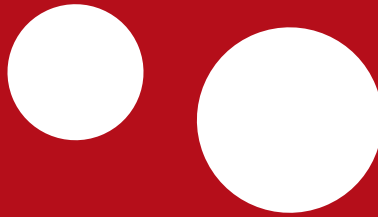
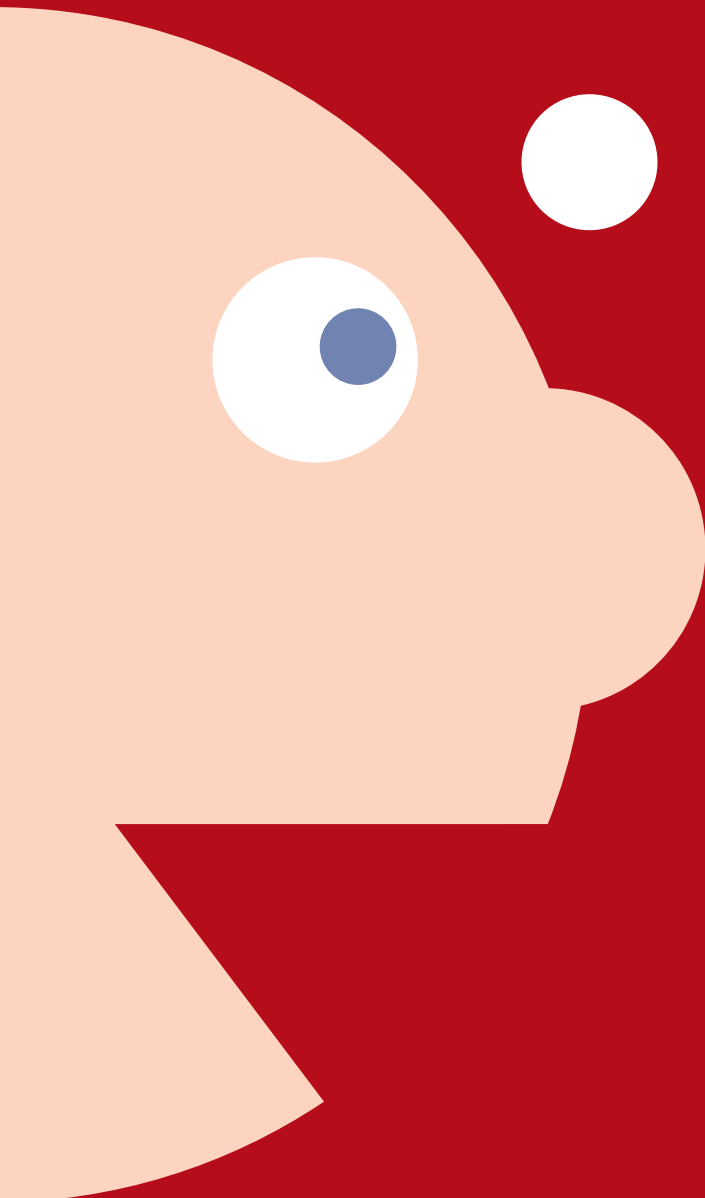


FOOD BEHAVIOURS

Changing our Behaviours

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Volume 3

Changing food behaviour

This document is the third in a three volume series. The terms of reference for the series are outlined in the introduction, which also provides an overview of the environmental, social and personal factors that can affect food behaviour. Volume 1 outlines the historical context of food safety issues on the island of Ireland (IOI), explains the major current public health issues and describes the available research on influences on food safety behaviour. Volume 2 provides the same information in relation to public health nutrition. Volume 3 relates to behaviour change and explores the development of behaviour change methods, current understanding of best practice and learnings from intervention studies. Recommendations for further research and for communication of changing food behaviour on the IOI have also been developed for each part of the report. This volume:

1. Outlines the development of behaviour change strategies
2. Examines best practice in changing food behaviour
3. Reviews interventions that have been carried out in relation to key nutrition and food safety behaviours and outlines from these, factors that may promote successful behaviour change
4. Develops recommendations for best practice in food and health communication based on current knowledge
5. Identifies research gaps and communications priorities.

All volumes are available on www.safefood.eu

Abbreviations

BBC	British Broadcasting Corporation
BM	Body Mass Index
CCTV	Closed Circuit Television
CFI	Community Food Initiatives
DASH	Dietary Approaches to Stop Hypertension
DG SANCO	Directorate General for Health and Consumer Affairs
DOHC	Department of Health and Children
EPODE	Together let's prevent childhood obesity
FSA	Food Standards Agency
HIV	Human Immunodeficiency Virus
HON	Health on the Net foundation
INDI	Irish Nutrition and Dietetic Institute
IOI	Island of Ireland
ISI	Institute for Scientific Information
ISM	Institute for Social Marketing
NI	Northern Ireland
NIC	National Institute for Health and Clinical Excellence
RCTs	Randomised Controlled Trials
ROI	Republic of Ireland
SCT	Social Cognitive Theory
UK	United Kingdom
US	United States
USA	United States of America
USDA	United States Department of Agriculture
WHO	World Health Organisation

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Glossary

Anthropometric measurements: Anthropometry is the measurement of humans with its purpose to understand human physical variation. It plays an important role in industrial design, clothing design, ergonomics and architecture.

Atkins diet: The Atkins diet, officially called the Atkins Nutritional Approach, is a low-carbohydrate diet created by Robert Atkins. The diet involves restriction of carbohydrates to more frequently switch the body's metabolism from burning glucose as fuel to burning stored body fat.

Bloggers:..A person who writes a blog or content for a blog. A blog is a type of website or part of a website which provides commentary or news on a particular subject whilst others function as more personal online diaries.

Disseminated: To disseminate is to spread or disperse something.

Flickr:..Flickr is an online photo management and sharing application created by Ludicorp and later acquired by Yahoo. In addition to being a popular website for users to store, share and embed personal photographs, the service is widely used by bloggers to host images that they embed in blogs and social media.

Formative research: This is research conducted during the development of programmes to help you decide on and describe one's target audience, understand the factors which influence that audience's behaviour and determine the best ways to reach them. It looks at behaviours, attitudes and practices of target groups, involves exploring behavioural determinants and uses a myriad of methods to collect data.

Herd effect:..Herd effect describes a form of immunity that occurs when the vaccination of a significant portion of a population provides a measure of protection for individuals who have not developed immunity. Herd immunity theory proposes that, in contagious diseases that are transmitted from individual to individual, chains of infection are likely to be disrupted when large numbers of a population are immune or less susceptible to the disease.

Infomercials:..Infomercials are long-format television commercials, typically five to thirty minutes in duration. Infomercials are also known as teleshopping. Infomercials are aimed at building awareness of a product or service by demonstrating its use and benefits. Some television stations choose to air infomercials as an alternative to the former practice of sign-off.

Macro environments (marketing):..This includes all factors that can influence an organisation, but that are out of their direct control. A company does not generally influence any laws (although it is accepted that they could lobby or be part of a trade organisation). It is continuously changing, and the company needs to be flexible to adapt. There may be aggressive competition and rivalry in a market.

Micro environments (marketing): ..The micro environment is specific to the industry and is different for different industries. It includes suppliers that deal directly or indirectly, consumers and customers, and other local stakeholders. Micro tends to suggest small, but this can be misleading. In this context, micro describes the relationship between firms and the driving forces that control this relationship. It is a more local relationship, and the firm may exercise a degree of influence.

Ornish diet:..The Ornish diet, developed by Dean Ornish, emphasises the consumption of whole grains, fruits and vegetables, and severely restricts the consumption of animal products, dietary fat and refined carbohydrates. In addition to these dietary recommendations, the Ornish Program involves comprehensive lifestyle changes including moderate aerobic exercise, stress reduction techniques, peer support, smoking cessation and nutritional supplementation.

Probability neglect:..Probability neglect is the tendency to consider the consequences of an action but to disregard probability when making a decision. It is one simple way in which people regularly violate the normative rules for decision making.

Psychometric:..Psychometrics is the field of study concerned with the theory and technique of educational measurement and psychological measurement, which includes the measurement of knowledge, abilities, attitudes and personality traits. The field is primarily concerned with the construction and validation of measurement instruments, such as questionnaires, tests and personality assessments.

Risk communication:..Risk communication is the complex and multidisciplinary exchange of information and opinion on risk among risk assessors, risk managers and other interested parties used to protect the public's health. Public health officials use risk communication to give citizens necessary

and appropriate information and to involve them in making decisions that affect them, such as where to build waste disposal facilities.

Social cognitive theory: ..Social cognitive theory is a learning theory that is used in psychology to understand, predict and change human behaviour. It is based on the idea that people learn by watching others as well as being influenced by certain aspects such as the environment, individual situations, expectations and individual self-control among many others factors.

Typologies:..Plural of typology, the study or systematic classification of types that have characteristics or traits in common.

Viral marketing: ..Viral marketing refers to marketing techniques that use pre-existing social networks to produce increases in brand awareness or to achieve other marketing objectives such as product sales through self-replicating viral processes, different to the spread of viruses or computer viruses. Viral marketing may take the form of video clips, interactive Flash games, advergames, eBooks, brandable software, images, or text messages which encourage people to pass along the marketing message.

Weight Watchers diet:..Weight Watcher's core philosophy is to use a science-driven approach to help participants lose weight by forming helpful habits, eating smarter, getting more exercise, providing support and using a counting, budgeting and planning approach to eating. No food is off limits; however, individuals must count points for the food they have eaten in the day. There are two primary ways individuals are supported within Weight Watchers: in-person meetings or an online-only programme.

Widget:..A widget is a small application that can be installed within a web page by a user. Widgets often take the form of on-screen tools (clocks, event countdowns and daily weather, etc.). Widgets are typically created in DHTML, JavaScript, or Adobe Flash.

Zone diet:..The Zone diet, created by Dr. Barry Sears, centres on a balanced ratio of "40:30:30", being 40% carbohydrates, 30% protein, and 30% fats in an individual's diet. Dieters are discouraged from eating saturated fats, processed foods and too much salt. Dieters are advised to not eat a meal exceeding 500 calories and a snack not exceeding 100 calories.

Executive summary

Volume 3 Changing food behaviour

This report:

1. Outlines the development of behaviour change strategies
2. Examines best practice in changing food behaviour
3. Reviews interventions that have been carried out in relation to key nutrition and food safety behaviours and outlines factors that may promote successful behaviour change
4. Develops recommendations for best practice in food and health communication based on current knowledge.
5. Identifies research gaps and communications priorities.

Amongst health communicators, the problems associated with facilitating behavioural change have been acknowledged and are continually debated. Chapter 1 of this report outlines a broad overview of behavioural change strategies and communications techniques for eliciting food safety and nutrition-related behavioural change while Chapter 2 offers a comprehensive review of intervention studies with a view to identifying success factors.

Approaches to behaviour change – an evolution

Since the 1950s there has been an acceleration in the evolution of behavioural change communication. Health communicators have moved from a primary preoccupation on individual choices towards the acceptance of a complex matrix of factors that determine nutritional or food safety behaviours. This over-simplistic view that the individual has complete control of the behaviour they adopt is no longer assumed as it neglects to consider how social constructs impact on behaviours. It is now recognised that behaviours are a result of many influences: the general culture and environment into which we are born; the day-to-day culture in which we live and work; the groups, subgroups and individuals with whom we interact; and our own personal emotions, beliefs, values and attitudes, all of which are

influenced by these wider factors. This recent change in perspective has catalysed the adoption of a multifaceted approach to behavioural change.

The current review has been divided into two parts, which reflect the planning and implementation of communication for behaviour change. The first half maps the evolution of behavioural change communication; introduces the role of theory and discusses the four dominant strategies which are used to facilitate food-related change namely health promotion, risk communication, social marketing and more recently, behavioural economics. The second half examines the techniques used to communicate behavioural change within any of the preferred strategies. Practical examples are used to illustrate the innovative communication approaches that have been adopted to tackle food safety and nutritional issues.

Current approaches to behavioural change

The behavioural change literature is dominated by three widely accepted frameworks; health promotion; risk communication and social marketing. In recent years a ‘Nudge’ or ‘libertarian paternalistic’ approach from behavioural economics has grown in prominence. However, to date it is a lesser used approach in relation to food safety and healthy eating. This report seeks to summarise the key characteristics of each approach and identify the impact they have had on the adoption of desirable food safety and nutrition behaviours.

This report extensively discusses social marketing, which is reflective of **safefood**'s commitment to the adoption of this approach to guide and inform the development of campaigns. Social marketing has been heralded as one of the most developed public health communication strategies, and as an innovative approach that has moved away from health education and social advertising strategies. Social marketing as a discipline seeks to bridge the gap between intention and behaviour through voluntary behavioural change. It is not a theory but a framework that has developed from other disciplines such as psychology, sociology and communication.

Like health promotion, social marketing as a strategy integrates many theories and approaches to promote behavioural change. Where it differs however, is its emergence as a discipline from traditional commercial marketing practices to address societal problems. Social marketers use central tenants such as ‘exchange theory’ to develop successful campaigns; ‘exchange’ in this context means that both parties need to receive something of value for any change to occur. By identifying barriers to change, positive behaviours can be ‘packaged’ to overcome difficulties whilst highlighting value to the individual.

Communicating for behavioural change

Each of the behavioural change strategies discussed are supported by a wide range of communication techniques in a variety of settings. This report identifies the most widely used techniques, ranging from health education to media advocacy, whilst discussing the role they play in facilitating positive behavioural change. Any of the techniques described are adaptable depending on the overall goals and objectives of the campaigns. However, it also should be acknowledged that within this chapter there is greater emphasis on nutrition-related messages, which reflects the scarcity of published information on food safety communication campaigns.

Communicators of nutrition and food safety messages have the opportunity to use multiple formats to target consumers. Traditional mass media tools such as radio, television, billboards, and print forms such as posters, leaflets, newspapers, magazines and education curricula are now accompanied by new media technologies such as the internet, mobile and digital communication. Techniques such as social advertising, for example public service announcements, have been replaced with these more proactive tools, as a call to action has become a key part of message exposure. This section describes in detail some of the most widely used communication techniques implemented through behavioural change strategies and how they have evolved to engage with a changing society.

Identifying a best practice approach

There is no universal solution to addressing current and arising food safety and nutritional issues. Therefore, there is a greater need to tackle complex problems through a more integrated approach and effect behavioural change through a co-ordinated effort. Future successful strategies should incorporate multiple stakeholders working simultaneously in various sectors and settings, and refocus on the influence of environmental forces in addition to changing behaviours of the individual. Theories such as the Social Cognitive Theory have long proposed this approach, emphasising the internal and external factors that impact on our behaviour. Behavioural change communicators need to recognise how these factors or forces interact with each other to impact on individual behaviour and present adequate solutions.

The evidence within this report emphasises how food safety and nutritional behavioural change communication is continuing to respond to a changing environment. For behavioural change to continue to take effect, communicators need to be flexible, adopting principles from more established approaches such as health promotion and risk communication with more contemporary strategies such as behavioural economics and the 'Nudge' theory. This flexibility should not be limited to the strategic approach adopted; it should also be reflected in the communication techniques adopted. For example,

mass media or media advocacy can be more effective with certain audiences, as would a different setting. Therefore, knowing your intended audience will be paramount in campaign success.

In response to the need for a more integrated, partnership approach behavioural change strategies should incorporate various types of stakeholders working in partnership from within and across different levels (including individual, communities and population) for a common objective. Strategies need to take a multifaceted approach to behavioural change, examining both prevention and treatment of complex behavioural issues. In this regard, public policy will play a major role in behavioural change in the future, focusing on implementation within and across systems at each level in order to restore this balance.

A review of behaviour change interventions in food safety and nutrition

As part of **safeFood**'s research on food-related behaviour change, an assessment of the effectiveness of food safety and nutrition interventions was also carried out. This review provides critical insight into the achievements and limitations of such research, including the identification of effective planning, implementation and evaluation strategies, ultimately providing direction for future funding, development, and collaboration. The current global obesity epidemic highlights the importance and priority of related health promotion interventions. Likewise, consumer food poisoning and the spread of foodborne infectious disease through cross-transmission represent considerable threats to public health. Research needs to be appropriately directed in order to achieve effective and sustainable changes.

An in-depth literature search was conducted using online databases that included PubMed, Web of Knowledge (including Web of Science and ISI database) and PSYCINFO. The electronic search was supplemented by a review of relevant bibliographies and consultation with experts. Documents in English were considered and sourced from various countries: United States of America; Canada; Wales; Northern Ireland; Scotland; New Zealand; Australia; Republic of Ireland; Israel; Netherlands; Germany; Austria; Switzerland; Sweden; Finland; Turkey; England; Denmark; Norway; China; Italy. Studies conducted between 1985 and 2010 were examined. Of these, roughly 14 per cent reported on food safety interventions; 86 per cent concerned nutrition. Two dietary interventions were found from the Republic of Ireland; 0 from Northern Ireland. One food safety intervention study was found for the island of Ireland. The intervention studies were organised into categories of obesity prevention, obesity treatment/weight loss, salt, fruit and vegetables, biological risks, unhealthy foods, mode of provision and fat. One intervention regarding technological consumer risks was found; there were none found regarding chemical consumer risks. A great deal of fruit and vegetable and obesity prevention interventions were found, yet there was a lack of comparable research for food safety, salt and reduction of unhealthy foods (soft drinks, treat foods, etc.). Commissioning bodies for the studies included the British Broadcasting Corporation (BBC), the Food Standards Agency UK (FSA), the Institute for Social

Marketing (ISM), the National Institute for Health and Clinical Excellence (NICE), **safefood**, the United States Department of Agriculture (USDA) and the World Health Organisation (WHO). For a full list of commissioning bodies and study details, please refer to the interventions database on www.safefood.eu.

Do nutrition and food safety interventions work?

The vast majority of food safety and nutrition studies reported change in a variety of populations and settings, suggesting that interventions have the capacity to improve consumer diet and food safety behaviour. That being said, there still exists a lack of high-quality evidence and, although progress is being made, guidance for both researchers and practitioners is insubstantial. Intervention planning, implementation and evaluation trends provide insight into the limitations and strengths of the available literature. Table 1 outlines the methodological feature, target groups and intervention settings that were examined.

