

Food Skills

Definitions, influences and relationship with health



Food Skills: Definitions, Influences and Relationship with Health

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1 Introduction

1.1 Background to *safefood*

safefood, the Food Safety Promotion Board, is an all-island body charged with conducting research, facilitating cross-jurisdictional working and promoting food safety and healthy eating messages to consumers, primarily at a population level. This is done through mass communication, such as print, radio, television and the web. *safefood* also collaborates with a variety of partners to promote healthy eating and better food safety practices on a community level or in specific settings, including schools, colleges, workplaces and community groups.

safefood works in several key areas relating to food safety and healthy eating. These include: education, research; and consumer communications. The role of *safefood* is determined by its governing legislation, which sets out its functions. These functions are summarised as follows:

- Promotion of food safety
- Research into food safety
- Surveillance of food borne diseases
- Promotion of nutrition
- Research into nutrition
- Promotion of scientific co-operation and linkages between laboratories
- Development of cost-effective facilities for specialised laboratory testing.

safefood's functions also include the provision of independent, science-based assessment of the food chain, and the organisation has a role in giving advice on the nutritional aspects of certain foods.

1.2 Our changing environment: food skills and health

There is strong evidence in the literature of the connection between diet and health. A poor diet has been recognised as a risk factor for the increased prevalence of chronic disease (1-4), as well as affecting the risk of future disease and having a role in causing excessive weight gain (5). In the past few decades, industrialisation, urbanisation, commercialisation and social changes have transformed the social and economic landscape on the island of Ireland (IOI). These changes in lifestyle and finances have resulted in a shift in eating patterns, a breakdown of traditional eating habits, the greater availability of high energy, ready-made foods, and eating outside the home more often, with resulting over consumption.

Convenience has emerged as a key factor in consumer food choices, and many social and environmental factors have contributed to a decline in time spent in the kitchen. Increases in energy intake and sedentary behaviour have many health consequences, including excess weight, obesity and increased risk of developing non-communicable diseases.

Based on these transformations to our food habits and environment, it is time to re-assess what we now consider ‘food skills’ on the island of Ireland and how these skills might affect our diet and consequently our health.

1.3 Objective and terms of reference of the review

The report will:

1. Examine definitions of food skills from the international literature
2. Provide a summary of key food skills as a basis for further research on this issue on the island of Ireland
3. Explore influences on food skills
4. Investigate the relationship between food skills, dietary quality, food safety and health.

2 The Importance of Food Skills

Key findings

- Knowledge of nutrition and healthy eating is not sufficient to improve dietary standards; other food skills such as cooking competence, planning and preparation skills are also needed to translate this knowledge into practice.
- Experts on food skills debate whether there is a decline in the state of contemporary food skills because of the ready availability of convenience products, or whether these skills have simply undergone a transition due to changes in modern technology and food availability.
- What's clear is that food skills equip consumers with the ability to prepare meals for themselves, without which they might be more inclined to consume pre-prepared or takeaway meals, which are generally higher in fat, salt and sugar.

In recent years, debate has been developing worldwide about the state of contemporary food skills (6-9). Pre-prepared foods and modern technologies have changed how consumers interact with food and engage in household food work. Some experts argue that due to these changes, home cooking skills are in decline (10, 11) and others argue that they are undergoing a transition (12, 13).

In order to implement healthy eating guidelines and improve dietary standards, nutrition knowledge on its own is not sufficient (14). Other food skills such as cooking competence, planning and purchasing skills are needed to translate this knowledge into practice.

To emphasize how food skills assist nutrition knowledge in achieving healthy diets, it can be useful to view nutrition knowledge as the 'what to eat' and food skills as the 'how to make it' (15). This clearly shows the relationship the two factors have with dietary behaviour. If a person knows what foods are healthy to eat or what preparation techniques are healthier, but is unable to make that healthy meal, his or her knowledge cannot be fully realised (16).

Possession of food skills allows for a broader variety of items to be prepared, which enables consumers to incorporate the vital foods for a healthy diet and broaden their food selection. Consumption of home cooked meals can also lead to a greater intake of healthier foods such as fruits, vegetables and grains (17), as well as higher levels of fibre, essential vitamins and minerals, but less fried foods (18). It can result in lowered cholesterol and saturated/trans-fatty acid levels (15, 17, 18) and in general a greater likelihood of attaining good dietary standards (16).

Food skills equip consumers with the abilities to prepare meals for themselves (15, 19), without which they might be more inclined to consume meals that were pre-prepared or frozen or are takeaways (15, 17, 20), which are generally high in fat and cholesterol (21). Otherwise, consumers have to rely on others such as spouses or family members (19, 22), and trust in the convenience food industry (19, 23), running the risk of lowered nutritional health (16). Food skills provides the consumer with knowledge of how a pre-prepared convenience meal was prepared (19). This may prove helpful in determining the healthier choice amongst convenience meals. Possession of such skills also allows the consumer to be able to make several types of meals from one food product, thus decreasing food costs (24).

It is therefore apparent why there is a growing recognition that consumers' cooking skills cannot be taken for granted. The acquisition of these skills has considerable implications for the food industry (e.g. for cooking instructions), caterers (for training), health promoters (translating dietary advice into everyday terms) and domestic life (the pleasure of eating homemade meals)(25).

3 Defining and Measuring Food Skills

Key findings

- Throughout the literature, the term 'food skills' is often used vaguely without a clear definition.
- There is a lack of empirically gathered data on food skills and the evidence base is impeded by a lack of clarity or consistency in the use of related concepts and terms, such as 'cooking from scratch', 'pre-prepared' and 'cook'.
- The lack of a reliable measurement tool to assess food skills is a fundamental barrier to the study of food skills and their relationship with dietary quality, food safety or related health.
- Food skills are far more complex than a set of mechanical skills. They encompass perceptual and conceptual skills, such as planning, organising and budgeting. Food skills are also highly contextual in nature which makes it even harder to assess and compare them.
- Studies in the literature have often used varying definitions of food skills, and those setting out to define food skills have often used expert/stakeholder panels and not a theoretical framework.
- Food skills can be interpreted as both 'task-centred' and 'person-centred', depending on how cooking is defined and whether the focus is the capabilities of the cook or the requirements of the cooking task.
- Definitions of food skills in the international literature vary in terms of focus and detail but ultimately common themes of planning, preparation and mechanical/practical competencies are featured .

3.1 Difficulties in defining and measuring food skills

The debate about the state of contemporary food skills and home cooking has intensified in recent years. Many have argued that food skills are being routinized, deskilled and devalued by the ready availability of industrially prepared convenience foods (10, 11), while others suggest that there is an ongoing revision of domestic practices and skills as ‘cooking’ increasingly becomes a recreational pastime in addition to a necessary daily task (12, 13). Hypotheses about the deskilling and decline of home cooking came to prominence in the 1990s (7, 10, 11, 26). These are generally based on a theory by Harry Braveman (27), which argues that within rationalized and industrial systems, the worker performs only a simplified part of a complete task and thus is removed from the overall process. Braveman asserts that this leaves the worker deskilled, dissatisfied and degraded, and that deskilled workers in turn require ever more simplified and rationalised work. The increased consumption, variety and availability of industrially pre-prepared food have suggested to some that a deskilling process similar to that described by Braveman is happening to food and cooking in the domestic environment.

Today’s cooking practices and their relationship with diet quality and people’s health have not been well studied (6, 19, 28). A fundamental issue and core problem in the study of food skills is the lack of reliable, generally applicable measurement tools.

In the public health and education domain, which is where most of the research on this topic is conducted, the terms ‘food skills’ and ‘cooking skills’ are frequently used vaguely and interchangeably and mostly in reference to techniques (often culturally specific) and tasks such as jointing a chicken; or making white sauce or short crust pastry. Other related terms and concepts, such as ‘being skilled’ and ‘cooking from scratch’, are also used inconsistently and without clear definition.

Findings from qualitative interviews (13) show that there is a relationship between food skills, knowledge and cooking practices but this relationship is not straightforward. ‘Cooks’ do not use convenience foods simply because they cannot cook or as a replacement for fresh or raw foods. But rather they use a range of skills in preparing and cooking food (using both raw and pre-prepared foods, mostly in combination), such as mechanical technical skills, as well as perceptual and conceptual abilities, creative and organisational skills and academic knowledge, in addition to a number of difficult-to-classify skills, such as preparing food, to satisfy the requirements of others.

Some authors have implied that pre-prepared foods do away with or reduce the need for cooking skills, and that the cook who uses pre-prepared foods will apply and acquire less skill. They tend to write from the perspective that cooking and cooking skills are concepts only applicable to the use of fresh or raw foods. However, if contemporary domestic skills are understood to be the skills used by contemporary domestic cooks, and those cooks use both raw and pre-prepared foods (29), then cooking skills in this instance cannot only be associated with the sole use of fresh and raw foods. From this new perspective, cooking with pre-prepared foods has to be acknowledged as involving skill.

