailed gathering and analysis of life story/oral history data (visual/verbal/written) will allow for a much more informed and nuanced profiling of different types of households to be conducted. The results of this analysis will be used to inform the development of more informative population level research instruments and support a move away from social stereotyping that

<p>receive?</p>		<p>relies primarily on population data and broad social variables (i.e. social class) to classify and profile different types of households. Inter-level analysis will allow for the identification of a much more informed and relevant set of classification variables which should be incorporated into the collection of both population and household level data going forward.</p>
<p>What investment has the performer be required to make in order to be able to performing a practice?</p>	<p>The performer (The investment)</p>	<p>This question requires the detailed auditing of the range of resources a performer requires and must commit to use in the performance of best practice domestic food safety practices. Using both population and household level data we can build up a comprehensive understanding of the effort required and value associated with the range of resources identified and why different types of households make decisions not to make the associated investment proposed. This will allow for the assessment, at both a population and household level, of the costs associated with performing best practice domestic food safety for different types of households. From there we can determine a range of strategies that can help different types of households to minimise the required investment and encourage, support and facilitate them to make this required investment to reduce the risk and incidence of food borne illness in their own homes.</p>
<p>What would the performer have to do and how much would it cost for them to change the way in which they perform a practice?</p>	<p>All stakeholders (The rewrite)</p>	<p>Matching the ‘actual’ investment that different types of stakeholders and households make in domestic food safety (drawing on both population and household level data) with the ‘blueprint’ for best practice (suggested above) will allow us to assess how much investment is needed, where best that investment should be made, who should be making the investment and how much resources should be given to such investments in order to support and facilitate the performance of best practice food safety in different types of household and support the reduction of food borne illness originating in the domestic environment.</p>

Through this route-map the candidate argues that in order to understand the performance of domestic food safety practices, multiple types of data, analytical techniques and disciplinary perspectives need to be brought together in an interdisciplinary practice driven framework, which respects and acknowledges the interdependencies they have on each other. It is by exploring these different types of data through an interdisciplinary inspired 'practice' lens that we can achieve much more holistic, multidimensional and illuminating domestic food safety research that better supports the development of a more robust and nuanced understanding of the nature of, and reasons behind, the deviating domestic food safety practices outlined in Brennan *et al.* (2007).

4.3. Conclusion of Doctoral Statement

Through this doctoral statement, the candidate has set in context the importance and cost of food borne illness both nationally and internationally. She has shown how the domestic food safety practices performed behind the array of different kitchens doors play a significant role in contributing to the incidence of food borne illness. Her review of how social science research has approached, framed and conducted research into microbiological food risk and the associated domestic food safety practices has highlighted the limited range of perspectives, techniques, and behavioural change solutions that have been considered. The identification of a clear knowledge practice divide (within the Safefood project) and her interdisciplinary background developed through her engineering and marketing academic training inspired the candidate to open her eyes to the possible contribution that alternative, yet closely related perspectives, could offer her in her critical assessment of domestic food safety practices. Using the submitted publications (See Part 2, Section 1-9) and the associated Safefood data as her platform, the candidate attempted to consider what a broadening of both disciplinary and policy perspectives could offer to our understanding of the nature of, and reasons behind, the range of deviating practices presented in Brennan *et al.* (2007). Through the analysis, which was conducted using a behavioural lens, she developed an interdisciplinary route-map for future research and policy developments on domestic food safety practices. This route-map places at its core the actual performance of domestic food safety practices and proposes a balanced, interdisciplinary assessment of the contribution of the individual, their household and the wider society on the development and context in which domestic food safety is performed. The route-map

incorporated and integrated the theories and techniques of these alternative perspectives and proposed that through the collection, analytical integration and critical reflection of an array of different types of social and scientific data we can better understand the nature of, and reasons for, the deviating domestic food safety practices identified in Brennan *et al.* (2007).

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