Table 1: Intervention planning and implementation trends

Methodological features	Target Groups	Intervention setting
Theories and techniques	Age	Workplace
Social marketing approaches	Educational attainment	School
Ethics	Ethnicity and at-risk/minority groups	Home
Sample selection		Rural versus urban
Survey design		Supermarkets, restaurants, canteens and point-of-purchase
Peer educators		Group settings
Creativity		Primary health care settings
Situational factors/timing		
Intervention adherence		
Educational component		

Overall, intervening simultaneously at an individual and environmental level is more likely to bring about sustained change. Multi-component campaigns that implement change in a variety of different settings show most promise for future research.

Intervention evaluation trends

A variety of outcome measures were examined in the interventions, including blood cholesterol levels, spending habits, hand washing frequencies, participant Body Mass Indexes (BMIs) and dietary intakes of salt, fruits and vegetables, and fat. While the importance of the use of biochemical and anthropometric measurements was often noted, less reliable measures, such as self-reported questionnaires, were frequently used as methods of evaluation.

It is becoming increasingly recognised that interventions need to consider multiple outcome measures in their evaluation strategies. Studies should also be realistic in their aims and objectives and consider immediate outcomes, such as changes in knowledge or attitudes, because many interventions have been evaluated on behaviour change alone and have consequently been labelled as ineffective. Multi-component intervention designs are also often used, but the different levels are not always compared, subsequently leaving the most effective unidentified. Furthermore, data on “unsuccessful” interventions are often kept out of the public domain. The publication and sharing of information amongst researchers and practitioners is of great importance. It is essential that the evaluation of studies has due emphasis in future planning.

Overall, it was difficult to find studies that exemplified recommended evaluation practices. Despite the public health emphasis on obesity worldwide, of note, there is currently insufficient high quality evidence for effective obesity prevention and treatment interventions. Although many countries have implemented recommendations for best weight management clinical practice, international guidelines for the evaluation of dietary interventions are lacking. The diversity of intervention designs and consequential evaluation methods are noted, and evaluation needs to be flexible and adaptable, yet a general evidence-based framework is still achievable.

One such framework for weight management interventions is that produced by the National Obesity Observatory in the United Kingdom. The framework outlines three main types of evaluation: formative evaluation, process evaluation and impact/outcome evaluation. The authors state that the evaluation types are complementary and should all be conducted at appropriate stages in a project’s cycle.

Characteristics associated with effectiveness

This review clearly demonstrates that more research is warranted on effective interventions for food-related behaviour change. Collaboration and efficient planning at multiple levels is urgently required for societal change. Very few published food safety and dietary intervention studies are currently available for the island of Ireland. It is hoped that policy makers, researchers and health practitioners on the island will use this review to help plan, implement and evaluate future studies. Dietary and food safety interventions are lacking in quantity and quality, but there is promise of consumer behavioural change and programme effectiveness. The intervention planning, implementation and evaluation information presented throughout this chapter should serve as a foundation on which future research and guidelines develop. Study characteristics included in the most effective planning, implementation and evaluation strategies for dietary and food safety interventions are listed below and followed by recommendations for further research and communications.

Planning and implementation

- Interventions should be multifaceted (involving family, school, workplace, policy, community, etc).
- Longitudinal design is of value.
- Intervening simultaneously at an individual and environmental level is more likely to bring about sustained change.
- Interventions should have a clearly stated theoretical basis.
- Targeting both specific and general groups has been effective, yet enhanced effect is seen with clearly defined target groups.
- Consultation with community leaders and professional disciplines should occur prior to intervention administration.
- An availability and wide distribution of intervention materials is beneficial.
- Intervention curriculum and materials are most effective when they are culture-specific and tailored to the specific group involved.
- Creativity is an important factor in intervention design.
- Timing factors (such as summer holidays or employee redundancies) should be considered when planning an intervention.
- Dietary interventions are more successful when the participants have an increased personal time commitment to the project.
- Implementing an educational intervention component has been successful for both dietary and food safety interventions.
- The impact of dietary interventions is often greater for the oldest and youngest participants.
- Targeting a specific age bracket is often a successful intervention method.
- Improving the quality of the location of food within stores has been shown to increase the sale of fruits and vegetables.
- Increasing access to healthier foods by opening supermarkets in inner-city areas can be effective.
- Parental involvement is an important factor in promoting sustainable changes during early childhood.
- Participants with higher levels of educational attainment often show the greatest capacity for behavioural and attitudinal change in dietary and food safety interventions.
- Problem-solving techniques and motivational interviewing are important elements in maintaining long-term weight loss among minority groups.
- Interventions should provide or work within a supportive environment.
- The preschool setting merits significant attention in future research.

- Food safety promotion methods such as community-based education programmes, hand washing promotion and food-handler training were all deemed useful (194, 248, 252).
- Trusted and recognised community workers (i.e. peer leaders) are effective vehicles for intervention implementation.
- Dietary interventions should provide increased availability, variety, taste opportunities and convenience of food.
- Liberal thinking around study design is recommended; RCTs are not always the most effective option and may not be practical at a community level.

Evaluation

- Long-term evaluations and follow-ups are important and should be included in the study design.
- Intervention clinical outcomes should be addressed in addition to the commonly measured behavioural outcomes.
- Interventions should consider multiple outcomes in their evaluation strategies.
- Focus groups, interviews and community/expert steering groups should be an aspect of project evaluation.
- Intervention studies should secure adequate funding for evaluation prior to programme implementation (at least 10 per cent of total budget).
- Cost-effectiveness and cost-utility analyses should be performed.
- Measurement tools should be valid and reliable.
- Appropriate statistical analyses should be used.
- An evaluation partnership between evaluators and practitioners is recommended.
- Project managers should employ external independent researchers to evaluate intervention effectiveness.
- Evaluation should be based on an evidence-based framework, such as that produced by the National Obesity Observatory in the United Kingdom.
- Formative, process and impact/outcome intervention evaluations should be conducted.
- “Toolkits” of evaluation for obesity prevention and treatment interventions should be considered.

Recommendations

Research recommendations for communicating behaviour change and developing interventions on the IOI

Knowledge gap	Public health implication(s)	Recommendation/solution
Recommendations relating to interventions		
A lack of research on effective intervention on the IOI and a lack of food safety intervention research internationally.	Poor understanding of effective food safety behaviour change.	<ol style="list-style-type: none"> 1. Conduct intervention studies to promote improved food safety practice. 2. Research needs to be published and shared. 3. Methods to address bias in publishing positive intervention outcomes are needed.
There is a lack of well-planned and evaluated interventions.	<ol style="list-style-type: none"> 1. Poor intervention outcomes. 2. Ineffective use of health promotion funding. 	<ol style="list-style-type: none"> 1. International guidelines for the evaluation of dietary interventions are needed. 2. Budget and resources are required for thorough planning and evaluation. 3. An advisory resource for practitioners should be created and distributed. 4. Opportunities for training in evaluation should be provided.
Little is known about the sustainability of interventions over time.	Poor sustainability may result in ineffective behaviour change.	<ol style="list-style-type: none"> 1. Evaluate sustainability of all intervention projects. 2. Methods to increase cost-effectiveness are needed.
The evaluation of different levels within multi-component	1. Potential to isolate key measures for	1. Include multi-level intervention in study design.

interventions is lacking.	effective behaviour change. 2. Potential to identify synergistic effects of different interventions.	
Attracting the co-operation of individuals who refuse participation remains a major setback in food safety and nutrition interventions, as is participant adherence.	May result in bias or non-significant results.	Methods to increase participation and adherence are needed.
Poor understanding of the effects of sociodemographic factors on intervention outcome.	Improved segmentation could enhance intervention effectiveness.	Additional research is needed to determine age, gender, marital status, family size/sibling number and ethnicity influences on intervention effectiveness.
Design effects, such as control group improvements, are not well understood.	Difficulty in assessing intervention effectiveness.	Further research is needed on control group inclusion in intervention design.
Lack of data on point-of-purchase interventions.	Potential to influence food choice at the point of decision.	More information is needed on the effectiveness of point-of-purchase interventions in retail and catering settings.
Evidence of effectiveness of multimedia-based interventions in rural and at-risk populations.	New media has potential to reach hard-to-reach audiences.	Future studies should explore the use of new forms of media.
Lack of information on interventions in unemployed individuals.	Unemployed individuals may constitute an important at-risk group.	More research should address food safety and dietary interventions for unemployed persons who cannot be reached in traditional settings.

Interventions in religious groups have shown promise.	Religious community groups offer existing structures within which to develop behaviour change interventions.	Replication of interventions in religion based community group within the IOI context merits investigation.
Dietary interventions are usually more effective for individuals of normal weight, rather than those who are overweight or obese at baseline.	Interventions to target obesity may be ineffective.	More research is needed to target overweight and obese individuals.
Research recommendations relating to communicating for behaviour change		
Further research is needed on best practice in risk communication, including the role of trust.	Potential to enhance consumer confidence, particularly during crises.	<ol style="list-style-type: none"> 1. Methods to enhance trust in institutions responsible for food risk communication in the IOI should be investigated further. 2. The use of the internet and social media in risk communication should be investigated further.
The use of behavioural economics or 'Nudge' techniques in food-related behaviour change has not been thoroughly evaluated.	'Nudging' may constitute one important route for promoting behaviour change.	The use of behavioural economics in food-related behaviour change merits further investigation.
Research associated with food safety behavioural change is limited and could benefit from the use of health promotion and social marketing techniques, which rely on a customer-focused and insight-driven approach.	Low evidence base for food safety behaviour change.	Conduct studies on determinants and barriers to safe food-related behaviour.
The effective use of social media in promoting food related health has not been investigated.	Major increase in public usage means this presents a potentially important channel for promoting behaviour	Studies on the use of social media for food-related behaviour change are warranted, particularly weight management.

	change.	
Little evaluation of settings-based policies for promoting food safety and healthy eating on IOI.	Difficult to assess impact of policy measures.	Evaluation of settings based policies are required (schools, preschool, catering, work place).
While health promoters have been using mass media to communicate health messages for decades, relatively little research exists regarding its effectiveness.	Low ability to assess effectiveness of mass media communication.	1. More evaluation of campaigns needed. 2. Need for a template for reporting evaluations of mass media campaigns.
Partnerships give organisations the opportunity to combine resources and capabilities to promote behaviour change.	Partnership approaches have the potential to enhance effectiveness of multilevel programmes for behaviour change.	Partnership approach needs further evaluation.

Recommendations for interventions and communication of behaviour change on the IOI

Priorities for communication/intervention	Public health implication(s)	Recommendation/solution
The review of food safety and nutrition interventions in Chapter 2 outlines effective characteristics of interventions.	Potential to improve outcome of interventions.	Future studies should consider the characteristics of effectiveness when planning, implementing and evaluating identified in Chapter 2.
Partnerships give organisations the opportunity to combine resources and capabilities to tackle food safety and nutrition issues.	Partnership approaches have the potential to enhance effectiveness of multilevel programmes for behaviour change.	1 .Innovative approaches are needed to achieve this synergy between resources and expertise, particularly in the area of health. 2. The utilisation of public-private partnerships, which has the potential to support

		health professionals to facilitate behavioural change, should be explored.
For behavioural change to continue to take effect, communicators need to be flexible adopting principles from more established approaches such as health promotion and risk communication with more contemporary strategies such as behavioural economics.	Drawing learnings from a wide variety of disciplines may result in improved intervention design, implementation and evaluation.	Measures to change food-related behaviour must draw on best practice from a wide variety of disciplines including health promotion, risk communication, social marketing and behavioural economics.
Resource allocation needs to be analysed with a focus on a comprehension of the complex relationship between the individual and their environment.	A wide understanding and targeting of the factors affecting behaviour change may enhance effectiveness.	Upstream social marketing measures should be included to change the wider environment and to create supportive environments, with downstream measures aiming to change individual behaviour.
Best practice in social marketing has already been established (see Volume 3, Chapter 1, Section 1.8).	Use of existing knowledge base on effectiveness is essential for successful behaviour change.	1. It is essential that formative research in programme development, monitoring and evaluation are implemented. 2. Behavioural change communications need to be evaluated on a short-, medium- and long-term basis, not only to measure impact and outcome but also to assess the techniques adopted.
Health literacy remains a barrier to health improvement for many people.	Vulnerable groups may be particularly affected.	Measures to improve health literacy are needed.
Continued emphasis on a settings-based	Established international	Expansion of the community

<p>approach is merited.</p> <p>Given the success of school setting interventions, attention must be paid to the role of parents and teachers as gatekeepers.</p>	<p>approach using existing structures may result in effective behaviour change.</p> <p>Potential to improve success outcomes.</p>	<p>settings-based approaches such as the WHO's Healthy Cities to promote capacity building and systems level change through a partnership approach with an emphasis on social, economical and environmental determinants of health is merited.</p> <p>Ensure interventions in school based settings include all stakeholders and gatekeepers to promote success.</p>
<p>Need to tackle complex problems through a more integrated approach.</p>	<p>Potential to improve effectiveness of behaviour change programmes.</p>	<p>Strategies should incorporate multiple stakeholders working simultaneously in various sectors and settings and refocus on the influence of environmental forces in addition to changing behaviours of the individual.</p>

1 The development of communications strategies for behaviour change

Key findings

1.1 Introduction

1.2 Evolution of behavioural change communication

1.3 Theoretical approaches to behavioural change

1.4 Behavioural change approaches

1.5 Communicating behavioural change

1.6 Settings-based approaches

1.7 Mass media and behavioural change

1.8 Best practice approach

1.9 Conclusions – innovative approaches

Key findings

1. Behaviour change communication has transitioned from a primary focus on individual choices towards a multifaceted perspective of change which considers the role of the individual and environment in shaping behaviours.
2. Health promotion, risk communication and social marketing are the dominant strategies for promoting behavioural change. More recently a 'Nudge' approach, based on behavioural economics is increasing in popularity.
3. There is an incomplete evidence base of best practice approaches to food safety and nutrition-related behavioural change. Regulation and legislation play a significant role in reducing the risk of poor food safety practices in the commercial setting; with limited scope in the home. In contrast, policy and guidance are more readily utilised to facilitate nutrition-related behaviour change.
4. There is a necessity for behavioural change communications to be evaluated on a short-, medium- and long-term basis, not only to measure impact and outcome but also to assess the techniques adopted.
5. To facilitate long-term sustainable change a 'total market approach' is proposed to co-ordinate change within and across levels (individual, community and population) by numerous organisations working together.
6. As a partnership approach becomes more popular for addressing complex multifaceted behaviours, the need for further research and long-term evaluation of the use of partnership is recognised and should be incorporated into interventions in the future.

1.1 Introduction

Amongst health communicators, the problems associated with facilitating behavioural change have been acknowledged and are continually debated (1). This chapter will outline a broad overview of behavioural change communication with an emphasis on food safety and nutrition. Legislative approaches, such as the use of a fat tax or mandatory nutrition labelling, will not be covered here due to the emphasis of the report on communication for behaviour change. Their importance however, as part of a suite of possible routes to behaviour change, is acknowledged.

For the purpose of this report, the discussion has been divided into two parts, which reflects the planning and implementation of communication. The first half will map the evolution of behavioural change communication; introduce the role of theory and discuss the four dominant strategies which are used to facilitate food-related change namely health promotion, risk communication, social marketing and more recently, behavioural economics.

The second half will examine the techniques used to communicate behavioural change within any of the preferred strategies. Practical examples are used to illustrate the innovative communication approaches that have been adopted to tackle food safety and nutritional issues. This chapter will not outline specific factors that impact the success of nutrition and food safety interventions. This discussion will be detailed in Chapter 9 of this report. Instead recommendations of best practice approaches for implementing behavioural change strategies in the future will be outlined.

1.2 Evolution of behavioural change communication

Since the 1950s there has been an acceleration in the evolution of behavioural change communication as evidenced in Appendix A. This table maps the transition amongst health communicators from a primary preoccupation on individual choices, towards the acceptance of a complex matrix of factors that determine nutritional (2, 3) or food safety behaviours (4). This over-simplistic view that the individual has complete control of the behaviour they adopt is no longer assumed as it neglects to consider how social constructs impact on behaviours (5). It is now recognised that behaviours are a result of many influences: the general culture and environment into which we are born; the day-to-day culture in which we live and work; the groups, subgroups and individuals with whom we interact; and our own personal emotions, beliefs, values and attitudes, all of which are influenced by these wider factors (6). The behavioural change process is further complicated as strategies tackling problems such as obesity must evolve with society or run the risk of becoming defunct, as past solutions may not work in the future (7). This recent change in perspective has

catalysed the adoption of a multifaceted approach to behavioural change which will be discussed in detail in the second half of this chapter.

The next section will introduce some of the major theories that have been adopted to assist food safety and nutrition behavioural change communication.

1.3 Theoretical approaches to behavioural change

1.3.1 Behavioural change theories

For several decades, researchers have sought to predict, change and explain health behaviour by the development and application of theories and models evolving from the disciplines of psychology and hybrid social psychology (8). The study of health behaviour change, including nutrition and physical activity behaviours, has historically been rooted in a cognitive-rational paradigm. A paradigm which suggests that behaviours are predictable (9).

A theory may be defined as a set of interrelated concepts, definitions, and propositions that present a systematic view of events or situations by specifying relations among variables in order to explain and predict the events or situations (10). Theories can therefore assist in understanding why change takes place; why people engage in health-risk or health-compromising behaviour and why they adopt health-protective behaviour (8). Understanding the diverse individual, familial, social and cultural factors that influence an individual's adoption or maintenance of health-compromising behaviour, can be extremely useful when applied to planning, implementing and evaluating health promotion and social marketing programmes. Therefore, theory development and application in the behavioural and social sciences can effectively contribute to improved public health (11-13).

While models cannot account for all the complexities of behaviour and determine how people behave, they can help identify some of the factors that influence those outcomes (8). Behavioural models can be used in the initial design phase to help identify those factors that will form the focus of the intervention. In turn, the intervention can be evaluated in terms of impact on those target variables, as well as the change in the target behaviour. The Government Social Research Centre in the UK published a behavioural change practical guide and reference report which contains extensive information on selecting and using behavioural change theories and models (14).

The theories that have been used to develop food safety and nutrition programmes are documented in Chapter 2 and summarised in the interventions database which accompanies this report (www.safefood.eu). From the 134 papers included; 51 did not state whether they used a theory to inform development. Twenty

nine theories in total were documented and only two of these were used frequently i.e. social cognitive theory (15) (23 mentions) and the transtheoretical model of behavioural change/stages of change model (16) (16 mentions). Both theories are briefly summarised below.