The lack of food skills can be an important barrier to food preparation (16). However, some (30) have pointed out that debate about the state of domestic cooking and food skills is speculative and difficult to develop because there is a lack of empirical data and theoretically based arguments. Little explanation is offered about how, for example, cooking with pre-prepared foods requires and utilizes less skill than cooking with fresh and raw foods, what and/or whose cooking skills are changing or being lost in the deskilling process and so on. Debate is also impeded by a lack of clarity or consistency in the use of related concepts and terms such as 'cook', 'cooking skills' and 'pre-prepared'. 'Cook', for example, has been used to refer to the preparation of fresh and raw foods, the preparation of fresh, raw and pre-prepared foods, as well as the household task of food provision (31).

Some suggest that understanding cooking skills as a set of practical techniques might not be the most useful way of gaining insights into the respondents' cooking practices (29). For example, using a pre-prepared sauce and fresh vegetables to prepare a sauce for pasta utilises the same technique as making a similar pasta sauce from fresh, raw ingredients, i.e. preparing vegetables, boiling, simmering and mixing. As demonstrated by Short (29), cooking skills should be viewed as more complex than a set of practical, mechanical abilities such as grilling, frying, etc. Perceptual and conceptual skills and knowledge are demonstrated by cooks' understanding of how the taste, colour and texture of foods react when combined, chilled or heated, as well as in their creative abilities to use leftovers or design meals and dishes around available ingredients. Cooks also use organisational skills to time foods to be ready simultaneously and fit food preparation into a busy day and with a restricted budget.

Cooking skills can also be highly contextual in nature (13) and this raises a number of questions in relation to defining and measuring food skills. "What is a skilled cook? Are there technical standards to be reached or does the domestic cook merely have to be able to produce food that is generally considered edible? It becomes difficult to compare the skills involved in devoting an entire afternoon to preparing sushi from scratch and with the aid of a recipe to the skills involved in preparing fish fingers, chips and peas whilst simultaneously washing up and looking after three children. What is cooking ability? It seems perverse to argue that a person who occasionally makes scrambled eggs to a consistency deemed 'correct' by food writers is more or less skilled than the person who regularly prepares a pasta dish for their family with a chilled pre-prepared pasta sauce from the supermarket and whatever is left in the fridge" (29).

3.2 Food skills in the international literature

A review of the food skills literature has revealed that studies in this area use varying definitions of what constitutes food skills. Most studies setting out to specifically define food skills have generally used expert/stakeholder panels to assess the validity of their tools and measures and not a theoretical framework. As a result, different studies produce different definitions and measures of food skills based on their specific criteria and population. Furthermore, as mentioned above, the term ‘food skills’ is mainly used interchangeably with cooking skills and is frequently used vaguely and in reference to mechanical techniques and tasks which are often contextual and culturally specific.

There is also a degree of plasticity in the literature when it comes to what is meant by the term ‘cooking’ (32). Sometimes published work dealing with the implications of cooking skills acquisition and practice in the domestic context evades definition (33, 34). Lack of definition perpetuates assumptions about the nature and scope of the skills in question. Elsewhere in the literature, cooking skills are gauged through questions about self-reported confidence rather than observed competence with specific techniques and foods (19, 35, 36). In general, cooking skills have been typically defined as a set of mechanical or physical skills used in meal preparation (13).

Nevertheless, “cooking skills in themselves do not guarantee the preparation of meals from basic ingredients and many people lack the ideas, knowledge and menu-planning skills necessary to organise a meal” (19). Therefore, food skills can be seen as more than a set of manual and technique-based abilities, far more than just the discrete practical skills surrounding the physical preparation of and the application of health to food. Therefore, definitions of such skills may be much more complex and abstract than previously believed. In addition to the mechanical tasks mentioned above, food skills also involve conceptual, perceptual and planning as well as fundamental skills of food nutrition, hygiene and chemistry (13, 37). Perceptual skills consist of knowing what happens when certain food items are combined or heated (24). Planning skills are essential and require constant monitoring of and varying daily meals so that they are not repetitive and satisfy everyone’s tastes (38). Other skills involved are multi-tasking (13) and reproducing a meal without using recipes (24).

Interpretation of these skills can be dependent on how cooking is defined and on whether the focus of definition is on the capabilities of the cook or the requirements of the cooking task (29). Therefore, food skills can be seen as both ‘task centred’ and technical or as ‘person centred’ and therefore contextual. The task-centred perspective might see making bread as requiring a range of techniques, but a person-centred approach would consider the perceptual, conceptual, emotional and logical skills used by the cook and the circumstances or context in which cooking took place. This approach divides cooking skills into two different categories: domestic and professional cooking skills (13). These can be seen as two sets of skills that have similar and different aspects. Both share the technical skills of chopping, boiling, etc. But the situations in which they prepare food as well as their kitchen equipment are different. A professional chef would have the knowledge and skills for preparing food of consistent high quality and

preparing several dishes simultaneously, while a home cook would have the knowledge and skills of creating dishes from leftovers, multi-tasking with children or house chores, and preparing food to meet the dietary, taste and budgetary requirements of the family (13). Understanding or defining food skills as a set of cooking techniques is not wrong, it just cannot provide the same depth of insight into people's practices, food choices and beliefs about food and cooking that a more person-centred approach can. As skills experts say, there is no definitive or conclusive way of understanding or defining concepts such as skill, ability or knowledge. Different kinds of learning and research intentions require that different approaches be taken (39).

In any discussion of food skills and the way cooking abilities have declined (11, 40), the unspoken assumption is that there was a time when good cooking skills were more routinely practised – a golden age (12, 13, 19, 25, 29). Certainly, there can be a measure of comparison with the recent past in accounts from our parents or grandparents of how they relied more on fresh, unprocessed vegetables, meat and fish. Knowing how to prepare materials, timing and mastery of all the basic cooking methods were requirements of everyday life in the recent past. However, it is easy to overstate the incidence of such skills. Hard times in the early 1920s restricted choice, and necessity may have made people ingenious in creating meals from very little. Examples of this can be seen in accounts of children between 1939 and 1942 which show that they were unused to sitting down to a meal or using cutlery, and rather were more accustomed to have a 'piece' in the hand, always white bread and generally spread with margarine and cheap jam. Others were unaccustomed to eating vegetables, soup, puddings or salad. Some children said they had never seen their mothers cook and that they had not had hot meals at home (41). These reports demonstrate that what some may now consider the 'golden age' of cooking homemade meals from basic and fresh ingredients may have been exaggerated.

The 1939-45 war had a profound effect on the UK and Ireland's food supply and distribution. The problems of material availability and storage techniques necessitated a measure of ingenuity in the past (42). The people who lived through such experiences may now serve as the benchmark against which some judge any decline of cooking skills. Perhaps unfairly, today's young adults' competence in the kitchen is compared to their equivalents all those years ago. As cooks today are faced with a different set of circumstances, their responses will also be different. Currently, although food poverty still exists for some, in terms of general availability there are no shortages of materials (42). However, it can be argued that the nutritional quality of some of today's pre-prepared materials are often poor and require little preparation before consumption and many are highly processed (43). Successive design innovations and better ease of control mean that equipment today is also either easier to operate, or requires different skills. If the latter is the case, then it may be more accurate to see what is happening as a progress of partial reskilling.

In the domestic domain, there have been changes in the availability of commodities, the technology for storage, preparation and cooking, and, subsequently, in the threshold level of knowledge and skills necessary to cook at the most basic of levels. Other factors, such as improvements in pre-prepared meals, the perceived financial and time costs of sourcing ingredients, and a reallocation of time-usage,

also have an influence (44). Furthermore, there is the question of whether we are comparing like with like when we talk about the ‘meal’ in different periods of time. Culture is not static and what is eaten at particular times of the day can change because of new products, new processes and new situational demands. Although the ‘hot cooked dinner’ format of the meal is still popular, meal elements may have been simplified (pork chops or sausages instead of a roast joint of meat), thus reducing the skill requirements. However, while there is little evidence to suggest marked generational differences in this, it is a factor to consider in the transmission of skills.

When defining skills, many experts warn about the dangers of over-simplifying and/or over-emphasising the mechanical aspects of practical tasks. Wallens (45) cautions that because skills are such complex concepts, a short and simple definition is always misleading. Singleton (46) points out that all practical tasks require a combination of mechanical abilities, academic knowledge and ‘tacit’ perceptual, conceptual and planning skills. Skills can also be defined, described and understood at different levels of detail.

Definitions of food skills in the international literature vary in terms of focus and detail, but ultimately common themes of planning, preparation and technical/mechanical competencies emerge from most. Some examples of such definitions are mentioned below:

3.2.1 Canadian Ministry of Health Promotion

According to the Canadian Ministry of Health Promotion, food skills represent “the necessary abilities needed for the knowledge, planning, conceptualisation, preparation and perception of food” (47). At a minimum, a definition of food skills should include the following:

- *Food selection* (e.g. menu planning, food shopping)
- *Healthy food preparation* (e.g. chopping, pureeing, cooking, safe food handling and serving)
- *Food storage* (e.g. safe storage techniques).