Theories and models	Author	Date	Description	Application
Social Cognitive Theory (SCT)(15)	Bandura	1963	The SCT explains how people acquire and maintain certain behavioural patterns, while also providing the basis for intervention strategies. Evaluating behavioural change depends on the factors; environment, people and behaviour. SCT provides a framework for designing, implementing and evaluating programmes.	Mass media, public health i.e. designing health education and health behaviour programmes, intervention studies, education, media studies, business, social and political change, psychology, psychiatry and marketing, etc.
Transtheoretical Model(16)	Prochaska, DiClemente and Norcross	1992	The Transtheoretical Model is a model of intentional change. It is a model that focuses on the decision making of the individual.	Smoking cessation, exercise, low fat diet, radon testing, alcohol abuse, weight control, condom use for HIV protection, organisational change, use of sunscreens to prevent skin cancer, drug abuse, medical compliance, mammography screening and stress

				management.
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Table 1.1: Most commonly used behaviour change models in studies of food-

related behaviour

As noted, health behaviours are typically influenced by a diverse array of factors that may not be amenable to explanation by a single theory (17). Therefore behavioural change strategies can be based on one or more behaviour change theories depending on the aim and objective of the campaign. Of the 134 papers included in the database, 20 were based on more than one theory.

The following section will describe the key characteristics of the dominant behavioural change strategies that utilised such a theoretical approach.

1.4 Behavioural change approaches

The behavioural change literature is dominated by three widely accepted frameworks; health promotion; risk communication and social marketing. In the past two years behavioural economics has grown in prominence, however, to date it is a lesser used approach in relation to food safety and healthy eating. This section seeks to summarise the key characteristics of each approach and identifies the impact they have had on the adoption of desirable food safety and nutrition behaviours.

1.4.1 Health promotion

Since the Ottawa Charter (1986) outlined the determinants of health, health promotion has developed as a discipline that is guided by a clear set of principles and values to mediate, advocate and enable (18, 19) for better health. Other characteristics outlined within this charter on health promotion include the key role of policy and partnerships in empowering communities to improve health through investment, capacity building, regulation, partnerships and advocacy (20). Although there are many features that characterise health promotion, there remains no single definition outlining its boundaries (18). However one of the most widely utilised delineations demonstrates health promotion as a process whereby individuals can improve their health:

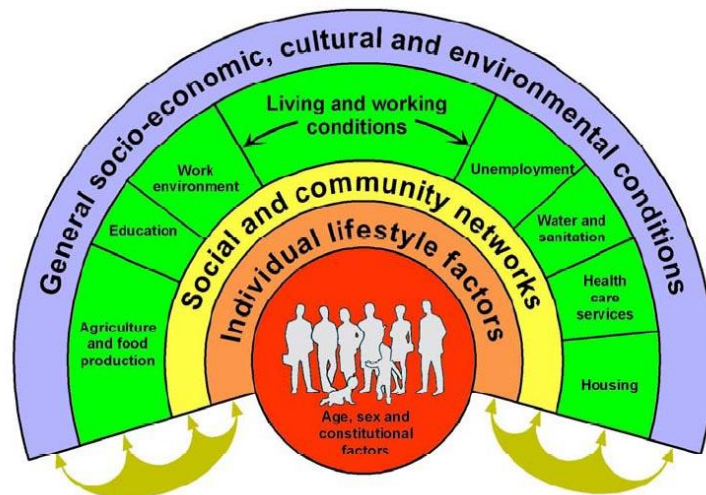
“The process of enabling people to increase control over, and to improve their health.”(19, 21)

This definition illustrates the breadth of this approach. Planning and strategic development are instrumental in health promotion as opposed to relying on reactionary methods (22). Health promoters adopt a user-led

approach to change, particularly in areas such as community development. They do this by seeking to reduce inequalities in health and by striving to assess the needs of the individual or community to develop a supporting framework, whilst playing an active role in policy development (22, 23).

Figure 1.1 models the wider determinants of health. Like the WHO's definition of health promotion, this model identifies the broad range of factors that should be considered when planning behavioural change interventions and communication. It highlights the shared responsibilities of behaviour by the individual and the many environmental forces that are influencers.

Figure 1.1: Dalghmen and Whitehead 's 'Social determinants of Health Model'



Source: (24)

Under the umbrella of health promotion there are many typologies or approaches which are based on existing change models. The most popular typology is Rothman's categorisation of community organisation into locality development, social planning and social action (23). Newer models have diverged by focusing on community empowerment and community building as alternatives (23). These approaches amalgamate the needs and strengths of the community to facilitate change within their environment (23). There is a focus on empowerment and enabling individuals and communities to take control of their own choices as well as their environment (23). Health promoters monitor the capacity for change within a community so that they

are able to mobilise participants and build social capital for the benefit of all members of the community (23). Engagement is focused on the needs of its members with a further emphasis on community partnership, participation and relevance. A similar approach within social marketing is discussed later in this section.

1.4.2 Risk communication

Risk communication is an approach more commonly used in food safety communications and rarely used in nutrition. This approach has continued to evolve as food safety crisis' such as BSE and Chernobyl have allowed practitioners to attain a greater understanding of how consumers process risk (25). The foundation for understanding effective risk communication comes from risk perception research and theory. The psychometric model is the most widely accepted (26) and uses nine explanatory scales to describe the nature of the risk including; voluntariness, immediacy, uncertainty, dread, controllability, catastrophic potential, severity of consequence, known to science and novelty. This model explains why food technologies, such as genetic modification, tend to gain a large amount of public attention despite having a low probability of causing harm to health whilst other public health issues, such as obesity, have elicited little concern despite serious consequences. This phenomenon is known as 'probability neglect'.

Traditionally, the core function of risk communication was to make information available on the risks and associated uncertainties in an attempt to impact on the behaviours of the individual (27). This primary function reflects the past limitations of risk communication usage which was based on a one-way information flow, built on the presupposition that if an individual was made aware of their risky behaviour they would positively modify it, i.e. an educational approach (28-32). It was assumed that education would permit the public to interpret risk more 'rationally'. However, research has since shown that consumers process risk quite differently from food experts (26). While food experts use technical, quantitative methods to assess risk, consumers use a broader approach for risk assessments and do not consult formal or scientific sources of information (33).

Risk communication has evolved to reflect a two-way dialogue of information between expert and the general public. This approach reflects the subjective interpretation of risk which can be impacted by a multitude of factors such as economic, institutional and social factors (25, 34). More recently, risk communication is tasked with giving individuals information to allow them to make their own decisions in relation to their perception of risk or to calm public unease.

To increase the impact of any risk communication, trust is as an important precursor; without trust in the institution communicating the message, behavioural change is unlikely. Messages need to be transparent, including any areas of uncertainty and must be developed in consultation with a wide variety of

stakeholders (35). The general public relate to trust within their own vision of the world, therefore messages will be accepted if they communicate value in changing behaviours that the audience can relate to (25).

Unfortunately, there remains a gap in the literature in relation to best practice for this style of communication (25, 35). Communication plans and messages will not be appropriate in all circumstances and for all audiences (35). Risk communication may facilitate change in practices depending on whether the message is in response to a crisis or not, emphasising how different circumstances will impact on the strategy for message delivery and how messages are perceived by audiences (35). Therefore an awareness of the importance of message tone and the most appropriate communication channel is crucial.

Like other behavioural change strategies, technological advances have impacted on the delivery of risk communications interventions. Information on food-related risks is being communicated through unconventional mediums such as television programmes, print media, the internet and social media. While widely used, these channels do not undergo the same rigors as academic research. This has led to a call for standards to be created for interactive health information (36).

A report commissioned by **safefood** in 2005 on 'Food Risk Communication' made a number of audience-focused recommendations, a sample of which are highlighted below-

1. Clearly identify your audience; therefore the barriers to change will be highlighted.
2. Choose the most appropriate media source based on the target audience.
3. Choose the best style relevant to the target audience.
4. Utilise the school setting for effective communication of risk and examples of best practice for children and young people.
5. Use a multi-layered approach in order to reach the appropriate target audience (25, 37).

It is clear that more guidance is needed for the implementation of effective risk communication. One approach that may help conceptualise these recommendations is social marketing; a framework based on commercial marketing practices (38).

1.4.3 Social marketing

This chapter extensively discusses social marketing, which is reflective of **safefood**'s commitment to the adoption of this approach to guide and inform the development of campaigns. Social marketing will be discussed in two parts. This section introduces the framework and subsequently explains the rationale for the use of social marketing techniques by **safefood**. Social marketing's role is to support the health promotion efforts that are taking place within the organisation and to assist in building on its core principles. The practical application of social marketing will be discussed in Section 1.5.

Social marketing has been heralded as one of the most developed public health communication strategies (39, 40), growing in popularity with policy makers and health professionals (41) as an innovative approach that has moved away from health education and social advertising strategies. Social marketing as a discipline seeks to bridge the gap between intention and behaviour through voluntary behavioural change (42). It is not a theory but a framework that has developed from other disciplines such as psychology, sociology and communication (41).

Social marketing provides health professionals with a 'contextual' framework for planning campaigns that reflect the problems or mindset of the target audience; seeking to change and maintain desirable behaviours (43). Behavioural change within a target audience is the primary aim of any social marketing campaign (44, 45) and it uses its foundations in commercial marketing as the key to its success. As a framework, it seeks to make behavioural change attractive to the audience through its customer-orientated (46) and long-term approach (47). It advocates change through the exchange of benefits through learning, strategic planning and development (42).

Since its inception, the scope of social marketing has broadened from a primary focus on the individual to the wider environmental issues impacting on behaviour. Although no concrete definition has been established for social marketing, one of the widely used definitions is:

"The application of commercial marketing technologies to the analysis, planning, execution and evaluation of programmes designed to influence voluntary behaviour of target audiences in order to improve their personal welfare and that of society." (45)

Like health promotion, social marketing as a strategy integrates many theories and approaches to promote behavioural change (48, 49) such as those highlighted in Section 1.3.1 of this chapter. Where it differs however, is its emergence as a discipline from traditional commercial marketing practices to address societal problems (38, 50). Social marketers use central tenants such as 'exchange theory' to develop successful campaigns; 'exchange' in this context means that both parties need to receive something of value for any change to occur. By identifying barriers to change, positive behaviours can be 'packaged' to overcome difficulties whilst highlighting value to the individual (51). This approach is customer-focused, diverging from past strategies such as traditional risk communication which sought to educate the individual, to an insight-driven understanding of where and how value can be created. Social marketers seek to develop value-adding relationships whereby mutually beneficial exchanges are encouraged. This facilitates the rejection of a

negative behaviour leading to long-term changes (42). Voluntary behaviour change is at the core of this approach, with social marketers increasing a consumer's readiness to change by giving them something of benefit in exchange for adopting a new behaviour (13).

Health promotion, risk communication and social marketing have been showcased as the key strategies that help to facilitate behavioural change. From the preceding discussion it is evident that all behavioural changes are continuously reacting to the changing environment in which we reside. One final strategy which is stirring debate in relation to the impact it has on behaviours is 'Nudge', based on behavioural economics.

1.4.4 Behavioural economics

Behavioural economics has been recently popularised due to 'Nudge', a book published by Thaler and Sunstein in 2008 (52). However, its central tenants are rooted in more developed disciplines such as behavioural economics and social psychology, as well as psychological and sociological theory which is reportedly over one hundred years old (53). Like other approaches, such as health promotion and social marketing, there is no clear definition of 'nudging'. Instead it is referred to as: "any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives "(52). This approach has been labelled as 'libertarian paternalism', a political philosophy which guides people's choices without restricting their ability to choose alternatives (53).

The growth in popularity of Nudge has been fuelled by the adoption of this approach by USA and UK policy makers who seek to increase the population's personal responsibility for health whilst reducing the need for regulation (54). In November 2010, the UK government launched a White Paper describing their '*radical new approach*' to behavioural change as a means to increase resilience to health threat. Within this document policy makers pledge to focus on the main principles of Nudge by influencing environmental cues to encourage the adoption of healthier choices (53) by pledging to:

"balance the freedoms of individuals and organisations with the need to avoid harm to others, and we will use a 'ladder' of interventions to determine the least intrusive approach possible, aiming to make voluntary approaches work before resorting to regulation." (55)

Suggested methods for implementation include proposals to introduce shopping trolleys with allocated compartments to encourage consumers to buy more fruit and vegetables; as well as the rollout of a hygiene-rating scheme which seeks to improve the hygiene standards of participating eateries (56).

Although growing in popularity, there is a stark lack of published research mapping the development of this behavioural change approach. This has stirred much debate in relation to the approach which has been criticised on two folds:

1. For its lack of theoretical foundation evident in more developed approaches such as health promotion and social marketing (57)
2. The long-term sustainability of behavioural change attributed to the Nudge approach has currently not been evaluated (53).

As noted at the beginning of this chapter, behavioural change strategies have continuously evolved in an attempt to counteract unhealthy nutritional and food safety behaviours that are evident in society. This discussion identified a definite shift in focus from the individual to the impact society has on behaviours, whilst acknowledging that as yet there is no concrete formula to counteract unhealthy behaviours in society. Each strategy discussed here has shown an ability to adapt to changing circumstances and should continue to do so in the future.

The next section will discuss the specific techniques that are adopted to implement these strategies and outline examples of their workings in practice.

1.5 Communicating behavioural change

Each of the behavioural change strategies discussed in the first part of this chapter are supported by a wide range of communication techniques. This section identifies the most widely used techniques, whilst discussing the role they play in facilitating positive behavioural change. Unlike other chapters in this review, techniques used to communicate food safety and nutrition practice are discussed in tandem. Any of the techniques described are adaptable depending on the overall goals and objectives of the campaigns. However, it also should be acknowledged that within this chapter there is greater emphasis on nutrition-related messages, which reflects the scarcity of published information on food safety communication campaigns.

Communicators of nutrition and food safety messages have the opportunity to use multiple formats to target consumers. Traditional mass media tools such as radio, television, billboards and print forms such as posters, leaflets, newspapers, magazines (58, 59) and education curricula are now accompanied by new media technologies such as the internet, mobile and digital communication. Techniques such as social advertising, for example public service announcements, have been replaced with these more proactive tools, as a call-to-action has become a key part of message exposure. This section describes in detail some of the most widely used communication techniques implemented through behavioural change strategies and how they have evolved to engage with a changing society. It is acknowledged that although each technique is discussed independently, they are not necessarily used in isolation and can be used to complement each other.

1.5.1 Education

Health education has played a significant role in the promotion of health and prevention of disease (60) and is an effective tool for promoting the benefits of behavioural change (51). It became popular in the 1960s as a result of a successful public health campaign promoting immunisation (61). Developing from an individualistic perspective, health education used the Health Belief Model as one of its central theories. This model proposes that the likelihood of individuals taking action is assessed by their:

- Perceived susceptibility to the problem
- Perceived seriousness of the consequences of the problem
- Perceived benefits of specified action
- Perceived barriers to action (8).

As with other areas of health communication the definition of health education is complex and broad, incorporating the many approaches that can be implemented within this technique:

“Health education comprises consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge and developing skills which are conducive to individual and community health” (21).

This definition cites health literacy as a core component of health education. Health literacy seeks to facilitate empowerment by making health information accessible (21); poor literacy skills limits the ability of an individual to comprehend health information (62).

1.5.2 Elements of an effective education campaign

In its simplest form, successful nutrition-related educational programmes can prevent individuals from developing illnesses and improve their health (63). In areas such as food safety, education strategies have in the past been criticised for teaching individuals how to avoid foodborne illnesses based on the assumption that if someone is told about the negative impact of their behaviour they will avoid the risk (11, 12).

Depending on the individual's knowledge levels, they may not be equipped to decipher this information, increasing the need for practical food handling education to develop consumer skills (64).

Education as a strategy has moved beyond awareness building and the communication of information; instead seeking to motivate, develop key skill sets and confidence within target audiences (21, 65). To encourage behavioural change, the primary focus of educators should be on creating messages that are attractive and relevant in the minds of their target groups, whilst encouraging the audience to change the undesirable behaviour (66). In the school setting for example, educational strategies should be based on insights gained from research into how young people view healthy eating or food safety practices, as well as the influence of social agents. By fully comprehending the young person's level of knowledge, attitudes, behaviours and perceptions towards the intended topic, a more successful strategy could be developed (67).

Educators should also develop strategies that have been carefully thought out, with predetermined education goals accompanied by theories on how to portray the positive behaviours effectively (68). Core food safety messages for example, are now dispersed through all educational programmes, including food production, preparation, preservation, and storage (69). Nutrition educators also use a combination of techniques to make messages more effective by addressing three crucial areas: food, the individual and their environment (70).

1.5.3 New developments in health education strategies

Health communicators have moved beyond traditional educational strategies, instead implementing education as one component of a wider campaign. This approach shifts the focus from short- to long-term change, such as generating community support (71). New technologies have also impacted on education strategies with the emergence of computer-tailored nutrition education programmes, which facilitate personalisation, greater exposure and greater personal relevance (65). In all cases, education programmes need to be assessed and evaluated to determine their effectiveness (68). Unfortunately, past education strategies have been criticised due to the lack of evaluation in this area (72). Clearly more guidance into the implementation of health education and its evaluation is needed to ensure effectiveness. Health education can fulfil an important function in individual behavioural change as users still recognise it as a valuable opportunity to influence populations in numerous setting such as schools, workplaces, hospitals and other community settings (61, 73). This settings-based approach will be discussed in the following section.

1.6 Settings-based approaches

Since the acceptance of the role of external environments in the shaping of behaviour as outlined in Figure 1.1, a settings-based approach has developed, which shifts the focus towards the role of society in influencing behaviours. The Ottawa Charter (1986) catalysed the popularity of a settings-based approach leading to the emergence of many locations that can be used to positively change behaviours such as schools, workplace, hospitals and communities. This settings-based approach is becoming more important because it offers access to key groups and in many cases pre-existing channels for facilitating communication (74). This section will briefly introduce the health care, workplace, community and school settings to illustrate how these environments can be utilised to facilitate behavioural change.

1.6.1 Health care sites

Although this setting is not within the terms of reference of this report, the impact the health care setting can have on nutrition and food safety communication is acknowledged and valued. This environment can provide access to large numbers of people and reach high-risk individuals with the focus on prevention or detection of disease (74).

1.6.2 Workplace

The workplace has been frequently highlighted as an effective setting for facilitating health promotion (19, 20, 75, 76). Those in employment are thought to spend a third of their lives at work and often eat one meal per day in this environment (77), giving the workplace the potential to improve health (78). The workplace setting has the advantage of reinforcing health promoting strategies such as the adoption of weight gain prevention messages and positive lifestyle behaviours (79). Unfortunately, this approach is often undermined as the focus is often on the behaviour of individuals rather than the creation of a supportive environment. When developing programmes, as well as having strong management and employee support, it is also suggested that a multi-level approach needs to be adopted so that individual, organisational and community-level strategies are included (80). Change must be adopted at all levels by all individuals simultaneously (81).

A key element of workplace programmes is the assessment of how the work environment could impact on the health of its employees (82). Factors such as the size of the organisation (82), organisational commitment, maintaining interest and time constraints (81), access to a work canteen (76) and continuous engagement (83) can also impact on implemented initiatives.

Although workplace programmes are thought to produce positive results, some employees in unconventional workplace settings and small- to medium-sized businesses have proved difficult to reach. Individuals who are seen to be high risk; who for example change worksites frequently, need pioneering approaches to health promotion (74) and this limitation should be examined in the future.

Case Study: The 5-a-Day Healthier Eater for the 'Overlooked Worker' programme

This American worksite nutrition education programme adopted an innovative approach to encourage employees at various worksites to adopt the '5-a-Day for Better Health' message. This public-private partnership targeted labourers and trade employees using a peer education approach which ran for nine months. Peer educators were recruited to promote the health benefits using different communication techniques on an individual and group basis. Those chosen to be trained were centrally and socially connected. Monthly booklets were also given to workers containing advice on how to adopt a healthier lifestyle as well as branded 'gifts', for example, cooler bags and seeds. This approach allowed planners to have continuous contact with participants through the workplace environment (84).

1.6.3 School

Schools have been identified as a key setting for public health strategies to treat and prevent childhood obesity (76). Schools possess the unique opportunity to target large segments of the population by adopting a multi-strategy approach exposing all members of the school community to positive behavioural change messages (73, 85).

The importance of the school setting has been emphasised by movements such as the 'Global School Initiative' (86) which was developed by WHO in response to recommendations in key reports such as the Ottawa (1986) and Jakarta Charter (1997) (19, 75, 87). This initiative proposes a direct focus on student health and the creation of supportive environments for change. This entails incorporating wider influencers, such as all workers within the school system, family members and those in the wider community (86). To be effective, school-setting strategies should move beyond the teaching of information to incorporate a holistic approach to change. This could be facilitated through incorporating the entire school environment, from the taught curriculum to food preparation to consumption.

Challenges and opportunities in the school setting

The school systems give educators (in theory) access to the same groups of children for an extended period of time as they move from pre-school to third-level. As this system is already in place, there is an opportunity to develop longitudinal educational strategies that tackle issues such as nutrition and food safety practices. However, to be successful they need to be built into the curriculum and education policy, meaning that all young people are taught consistent messages adapted to reflect their backgrounds and culture. Although arguably a simple solution and an easy way to interact with individuals from a young age, the implementation of an holistic approach within the school setting is a slow and complex process (69, 73). For strategies to be successful, programmes need to reflect the existing level of knowledge of the students, along with their needs, interests and capabilities (69, 73). The development of, for example, healthy-eating policies at school should involve and reflect the whole school community which facilitates ownership of the approach (88). Learning should not be confined to one classroom or lesson; instead supported by the whole school environment from the classroom to the canteen. School policies should be visible throughout the classroom itself, the food provided on the premises, and with cross- and extra- curricula activities (88).

Unfortunately, such a strategy may be developed against a back drop of problems in the school systems. For example, competing demands on teachers to facilitate a wide range of subjects in a limited amount of time and additional training for teachers as well as the willingness by teachers to be enthusiastic about this subject all impact on success. There is also a lack of research into the knowledge levels of young people at various stages or an assessment of the catering available at school. Creating ownership of the approach will ensure that the school community will understand the benefits of doing so and will encourage all members to follow the policy set out through the schools (88).

1.6.4 Community

As a mechanism within the community settings, community engagement encourages communities to become proactively involved in decisions that affect them. Areas of engagement include planning, development and management of services, as well as activities which aim to improve health or reduce health inequalities (89, 90). This approach empowers communities to build capacity to improve their lifestyles (91).

One example of a community settings-based approach is demonstrated by WHO's Healthy Cities which encourages communities to work together to systematically develop policies and sharing at a local level. This approach promotes capacity building and systems level change through a partnership approach with an emphasis on 'social, economical and environmental determinants of health' (92). On the IOI, Galway and Belfast are members of this healthy city 'movement' and are actively working to enhance the health of their city by examining their environment.

In 2008, NICE published a guidance document for engaging with communities. Within this document a number of recommendations were outlined, which seek to govern health promotion and activities in relation to the wider determinants of health. These extensive recommendations are broken into four parts; prerequisites for engagement, infrastructure to implement practice, agents of change and quality control (90). Other guidance documents have been developed to aid with community development; for example, Healthy Food For All developed a 'A Good Practice Guide for Community Food Initiatives'. This document makes recommendations for working in a community setting to combat food poverty by improving the affordability and accessibility of food (93).

Community food initiatives

Community food initiatives (CFIs) are projects that improve the choice of healthy food for low-income groups at local level using a community development approach (94). **safe food** is currently funding seven projects as part of a three-year demonstration programme of community food initiatives which is managed by Healthy Food for All. The programme uses a community development approach to promote greater access to healthy food in low-income areas.

The objectives are to:

- Provide funding for a limited number of community food projects over a three-year period
- Provide technical support, collective training and facilitate networking between projects
- Promote shared learning among community food initiatives on the island of Ireland
- Identify and support models of best practice on the island of Ireland
- Increase awareness of community food initiatives among key stakeholders across the island of Ireland.

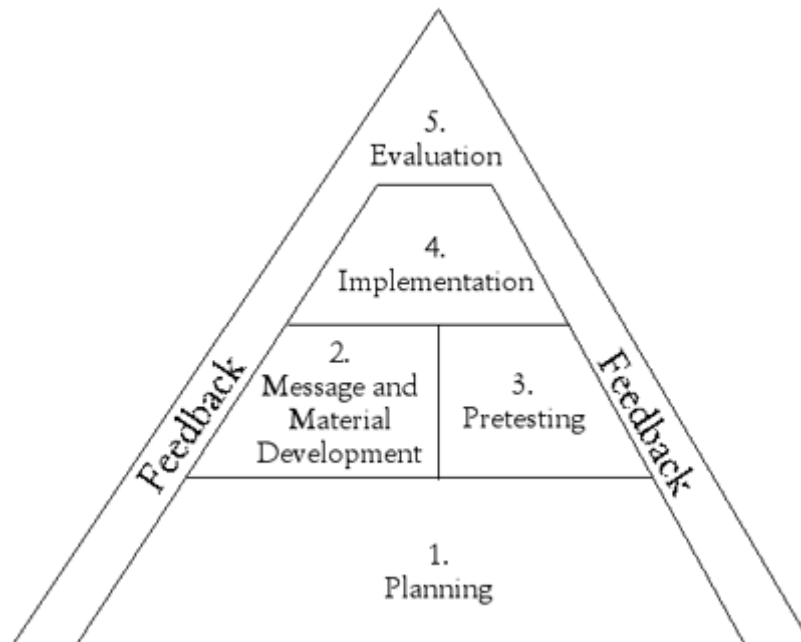
Projects include healthy eating education through cookery demonstrations and training on how to grow their own food. (95)

1.6.5 Putting social marketing into practice

The fundamental characteristics of social marketing have been previously outlined (see Section 1.4.3). The social marketing process which will be described in this section identifies how the recommendations emerging with regard to risk communication have been incorporated into this developed approach. This section will also highlight the important role of the setting in facilitating behavioural change.

Figure 1.2 outlines the social marketing process. Its non-linear depiction represents the oscillating process that may take place during the campaign. The importance of research and evaluation is evident in each stage of the process.

Figure 1.2 Social marketing process



Source (96)

1.6.6 Planning

The planning phase is crucial for effective implementation and to ensure that voluntary behavioural change has been achieved (13). It involves spending considerable time analysing the problem and understanding the target audience through strategic development (96). Formative research assists project planners in the development of specific campaign objectives and behavioural change goals (97). Andreasen (1995) poses three important questions which mirror the risk communication recommendations outlined in Section 1.4.2.

What target markets should be addressed (and how should they be segmented?)

- How should each chosen target market be addressed?
- How much resources should be allocated to each programme component?

The target audience must be examined relative to their environment and its impact on the behaviour. This research should be utilised as a tool to effectively reach audiences in their relevant setting (96). Since

individuals are not homogenous and social marketers often have a finite level of resources, using segmentation can greatly enhance campaign effectiveness (45).

1.6.7 Message and material development

Social marketers must understand why the individual behaves the way they do, how they can be persuaded to change behaviours (through Macro and Micro environments), and what they would value in exchange. The marketing mix is used to develop a strategy for motivating change (96), and determines how much influence the campaign has on the audience (40). The marketing mix or four 'P's adopted from commercial marketing practices include:

1. Product (tangible and intangible) – the benefit of the behavioural change activity (40), intangible complex behaviours (13) and the behaviour you want the target audience to adopt (96)
2. Place – communication and distribution channels (13)
3. Price – what the audience have to give up in order to develop the behaviour (96) (monetary and non-monetary(40))
4. Promotion – persuasive communication.

1.6.8 Pre-testing

The purpose of this stage is to monitor the material's effectiveness to deliver and meet the campaign objectives (40). This stage tests the quality of the programme and the core materials that will be implemented in the next stage (98). Pre-testing often involves testing and changing material several times before it is appropriate for the target market (96). Failure to pre-test material with the target audience prior to implementation is a major failure of any campaign (97). Although insight has been generated from formative research, the execution may not reflect the target market's perspective.

1.6.9 Implementation

Effective implementation should merge an in-depth understanding of the target market and accurate analysis of the research (96), complemented by a thorough understanding of relevant behavioural theories, which will act as a supporting mechanism to the campaign (96).

It is important to note the contextual factors that may impact on the success of the programme. Monitoring describes the measurements that are taken before the campaign is completely finished (40). This is vital as audiences do not live in static environments and therefore competitive environments do change (45, 97). Process evaluation is an effective way to monitor all the elements that impact on the entire campaign and account for this in future campaigns.

1.6.10 Evaluation and feedback

Evaluation refers to the measurements that are taken at the end of the programme or campaign (40). It is important that outcome evaluations begin with an assessment of whether the campaigns objectives and goals have been met (45). Evaluation can incorporate assessment of the effectiveness of campaign elements. However, it primarily needs to measure behavioural change. This type of measure is more difficult than an assessment of awareness (13). Indicators such as knowledge, beliefs and attitudes must be carefully considered to assess the fulfilment of set objectives (96). Hastings (2007) proposes that evaluation needs to be long-term, integrated and constructive. These combined elements will ensure that there is a strategic direction in the programme, as change may not be immediate but may occur over period.

1.6.11 Benchmark criteria

To assist in the evaluation of social marketing programmes, the National Centre for Social Marketing in the UK has developed eight social marketing benchmark criteria which can be found on their website (<http://www.nsmcentre.org.uk/>) along with numerous examples of best practice approaches to social marketing implementation.

One example of the application for these criteria is illustrated in the case study below. This example highlights how other techniques such as education and a settings-based approach can be incorporated into a communication strategy to bring about behavioural change.

Case study: Get Your Life in Gear

Background

The 'Get Your Life in Gear' pilot project was launched by **safefood** in October 2009 to address the issue of obesity among male truck drivers on the IOI. It aimed to assist truck drivers in making positive lifestyle changes in terms of healthy eating and physical activity. Truck drivers are a moveable workforce who are characterised by poor eating habits, sedentary lifestyles and work long hours.

Bench mark criteria	
<p>1. Customer orientation</p> <p>Develops a robust understanding of the audience, based on good market and customer research, combining data from different sources.</p>	<p>Secondary research consisted of analysing past campaigns targeting male audiences with a specific focus on weight loss programmes and initiatives targeting truck drivers. This search developed the researchers' knowledge of the targeted audience and assisted in the development of a formative research plan. To deepen this understanding on an IOI setting, formative research was undertaken with the target audience.</p> <p>Formative research:</p> <p>A mixture of in-depth interviews (16) and focus groups (8) were held with truck drivers across the IOI. Themes discussed included background to their profession, general health, healthy eating, physical activity and weight loss.</p> <p>As this pilot was a workplace initiative, meetings were held with managers at the sites.</p>
<p>2. Behaviour</p> <p>Has a clear focus on behaviour, based on a strong behavioural analysis, with specific goals.</p>	<p>Focused on healthy eating on the road and making better food choices at truck stops. It also outlined opportunities for the drivers to be physically active at home and whilst at work</p>
<p>3. Theory</p> <p>Based and informed on behavioural theory – rawing from an integrated theory framework.</p>	<p>As a result of formative research, social cognitive theory (SCT) and the transtheoretical model were chosen to inform the campaign. SCT helped the researchers assess the impact the individual and the environment had on behaviours. It aided in the differentiation between internal and external factors that could impact on the</p>

	programme. Behavioural change theory allowed further segmentation of the drivers into those who were ready to change and those who were not.
<p>4. Insight</p> <p>Based on developing deeper 'insight' approach – focusing on what 'moves and motivates.'</p>	<p>Key issues arising from the research included; lack of time to eat healthy and be physically active. Their job restricted the amount of activity they could include in their routines. There is a lack of facilities on the road and a lack of knowledge and time to choose healthy foods. Drivers valued spending time with their children and found a lack of energy and tiredness to be an ongoing issue.</p>
<p>5. Exchange</p> <p>Incorporates an 'exchange' analysis. Understanding what the person has to give to get the proposed benefits.</p>	<p>Throughout this initiative certain value propositions were developed. Drivers were offered free health checks and given a tool kit. However; they had to take the time and become committed for it to be a success. Drivers were encouraged to build activity into their daily lives and build on what they were already doing. In exchange for these changes it was proposed that drivers would feel better, lose weight, become more energetic and as a result spend time with their family.</p>
<p>6. Competition</p> <p>Incorporates a 'competition' analysis to understand what competes for the time and attention of the audience.</p>	<p>There were many indirect and direct competitors that impacted on the behaviours of the drivers. These included; time in relation to what, when and where they eat as well as how physically active they were, work deadlines and pressures from employers, supply of healthier foods where they purchased food, marketing of unhealthy foods and cost.</p>
<p>7. Segmentation</p> <p>Uses a developed segmentation approach (not just targeting). Avoiding blanket approaches.</p>	<p>From the onset of this programme, the researchers wanted to focus on the workplace as literature indicated that this was an effective way to engage with men. Truck drivers were identified as an audience who had largely been neglected in the past and had issues with weight gain. Recruiters focused on IOI truck drivers at the service station and the drivers who were ready to change engaged in the project.</p>
<p>8. Marketing mix</p> <p>Identifies an appropriate marketing 'mix of methods'</p>	<p>Product – drivers were offered a 12 week tailored lifestyle programme specifically for truck drivers. This included a pre- and post-health check and tool kit consisting of a booklet containing lifestyle advice, a</p>

<p>'Intervention mix' = Strategic SM</p> <p>'Marketing mix' = Operational SM</p>	<p>pedometer to complete an incentivised walking challenge, measuring tape and the opportunity to sign up for weekly motivational texts.</p> <p>Price – time and commitment were the largest costs for the drivers. The health checks and other components were free of charge. The time commitment was offset by the benefits of more energy, feeling less tired and weight loss through a supporting programme specifically for truck drivers.</p> <p>Place – sites were chosen that were convenient for the drivers. These included a logistical firm and service station in NI as well as a truck stop in ROI.</p> <p>Promotion – posters and leaflets were distributed within pilot sites and recruiters were on-site to help support drivers and answer any questions.</p>
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1.7. Mass media and behavioural change

Mass media communication refers to any form of communication that can reach a large audience. Media includes but is not limited to television, radio, newspaper (99); web and, more recently, social media. The purpose of mass media is to influence the social context of the campaign as well as making people aware of the behaviours in question (100). Mass media techniques are used to:

1. Keep health issues on the social and public agenda
2. Fulfil a valuable role in publicising community interventions
3. Provide a trigger for other initiatives.

These functions highlight the various dimensions of a mass media approach and are often used to contextualise behaviours within society and add value as a supporting tool within a given campaign.

When analysing mass media tools, it is evident that this approach lacks interpersonal communication experienced through individual one-to-one communication. Griffith et al. (1994) argues that food safety communicators have not taken complete advantage of this tool (58). This medium could be utilised to promote best practice in the kitchen and develop the individual's knowledge in a given area; therefore preparing them to change their behaviour (25). It is also proposed that mass media may have a higher impact

when used to promote food safety, as in most cases recipients are not asked to undertake challenging activities in order to change behaviour (58).

This approach has been used as a communication tool for an extensive period of time (101); however, much debate remains in relation to the place and usefulness of mass marketing approaches; especially as traditional techniques such as social advertising have had a limited effect (102). The impact of mass media tools for behavioural change remains a much debated topic (103). Wardle (2001) argues that although mass media tools have impacted on awareness and knowledge levels (104); a relationship between knowledge and behavioural change has yet to be established (105, 106). McCarthy and Brennan (2008) illustrate this as they acknowledge there is a gap between food safety knowledge levels and the actual practices of message recipients (107). Campaigns that use mass media approaches in isolation have been deemed ineffective (104) and impact only on those who actively take part in the campaign (106). Advocators of mass media campaigns believe that this method has the potential to work as an intervention mechanism, therefore, changing social norms rather than changing individual behaviour (100). This form of advertising can reach vast numbers of people increasing 'knowledge, awareness and understanding' of health and social behaviours (108, 109). Table 1.2 highlights some of the strengths and weaknesses of utilising mass media as a communication strategy.

Table 1.2: Strengths and weaknesses of using a mass media approach

Strengths	Weaknesses
<p>Raise awareness about health information (100)</p> <p>Can communicate with hard to reach audiences (110)</p> <p>Useful for conveying simple messages (100)</p> <p>Inexpensive as a means of communicating with large populations (111)</p> <p>More accessible for lower social-economic groups (104)</p>	<p>Less successful at conveying complex messages</p> <p>Less controlled than targeted interventions – how messages are received and understood (100)</p> <p>Less successful at teaching skills when used in isolation (100, 105)</p> <p>Often lack research into formalised message design (112)</p> <p>Messages may reach audiences for which they were not intended (100)</p>

The weaknesses outlined in Table 1.2 do not render mass media approaches obsolete. There is still potential for communication techniques to combat problems such as obesity, as they are useful for promoting healthy activities (113). This approach shows more promise when it is used as a part of a multi-layered approach rather than in isolation (112) as recommended with risk communication and social marketing.