A more elaborate definition may include the following:

- *Knowledge* includes nutrition knowledge (understanding what vitamins and nutrients are required to sustain health), label reading (reading the label and understanding how to determine the nutritional value of the food), food safety (understanding the importance of food safety when storing, preparing and handling food) and knowledge of food varieties, ingredients and substitutions for ingredients (understanding which foods can be exchanged within a given recipe and understanding the variety of ways food can be used so that optimal nutritional value can be derived from it).
- *Planning* is an understanding of the way meals can be organised to offer nutritional value. This involves being able to budget while shopping and understanding the preparation needed (time and skill). Due to a decreasing need to create meals from fresh ingredients, consumers often lack this skill.

- *Conceptualisation* is accomplished through creating meal ideas with leftover food and adjusting recipes to fit the needs of an individual. This requires creativity and an awareness of food varieties. Given the rise of ready-made meals, this has become a rare skill.
- *Preparation* encompasses mechanical techniques and preparing meals, including chopping, mixing, blending, cooking and following recipes.
- *Perception* is seen among individuals who use their senses, such as touch, taste and smell, to guide their cooking techniques.

3.2.2 Essential food skills required in a skill-based healthy eating programme

Fordyce Voorham (48, 49) defines food skills as “the process of purchasing, preparing and cooking food materials using available resources to produce well-balanced and tasty meals appropriate to age and needs of the individuals consuming them”.

The essential skills identified by a survey of food experts include:

- Knowledge
 - Cookery methods (ability to know how to match food products with appropriate cookery methods to achieve best outcomes and value for money)
 - Equipment (ability to know how to competently use small and large items of equipment, skilfully and proficiently)
 - Nutritional health (ability to know what constitutes a healthy meal in relation to meeting daily health and activity requirements, why it is important to enjoy and consume a wide variety of nutrient-dense foods, the importance of portion sizes, and how to select nutrient-dense foods in relation to vegetarian and healthier alternatives)
 - Terminology (descriptive and generic instructions that allow an individual to deconstruct and accurately follow recipes and produce successful meals)
 - Troubleshooting (ability to understand why food product outcomes are not successful and how to rectify them)
 - Sources of information (point of sale, television, internet, cook books, etc.).
- Skills
 - Consumer knowledge and skills (ability to know how to make informed purchase decisions and, what to do with that food post purchase, be able to interpret and act upon food labelling, and apply knowledge to make plans, prepare and cook healthy meals and snacks instead of buying take-away dishes or convenience pre-prepared food products.
 - Food safety (ability to understand and apply how to store, prepare and cook food, safely defrost frozen foods and correctly clean and use kitchen tools and equipment)
 - Meal knowledge and skills (ability to understand and apply time management in meal planning and production: food shopping, preparation and cooking, resulting in the production of appetising food that matches the budgetary, nutritional and appetite requirements of the people consuming those meals).

- Resources
 - Opportunities for learning (home economics classrooms, restaurants and market visits and culinary tours)
 - Motivation (encouraging practice, trial and error and fun, and enjoyable social experiences around food)
 - Parental involvement (role models, providing encouragement)
 - Community involvement (providing information to support programmes, extending, enriching and skill-based endorsing of healthy eating programmes)

3.2.3 An individualised food skills programme

Porter et al (50) define food skills as the “skills or the variety of skills included in the performing of tasks associated with the selection, purchase, preparation and consumption of food that are important components of activities of daily living”.

3.2.4 Examination of home food preparation activities

McLaughlin et al (51) compiled an inventory of cooking skill measurements from the literature, which examined cooking knowledge, technical skills and competence. However, they maintain that these measurements do not encompass the broad variety of tasks associated with domestic cooking competence and that technical, planning, perceptual, conceptual, basic food knowledge and other food-related skills need to be included in a questionnaire. They suggest that the memorising of recipes, using ingredients without measuring devices, simultaneously doing other house chores while cooking, cleaning up after using ingredients like raw chicken, utilizing leftovers and making two dishes out of one food product are other items of measurement that have not been used so far. According to these authors, an example of a list of items (Likert scale: Agree/disagree) that represent a comprehensive definition of domestic cooking competence include:

- I make meals that require more than three ingredients (typically packaged convenience foods need only one or two more ingredients to complete the meal).
- I am able to visualise the meal I am going to make and how the food items will come together on the plate.
- I make a grocery list; I plan food for the week; I plan what meals I will make each day.
- I am aware of the necessary food hygiene measures to take while preparing food and cleaning up.
- I do not need to use recipes because I know through experience which combination of ingredients can make a tasty meal.
- I am able to create a meal out of leftovers.
- I am able to do house chores while cooking.
- I am distracted from cooking and meal preparation whenever my children are around.
- I create meals from scratch without convenience food ingredients.
- I know my family’s specific food taste/requirements.

- I know how to create homemade meals that satisfy my family and do not include convenience foods.
- I do not need to use measuring devices when I create meals from scratch.
- I know how long certain food items will take to cook.
- I can plan according to food item cooking times so that all the items are completed and served at the same time.
- I make sure I have the basic ingredients in storage.
- I am flexible and can make a meal out of whatever ingredients I have in the house.

3.2.5 Ready meal consumption and association with cooking skills

In this study (52), cooking skills were assessed using a seven-item, six-point scale: 'I can cook complicated multi-course meals', 'I can prepare gratin potatoes', 'I can prepare a soup', 'I can prepare a sauce', 'I can bake a cake' and 'I can bake bread'.

3.3 Commonly measured food skills

After reviewing the available international work in relation to definitions of food skills and in consultation with an expert advisory group, a list of commonly measured food skills was compiled (Table 1), which were of particular relevance in relation to their impact on diet and health.

Since there was no consensus on a definition of food skills in an IOI context, the list of skills in Table 1 will be used to provide a framework for a discussion guide on the topic during the qualitative phase of this project.

These findings will then help to generate a suitable definition to help assess the relationship between food skills and health among the IOI population.

Table 1 – Commonly measured food skills in relation to health

Category/Theme	Skill	Studies that have included these skills
Diet and Health	Nutrition knowledge (demonstrate an understanding of energy and nutrients that are needed to sustain a healthy lifestyle and sources of such nutrients)	(8, 16-18)
	Understand and implement current healthy eating guidelines for a balanced diet (know the composition of various food groups, e.g. meat gives you iron and protein, and understand how to translate these into food and food habits)	
	Understand the importance of energy balance (knowledge of proportions and balance/variety)	(19)
	Know the different nutritional requirements of different stages of life (children, adolescents, pregnant women, adults and the elderly)	
Consumer Awareness	Be able to understand and make use of information provided on food labels and nutrition information panels (e.g. understand how to use the ‘per 100g’ vs. the ‘per portion’ columns)	(16, 17)
	Understand that various factors may influence food choice (seasonality, cost, culture, advertising etc.) and make informed decisions accordingly	
	Consider cost and budget (ability to buy food for a healthy diet on a budget; waste is primarily a concern for those on a low budget)	(16, 18) (17)

Cooking, Food Preparation and Handling	Follow a recipe	(18, 20-22)
	Menu planning	(16-18, 20)
	Preparing high nutritional quality meals	(23)
	Confidence in cooking meals from basic ingredients	(11, 21, 22, 24)
	Basic techniques to prepare grains, proteins, fruits and vegetables	(25)
	Know and have confidence in applying various food preparation/handling techniques (e.g. chopping, mixing, blending, steaming, boiling, stewing, baking, roasting, frying, microwaving, etc.)	(8, 11, 16)
	Perceptual skills (understanding of the properties of food in terms of taste, colour and texture, and how they react when heated or combined)	(8, 26)
	Ability to conceptualise the outcome (in terms of taste, colour and texture) of mixing, heating and chilling foods	(8)
	Creativity and awareness (using leftovers, adjusting/modifying recipes to make them healthier or use available/alternative ingredients)	(8, 18)
	Confidence in using common pieces of kitchen equipment (e.g. cooker, microwave, blender, etc.)	

	Self-efficacy in preparing a meal and confidence in one's ability to prepare meals under challenging circumstances	(1, 11, 20, 21, 23, 27)
Food Safety	Understand and implement food safety/hygiene guidelines (during storage, preparation, handling and cooking)	(19)
	Understand and use date mark and storage instructions on food labels	(19)

4 Factors Influencing Food Skills

Key findings

- Numerous factors such as age, gender, social class, knowledge and attitudes can influence food skills, affecting food choice and therefore health.
- There is conflicting evidence on the links between socio-economic status (SES) and food skills. Some studies show that lower SES groups lack the knowledge and funds to consume fresh fruits and vegetables and the ability to budget for groceries while others find that lower SES participants were more resourceful when preparing meals from scratch.
- Food and cooking skills seem to be strongly gendered household tasks, with more than twice as many women responsible for cooking meals. In addition, women, on average, show higher level of skill and are more confident in their abilities.
- Convenience food products can be viewed as having both positive and negative effects on dietary quality. Such foods have introduced variety into diets but at the same time their excessive consumption is linked with changes in body fat percentage and BMI. Lack of food skills has been shown to be associated with higher consumption of pre-prepared foods.