Mass media campaigns underlined with theory originating from other disciplines assist in the development of a greater understanding of the target audience. Therefore, they can help predict reactions to behavioural change campaigns (66). Unfortunately, the development of mass media campaigns is still at a disadvantage as there are few theories focused specifically on communication and message development (112). Campaign development can be assisted by thorough evaluation which identifies the research implementation process (112). Wammes (2007) focuses on the need to incorporate a tailored, interpersonal approach to campaign planning, with the need for a support system available for those being targeted to facilitate long-term change (105).

While health promoters have been using mass media to communicate health messages for decades, relatively little research exists regarding its effectiveness. Noar (2006) identified numerous examples for the future development of this strategy, some of which have been highlighted below:

- Need for a template for reporting evaluations of mass media campaigns

- Development of communication-based theory
- Need for innovative approaches to message design
- Collaboration with advertisers and social marketers
- More evaluation of campaigns
- Consideration of replication and dissemination issues when designing campaign efforts (112).

The most appropriate way to address these issues is through a deep understanding of the target audience and the social context in which they reside (67). It is imperative for communicators to understand how different audiences can react to different messages (112). Through targeting and designing messages focused on a particular target audience, strategies can benefit from a greater impact (66). Noar's (2006) review also concluded that the choice of behaviours the communicator seeks to change has an impact on the channels that should be utilised. For any campaign to be successful, evaluation needs to be conducted to ensure that its strengths and weaknesses can be assessed for future usage (112).

1.7.1 Media advocacy

Advocacy is a strategic communication tool whereby

'advocates apply pressure for policy change through the media' (46).

This focus on governmental or public policy level seeks to pressurise those in power to implement changes to the environment (39). Advocates believe that to facilitate the desired level of health in society, the basic values of the environment should be the focal point (46). They oppose traditional approaches which focus blame on the individual to emphasise the problem as a societal issue (46). Media advocacy differs from other communication tools due to its underlying assumptions including:

1. Government and other organisations control over the environment
2. Government and other organisations response to the public's agenda (114)

These assumptions acknowledge the impact the wider environment has on behaviours; and therefore the importance of communicating with the government using the media. Advocacy can play a supporting role or complement other communication strategies.

The 'National Heart Alliance' in the Republic of Ireland is one example of advocacy at work. It aims to increase co-operation among organisations to combat heart disease. Their major roles include stimulating action in new areas by acting as advocates and ensuring influential topics remain on political agendas as well as reviewing policy and developing recommendations (115).

1.7.2 Use of new media

Engagement with target audiences through traditional mass media outlets is becoming more difficult (116). This has led to an increasing interest in new media outlets such as social media, computer gaming, telephone communication and digital television (117). Social media and mobile communications should be considered as a component of any communication strategy and an instrument for learning (118). As internet penetration rates continue to increase on the island of Ireland so does the potential for new media communication. Internet penetration rates in ROI have increased to 67 per cent, with the speed and access continuing to improve on IOI (119). In NI 100 per cent broadband coverage was achieved by 2006 with a 42 per cent household uptake (120). This equates to an increased access to new media technologies.

The internet itself, if used effectively, has the potential to play an active role in influencing health due to its interactive nature (118, 121). In some instances, passive communication has failed to facilitate desired levels of change (122). The internet is different from other mass media approaches in terms of access to and execution of information (116). Through this channel, marketing techniques such as word-of-mouth communication have become popularised through viral marketing i.e. messaging passed along by a few recipients who pass the information along via email or social networking sites (123). Messages can be developed with minimal contact with the recipient (124).

Case study: 'True Heart' campaign developed by the American Heart Association

This campaign sought to raise awareness about heart disease in women. As part of the 'True Heart' campaign, an online strategy was piloted. The objective was to build awareness of the True Heart 'Red Dress' symbol with the goal of driving traffic to their site. It was proposed that online communication would:

- Increase visibility of the campaign and build on the brand image
- Increase exposure/reach to the target audience
- Promote activities and information
- Humanise the issue through interactivity and build trust.

This online campaign included various elements that were trialled throughout the pilot. Some of these included:

- Using email as a communication route through the development of an E-zine (online newsletter)
- Incorporating various social media mechanisms, for example social networking, message boards and high profile bloggers
- Banner advertisements placed on web pages and paid placement of badges which allowed easy access to their site, Google adverts were created and a 'pay per click' strategy developed
- Campaign material was also placed on YouTube, a photo gallery on Flickr and a Facebook page
- A 'widget' also acted as an interactive tool which allowed users to download information.

This strategy allowed campaign material to be accessed via new media routes making the internet a very cost-effective, supporting and awareness building channel. (124)

When embarking on a campaign, research needs to be conducted to ensure the successful integration of old and new media (116). 'Food Veggies' is an example of an online communication strategy which uses interactive gaming to encourage the consumption of fruit and vegetables in a fun way (125). There is evidence that online messages can lead to an improvement in fruit intake. However, mixed results have been found (125).

Internet approaches can be undertaken to overcome some of the limitations of traditional health communication methods (122) discussed in the previous section. Although the internet has potential to impact on behavioural change, the development of online behavioural change programmes is in its infancy (121) and there are still challenges to its implementation. The internet environment remains unregulated and it remains relatively easy to publish unsubstantiated advice on any given topic (126). To increase the visibility of legitimate health information on the internet the 'Health on the Net Foundation' (HON) was launched in 1995. It developed a code (HON) which represents an ethical standard for those who wish to provide health information online (127).

Health communicators developing online programmes have to consider the appeal that educational online tools have to the end user. Repeat visits will depend on how the information is perceived by the user.

Developers need to segment their market to ensure that behavioural change is facilitated by repeat views. Technology and design can also affect the impact on the end consumer. For example, registration is viewed negatively, as are pages that take too long to download (118).

Communicators need to look at these channels from the viewpoint of their strategic goals and consider how tools such as new media (social networking), interactive content and mobile technology will benefit their campaigns (116). On the positive side, it also allows for the numerous types of media such as music and visual effects to work together to enhance the experience for the end user (128).

The suitability of the internet for promotion of weight management is questionable due to the lack of research on the long-term impact of the effectiveness of the internet in this capacity, however it shows potential. More people are turning to the internet for information and recreational usage, increasing the potential for its use to target and tailor messaging. It is recommended that, as with other techniques, new media should be thoroughly evaluated and not restricted to the measurement of page views. Questions such as “who is engaging with the tool?” and an assessment of the impact it has on behaviour should be considered as part of an outcome evaluation (117), as well as the profile of users and their patterns of behaviour. New media such as social networking and mobile technology are also impacting on the way messages are received. This is another area that needs further research in terms of its impact on the communication of food risks (35).

Health communicators are beginning to embrace new media and including it as a component in their communication strategies. Organisations such as the Centre of Disease Control have developed their own best practice guidelines to help control their usage of social media (129). Their use of new media during the recent Swine Flu epidemic, using mobile and social networking to communicate advice to a population, highlights its public health potential. Recently, **safe food** and the INDI launched a weight loss website (www.safefood.eu/weigh2live) which offers free, impartial, confidential and supportive advice for adults trying to lose weight. The website allows participants to monitor and track progress whilst receiving tailored advice based on their personal characteristics, and can be accessed through Facebook, the social networking site. More research is required on the long-term impact of internet-based programmes and types of behaviour they are most suited to.

Behavioural change strategies should not be confined to mass media style approaches alone. To maximise impact, other approaches need to be amalgamated. This integration of resources is discussed in the following section.

1.8 Best practice approach

One individual or community cannot catalyse major changes within social systems. There is also no universal solution to addressing the arising food safety and nutritional issues. Therefore there is a greater

need to tackle complex problems through a more integrated approach (96, 97) and effect behavioural change through a co-ordinated effort (13). Strategies should incorporate multiple stakeholders working simultaneously in various sectors and settings (20, 85), and refocus on the influence of environmental forces in addition to changing behaviours of the individual (130). Theories such as the social cognitive theory have long proposed this approach, emphasising the internal and external factors that impact on our behaviour. Behavioural change communicators need to recognise how these factors or forces interact with each other to impact on individual behaviour and present adequate solutions (13).

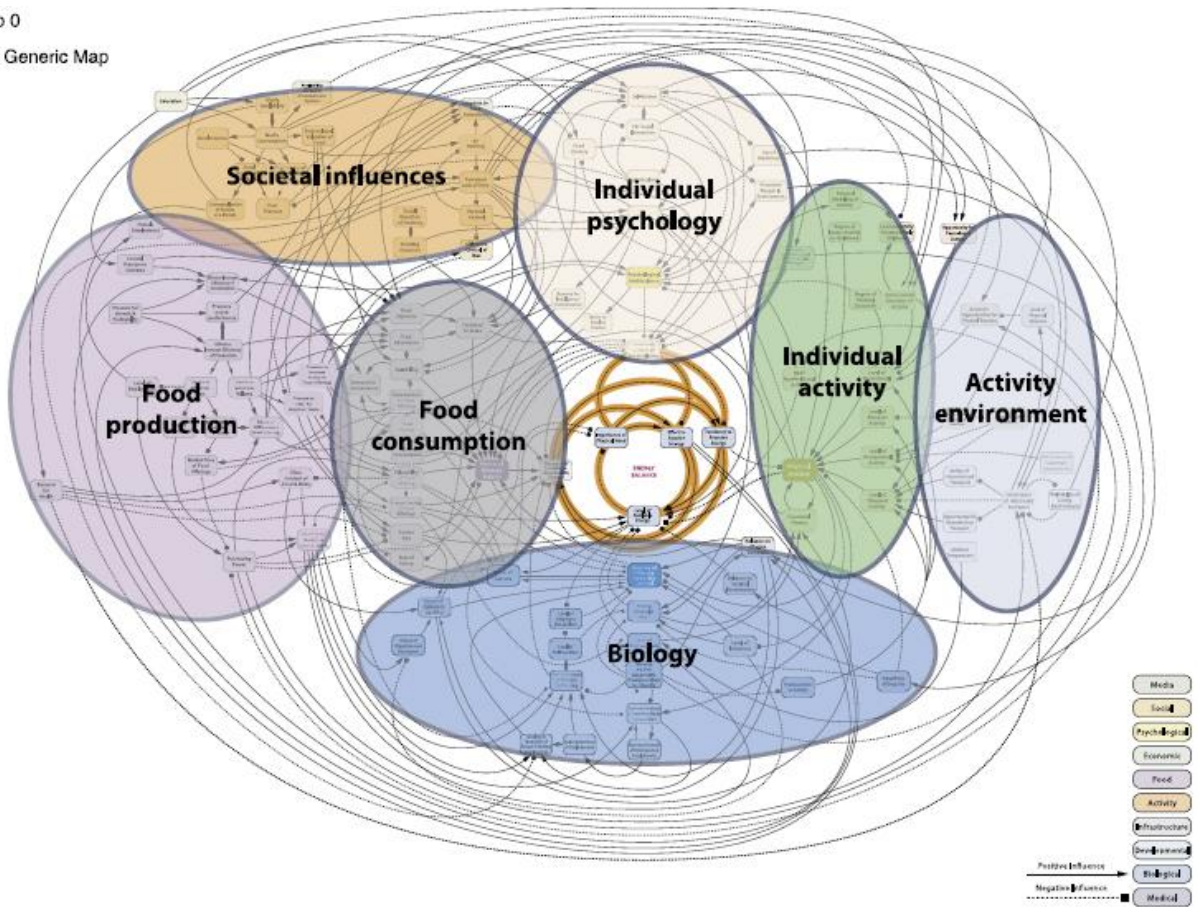
The evidence within this report emphasises how food safety and nutritional behavioural change communication is continuing to respond to a changing environment. For behavioural change to continue to take effect, communicators need to be flexible adopting principles from more established approaches such as health promotion and risk communication with more contemporary strategies such as Nudge. This flexibility should not be limited to the strategic approach adopted; it should also be reflected in the communication techniques adopted; mass media or media advocacy can be more effective with different audiences as would a different setting. Therefore, knowing your intended audience will be paramount in campaign success.

In response to the need for a more integrated approach, social marketers and health promoters are calling for an holistic partnership approach. Behavioural change strategies should incorporate various types of stakeholders working in partnership from within and across different levels (including individual, communities and population) for a common objective such as obesity prevention or reduction. When discussing the facilitation of change, Bentz, Dorfman *et al.* (2005) outline examples of key influential stakeholders that complement each other when tasked with catalysing change; these range from legislators and community boards to commercial marketers and news media. Strategies need to take a multifaceted approach to behavioural change, examining both prevention and treatment of complex behavioural issues (2). In this regard, public policy will play a major role in behavioural change in the future, focusing on implementation within and across systems at each level in order to restore this balance.

Figure 1.3 illustrates the ‘Obesity systems map’ published in the Foresight Report [2007] which visually depicts the network of effects that result in the development of complex issues like obesity. This ‘networked approach’ presents a possible solution to addressing complex problems. By adopting an holistic approach, stakeholders from different sectors and disciplines work together to develop innovative long-term solutions to the major issues that impact on the health of the nation. As their overall goal is the same, it is possible to work together to fulfil these common interests whilst maintaining different organisational goals (131).

Figure 1.3: Summary of the obesity system map highlighting the broader determinants of health such as drivers of food production and components of the physical activity environment

Map 0
Full Generic Map



Source: Foresight report (2)

This proposed ‘total market approach’ involves stakeholders developing a co-ordinated effort through multi-disciplinary partnerships including government and non-governmental agencies to facilitate long-term sustainable change (85, 131, 132). If managed correctly, partnerships can play an influential role in building resource capacity including knowledge-sharing to insure opportunities are not lost; as well as increasing reach and impact of efforts (131-136).

Case study EPODE European Network

The EPODE (together let’s prevent childhood obesity) is an example of a methodology that co-ordinates key stakeholders on a pan-European level to tackle childhood obesity through environmental change.

The aim of EPODE is to encourage stakeholders to implement similar strategies across Europe as part of a

"local, long-term and multi-stakeholder approach to prevent childhood obesity", by raising awareness throughout the entire system. It also seeks to create guidelines and best practice approaches that can be transferred to countries who wish to continue the EPODE programme. As described in the objectives of EPODE this 'think tank' is comprised of four pillars outlining:

- The importance of political awareness, willingness and involvement
- Good practices for the design, delivery and especially evaluation of EPODE-similar community-based initiatives
- The interest of network expertise and social marketing approaches
- The legal and ethical framework of public-private partnerships.

(137)

Partnerships give organisations the opportunity to combine resources and capabilities to become a stronger power within a hyper-competitive market place. The term 'partnership' does not reflect the diverging types of relationships that are emerging (138). Innovative approaches are needed to achieve this synergy between resources and expertise, particularly in the area of health (138). One approach relates to the utilisation of public-private partnerships, which has the potential to support health professionals to facilitate behavioural change (139). An example is the 'Experience food at work' project which sought to improve healthy eating in the workplace. This project incorporated numerous types of partnerships, including a local sandwich company that delivered fruit to the workplace (140).

Hastings [2007] proposes that social marketers need to continue to build relationships following in the footsteps of their commercial counterparts. Partnership building will ensure that valued exchange relationships will introduce change to the environment at every level (13). Strategies need to foster networks at the individual level; influence changes at population/policy level as well as at all levels in between such as community initiatives. Strategies need to work in parallel with each other to facilitate widespread long-term behavioural change that is needed to address the greatest of society's issues.

1.9 Conclusions – innovative approaches

This chapter has introduced the core communication strategies that seek to facilitate behavioural change. It has identified the progression from the individualistic behavioural interventions to a more holistic total society approach. Traditional approaches examined the problem at the surface and developed solutions to fit the perceived problem. Unfortunately, the core issues were not always examined (45). The role of the environment is critical in shaping behaviours linked to nutrition and food safety. For problems such as

obesity, there has been a global push towards addressing environmental factors to aid change (141). Past strategies have failed to recognise that individuals live in and are directly impacted by the culture and society in which they reside (141). Successful strategies in terms of nutritional messages tend to incorporate a number of elements; they are behaviourally based, use a theoretical framework, incorporate the environment and utilise multiple components (142). Although traditional strategies do have their limitations, their importance in message development should not be discounted. Instead, the learnings from each of these approaches can and should be applied to facilitate sustainable behavioural change.

As with other communication techniques, it is no longer appropriate to develop one-way messages in the hope that your audience is listening; a multi-modal, 'total market' approach to strategy, involving multiple stakeholders, will prove most effective (49).

Through utilisation of all the learnings from the tools and techniques under the framework of social marketing or health promotion, a 'best practice' approach could be adopted to facilitate behavioural change in terms of healthy eating and food safety. However, this approach will only continue to develop if campaigns are continuously evaluated on a long-term basis. Overall recommendations for research and communication are included in Chapter 2, Section 2.9

1 Behaviour change interventions in food safety and nutrition

Key findings

2.1 Introduction

2.2 Do nutrition and food safety interventions work?

2.3 Intervention planning and implementation trends

2.4 Intervention evaluation trends

2.5 Conclusions - Characteristics associated with effectiveness

2.6 Recommendations

Appendix

References

Key findings

General

- Overall, a review of the literature indicates that there is promise of consumer behavioural change and programme effectiveness.
- Very few published food safety and dietary intervention studies are available for the island of Ireland.
- There is a lack of available food safety intervention research.

Methodological Issues

- Multi-component interventions that implement change in a variety of different settings (i.e. schools, homes, point-of-purchase, workplaces and communities) show most promise for future research.
- Studies should use an established theoretical basis.
- Social marketing techniques have shown potential.
- The use of randomised controlled trials (RCTs) may not be practical at a community level.
- Interventions should be creative.
- Methods to promote participants' intervention adherence and long-term behavioural change need to be further investigated.

Settings

- The pre-school setting should be examined in future research.

Target groups

- Influences of participant age, gender, marital status and educational attainment should be investigated in future research.
- Dietary interventions for at-risk and minority groups should be culturally sensitive and use appropriate programme materials.
- The use of peer educators and educational components are effective in promoting behavioural change.

Dissemination

- Research findings should be published and shared.

Evaluation

- There is a lack of effective intervention evaluation.
- Studies should use three types of evaluation: formative, process and impact/outcome.
- International guidelines for the evaluation of dietary interventions are lacking.