Numerous studies and reports agree that making the right choices of food can protect against many food-related illnesses (53-55). However, there are various factors that can influence food skills, affect food choice and ultimately affect health. Some of these barriers and influences are outlined below.

4.1 Socio-economic status

There have been many conflicting links drawn between socio-economic status (SES) and food skills. A cross-sectional survey of 21,326 men and women across multiple countries (56) reported that families with high SES were significantly more likely to purchase and consume fresh fruits and vegetables (stemming from the knowledge component of food skills, which shows their recognition of fruit and vegetables as a healthy choice) while those with lower SES and food insecurity lacked the funds to be able to budget for groceries and kitchen appliances (57). In contrast, others have found that low SES participants were resourceful when preparing meals from scratch, thus showing evidence of high food skills (51).

Income and social class were also found to have an effect on consumption of pre-prepared foods, with higher income consumers purchasing more than twice as many pre-prepared meals (19).

4.2 Age

Research shows that as people get older, their cooking techniques and confidence in their cooking competence increases. Experience allows the meal preparer to learn through trial and error what foods their spouses and children do not enjoy or are allergic to, and, as such, older consumers find it easier to cater for their family's particular food tastes. These older food preparers are also, through practice, able to memorize the items needed for several dishes instead of using recipes and measuring devices (38).

4.3 Gender

No other household task seems to be as strongly gendered as cooking. More than twice as many women are responsible for cooking meals during the week. In addition, women, on average, have higher cooking skills compared to men, especially in older age groups (33). With higher levels of cooking competence, it can be assumed that women cook more often. Caraher et al (19) support this, as they found that four out of five women cooked daily compared to only one out of five men. Women were also more confident of their cooking competence and being able to cook from scratch.

In men, cooking skills are highly correlated with cooking enjoyment and men are more likely to have higher cooking skills when cooking is constructed as a fun activity. It is possible that men's motivation for domestic cooking may be constructed as cooking when they are in the right mood rather than as an everyday responsibility while women's familial role is mostly characterised by their task as the main food

provider (33, 58), and cooking rather occurs as an obligation than as a pleasure. On the one hand, it is possible that cooking may give women a feeling of self-confidence and self-worth as they report the importance of having control over their family's food consumption patterns (33). Handing over food preparation to their partner would mean adapting to men's ways of eating, which is often regarded as less health conscious and less health promoting.

Furthermore, some men seem to lack the planning and organising skills necessary for food shopping. Lake et al (22) examined food shopping and preparation patterns among a sample of men and women and found that many women took responsibility for food shopping because they claimed their spouse did not plan ahead for meals, wasted time and spent more money, with the end result of still not having the necessary food to create a meal, as well as lacking familiarity with their family's food preferences. As a result, only 7% of male participants surveyed were responsible for food shopping because they were more skilled and knowledgeable than their partners (22). These findings are supported by other studies which reveal that women carry out food preparation tasks almost twice as often as men and that men tend to buy less fresh produce, decline to write grocery lists and use more convenience food products (16).

4.4 Knowledge

Knowledge about nutrition, label reading, food safety and food variety also influence food skills. Studies have shown that interventions designed to help participants discern healthy from non-healthy foods resulted in favourable increases in dietary choices (59, 60). Other initiatives such as garden programmes, offering knowledge on and experience with growing and preparing vegetables, consistently lead to a variety of healthier food choices among participants (61, 62). However, findings of a study by Raza et al (63) suggest that despite having an awareness of healthy foods, knowledge does not always correlate with action. Food guidelines simply inform people about healthy food choices and good eating practices. People need to apply their nutrition knowledge to translate these guidelines into actual daily meal practices.

Sources of knowledge of cooking skills range from family members to TV programmes. Regardless of social and economic class, the main source of gathering cooking knowledge and skills (76% of women and 58% of men) is through mothers, particularly for younger age groups. Another source is cooking classes (48.6% of women and 15% of men). Other family members, spouses/partners, friends, magazines, cooking programmes on TV and doctors are other sources of knowledge and skills (19). Predictably, those in higher educational and social classes use cook books as an important learning source, whereas lower educational and social classes are more likely to rely on cooking classes at school which are free (19).

4.5 Attitudes

Attitudes towards cooking determines a consumer's cooking competence as it can be seen as a barrier to gaining or improving cooking skills (15). Many men assume that they do not require cooking competence because they believe women will provide food for them (19, 22). However, there has been a shift in traditional attitudes as young single men are becoming more reliant on their own cooking competence (19). A literature review by Candel concludes that a negative attitude towards cooking results in a convenience orientation attitude, with the consumer being more inclined to purchase convenience food products, whereas enjoyment of cooking has the opposite effect and decreases convenience orientation (64, 65).

4.6 Preferences

Food preferences and lifestyle factors also have an effect on food skills related to food choices and meal preparation. Taste plays a large role in food preferences that guide food skills. Stead et al (66) reported that lower SES respondents found healthy food boring, tasteless and unfulfilling, as well as showing a preference for high fat foods (67). Therefore, the knowledge required for food skills is often neglected in favour of the flavour of less healthy foods.

4.7 Convenience

Due to the fast-paced nature of today's lifestyle, lack of time has become an important barrier to cooking and healthy eating, and time pressure has been found to have a significant and positive relationship with pre-prepared meal consumption (16, 66).

Many factors need to be considered when examining what determines a consumer's convenience orientation which ultimately affects the consumer's decision of pre-prepared food purchasing and meal preparation activities. These include widely researched factors such as time availability, income, beliefs/attitudes and product characteristics. However, other factors such as cooking competence (knowledge and skills) and home meal preparation are poorly understood (37).

Food retailers have reacted to consumers' demands to spend less time in the kitchen by offering a huge variety of fully or partially prepared foods, which require less or no domestic labour (68) and as, some assert, contribute to decreasing food skills and in turn health. Various studies in the literature have linked consumption of pre-prepared or fast foods to changes in body fat percentage and increasing BMI (69, 70).

In some ways the availability of some convenience food products has had a positive effect through introducing variety to diets. On the other hand, some argue that the use of these foods has removed the choice of cooking with raw ingredients and deskilled the consumers, a situation which is intensified by the lack of opportunity for children to gain cooking skills from parents who use pre-prepared foods (71).

A clear association between lack of cooking skills and pre-prepared meal consumption has been demonstrated in the literature (52), where a dislike of cooking was linked to the frequency of fast food consumption (72). Therefore, lack of cooking skills might be a barrier to preparing healthy homemade meals. Unfortunately, this lack of skills reduces consumers' chances to choose between self-prepared and pre-prepared foods and might lead to a loss of control over ingredients and food safety and render consumers dependent on the information given by the food industry (7). Furthermore, convenience food products are heavily processed and include a lot of sugar, fat and/or salt. Therefore, their high consumption frequency is related to obesity (52).

No association has been shown between beliefs about the nutritional value and the taste of pre-prepared foods and age, income and working status. On the other hand, gender (being male), household composition (single living) and weight status (being overweight) have all been found to be associated with more positive attitudes about pre-prepared meals as well as lower cooking skills (52). In terms of actual consumption, age was shown to be the strongest predictor of pre-prepared meal consumption (highest in those in the 17-39 age groups), followed by cooking skills.

However, there needs to be a distinction made between pre-prepared meals and convenience food products. Pre-prepared or ready meals are defined as complete meals that require few or no extra ingredients, prepared by external procedures and designed to replace the main course of a homemade main meal. They require minimal or no cooking apart from heating (73). In contrast, convenience products generally require more extensive cooking as part of meal preparation. Therefore, while the use of pre-prepared foods is associated with lower food skills, the same is not true for convenience products. These products have been shown to be used by skilled home cooks and their use is entirely normal and acceptable by modern cooks (29). These cooks never consider that they should make foods such as bread, sausages, veg-burgers, fruit yoghurts, pasta, breakfast cereals and jam 'from scratch'.

4.8 Social Environment

Although the influence of gender has already been discussed above, it is important to note that gender constructs created by society have led to the division of roles played by men and women within a family where, in general, women are given the responsibility of food provision (19, 22, 24). This designated role may be the reason why we see a large dependence on mothers for learning how to cook. This role has led women not only to develop higher cooking skills, but also to develop them at an earlier age compared to men, who are more likely to first learn cooking at a later age from their wives or partners (19).

Satisfaction from catering for the family (38) (the meal provider naturally wants to please those they are feeding and through accomplishing this, they feel a sense of satisfaction and pride), changes in household structure (24) (changes occur in food habits and meal preparation when a child moves away or a spouse dies, possibly due to a lack of motivation to prepare meals as the previously mentioned satisfaction disappears), and peer pressure (64) (peer pressure affects adolescents' behaviours

significantly and, as such, it may not be 'cool' to eat healthily) are all examples of environmental factors influencing food skills and preparation patterns.

4.9 Confidence

Bava et al (74), in a study of the food provisioning practices of busy mothers, reveal that lack of confidence in cooking ability was prominent amongst young participants and was found to substantially influence their food practices.

5 Relationship between Food Skills and Health

Key findings

- Evidence suggests that the ability to cook may be linked to health as it encourages positive attitudes to healthy eating by fostering an awareness of what food is.
- Lack of food skills may have a negative influence on dietary quality as it can lead to a reliance on pre-prepared foods and takeaways which in turn can result in an unintentional increase in intakes of energy and fat and an insufficient intake of fruits and vegetables.
- A direct relationship between food skills and health has not been established to date, possibly due to the lack of a formal definition of food skills. However, there is clear evidence that possession of food skills can influence healthy eating behaviour, dietary quality and food safety, which can affect health.

Traditionally, diet and health promotion interventions have focused on changing knowledge, attitudes and behaviour. However, lack of practical food skills to execute the change can undermine such efforts as the capacity of the informed consumer to control their dietary intake and follow healthy eating guidelines may be reduced if they cannot cook and prepare meals for themselves (7).

A transition in food skills such as that described by Lang and Caraher (12), where a fundamental cultural shift occurs in the patterns and kinds of skills required for food preparation and consumption, might lead to a number of health consequences. As cooking habits change, reliance on pre-prepared foods could result in an unintentional increase in intakes of energy and fat and an insufficient intake of fruits and vegetables. Improving food and cooking skills, on the other hand, can have a long term positive impact on consumers' cooking confidence as well as improved healthful eating habits (75-77).

The changes in the food industry and environment in recent decades have had considerable impact on consumers' food choices and practices, including the amount of time given to food preparation and cooking and the level of skills used (78). However, an examination of how this restructuring of skills relates to dietary quality and health has seldom been included in the available research (7). When such evaluations have been conducted, they have been primarily in the context of programme evaluations that have only included programme participants and self-reported behaviour (17, 77, 79, 80). Although direct measures of at-home cooking practices are not readily available (51), most of these evaluations show promising results that indicate positive, though small, dietary changes and increased confidence in food preparation.

Whilst a direct relationship between food skills and health status has not yet been drawn from research, some would argue that cooking skills are the most important factor affecting dietary behaviour and that a better understanding of them could improve health education policy and practice (7).

Although there is a major gap in the literature regarding surveillance data related to food skills, it is clear that there are many factors contributing to levels of food skills among various populations. The evidence suggests that the ability to cook is linked to health (Table 2), as it encourages proper attitudes to healthy eating by fostering an awareness of what food is (26). Vrhovnik concurs and suggests that lack of food skills could be a major preventable link to becoming overweight and obese (81). Lack of necessary food skills has a negative influence on consumers' dietary quality, as those who lack food skills also lack the ability and opportunity to control their diet with ease and follow healthy eating principles (20). Research has also shown that active cooking experiences combined with nutrition knowledge instead of solely theoretical nutrition knowledge is more effective in changing dietary behaviour (14, 19, 80). Furthermore, increased cooking competence can result in better nutrition knowledge (17), as well as enabling cooks to prepare different food items and dishes, thereby increasing food choice opportunities and food variety. It is well known that food variety is one factor among others that may increase the intake of fruit and vegetables (82, 83), which is a marker of a healthy diet.

5.1 Food skills and healthy eating

The addition of hands-on cooking activities to nutrition and health interventions allows for nutrition knowledge and practical food competencies to come together to improve dietary habits (84). Nutrition knowledge, analytical skills for planning and evaluating nutritional quality of meals, technical competence and refined cooking skills are all needed (84). In particular, interventions targeting cooking skills have been suggested to be an effective strategy to promote healthy eating (52).

Population groups with lower income and socio-economic status tend to have poorer dietary intakes and higher risk of chronic conditions (85-89). These populations are also more likely to lack nutrition knowledge and cooking skills (90). The lack of such skills reduces their chances of cooking and consuming freshly cooked meals (16) resulting in lower dietary quality (91). In addition to the above, poor food skills have also been reported to be strong predictors of ready-meal consumption (52), which can contribute to increased total energy, fat, salt and sugar intake (73). As a result, interventions targeting cooking skills have been identified as an effective strategy in promoting healthy eating (52) and positively affecting food choice, particularly for low income groups (79).

In a study examining the relationship between food preparation activities and food security, McLaughlin et al (51) reported that the increased complexity of at-home food preparation was associated with living in more food secure settings. However, it was not clear whether greater preparation complexity may have contributed to the participants' abilities to avoid food insecurity or whether more food secure participants had greater amounts of food available and therefore had more complex meal preparation routines. In another study of food habits, investigators found that participants with the highest dietary quality cooked more often and cooked meals with more complex preparation steps (16).

In general, taking part in food preparation activities has been shown to be related to healthier food choices (16), whereas lack of cooking skills has been associated to use of convenience food products (6, 68). Increased consumption of such products has been linked to becoming overweight and obese (52).

5.2 Food skills and dietary quality

Research shows that those who report being more involved in food purchase and preparation or those who cook most often are more likely to meet dietary guidelines (16). Cooking empowers individuals and families to have a varied and balanced diet (19). As a life skill, the physical activity of cooking encourages higher order cognitive processes, such as reasoning, planning and decision making (92). Such skills enable the consumer to prepare different food items and dishes and therefore increase food choice opportunities and food variety which in turn, among other factors, may lead to increased intake of foods such as fruits and vegetables (82, 83).

The facilities available and the ability to prepare food and follow a recipe can also impact on consumers' food choices (79). In the UK, 10% of people cite not knowing how to cook as a factor limiting their food choice (19). If people are reliant on convenience and pre-prepared foods, which require minimal

preparation, they will become increasingly disconnected from food preparation and have limited food choice (93). There is also evidence to suggest that convenience foods and foods consumed away from home can lower diet quality and raise energy density as well as leading to increased levels of fat, sugar and salt (94). In contrast, food prepared at home tends to be more nutritious (16, 51), and a healthier dietary variety can be achieved by those who regularly prepare meals at home (19). Furthermore, cooking with fresh ingredients gives consumers maximum control over choice of ingredients and allows for healthy eating guidelines (e.g. levels of salt, sugar and fat) to be followed more rigorously.

5.2.1 Knowledge

Food skills and nutrition knowledge have been associated with healthy eating. According to Wardle et al. (95), knowledgeable individuals are 25 times more likely to consume adequate daily amounts of fruit and vegetables. A similar finding was reported in a study by USDA (96), which showed that the more mothers know about food and nutrition, the better the quality of their children's diets. Elbon et al. (97) also found nutrition knowledge to be strongly associated with reading of nutrition information panels on food products and positive nutrition-related health seeking behaviour. According to Lang et al. (7), absence of knowledge on how to prepare meals from basic ingredients and what constitutes food composition has made some contribution to increases in fat intake. However, knowledge alone does not predict healthy food behaviour as there are many additional social and environmental factors that influence food choice (98).

5.2.2 Time spent on food preparation

Various studies have aimed to verify the relationship between the amounts of time spent preparing food and diet quality. However, there is no guarantee that spending more time preparing food will result in better diet quality. For example, raw fruits and vegetables are both healthy and convenient while a homemade chocolate soufflé is a time consuming source of empty calories (99).

The American Use of Time Survey results reveal that healthy weight individuals spend more time in food preparation than overweight individuals, and both healthy weight and overweight individuals spend more time in food preparation than obese individuals (100, 101). However, survey data limitations have prevented researchers from estimating the relationship between the time spent in food preparation and diet quality. Another drawback of these estimates is that they cannot distinguish the effects of food consumed away from home, which would reduce time spent cooking, from the effect of cooking at other meals. This in turn may bias the estimated correlation between time spent cooking and BMI.

Mancino et al. (99) looked at the impact of time spent cooking on BMI groupings and reported (after controlling for individual level fixed effects and meal type as well as meals away from home) that more time spent in food preparation may be of benefit for obese respondents as an additional 10 minutes is estimated to increase dietary quality (an additional two points on the healthy eating index), lower energy density and increase dark green and orange vegetable consumption.

5.2.3 Food safety

International research shows that there are many gaps in food safety knowledge and practices that may result in food borne diseases. Food can be mishandled at a variety of places during food preparation, cooking and storage, and the evidence indicates that consumers have inadequate knowledge about the measures needed to prevent food borne illness in the home (102).

On the island of Ireland, McCarthy et al. (2007) (103) and Kennedy et al. (2005) (104) have shown that young people, and both older and younger men, may be particularly at risk of low levels of food safety knowledge. This is consistent with the international literature (105-109). The effect of educational levels is unclear, but formal food safety training (e.g. home economics or food hygiene courses) may be important.