2.1 Introduction

A literature review addressing the effectiveness of food safety and nutrition interventions provides critical insight into the achievements and limitations of such research, ultimately providing direction for future funding, development and collaboration. The current global obesity epidemic highlights the importance and priority of related health promotion interventions. Likewise, consumer food poisoning and the spread of food borne infectious disease through cross-transmission represent considerable threats to public health. Research needs to be appropriately directed in order to achieve effective and sustainable changes.

Aims

This review aims to identify effective planning, implementation and evaluation strategies from available food safety and dietary intervention studies, and to ultimately explore recommendations for future research.

Methods

An in-depth literature search was conducted using online databases that included PubMed, Web of Knowledge (including Web of Science and ISI database) and PSYCINFO. The electronic search was supplemented by a review of relevant bibliographies and consultation with experts. Documents in English were considered and sourced from various countries: United States of America; Canada; Wales; Northern Ireland; Scotland; New Zealand; Australia; Republic of Ireland; Israel; Netherlands; Germany; Austria; Switzerland; Sweden; Finland; Turkey; England; Denmark; Norway; China; Italy. Studies conducted between 1985 and 2010 were examined. Of these, roughly 14 per cent reported on food safety interventions; 86 per cent concerned nutrition. Two dietary interventions were found from the Republic of Ireland; 0 from Northern Ireland. One food safety intervention study was found for the island of Ireland. The intervention studies were organised into categories of obesity prevention, obesity treatment/weight loss, salt, fruit and vegetables, biological risks, unhealthy foods, mode of provision and fat. One intervention regarding technological consumer risks was found; there were none found regarding chemical consumer risks (143). A great deal of fruit and vegetable and obesity prevention interventions were found, yet there was a lack of comparable research for food safety, salt and reduction of unhealthy foods (soft drinks, treat foods, etc). Commissioning bodies for the studies included the British Broadcasting Corporation (BBC), the Food Standards Agency UK (FSA), the Institute for Social Marketing (ISM), the National Institute for Health and Clinical Excellence (NICE), **safefood**, the United States Department of Agriculture (USDA) and the World

Health Organisation (WHO). For a full list of commissioning bodies and study details, please refer to the interventions database on www.safefood.eu. The search strategy involved and keywords used is also noted

Table 2.1: Summary of intervention findings

in Appendix A. Consumer-based interventions were the focus of this review.

Country	Number of studies
Island of Ireland	1
Northern Ireland	0
Republic of Ireland	3
European Union	12
USA	75
Canada	1
Australia	2
UK	14
Rest of World	4
Type of intervention study	Number of studies
Food safety/biological risks	12
Obesity prevention	21
Obesity treatment/weight loss	16
Fat	16
Salt	8
Fruit and vegetables	29
Technological risks	1
Unhealthy foods	5
Information	13

Reviews	43
Intervention setting	Number of studies
Media and multimedia	6
Workplace	12
Pre-school	3
Primary school	24
Secondary school	12
University	4
Religious centre	3
Rural	1
Home	14
Supermarkets/restaurants/canteens/point of purchase	3
Primary health care	13
Community-based	20
Methodological features	Number of studies
Theoretical basis	55
Social marketing approach	
Thorough evaluation	

2.2 Do nutrition and food safety interventions work?

The vast majority of food safety and nutrition studies reported change in a variety of populations and settings, suggesting that interventions have the capacity to improve consumer diet and food safety behaviour. That being said, there still exists a lack of high-quality evidence and, although progress is being made, guidance for both researchers and practitioners is insubstantial. Intervention planning, implementation and evaluation trends provide insight into the limitations and strengths of the available literature.

2.3 Intervention planning and implementation trends

2.3.1 Methodological features

Theories and techniques

Many of the interventions had an established theoretical basis. Social cognitive theory is typically used in health education and behaviour programmes (144). It was of particular use in interventions that targeted an increased consumption of fruit and vegetables (144). Similarly, food safety risk information interventions, based on the theory that including emotion may increase both the personal relevance of the hazard and an individual's motivation to respond to it through behaviours focused on mitigating risk, also conveyed successful results (145).

The health belief model and the transtheoretical/stages of change model were common in both food safety and dietary interventions (146-148). The health belief model was a useful framework for addressing the dietary and food safety behaviours of older adults (149, 150). The transtheoretical/stages of change model was especially effective for adolescents, work-based programmes, low-income and minority groups (148, 151, 152). Interventions that incorporated a clearly stated theoretical basis were generally more effective in implementing change and are recommended for future studies (153). A theoretical basis provides an evidence-based framework upon which a study can be thoughtfully planned and implemented.

In a review on intervention behaviour change techniques, Abraham et al. noted however that a standardised vocabulary that defines intervention components has not been developed, thereby impeding the design of optimally effective interventions (154). This increases the difficulty of assessing effective aspects of studies

of food safety and nutrition interventions. In this chapter insights are gained from examination of design, planning, implementation and evaluation of relevant studies.

Social marketing approaches

As discussed in Chapter 1, social marketing-based interventions are also becoming increasingly prevalent and can be used in both upstream and downstream contexts (155). Intervening simultaneously at an individual and environmental level is more likely to bring about sustained change (155). A variety of dietary interventions have effectively employed social marketing principles. Wechsler et al. found that a multi-faceted, low-fat milk intervention in inner-city primary school cafeterias resulted in significant increases in student consumption of low-fat milk (156). The intervention was based on social marketing techniques such as product positioning, taste tests and sales promotion incentives (156).

In comparison to dietary changes, social marketing interventions have had less of an effect on food safety initiatives; existing interventions are limited in both their quantity and quality (155). Food safety interventions that have used social marketing techniques to encourage the use of food thermometers have been found effective (146, 155). In addition, a social marketing-based initiative, conducted by Redmond et al. that measured consumer food safety behavioural change in a test kitchen environment, was successful (157). Over a 3-month period, participants prepared a set meal in a domestic model kitchen before, immediately after, and four to six weeks after implementation of the strategy. The campaign included promotional materials distributed throughout the community (including leaflets, posters, fridge magnets, television documentaries and newspaper articles). Observations were collected using CCTV surveillance equipment. Consumer food safety behaviours significantly improved over the intervention period (157). Although effective, long-term results were not assessed, a small sample size was used and the procedure was very expensive (157).

Ethics

Researchers were typically granted ethical approval by their governing institution. Several papers mentioned a “delayed intervention” strategy, meaning that for ethical reasons the intervention was administered to control subjects at the close of the study period (158, 159). In their fruit and vegetable intervention for homebound seniors, Johnson et al. found that, especially for government food assistance programmes, it is seldom ethical or legal to randomly assign individuals to receive assistance or to join a control group where no service was provided (160). Instead, their control group was made as similar as possible to the study group, which in itself has great limitations.

Sample selection

Targeted participants included students, children, families, the elderly, adults and employees. Targeting both specific and general groups have been effective, yet enhanced effect is seen with clearly defined target groups (155). Many participants had volunteered, contributing to possible bias within the sample. Participants who are willingly recruited are often more committed to a potential change in behaviour (161). The “worried well” of society may be more interested in public health issues and hence may be more likely to get involved in a related study. Many studies reported that those who wanted to change were more likely to do so (104). Furthermore, dietary interventions were found to be more effective for individuals of normal weight, rather than those who were overweight or obese at baseline (104, 106, 162-164).

Survey design

The vast majority of the studies were quasi-experimental in design. These types of designs are often more feasible in real-life settings (165). Swinburn et al. states that “randomised controlled trials (RCTs) are often inappropriate, unachievable, or irrelevant because the RCT requirement to manipulate a single or limited set of variables may be too artificial or unrealistic for the complex systems affecting population health (166)”. RCTs are often too expensive and neither practical nor appropriate for public health interventions (165). Furthermore, community-based interventions can be more complex than RCTs as they often have multiple elements and partnerships (165).

Many of the interventions were also pilot studies, indicating a lack of available research. The majority of papers were recently published and interventions were short in duration. Interventions were often lacking in sample size, statistical power, subject randomisation, comparison control groups and generalisability. The majority of studies reported a change in awareness rather than in behaviour.

In some studies, there was evidence of potential contamination with intervention messages carrying over to control groups (155). In a study conducted by Parmer et al., participants were assigned to one of three conditions; nutrition education and gardening treatment group, nutrition education only, or a control group (who did not participate in the education or gardening components) (167). The study was conducted in one school and with second-grade students only, which enabled possible message contamination in that the children in different conditions may have discussed content together.

The importance of collecting formative data through interview sessions and focus groups, in order to gain insight into the needs, concerns and interests of the targeted group, was noted (168, 169). Funding limitations, however, often reduced the potential for initial planning, focus groups, pre-evaluation, the piloting of materials and longitudinal assessment. In both food safety and nutrition interventions, an availability and distribution of related materials was beneficial (146, 150). Observation and data collection of

hand washing behaviours was limited because, for personal privacy reasons, bathroom hand washing was not monitored (170).

Peer educators

Nutrition interventions that use peer educators to promote dietary change appear promising, but the scientific quality of the evaluations is low (151, 171). In a health education intervention for public sector labour and trade workers, employee reports of peer educator contact were positively associated with fruit and vegetable intake (172). A review conducted by Baird et al. noted that peer educators may be an effective means of delivering dietary interventions to low-income families (173). Parent peer educators have been proven effective in home-based, pre-school dietary interventions (162). Peer modelling is also an important aspect for salt interventions (167, 174).

Fitzpatrick et al. evaluated the community mothers' programme, an 18-month intervention with experienced mothers who volunteered to deliver a childhood development programme to first-time parents, within the context of the travelling community on IOI. This was a prospective study and comparisons were made with a previous randomised trial of the community mothers' programme for settled mothers. Results were collected from 24-hour mother and child dietary recall and indicated that the diet (whole foods, vegetables, fruit and milk intake) of traveller children surpassed that of the settled children control group in all food groups except fruit post-intervention (175). The diet of traveller mothers was superior to that of the settled mothers control group and was similar to the settled intervention mothers.

Birnbaum et al. reported that in a dietary intervention for adolescents, the peer educators themselves reported the largest increases in fruit and vegetables and lower fat consumption (176). The authors recommended that future studies explore the feasibility and effects of giving all students, through relevant training, a chance to be peer leaders. However, in a review of peer-led approaches to dietary change and increased fruit and vegetable consumption, prepared for the Food Standards Agency UK, mixed results on the effectiveness of peer educators were found (177). The author suggested a need for more sophisticated analyses and long-term evaluations (177). For food safety interventions, Ejemot et al. found that the use of a trusted and recognised community worker can provide a groundwork "herd effect" and influence widespread behaviour (178).

Creativity

The importance of creativity as a tool for intervention effectiveness was apparent in the success of garden projects, hand washing promotion through song, nutrition awareness through popular films and theatre-

based diet and food safety interventions (158, 179, 180). A study conducted by Rosen et al. found that teaching children to sing a 10-second song whilst they washed their hands significantly increased efficient hand washing practices that continued over a six-month period (158).

One computer-based intervention for low-income women receiving food assistance consisted of a tailored soap opera and interactive “infomercials” that provided individualised feedback about dietary fat intake, knowledge and strategies for lowering fat intake (168). A church-based intervention by Campbell et al. included a component that helped participants to modify their favourite recipes to meet the 5-a-Day guidelines (159). These recipes were then taste-tested by the participants and incorporated into a cookbook which was distributed to all members.

The importance of taste-testing in interventions promoting fruits and vegetables was noted in workplace, church-based, school-based and elderly populations (150, 174, 179, 181). Anderson et al. found that many people used the excuse of not eating breakfast as an explanation for their limited consumption of fruit and vegetables (182). The authors of this study suggested that encouraging a daily breakfast should be a focus for similar interventions (182). Like the fruit and vegetable intervention results, a study prepared for the Food Standards Agency UK found that introducing new tastes and foods were important factors for change in workplace sodium-reduction interventions (183). These interventions, although creative, were often lacking an effective evaluation strategy.

Situational factors/timing

Timing was another important influencing factor in the effectiveness of intervention design and data collection. If the organisation was experiencing time constraints, employee redundancies or excessive workload, the school was coming to the end of a term, or Halloween was an upcoming event, participant data and involvement may have been consequently effected (183-185). For instance, many school interventions deferred data collection during summer months and weekends (156, 186). Surpluss et al. noted that in their workplace salt study, the intervention implementation was severely affected by an extremely busy work period for the organisation and employee night shifts (183).

Intervention adherence

High rates of attrition were prevalent in many studies however several positive factors were present. An increased personal time commitment to the project often translated into greater intervention success rates for participants (147). Sustained long-term intervention support is also an important intervention component (147). A lack of clarity remains for the use of incentives, for example rewards for children were often used to promote participation, yet the perceived potency of these incentives was often difficult to determine (174). Studies may also be difficult to evaluate because participants in the control/waiting list

groups often improve due to personal initiative, developmental growth and/or exposure to issues through external sources (164). For child-focused interventions, high attrition rates for parents and teachers were commonly reported (169, 185).

Long-term weight gain and diet adherence were major limitations in all obesity treatment and weight loss interventions (187-189). Dansinger et al. reported on a one-year dietary intervention for adults randomly assigned to the Atkins, Ornish, Weight Watchers or Zone diet (187). After two months of maximum effort, participants were able to choose their own level of dietary adherence. Post-intervention, each diet group reported modest weight loss but it was the adherence level, rather than diet type, that was the key to clinical benefits. Furthermore, increased adherence was associated with increased weight loss for all diet types. The authors concluded that practical techniques to increase dietary adherence are urgently needed.

Educational component

Many fruit and vegetable interventions indicated that sustained long term-effects were achieved when an educational component was implemented in conjunction with a free fruit and vegetable school subscription (171, 174, 190). However, fruit and vegetable subscription alone was also found to be effective in school-based programmes and when targeting homebound low-income seniors (160, 186, 191).

Parmer et al. noted that primary school children who participated in a nutrition education programme with a hands-on gardening activity were more likely to increase their fruit and vegetable knowledge and consumption than children in the nutrition education-only programme or control group (167). The authors also recommended that a variety of fruit and vegetables be offered to participants and not to favour one food group over the other (167). James et al. found that a one-year education programme for primary school students that included taste tests, music competitions and classroom quizzes, resulted in a significant reduction of the number of carbonated drinks consumed (192).

A study conducted by Hu et al. with pre-schoolers and their families found that providing monthly nutrition education activities improved pre-schoolers' lifestyle behaviours and brought about beneficial changes in parents' attitudes to planning their children's diets and their own personal eating habits (193). This study was one of the first to investigate a kindergarten-based nutrition education programme in China and one of the few studies to be conducted in a developing country (193). For food safety interventions, education combined with accessible convenient hand hygiene may result in a sustainable increase in the frequency of hand washing among primary school children (194).

2.3.2 Target groups

Age

The impact of dietary interventions was often greater for the youngest and oldest participants (195-197). Campbell et al.'s fruit and vegetable intervention with rural African-American church members found that the oldest age bracket, those aged 66 years and older, showed the greatest increase in fruit and vegetable consumption (159). A study conducted by Sellers et al. was one of the first reported interventions designed to increase home food safety practices in older people attending a congregate meal programme (149). This study found a major change in post-intervention, self-reported hand washing practices and reported that older age was the most common predictor of improvements after the intervention (149). In an evaluation of an obesity mass media campaign, Miles et al. found that older participants were slightly more likely to make lifestyle changes (106). In contrast, a nutrition intervention for high-risk auto workers noted that the effects of the programme were larger in younger employees (198).

Other studies are equivocal in relation to the effect of age. In a study conducted by Johnson et al., the oldest participants had the highest fruit and vegetable intake baseline, but age had no significant influence at the end of the intervention (160). In a dietary fat-reduction intervention for older women (aged 55 to 80), Kearney et al. noted that age-related differences were not found. However, the author concluded that it is not yet known whether age is a determinant of the relative strength of particular influences on dietary change (199). A wider age range in sampling is required to further investigate the influence of participant age. Overall, the above studies suggest a possible 'extreme age' influence, individuals that are the youngest or oldest in a sample are more open to change, yet further research is clearly warranted.

Targeting a specific age bracket is often a successful intervention method. Hendrix et al.'s fruit and vegetable intervention in American senior centres found methods such as holding multiple sessions on the same topic, frequent taste-testing, goal setting, personal interaction, keeping the educational message simple and practical and reinforcing messages were all beneficial for this particular sample (150).

None of the salt interventions specifically targeted children or adolescents (200). For younger populations, salt reduction is generally an aspect of a wider dietary intervention. A number of nutrition interventions targeting college-aged students have been conducted, but are usually poorly evaluated and use potentially biased samples (144, 201). Yarrow et al. stated that their intervention was the first to provide food safety education to improve related behaviour in college students (202). The largest number of food safety and nutrition intervention studies found were those that targeted school-aged children (203, 204).

Interest is increasingly growing for early preschool-aged dietary interventions (158, 193). In a 2010 review on preschool-aged obesity prevention interventions, Hesketh et al. reported that three-quarters of the 23 studies were published from 2003 onwards. They reported that pre-school/childcare settings were the most commonly targeted setting for interventions involving young children (205). The authors found that one-third of the studies achieved clear success in modifying their respective outcomes of interest [fat intake (19), increased physical activity (20), and reduced sedentary behaviour (5)] (205). A further third of the studies

showed some evidence of success on some outcomes (205). The authors of this review noted that inconsistencies within the pre-school and childcare settings (such as structured versus unstructured days) make generalisability difficult (205). Parental involvement was suggested as an important factor in promoting real and sustainable behaviour changes during the early childhood period. It was also noted that, although this evidence base is growing, it is still relatively sparse as compared to interventions that focus on school-aged children and there is an urgent need to build upon existing information.

Participant gender

Mixed effects of gender were found in the different interventions: two fruit and vegetable interventions and one mass media campaign found a weakened impact among male participants; one salt intervention found a greater impact among men; and an obesity prevention intervention found no gender effect at all (144, 183, 190, 196). Miles et al. recommended specifically targeted initiatives for men (106). In their evaluation of a mass media obesity campaign, they noted that men reported significantly higher post-intervention lifestyle changes than women, especially in weight loss and exercise levels (106). However, these results may have occurred because only a small percentage (10.9%) of participants was male, so those who did join may have been a particularly motivated group (106).

In a salt prevention study by Surpluss et al., a greater intervention effect was reported for male participants. Campaign elements found most useful by men were the pamphlets, visual indicators of low-salt foods, posters and messages on canteen tables. Methods most effective for women included elements of interactive delivery, such as cooking classes and taste testing (183). Messages conveyed included that adults should eat no more than 6g of salt a day, that too much salt is bad for your heart, that around 75% of the salt we eat is already in everyday foods and to check the label and choose options lower in salt (183). Although these gender effects were found, this study had a significantly larger number of male participants (272 men; 83 women). Men were specifically targeted in this salt intervention. The author recommended that a tailored gender-sensitive workplace intervention can be more effective in facilitating positive change in men's awareness of the impact of salt on health (183).

Snow et al. noted that in a primary school hand washing intervention, teacher modelling of hand hygiene influenced male students' frequency of hand washing to a larger extent than that of female students (170). The authors noted, however, that this observation may have been due to a higher baseline of hand hygiene among female students (170). Details on teacher gender were not provided, but future research should look at the effect of a trainer or teacher's gender on intervention outcome.

In a school-based dietary intervention, Wechsler et al. found that consumption rates of low-fat milk changed based on the colour of the carton; in the pilot study, the cartons were blue and a significantly larger proportion of boys chose the low-fat milk, whereas in the subsequent study the low-fat milk cartons were

pinkish in colour and the girls had higher consumption rates (156). The authors recommended that, in future studies, non-gender-specific colour packaging be used.

Educational attainment

Campbell et al. found that individuals with an education level beyond second level were more likely to increase their consumption of fruit and vegetables post-intervention (159). In a mass education campaign conducted by Wardle et al., memory of the healthy lifestyle messages was significantly poorer in those with lower levels of education (104). In contrast, Sorensen et al. found that an intervention targeting fruit and vegetable consumption was more effective among individuals with lower education levels (206). Overall, these differing reports clearly warrant further investigation.

In a home food safety intervention for older Americans, Sellers et al. found that greater changes in food safety practices were significantly associated with higher participant education levels (149). Angelillo *et al.* (2000) conducted a survey to investigate knowledge, attitudes and related behaviour on food borne diseases and food-handling practices among consumers in one region of Italy. The sample consisted of 394 mothers with children attending public schools. The survey revealed that 36 per cent of the respondents knew about all the six food borne pathogens investigated however only 11 per cent correctly indicated six related different food vehicles; education level was a predictor of this knowledge. Older and more educated women were found to have a greater knowledge of food borne disease control with 96 per cent agreeing that improper storage of food represents a health hazard.

Scheule (2004) assessed the opportunities and challenges for food safety education in the Special Supplemental Nutrition Programme for Women, Infants, and Children. The sample included directors and health professionals with nutrition counselling responsibilities in 79 clinics. The author reported that 90 per cent of the clinics involved identified the food safety knowledge of their clients ranged from fair to very poor. These results are consistent with studies that report gaps in consumer understanding of safe food-handling practices, including one that found pregnant women to be unaware of listeriosis risks. The food safety issues identified were infant formula use, breast milk storage, fish consumption and general food preparation skills. Socio-economic factors and the education level of the participants were identified as issues affecting food safety (207).

Researchers now recognise the possibility of a link between education length and healthy choices/behaviour. As such, scientists are becoming increasingly interested in early preschool-aged interventions with the aim of prolonging education and, consequently, promoting healthy lifelong decisions.

Marital status

Little data on the effect of marital status was found. In a church-based fruit and vegetable intervention, those widowed or divorced were found to increase their consumption more so than individuals who were single (159). Comparable results could not be found in the literature for married persons; additional studies are needed to explore this trend.

Ethnicity and at-risk/minority groups

Dietary interventions that specifically target ethnic minorities were found to be particularly effective (206, 208). A review commissioned by the Food Standard Agency Wales on dietary interventions for ethnic minorities recommended that programmes be well planned, evaluated, have a theoretical basis, address cultural acceptability, offer a sustainable and long-term approach, involve trusted and recognised community workers, be tailored to lifestyle, combine health professionals with community-based activities, and promote peer education (151, 209). The “Dietary Approaches to Stop Hypertension (DASH)” diet, which emphasises fruit, vegetables, and low-fat dairy foods, includes whole grains, poultry, fish, and nuts, and contains smaller amounts of red meat, sweets and sugar-containing beverages than the typical diet in the United States of America, has been shown to reduce sodium intake in interventions targeting ethnic minorities (210-212). Indeed, the majority of salt intervention studies found favoured this diet type (210, 211, 213-215).

Baird et al. noted that effective dietary intervention strategies for young women from disadvantaged backgrounds included the use of an educational component, continued support after the initial intervention, social support from peers or lay health workers and family involvement (173). Similarly, interventions in developing countries should be sufficiently adapted to cultural context and involve community members (216).

Intervention curriculum and materials are most effective when they are culture-specific and tailored to the different groups involved (151, 217). Many interventions could not assess possible differences between ethnic sub-groups (151). Problem-solving techniques may also be a critical element in maintaining long-term weight loss among minority populations (218). Resnicow et al. reported that “motivational interviewing” was a promising strategy for modifying dietary behaviour in a group of African-American church goers (181). Motivational interviewing is a client-centred counselling strategy that uses techniques such as reflective listening and eliciting self-motivational statements to help individuals work through their ambivalence about behaviour change and allows the counsellor to tailor the content and format to match the participant’s readiness to change (181).

Pathways, a multi-centre study that tested the effect of a school-based programme to prevent obesity in American-Indian children, stressed the importance of building strong relationships with the tribes and encouraging participation and a sense of ownership in the development of the programme (219). The

researchers also noted that the most successful intervention approach when dealing with American-Indian Nations is to adapt to the particular cultural, environmental and economic settings of the tribe (219). This method results in a lack of standardisation and makes it difficult to link interventions with outcomes, yet a highly standardised intervention is potentially at odds with cultural sensitivity (219).

In a dietary intervention for adults with low literacy skills, the use of a variety of learning modalities including demonstration, experiential learning, video, audio and limited print materials were all successful methods in lowering fat levels post-intervention (220). Likewise, Howard-Pitney et al. noted that tailoring curriculum to the cultural, economic and learning needs of low literacy adults was significantly more effective in achieving fat-related nutritional changes than the general nutrition curriculum (221).

Effects of subject ethnicity on programme outcomes were not assessed in the food safety interventions.

2.3.3 Intervention setting

A variety of settings were successful in implementing consumer diet and food safety change: home; child care centres; primary schools; churches; pre-schools; secondary schools; colleges; communities; hospitals; restaurants; government; multimedia; Internet; worksites and clinics.

Media and multimedia

Mass media dietary campaigns were effective in producing increased awareness amongst targeted samples (222-224). In the BBC's "Fighting Fat, Fighting Fit" campaign, its largest ever health education campaign, television, radio and print were all employed (104). Awareness of the campaign was high in all socio-economic groups, but was no higher in overweight than normal weight respondents.

The most successful mass media campaigns are those that are accompanied by "upstream" policy support and "downstream" community-based activities (216). Further research is needed to determine whether changes made as a result of such campaigns can be sustained long-term (216). Evidence on their effectiveness for different age groups and settings is also required.

The use of multimedia also has potential. For example, Cottone et al. showed a sample of college-aged students the popular film "Super Size Me" which, although was poorly evaluated with self-reported questionnaires, resulted in increased knowledge of nutrition, fast food, and obesity-related health conditions (201). A similar intervention in which college students had to select meal choices from simulated fast food environments found that although there was a decrease in calorie and fat consumption post-intervention, the average calories and fat consumed continued to be above the recommended daily allowance for a single meal (225). Cullen et al. reported that primary school students who were provided with

a multimedia game that included preparing healthy recipes in a virtual kitchen, demonstrated positive food specific dietary behaviour change post-intervention (226). Multimedia can effectively reach underserved populations in settings outside of the health care service and may also be more beneficial than print-based media for individuals with limited literacy skills (168).

No evaluated food safety mass media interventions were identified in the literature. One food safety multimedia intervention was found; it used a computer programme to educate college students on food safety knowledge and best practice (202). It was a three-hour online intervention that involved the completion of three educational modules. These modules included topics of food safety knowledge and older adults' foodborne risks (202). Increased food safety knowledge was reported by the students post-intervention.

Workplace

Several dietary workplace interventions were identified and all demonstrated great potential for employee learning and behavioural change. Themes of sodium reduction, obesity, fat and fruit and vegetable consumption were all addressed in the various studies. Of the reports found, worksite types varied and included places such as manufacturing industries, petrochemical sites, post offices and information technology businesses. Some studies targeted multiple sites; others looked at a single site (147, 206, 227). Results indicate that including workers in programme planning and implementation often brings about positive outcomes (216). In a review of dietary worksite-based interventions, Sorensen et al. noted that management support and individual or group counselling delivered by health professionals resulted in greater levels of change (228). Dietary lifestyle counselling by phone and email are often reported as effective tools for change in the workplace (228-230).

Workplaces are often ideal settings to implement dietary change because of employee canteens and vending machines (152, 216). However, environmental work-based intervention studies are often limited by small sample sizes and non-randomised designs (228). No consumer-based food safety workplace interventions were found.

School

The school-based interventions showed consistent improvements in knowledge, attitudes, behaviour and clinical outcomes. They were often cost-effective yet lacked long-term follow-up (204).

Dietary school-based interventions often targeted students (preschool-aged, primary, secondary and college), teachers and parents. In the CATCH Eat Smart Service Intervention, Osganian et al. found that targeting primary school food service staff over a 2 ½ year period through educational materials, training sessions and ongoing support visits was a successful way of reducing the total fat and sodium content of school meals (231). Hesketh et al. reported similar findings in their two-year Healthy Heart Project intervention that took place in American pre-schools for socio-economically disadvantaged children (205). The ultimate aim of this intervention was to reduce cardiovascular risk factors in pre-school children aged 3-5 years. In the study, pre-schools were assigned to one of three conditions: food service and teacher nutrition training; food service only; and control. The food staff of pre-schools assigned to the food service conditions were provided with a full day training course, administered by registered dietitians, on the purchasing and preparation of healthy meals (232). This training resulted in a menu modification for the pre-school, designed to reduce the total fat and saturated fat content of the meals provided (232). The teachers assigned to the nutrition training were instructed on developmentally-appropriate nutrition information for pre-schoolers (232). The primary outcome measure was the change in pre-schoolers' serum blood cholesterol levels from baseline to post-intervention (232). At the end of the intervention, there was a significant decrease in the blood cholesterol level of pre-school children in the food service and teacher nutrition training and the food service only conditions, as compared to controls (232). Furthermore, children who were "at risk", those with initial elevated levels of blood cholesterol, were significantly more likely to have a cholesterol level in the normal range at follow-up if they attended a pre-school in the food service modification group (232).

In an environmental change strategy for primary schools, Bartholomew et al. found that increasing the availability of low and moderate-fat entrées was not enough to increase their rate of selection; increases were only found once the availability of high-fat entrée choices were reduced (233). The most successful community- and school-based dietary interventions usually include both diet and physical activity components (216).

The fruit and vegetables "Food Dudes" programme in the Republic of Ireland is an example of an effective local dietary intervention for primary school students (171). A 16-day intervention was administered, during which children watched video adventures featuring the heroic Food Dudes and received small rewards for eating the fruit and vegetables provided. Information was also sent home to caregivers. Dietary intake was recorded and a 12-month follow-up was conducted. The Food Dudes intervention was effective in changing parental provision and children's consumption of lunchbox fruit and vegetables in the Republic of Ireland (171). The programme has since been adopted by the Irish government and has been made available to all primary schools in the country. Similar results were found when the intervention was conducted in the UK (234).

Several successful food safety/biological school-based interventions were also reported. Like the mentioned dietary interventions, these targeted preschool-aged, primary, secondary and college students. They focused on hand washing behaviour and food safety knowledge (158, 170, 185, 202).

Home

Haire-Joshu et al. found that a home-visiting programme that included child and parent training resulted in a significant increase in the family's fruit and vegetable consumption post-intervention (162). They noted the importance of the home as a place for early pre-school dietary interventions.

A few home-based food safety interventions were successful; these included educational programmes for seniors and children and consumer fridge thermometer initiatives (146, 158). One obesity prevention study found family-based dietary interventions to be more effective than those that were child-focused; another study found both to be equally effective (235, 236). Parental involvement is an important predictor of success for childhood dietary and food safety interventions, and the home is often an appropriate setting to encourage such communication (169). The increased use of multimedia resources and the Internet is making the home a more accessible intervention setting, even for those who are in rural or isolated locations (168).

Religious community

Only a few dietary religious interventions were found, yet using the existing social structure of a religious community appears to facilitate the adoption of changes towards a healthy lifestyle, especially in disadvantaged communities (216). All religious interventions were based in the United States of America. No food safety religious community interventions were found.

Rural versus urban

Interventions in rural vs urban communities showed mixed results. Hendrix et al.'s study found that older individuals in rural areas were less likely to benefit from a fruit and vegetable intervention, as compared to individuals in urban regions (150). In an Irish nutrition education programme for primary school students, rural children benefited more from the intervention than those from urban areas (237). The rural children also had healthier diets at baseline. In a low-intensity dietary intervention specifically targeting rural American residents, tailored feedback, telephone counselling and theory-based nutritional education booklets, all delivered directly to the home, were associated with significant changes in dietary fat and fibre behaviours post-intervention (238). In the food safety interventions, no studies were found that specifically considered rural versus urban influences.

Supermarkets, restaurants, canteens and point-of-purchase

Interventions to increase fruit and vegetable consumption in grocery stores have found that innovative strategies, partnerships, grass roots action and involving economic development for low-income communities are all effective strategies (239). Improving the quality of the location of food within stores has also been shown to increase sales of fruits and vegetables (239). The influence of training worksite canteen staff was reported in a study by Lassen et al. in which, after an 8-hour training session for staff on the importance of fruit and vegetables, there were significant increases in customers' consumption of fruits and vegetables (240).

Point-of-purchase behaviour change interventions in adults have obtained mixed results. Research suggests that worksite and school-based point-of-purchase environmental interventions have the greatest potential for success; grocery stores the least (241, 242). Interventions that lowered the prices of low-fat vending machine snacks showed promising results, yet did not track individual changes and were poorly planned and evaluated (243, 244). Indeed, the importance of food price was well noted in several intervention studies (156). The sustainability of environmental change in point-of-purchase interventions is not addressed in the literature (241).

Restaurant healthy eating interventions also obtained mixed reviews; one study reported positive dietary changes, whereas two published unsuccessful results (214, 225, 245). In one study, providing calorie information at point-of-purchase, on a menu, had little effect on food selection and consumption among a sample of adolescents and adults who ate regularly at fast food restaurants (245). In contrast, Seymour et al. found that food labelling in restaurants is a successful method for dietary change (241). Increasing access to healthier foods by opening supermarkets in inner cities can be effective (241). Interventions in limited access sites, where few other choices are available, have the greatest effect on food choices (241). Partnerships with grocery stores and restaurants have been found to be important for dietary interventions (239). In addition, researchers may need to work with non-traditional partners, such as chefs, growers, shippers and food companies to develop effective and practical interventions (241).

Group settings

Group settings for obesity treatment were found to be more effective than individually-focused programmes, yet the use of both individual and group approaches together appear to be more effective than the use of a group approach alone (218, 235). Still, interventions that were individually-based (and not directly compared to a group approach) were also effective (246).

Primary health care settings

Interventions in primary health care settings vary in their intensity and therefore also in their effectiveness (216). A review by Ejemot et al., which evaluated the effects of interventions that promoted hand washing for

diarrhoeal episodes in children and adults, found that hand washing techniques are often promoted in developing countries, where personal hygiene and related disease are of great concern (178).

Multi-component

Overall, intervening simultaneously at an individual and environmental level is more likely to bring about sustained change (155). Multi-component campaigns that implement change in a variety of different settings show most promise for future research (158, 171, 208, 246).

2.3.4 Policy and wider environment

Few studies outline the effect of policy and the wider environment on consumer behaviour. Therefore, few interventions have targeted this level. Regulatory policies supporting a healthier composition of foods, as well as those that support individuals to make healthy choices, can work and have the potential to reach large populations (216). A report on dietary interventions issued by the World Health Organisation states that relatively few policy interventions have been evaluated in peer-reviewed studies and that more research is urgently required (216). Governmental policy-targeting interventions have shown potential for widespread population influence (171, 185, 247, 248).

2.4 Intervention evaluation trends

A variety of outcome measures were examined in the interventions, including blood cholesterol levels, spending habits, hand washing frequencies, participant Body Mass Indexes (BMIs) and dietary intakes of salt, fruits and vegetables and fat. While the importance of the use of biochemical and anthropometric measurements was often noted, unreliable measures, such as self-reported questionnaires, were frequently used as methods of evaluation (153, 249, 250). This may be because methods such as tracking biomarkers through blood samples or participant body weight and height can be very costly, time-consuming and invasive. Clinical outcomes (such as participant blood cholesterol or nutrient levels), should be addressed in addition to the commonly measured behavioural outcomes (such as dietary intake) (153). For example, in van Wier et al.'s counselling lifestyle programme for weight control among an overweight working population, body weight, waist circumference, sum of skin folds, blood pressure, total blood cholesterol and aerobic fitness were collected at baseline and after six and 24 months. In addition, outcomes of perceived health,

empowerment, stage of change and self-efficacy concerning weight control, physical activity, eating habits and work performance/productivity were also collected by questionnaire at baseline and after six, 12, 18 and 24 months (230). It is becoming increasingly recognised that interventions need to consider multiple outcome measures in their evaluation strategies (153). Studies should also be realistic in aims and objectives and consider immediate outcomes, such as changes in knowledge or attitudes, because many interventions have been evaluated on behaviour change alone and have consequently been labelled as ineffective. Multi-component intervention designs are also often used, but the different levels are not always compared, subsequently leaving the most effective unidentified.

Surprisingly, evaluation guidance is not readily available. In a review conducted by the Health Education Authority, Roe et al. recommended that measurement tools for dietary change should be tested for reliability and validity (153, 165). Interventions should also employ long-term evaluations, which should be included in the study design and discussed at the start of the project (153). Among the studies described in this section, the level and quality of evaluation was highly variable. Harnack et al. conducted an intervention to measure the effect of point-of-purchase calorie information and value-size pricing on fast food meal choices (245). This intervention was only three hours in length and follow-up data were not collected, so the long term effectiveness of the intervention was difficult to determine. In contrast, Reinehr et al. conducted a two-year follow-up in 21,784 overweight children and adolescents that had participated in a lifestyle weight-loss intervention at a treatment institution (196). They noted that most treatment centres could not prove the effectiveness of their lifestyle interventions under real-life conditions due to high drop-out rates and/or lack of documentation after two years. Such findings highlight the importance of follow-up data in identifying important participant trends and guidance for future research.