Although preparing, handling, cooking and storing food safely are major components of food skills, they have not been given as much attention in the literature. Observation of food handling practices of consumers, specifically to determine how often proper food safety practices were employed during home food preparation, including at meal preparation, service, post meal clean up and leftover storage (110), reveal that at least one critical violation (one that could by itself lead to potential foodborne illness) was observed in 96% of households across the US and Canada. Less than 1% of households met the minimum criteria for acceptable performance (zero critical violations and no more than four major violations). In a similar study in Britain, Worsfold and Griffith (111) observed 108 consumers preparing meals in their own homes and found high levels of poor food handling and failures to follow guidelines.

Studies on the island of Ireland have examined food safety behaviours, including temperature control, cooking and cross contamination. In relation to temperature control, Bolton (2006) showed that the majority of householders (>75%) did not know the correct temperature for refrigeration. Most did not possess thermometers for either the fridge (76.8%) or freezer (71.5%). A total of 57% of householders reported the use of unsafe practices to defrost frozen meat, with over half defrosting meat at room temperature. In addition, approximately half of the refrigerators surveyed had an average temperature above the recommended 1-5°C temperature range, increasing the risk for the multiplication of food-borne pathogens during storage (particularly *Listeria*) (112).

A study by Kennedy et al (2011) investigated if **safefood**'s advice in relation to cooking meat safely was put into practice by 120 participants preparing a warm chicken salad followed by a homemade beef burger in test and domestic kitchens across the IOI. In this study, 77 per cent of participants did not check that the chicken was fully cooked by cutting it with a knife and looking at the colour in the middle. Raw meat bacteria were detected in 17 per cent of 'cooked' chicken (cross-contamination may have been another cause). After food preparation, 30% of 'cooked' beef burgers were still pink in the middle and 37 per cent of 'cooked' burgers contained raw meat bacteria. This research highlights the frequency of undercooking, even in test conditions, amongst a group of consumers on the IOI (113).

The same study identified cross-contamination occurring as a result of unsafe food preparation practices. During food preparation, 84 per cent of people did not thoroughly wash their hands after

handling the raw chicken and 72 per cent failed to properly wash a knife used in preparing raw chicken before its reuse on salad vegetables. A total of 57 per cent of people using a knife to prepare burgers failed to thoroughly wash the knife before reusing it to cut raw salad vegetables. These behaviours all resulted in raw meat bacteria being detected on ready-to eat salad vegetables, hands and kitchen utensils.

The Kennedy et al. (2011) study showed that participants' scores on the food safety knowledge and scores on the observed safe food behaviour were moderately and positively correlated and food safety knowledge was an important predictor of observed food safety score. These results indicate that improving food safety knowledge can have an impact on food safety practice but is not the sole solution for improving food safety behaviour. The participants had, in general, a good knowledge and understanding of the importance of food safety, but this was not, however, always practised (113).

5.3 Conclusions

Advances in the food technology and industry, as well as changes in consumers' daily lives and habits, have resulted in changes in food provision and preparation practices and the level of skills required by these tasks. A direct relationship between food skills and health has not yet been established in research. This may be partly due to the fact that a formal definition of food skills has yet to be agreed upon in the literature. However, it is clear that food skills can influence healthy eating behaviour, dietary quality and food safety for consumers, which in turn can affect their health.

Table 2 – Food skills and health studies

Study	Location	Year	Findings in relation to food skills
Interventional studies			
When chefs adopt a school? An evaluation of cooking intervention in English primary schools (114)	England	2013	Professional chefs linked with local schools, where they delivered up to three sessions (food, healthy eating, nutrition and cookery) to one class over a year. Those taking part in the intervention reported a significant increase in cooking confidence and consumption of vegetables. No significant changes were observed in the control group.
Evaluation of cooking skills programme in parents of young children (75)	Scotland	2013	Data collected at baseline, post intervention and one year follow up of a cooking skills programme delivered by the NHS show significant increases from baseline to post intervention in confidence to cook with basic ingredients, follow simple recipes, prepare and taste new foods. These changes in confidence were retained at one year follow up for following a simple recipe and preparing and cooking new foods. Confidence levels for cooking with basic ingredients and tasting new foods decreased significantly at one year follow up but did not drop to baseline levels.
Cooking skills are important competencies for promoting healthy eating in an urban indigenous health service (115)	Australia	2011	Cooking skills were essential for facilitating practical workshops to promote healthy cooking and eating among participants. The workshops provided participants with new cooking ideas, opportunities to cook new recipes and some unfamiliar ingredients, as well as learning new cooking skills. Cooking skills enhanced the process of effective community engagement and nutrition promotion and enabled the participants to be more confident preparing healthy meals at home.
The impact of a community-based food	Scotland	2007	Pre and post intervention and six month follow up measures were collected in a community-based practical food skills intervention. Fruit and vegetable intake significantly increased from pre to post

skills intervention on cooking confidence, food preparation methods and dietary choice – an exploratory trial (79)			intervention; however, at follow up, fruit and vegetable intake were similar to baseline. Percentage of participants cooking from basic ingredients was higher at six months follow up than at pre or post intervention.
Cooking classes increase fruit and vegetable intake and food safety behaviours in youths and adults (77)	USA	2005	After participating in classes on a variety of fruit and vegetable preparation methods, including microwaving, stir frying, steaming, baking, pressure cooking, grilling and slow cooking, as well as incorporating fruit and vegetables into smoothies, salads, snacks, desserts, soups and one dish meals, participants reported a significant increase in daily fruit and vegetable consumption. Significant improvements were also observed in food handling behaviours, such as washing hands before food preparation, washing fruits and vegetables before preparation and using a clean knife and cutting board.
Cooking classes outperform cooking demonstrations for college sophomores (17)	USA	2004	All participants in both demonstration and cooking groups reported a positive shift regarding confidence using various cooking techniques but the intervention group had statistically significant gains.
The Cookshop programme: Outcome evaluation of a nutrition education programme linking lunchroom food experiences with classroom cooking experiences (80)	USA	1998	Positive effects from the intervention were observed on preference, knowledge and plate waste. The results suggest that actual cooking experiences and eating food with peers, accompanied by cognitive learning, may provide a promising approach to nutrition education.

Observations Studies

<p>Shared meals among young adults is associated with better diet quality and predicted by family meal patterns during adolescence (116)</p>	<p>USA</p>	<p>2013</p>	<p>More frequent shared meals in young adulthood was associated with higher intake of fruits and vegetables among men and women, with higher intakes of milk products and some key nutrients among women. Having more frequent family meals in adolescence also predicted a higher frequency of shared meals in young adulthood.</p>
<p>Importance of cooking skills for balanced food choices (6)</p>	<p>Switzerland</p>	<p>2013</p>	<p>Cooking enjoyment was the most important predictor of cooking skills, especially in men. Women had higher cooking skills in all age groups. Cooking skills correlated positively with weekly vegetable consumption but negatively with weekly convenience food consumption frequency, even while controlling for the effect of health consciousness related to eating.</p>
<p>More than preparing a meal? Concerning the meanings of home cooking (117)</p>	<p>Belgium</p>	<p>2012</p>	<p>Cooking is influenced by individual, family and cooking related determinants. Social background, family situation, employment status, educational level and people's attitudes towards traditional gender roles and time pressure all influence consumers' cooking experiences. Those who attach greater importance to the social aspects of cooking and do not feel rushed in their daily activity are more likely to experience cooking as a leisure activity rather than a necessity. Cohabiting couples, especially those with children, acknowledge cooking as a way of showing care, whereas those living alone tend to experience cooking as a chore. Cooking is more likely to be considered a pleasure when it is shared with or done in the presence of others and meant to please others who join in eating.</p>
<p>Does more cooking mean better eating? Estimating</p>	<p>USA</p>	<p>2012</p>	<p>After controlling for individual fixed effects and meal type and excluding meals away from home, findings suggest that for non-overweight individuals, the effect of time spent preparing food has no</p>

the relationship between time spent in food preparation and diet quality (99)			significant impact on diet quality. However, for obese respondents, an additional 10 minutes in food preparation is estimated to increase dark and orange vegetable consumption and reduce energy density.
Does living in a food insecure household impact on the diets and body composition of young children? (89)	England	2012	Children living in food insecure households were more likely to have a diet of poorer quality, characterised by greater consumption of white bread, processed meat and chips and lower consumption of vegetables.
The current state of cooking in Ireland: the relationship between cooking skills and food choice (32)	Ireland	2011	92% of respondents agreed that having cooking skills contributes to a healthy diet and reduces dependence on takeaway meals. All respondents above the age of 27 reported coming from a background where home cooking was the norm (93% in 17-26 year olds). Over 58% reported reading labels when purchasing food while 27.5% reported that they 'never' or do 'not often' read labels. Greater percentage of women reported reading labels (32.2% vs. 22.8%).
Identification of essential food skills for skill-based healthful eating programmes in secondary schools (48)	Australia	2011	Food experts, including home economics educators, chefs, nutritionists and dieticians, described food skills required for young people to live independently. These included the four themes of knowledge (understanding of nutrition, different cooking methods and recipe modification), information (ability to read and understand and act upon various sources of information), skills (planning, shopping, preparation, cooking, storing, organisation and food safety) and resources (time, equipment and transport).
Improvement of meal composition by vegetable	Switzerland	2011	Participants were randomly assigned to serve themselves lunch from a buffet of food offering the choice of carrots with pasta and chicken, or green beans with pasta and chicken, or carrots and green