The use of focus groups, interviews and community/expert steering groups should also be an aspect of evaluation and implemented at the design stage of the study. In Beaudoin et al.'s mass media obesity campaign targeted towards an African-American urban population, focus groups were held during the development of media messages to determine specific recommendations and messages most likely to be effective. The focus groups consisted of African-American women, half of which were overweight. The campaign messages were refined with reference to focus group findings, which indicated that media messages with a white or mainstream focus have less of a beneficial influence on African-Americans than whites (223).

Intervention studies should also secure adequate funding for evaluation prior to programme implementation. In fact, the World Health Organisation (WHO) suggests that at least ten percent of a health promotion project's total budget should be allocated to evaluation (165). Furthermore, there is a lack of

available data on cost-effectiveness for interventions and planners should try to incorporate this into their programmes (153). Van Weir et al. performed a cost-effectiveness and cost-utility analysis on their workplace weight control intervention (230). Cost-effectiveness was performed from both a company and societal perspective. For the company perspective, intervention costs were compared with obtained benefits from reduced sickness absence and increased work productivity. The cost-effectiveness from a societal perspective was addressed by assessing health care utilisation and medical costs. Utilities for the cost-utility analysis were based on a facility for the measurement of health-related quality of life. Studies should also use appropriate statistical analyses or tests in their evaluation (153). A variety of texts are available to assist in choosing the most appropriate analysis based on study design (165). Generally speaking however, the analyses of data in the reviewed studies were appropriate and reliable (155).

An evaluation partnership between evaluators and practitioners is recommended (165). It is also recommended that project managers employ external independent researchers to evaluate their programme's effectiveness, thereby aiding unbiased assessment (165). Studies by Surpluss and Wardle et al. are two such examples, as they conducted research commissioned by the Food Standards Agency UK and BBC respectively (104, 183). This option is not necessarily the cheapest, but support can be requested from voluntary groups, universities and governmental bodies (165).

Despite the public health emphasis on obesity worldwide, there is currently insufficient high-quality evidence for effective obesity prevention and treatment interventions. Although many countries have implemented recommendations for best weight management clinical practice, international guidelines for the evaluation of dietary interventions are lacking. The diversity of intervention designs and consequential evaluation methods are noted, and evaluation needs to be flexible and adaptable, yet a general evidence-based framework is still achievable.

One such framework for weight management interventions is that produced by the National Obesity Observatory in the United Kingdom (165). The framework outlines three main types of evaluation: formative evaluation, process evaluation and impact/outcome evaluation (165). The authors state that the evaluation types are complementary and should all be conducted at appropriate stages in a project's cycle; one is not superior to the other (165). Formative evaluation takes place at the planning stages of a project and uses theory to plan programme components and pilot-testing (165). Process evaluation, also known as implementation evaluation, evaluates delivery and implementation; it aims to see why a project does or does not meet its aims and objectives (165). Process evaluation begins after the full programme has commenced. This type of evaluation is often limited by funding in that researchers may not be financially able to make changes to the intervention design once the project has already commenced. Impact/Outcome

evaluation examines whether, on completion, the project met its aims and objectives (165). This is often considered in light of health outcomes or behaviours (such as a reduction in participant BMI).

In Caballero et al.'s three-year school-based obesity prevention intervention for American-Indian schoolchildren, all three types of evaluation were employed (249). Formative evaluation took place during the project's planning stages and involved the pilot-testing of each programme component. Process evaluation was conducted annually by investigators and staff not involved in the intervention. Types of data collected included attendance logs and student/parent evaluation forms. The impact/outcome evaluation measured outcomes of percentage body fat, dietary intake, physical activity and knowledge, attitudes and behaviours in order to determine whether the programme was successful in preventing obesity. From a practical standpoint, an equal amount of time cannot be spent on each type of evaluation. Roberts et al. recommend that the amount of attention given to each should depend on the type of project, its aims and the perspectives of the stakeholders concerned (165).

The European Directorate General for Health and Consumer Affairs (DC SANCO) and the World Health Organisation (WHO) currently have a joint Strategy Monitoring project that includes the development of a database of evaluated interventions that tackle obesity. This database will be used to create a European "toolkit" for evaluating best-practice obesity interventions. A decision has not yet been made on whether it will be made available publically or if its use will be restricted internally. The United States of America have also developed a toolkit on evaluation tools for obesity prevention and intervention programmes. The framework is composed of six steps that must be taken in any evaluation. These steps include: engaging stakeholders; describing the programme; focusing the evaluation design; gathering credible evidence; justifying conclusions and ensuring that lessons are learned (251).

Overall, it was difficult to find studies that exemplified recommended evaluation practices. A similar problem was found with the reviewed food safety interventions. Furthermore, data on "unsuccessful" interventions are often kept out of the public domain. The publication and sharing of information amongst researchers and practitioners is of great importance. It is essential that the evaluation of studies has due emphasis in future planning.

2.5 Conclusions - characteristics associated with effectiveness

As seen from the abundance of recent pilot studies, more research is warranted on effective interventions for food-related behaviour change. Collaboration and efficient planning at multiple levels is urgently required for societal change. Very few published food safety and dietary intervention studies are currently available for the island of Ireland. It is hoped that policy makers, researchers and health practitioners on the island will use this review to help plan, implement and evaluate future studies. Dietary and food safety interventions are lacking in quantity and quality, but there is promise of consumer behavioural change and programme effectiveness. The intervention planning, implementation and evaluation information presented throughout this chapter should serve as a foundation on which future research and guidelines develop. Study characteristics included in the most effective planning, implementation and evaluation strategies for dietary and food safety interventions are listed below. A table of recommendations is available in Section 2.6.

Planning and implementation

- Interventions should be multi-faceted (involving family, school, workplace, policy, community, etc).
- Longitudinal design is of value.
- Intervening simultaneously at an individual and environmental level is more likely to bring about sustained change.
- Interventions should have a clearly stated theoretical basis.
- Targeting both specific and general groups has been effective, yet enhanced effect is seen with clearly defined target groups.
- Consultation with community leaders and professional disciplines should occur prior to intervention administration.
- An availability and wide distribution of intervention materials is beneficial.
- Intervention curriculum and materials are most effective when they are culture-specific and tailored to the specific group involved.
- Creativity is an important factor in intervention design.
- Timing factors (such as summer holidays or employee redundancies) should be considered when planning an intervention.
- Dietary interventions are more successful when the participants have an increased personal time commitment to the project.
- Implementing an educational intervention component has been successful for both dietary and food safety interventions.
- The impact of dietary interventions is often greater for the oldest and youngest participants.
- Targeting a specific age bracket is often a successful intervention method.
- Improving the quality of the location of food within stores has been shown to increase the sale of fruits and vegetables.
- Increasing access to healthier foods by opening supermarkets in inner-city areas can be effective.
- Parental involvement is an important factor in promoting sustainable changes during early childhood.
- Participants with higher levels of educational attainment often show the greatest capacity for behavioural and attitudinal change in dietary and food safety interventions.
- Problem-solving techniques and motivational interviewing are important elements in maintaining long-term weight loss among minority groups.

- Interventions should provide or work within a supportive environment.
- The pre-school setting merits significant attention in future research.
- Food safety promotion methods such as community-based education programmes, hand washing promotion and food-handler training were all deemed useful (194, 248, 252).
- Trusted and recognised community workers (i.e. peer leaders) are effective vehicles for intervention implementation.
- Dietary interventions should provide increased availability, variety, taste opportunities and convenience of food.
- Liberal thinking around study design is recommended; RCTs are not always the most effective option and may not be practical at a community level.

Evaluation

- Long-term evaluations and follow-ups are important and should be included in the study design.
- Intervention clinical outcomes should be addressed in addition to the commonly measured behavioural outcomes.
- Interventions should consider multiple outcomes in their evaluation strategies.
- Focus groups, interviews and community/expert steering groups should be an aspect of project evaluation.
- Intervention studies should secure adequate funding for evaluation prior to programme implementation (at least 10% of total budget).
- Cost-effectiveness and cost-utility analyses should be performed.
- Measurement tools should be valid and reliable.
- Appropriate statistical analyses should be used.
- An evaluation partnership between evaluators and practitioners is recommended.
- Project managers should employ external independent researchers to evaluate intervention effectiveness.
- Evaluation should be based on an evidence-based framework, such as that produced by the National Obesity Observatory in the United Kingdom.
- Formative, process and impact/outcome intervention evaluations should be conducted.
- “Toolkits” of evaluation for obesity prevention and treatment interventions should be considered.

2.6 Recommendations

Table 2.2: Research recommendations for communicating behaviour change and developing interventions on the IOI

Knowledge gap	Public health implication(s)	Recommendation/solution
Recommendations relating to interventions		
Lack of research on effective intervention on the IOI and a lack of food safety intervention research internationally.	Poor understanding of effective food safety behaviour change.	<ol style="list-style-type: none"> 1. Conduct intervention studies to promote improved food safety practice. 2. Research needs to be published and shared. 3. Methods to address bias in publishing positive intervention outcomes are needed.
There is a lack of well-planned and evaluated interventions.	<ol style="list-style-type: none"> 1. Poor intervention outcomes 2. Ineffective use of health promotion funding. 	<ol style="list-style-type: none"> 1. International guidelines for the evaluation of dietary interventions are needed. 2. Budget and resources are required for thorough planning and evaluation. 3. An advisory resource for practitioners should be created and distributed. 4. Opportunities for training in evaluation should be provided.
Little is known about the sustainability of	Poor sustainability may result in	<ol style="list-style-type: none"> 1. Evaluate sustainability of all

interventions over time.	ineffective behaviour change.	intervention projects. 2. Methods to increase cost-effectiveness are needed.
The evaluation of different levels within multi-component interventions is lacking.	1. Potential to isolate key measures for effective behaviour change. 2. Potential to identify synergistic effects of different interventions.	1. Include multi-level intervention in study design.
Attracting the co-operation of individuals who refuse participation remains a major setback in food safety and nutrition interventions, as is participant adherence.	May result in bias or non-significant results.	Methods to increase participation and adherence are needed.
Poor understanding of the effects of socio-demographic factors on intervention outcome.	Improved segmentation could enhance intervention effectiveness.	Additional research is needed to determine age, gender, marital status, family size/sibling number and ethnicity influences on intervention effectiveness.
Design effects, such as control group improvements, are not well understood.	Difficulty in assessing intervention effectiveness.	Further research is needed on control group inclusion in intervention design.
Lack of data on point-of-purchase interventions.	Potential to influence food choice at the point of decision.	More information is needed on the effectiveness of point-of-purchase interventions in retail and catering settings.
Evidence of effectiveness of multimedia-based interventions in rural and at-risk populations.	New media has potential to reach hard-to-reach audiences.	Future studies should explore the use of new forms of media.

Lack of information on interventions in unemployed individuals.	Unemployed individuals may constitute an important at-risk group.	More research should address food safety and dietary interventions for unemployed persons who cannot be reached in traditional settings.
Interventions in religious groups have shown promise.	Religious community groups offer existing structures within which to develop behaviour change interventions.	Replication of interventions in religion-based community group within the IOI context merits investigation.
Dietary interventions are usually more effective for individuals of normal weight, rather than those who are overweight or obese at baseline.	Interventions to target obesity may be ineffective.	More research is needed to target overweight and obese individuals.

Research recommendations relating to communicating for behaviour change

Further research is needed on best practice in risk communication, including the role of trust.	Potential to enhance consumer confidence, particularly during crises.	<ol style="list-style-type: none"> 1. Methods to enhance trust in institutions responsible for food risk communication in the IOI should be investigated further. 2. The use of the internet and social media in risk communication should be investigated further.
The use of behavioural economics or 'Nudge' techniques in food related behaviour change has not been thoroughly evaluated.	'Nudging' may constitute one important route for promoting behaviour change.	The use of behavioural economics in food-related behaviour change merits further investigation.
Research associated with food safety behavioural change is limited and could benefit from the use of health promotion and social marketing	Low evidence base for food safety behaviour change.	Conduct studies on determinants and barriers to safe food-related behaviour.

techniques, which rely on a customer-focused and insight-driven approach.		
The effective use of social media in promoting food related health has not been investigated.	Dramatic increase in public usage means this presents an important channel for communicating health messages.	Studies on the use of social media for food-related behaviour change are warranted, particularly weight management.
Little evaluation of settings-based policies for promoting food safety and healthy eating on IOI.	Difficult to assess impact of policy measures.	Evaluation of settings-based policies is required (schools, pre-school, catering, work place.
While health promoters have been using mass media to communicate health messages for decades, relatively little research exists regarding its effectiveness.	Low ability to assess effectiveness of mass media communication.	<ol style="list-style-type: none"> 1. More evaluation of campaigns needed. 2. Need for a template for reporting evaluations of mass media campaigns.
Partnerships give organisations the opportunity to combine resources and capabilities to promote behaviour change.	Partnership approaches have the potential to enhance effectiveness of multi-level programmes for behaviour change.	Partnership approach needs further evaluation.

Table 2.3: Recommendations for interventions and communication of behaviour change on the IOI

Priorities for communication/intervention	Public health implication(s)	Recommendation/solution
The review of food safety and nutrition interventions in Chapter 2 outlines effective characteristics of interventions.	Potential to improve outcome of interventions.	Future studies should consider the characteristics of effectiveness when planning, implementing and evaluating identified in Chapter 2.
Partnerships give organisations the opportunity to combine resources and capabilities to tackle food safety and nutrition issues.	Partnership approaches have the potential to enhance effectiveness of multi-level programmes for behaviour change.	<ol style="list-style-type: none"> 1. Innovative approaches are needed to achieve this synergy between resources and expertise, particularly in the area of health. 2. The utilisation of public-private partnerships, which has the potential to support health professionals to facilitate behavioural change, should be explored.
For behavioural change to continue to take effect, communicators need to be flexible adopting principles from more established approaches such as health promotion and risk communication with more contemporary strategies such as behavioural economics.	Drawing learnings from a wide variety of disciplines may result in improved intervention design, implementation and evaluation.	Measures to change food-related behaviour must draw on best practice from a wide variety of disciplines including health promotion, risk communication, social marketing and behavioural economics.
Resource allocation needs to be analysed with a focus on a comprehension of the complex relationship between the individual and their environment.	A wide understanding and targeting of the factors affecting behaviour change may enhance effectiveness.	Upstream social marketing measures should be included to change the wider environment and to create supportive environments, with downstream measures aiming to change individual behaviour.

<p>Best practice in social marketing has already been established (see Volume 3, Chapter 1, Section 1.8.)</p>	<p>Use of existing knowledge base on effectiveness is essential for successful behaviour change.</p>	<p>1. It is essential that formative research in programme development, monitoring and evaluation are implemented.</p> <p>2. Behavioural change communications need to be evaluated on a short-, medium- and long-term basis, not only to measure impact and outcome, but also to assess the techniques adopted.</p>
<p>Health literacy remains a barrier to health improvement for many people.</p>	<p>Vulnerable groups may be particularly affected.</p>	<p>Measures to improve health literacy are needed.</p>
<p>Continued emphasis on a settings-based approach is merited.</p> <p>Given the success of school-setting interventions, attention must be paid to the role of parents and teachers as gatekeepers.</p>	<p>Established international approach using existing structures may result in effective behaviour change.</p> <p>Potential to improve success outcomes.</p>	<p>Expansion of the community settings-based approaches such as the WHO's Healthy Cities to promote capacity building and systems level change through a partnership approach with an emphasis on social, economical and environmental determinants of health is merited.</p> <p>Ensure interventions in school-based settings include all stakeholders and gatekeepers to promote success.</p>
<p>Need to tackle complex problems through a more integrated approach.</p>	<p>Potential to improve effectiveness of behaviour change programmes.</p>	<p>Strategies should incorporate multiple stakeholders working simultaneously in various sectors and settings and refocus on the influence of environmental forces in addition to changing behaviours of the individual.</p>

Appendix A

Table 1.1: Evolution of food and health communication for behaviour change

Period	Strategy
1700s	First examples of mass media approaches to behavioural change – Mather’s small pox campaign (101)
Mid 1800s	Health belief model developed and has since become one of the most widely used frameworks in health education (61)
1945	Henry Sigerist coined the term ‘health promotion’ (253)
1946	WHO expanded the definition of ‘health’ (140)
1951-1952	Idea that marketing practices could be applied to ‘selling brotherhood like soap’ (44) Henry Sigerist coined the term ‘health promotion’ (253)
1960s - 1970s	Campaign developers started blaming ineffective campaigns rather than recipients for lack of change (101)
1965	Principles of social marketing first used – Family planning project in India (44)
1969	Kotler and Levy argued that the marketing discipline needed to be expanded - growth of social marketing was slow with the exception of family planning (44)
1970	Social marketing emerged for the first time in the literature (44) Health Act established health boards in the ROI (254)
1974	Lalonde Report – introduced the idea that hospital services were not primarily responsible for individual wellbeing and population level improvements in health status (61)
1977	WHO declaration at Alma Ata committing members to the principles of ‘Health for All 2000’ (255)
1979	US defined a national strategy for the creation of a more healthy society called ‘Healthy People: The Surgeon General’s Report on health promotion and disease

	prevention' - Catalysed an acceptance of health promotion to be included in strategy (253)
1980s	First books published on health communication (256) Publication of the 'Black report on inequalities in health' (18)
1986	National economic and social council develop definition for 'social policy' (140)
1987	Sandman developed his 'Hazard' or 'Outrage' model which helped explain why individuals react to some things and not to others (34) 2 nd international conference on Health Promotion in Adelaide focused on healthy public policy (18) McLeroy, Bibeau, Steckler and Glanz proposed an ecological model of change which incorporated five levels of influence (257)
1988	First health communication journal published (256) Kotler and Roberto developed a new definition of 'social marketing' – those in health education and health communication did not comprehend its benefits (44)
1989	More focus on theory when developing campaigns (101)
1990s	Realisation that social marketing should be developed around changing behaviour as opposed to changing ideas (44) Establishment of Health Promotion Agency NI Establishment of Health Promotion Unit in ROI
1991	3 rd international conference on health promotion in Sundsvall Sweden focusing on supportive environments (18)
1997	4 th international conference on health promotion in Jakarta highlighted the importance of socio-economic development for health (18)
2006	National Social Marketing Centre set up by UK government
2008	Publication of 'Nudge' (258)

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