variety (82)			beans with pasta and chicken. Results showed that those who chose from two vegetables derived significantly more energy from vegetables compared to the other two groups. Total energy content from the meal was not affected.
Socio-economic differences in weight control behaviours and barriers to weight control (90)	Australia	2011	After adjusting for age, gender and BMI, results showed that socio-economically disadvantaged groups were less likely to engage in weight control. They were also more likely to believe losing weight was expensive, not of high priority, required a lot of cooking skills and involved eating differently from others in the household.
Does involvement in food preparation track from adolescence to young adulthood and is it associated with better dietary quality? Findings from a 10 year longitudinal study (118)	USA	2011	Participants in their mid to late twenties who enjoyed cooking were more likely to have engaged in food preparation as adolescents and emerging adults. Emerging adult food preparation predicted better dietary quality for the mid to late twenties age group, including higher intakes of fruit and dark/orange vegetables and less sugar-sweetened beverages and fast food consumption.
Ready meal consumption: associations with weight status and cooking skills (52)	Switzerland	2010	Cooking skills were identified as a strong predictor of ready meal consumption. There was a clear association between ready meal consumption and lack of cooking skills. Men and overweight adults had more positive attitudes towards ready meals. Ready meal intakes of 17-39 year olds, those living in a single person household and those with lower education levels were significantly higher.
Dietary patterns and cardiovascular risk markers in the UK Low Income Diet	UK	2010	Results revealed that participants consuming more items from the 'fast food' pattern were younger, more likely to be smokers and employed, but not partnered.

and Nutrition Survey (87)

Convenience food products: drivers for consumption (68)	Switzerland	2010	Age (younger), higher concerns about the naturalness of foods, higher levels of nutrition knowledge and cooking skills, having children and trying to avoid food waste all predicted lower levels of convenience food consumption.
Mothers and meals. The effects of mothers' meal planning and shopping motivations on children's participation in family meals (119)	USA	2010	Mothers' beliefs in the importance of family meals increased the likelihood of children eating dinner with families, by increasing the likelihood that mothers planned dinner and that dinners were regularly scheduled. Mothers' perceptions of time pressures on meal preparation had a negative, indirect effect on the frequency of children's participation in family dinners by reducing mothers' meal planning.
Dietary patterns of school aged children in Scotland: association with socio-economic indicators, physical activity and obesity (88)	Scotland	2009	Healthier dietary patterns loading highly for fruit and vegetables were significantly associated with higher socio-economic status and higher education levels for the main food provider, whereas more unhealthy patterns were associated with lower socio-economic status and education levels of the main food provider. Screen time was inversely associated with healthier dietary patterns. There were no associations between dietary patterns and BMI group or time spent in physical activity.
Which food related behaviours are associated with healthier intakes of fruit and vegetables among	Australia	2007	Food-related behaviours reflecting organisation and forward planning, as well as enjoyment of and high perceived value of meal shopping, preparation and consumption, were associated with healthier intakes of fruits and vegetables. On the other hand, those participants who found cooking a chore spent less than 15 minutes preparing dinner, decided on the night what they would eat for dinner, ate

women? (91)			fast foods and takeaways, ate dinner and snacks while watching TV and frequently ate on the run were less likely to eat two or more servings of vegetables a day.
Food preparation by young adults is associated with better diet quality (16)	USA	2006	Participants reporting frequent food preparation also reported less frequent fast food use and were more likely to meet dietary objectives for fat, calcium, fruit and vegetables and wholegrain consumption. Sex (male), race (African American) and living situation (campus housing) were significantly related to less frequent food preparation.
Quantifying the impact of food preparation skills among college women (15)	USA	2006	The dominant reasons for being unable to prepare basic foods in this population were knowledge barriers ('never been taught') and attitude barriers ('no interest in learning'). Most of these college women ate food prepared outside the home one to three times a week.
Domestic cooking practices and cooking skills: Findings from an English study	England	2003	Cooking skills can be seen either as task centred or person centred and contextual, and as consisting of perceptual, conceptual, as well as organisational, practical and mechanical skills and academic knowledge. Results also reveal that there is no clear cut relationship between the domestic cooks' skills and knowledge and their cooking practices and food choices.
An examination of at-home food preparation activity among low income, food insecure women (51)	Canada	2003	97% of participants consumed food prepared from scratch at least once during the three day observation, 57% did so each day. Both the frequency and complexity of at-home food preparation were positively related to women's energy and nutrient intakes and their consumption of fruits and vegetables, grain products, and meat and alternates. The intakes by women in households with food insecurity and hunger reflected less complex food preparation but no less preparation from scratch than women in households where hunger was not evident, raising questions about the extent to which food skills can protect very poor families from food insecurity and hunger.
Food shopping practices are	USA	2001	Food shopping practices, such as 'looking for grocery specials', using coupons, using shopping lists or

associated with dietary quality in low income households (120)			engaging in ‘comparison shopping’, were significantly associated with the availability of nutrients in the food the households used during a week. Planning meals ahead and ‘thinking about healthy food choices’ were also significantly associated with increased consumption of nutrients.
Nutrition knowledge and food intake (95)	England	2000	Knowledge was significantly associated with healthy eating, and the effect persisted after controlling for demographic variables. Nutrition knowledge was shown to be a partial mediator of the socio-demographic variation in intake, especially for fruit and vegetables.
Demographic factors, nutrition knowledge and health seeking behaviours influence nutrition label reading behaviours among older American adults (97)	USA	2000	Being female, high nutrition knowledge and positive nutrition-related health seeking behaviours were most strongly and consistently associated with the use of food labels. Participants read labels for saturate fat and cholesterol more than for protein and calcium.
The state of cooking in England: the relationship of cooking skills and food choice (19)	England	1999	Socio-economic status and education are associated with the sources of people’s knowledge about cooking. Mothers followed by cooking classes are the most important sources of learning about cooking skills. Overall, results show a population unsure of specific cooking techniques and lacking in confidence to apply techniques and cook certain foods.
Food safety behaviour in the home (111)	UK	1997	Safe cooking practices were used by a majority of consumers; some used potentially unsafe practices such as transporting and storing food at the wrong temperature, holding cooked food at ambient temperature for prolonged periods and inadequate reheating.

Reviews

Exploring mediators of food insecurity and obesity: a review of recent literature (86)	International	2012	Overall the review confirmed that food insecurity and obesity continue to be strongly and positively associated in women. New mediators such as gender, marital status, stressors and food stamp participation were revealed that alter the association.
Understanding and measuring cooking skills and knowledge as factors influencing convenience food purchases and consumption (37)	International	2010	The literature review revealed that mothers and cooking classes are the most important sources for acquiring cooking skills, while factors such as gender, age, income, social/educational class, attitude and social environment determine how one acquires their cooking competence.
Does social class predict diet quality? (85)	International	2008	The cross-sectional studies reviewed above permit the conclusion that higher quality diets are, in general, consumed by better educated and more affluent people. Conversely, lower quality diets tend to be consumed by groups of lower SES and more limited economic means. This conclusion is based on a review of empirical data and some computer modelling of dietary habits subjected to cost and other constraints.
An international perspective on food and cooking skills in education (26)	International	1996	This looks at the national school curriculums of Iceland, Finland, Ireland, France, the Netherlands, Spain, New Zealand and Canada in comparison with the British National Curriculum in order to strengthen the argument for prioritizing food cookery skills in schools as an effective strategy to improve dietary standards among individuals and families.

6 Learning Food Skills

Key findings

- Families and in particular mothers are reported as the main source of learning about basic cooking skills.
- Cooking classes in schools, though not compulsory in many countries, are also a major source of learning for food skills.
- Some authors suggest that today's younger generation is not acquiring adequate food skills. Nowadays busy daily lives and professional commitments mean that parents may be cooking less frequently at home. In addition, practical learning courses in schools such as home economics are not available in some schools and generally have a low level of engagement, particularly among boys.
- It is important to emphasize food skills training, both formal and informal, particularly but not only in children, as lack of such skills may hinder attempts at changing and/or improving food-related behaviour in the future.

The acquisition of food skills is dependent on the skills learnt in the home, at school and on individual self-directed learning by means of books, magazines or televised cooking programmes. In the past, cooking classes in schools (mainly compulsory in the UK in the past century) were seen as a source for learning cooking skills (32). Today, families and in particular mothers are reported as the major sources of learning about basic cooking skills from an early age (12, 19, 81). However, each of these routes is under threat. Firstly, cooking classes in schools are no longer formally taught in many countries (26). Secondly, the changing family dynamics mean that there is a decline in the intergenerational transmission of basic cooking skills at home as parents are not cooking from fresh raw ingredients, possibly due to work or other commitments (6, 121).

Nowadays consumers tend to adopt more time-saving measures in relation to their daily food consumption (92) due to their busy daily lives. This is evident in the current speedy food preparations with minimal effort and in the decreased amount of time allotted for eating. Improvements in food technology have enabled the food industry to respond to this demand with an increasing availability of convenience and ready-to-eat food (122). Consequently, cooking skills become less frequently practised on a daily basis because it is no longer necessary to cook to get one's daily nutrition supply.

On the other hand, allocated hours to practical learning in schools have also been reduced. Home economics courses are not available in all secondary schools (32) and when available, there is generally a low level of involvement (123). The consequences of these circumstances may hinder any attempts at changing dietary behaviour in the future.

Given the high preference/prevalence of pre-prepared foods (124), it is possible that nowadays children do not have their parents' food skills to emulate. This puts even greater emphasis on the role of non-domestic sources of food skills learning to ensure that the next generation of Irish children does not miss out on this essential life skill (32).

7 Food Skills on the IOI

Key findings

- Lack of time, attitudes, cost, lack of skills and confidence has all been cited as barriers to cooking.
- Although almost all parents surveyed report that it is important for children to learn how to cook and the majority of children surveyed report that they would like to improve their cooking skills. However, only half the children reported cooking, at most, twice a year at school.
- Overall, a trend towards increasing interest in home cooking can be observed in the IOI population, with 42% of consumers reporting that they cook their evening meal from scratch on six or more evenings a week.

Food preparation practices have developed dramatically over the last century in the IOI, shifting from almost exclusive use of raw ingredients to being greatly dependent on processed foods, which are heavily consumed by adults, particularly those in the 15-24 year age brackets (125). This shift has also led to a change in cooking skills. There would appear to be plenty of evidence of a recent reduction in domestic cooking. On the IOI in 2011, consumers on average spent 41 minutes preparing and cooking their meal on a weekday evening, increasing to 53 minutes on Sundays (126). Work, family responsibilities, lack of time and knowledge, as well as cooking skills, have all been cited as contributing factors to the degree of reliance on convenience foods (74). This has further implications for the passing of domestic cooking skills and knowledge to the next generation. Parents who use pre-prepared meals as their food provisioning norm will give their children fewer opportunities to learn cooking skills since active cooking experiences are needed to promote positive attitudes to healthy eating (26) and to translate nutrition knowledge into routine habit (14). According to a survey conducted by Lang et al (7) in the UK, less than half of the participants reported cooking a meal every day in the previous week. However, respondents in the same survey reported that 7% of meals consumed in the previous week were ready made and 5% were takeaways. This disparity could be attributed to some plasticity in what is meant by 'cooking' and the meaning attributed to 'ready meals'.

Having a healthy balanced diet remains a challenge for many people at all levels of society on the IOI, but it is particularly important for those who cannot cook. In a survey of respondents from the ROI (32), 96.8% indicated that they come from a background where home cooking was the norm. All age groups from 27 years upwards recorded a 100% 'yes' to this question, whereas only 93% of the 17-26 year olds recorded 'yes'. This may have implications for the future, as this cohort has been disadvantaged in two ways. It has missed out on both the cultural experience aspects of home cooking, as well as a valuable means of learning to cook. The majority (92%) of the participants in this study agreed that having cooking skills contributes to having a healthy diet. Almost all respondents felt that this would make one more dependent on other sources of food provision, such as takeaways or pre-prepared meals.

Lack of time, attitudes ("other things are more important"), cost vs. value ("scratch cooking is expensive") and lack of skills and confidence were cited as barriers to cooking. While 90% of parents reported that it is important for children to learn how to cook, and 83% of children

reported that they would like to improve their cooking skills, only half the children in the sample cooked a maximum of twice a year at school.

A recent report published by Bord Bia (127) as part of their biennial survey of consumers across 10 countries (France, Belgium, Germany, Spain, the Netherlands, Sweden, Republic of Ireland (ROI), Great Britain (GB), United States and New Zealand), has looked at food shopping and cooking practices of consumers (Table 3) from the ROI and GB (Northern Ireland not included in the 2013 report). Face-to-face surveys were conducted with 1,000 respondents (+15 years) in ROI and 1,029 (+16 years) respondents from GB. Demographic descriptions of the sample are available elsewhere (127). Overall, the ROI respondents were slightly more positive in their attitudes towards food than GB participants. ROI adults were more likely to eat foods low in fat and avoid sugary foods, and were also less likely to eat ready prepared/convenience meals.

In contrast, GB shows slightly better culinary expertise than ROI. Just under two thirds of residents in GB claim that they would be 'confident to cook a Sunday roast with all the trimmings/would enjoy hosting a dinner party where they do all the cooking' (65% in GB vs. 59% in ROI). However, ROI residents are displaying a growing confidence regarding their abilities in recent years. For both ROI and GB, a significantly higher percentage of women compared to men expressed 'confidence to cook a Sunday roast with all the trimmings/would enjoy hosting a dinner party where they do all the cooking' (76% vs. 42% in ROI and 78% vs. 51% in GB).

The incidence of eating out of the home tended to be higher for those describing their diet as unhealthy, single-person households (ROI) and having basic or no cooking skills (GB).

Table 3 - PERIScope study, Bord Bia 2013 (127)

	Great Britain	ROI
Positive attitude to cooking (fun and passion)	47%	42%
Children’s interest in cooking	15%	25%
Attending/taking cooking lessons	6%	12%
Importance of eating well	28%	34%
Eat out of the home only for special occasions	72%	84%
Eating out of the home during the week	30%	23%
Eat out of the home as a treat or something different	28%	35%
Responsible for preparing own meals at home	54%	48%
Cooking meals from scratch once/few times a day	48%	36%
Convenience/ready meals are good value for money	59%	47%
Convenience/ready meals are good substitute for home cooking	49%	42%
Convenience/ready meals are always in the home	37%	28%
Use only the microwave for food preparation	12%	6%

In a separate survey in 2011, Bord Bia (126) explored the evening meal time behaviour of IOI consumers (n=1003) by looking at food shopping and preparation behaviours of consumers as well as collecting data on the types of dishes, cooking styles and ingredients used by consumers. The results reveal that cooking from scratch, using fresh ingredients is a growing trend with 4 in 10 claiming to do it more often nowadays. 42% of those surveyed claimed to prepare their evening meal from scratch six or more evenings a week. Half of adult meals and a quarter of children’s meals were prepared totally from scratch.

54% of all evening meals (excluding takeaways) were prepared with ingredients that were in the home already versus 19% prepared with ingredients specifically bought for the previous night’s dinner.

Ready meals made up 4% of the previous night’s dinners and 9% were previously prepared meals which were reheated.

Table 4 – Evening meal preparation: adults vs. children (126)

	Adults’ meals	Children’s meals
Prepared from scratch, no ready-made ingredients	49%	24%
From scratch with some help from shop-bought sauces and other additions	30%	30%
Mainly pre-prepared or ready-made ingredients	9%	25%
More of shop-bought, prepared and fresh	6%	12%
A total ready-meal solution	4%	7%

Overall, findings suggest a trend towards increasing interest in cooking at home from basic ingredients on the IOI. However, current findings do not distinguish the specific socio-economic groups experiencing these trends. Therefore, it is hard to assess whether this increase in home cooking will also have a positive effect on the dietary quality and thus the health of those population groups with higher risk levels.

8 Conclusions and Recommendations

8.1 Conclusions

Defining food skills has proven to be complex. Food skills encompass far more than a set of mechanical skills and are highly contextual in nature, which makes their assessment and comparison even harder. So far, there is a lack of a theoretically based definition of food skills, and definitions vary in terms of focus and detail. Common themes include planning, preparation and mechanical/practical competencies.

What is clear from the literature is that knowledge of nutrition and healthy eating alone is not sufficient to improve dietary standards. Other competencies are needed to translate this knowledge into practice. Studies have shown that food skills equip consumers with the ability to prepare meals for themselves, without which they might be more inclined to consume pre-prepared or takeaway meals, which are generally higher in fat, salt and sugar.

A direct relationship between food skills and health has not been established to date, possibly due to the lack of a formal definition of food skills. However, there is clear evidence the possession of food skills can influence healthy eating behaviour and dietary quality, which can affect health. Evidence suggests that the ability to cook may be linked to health as it encourages proper attitudes to healthy eating by fostering an awareness of what food is. Lack of food skills may have a negative influence on dietary quality, as it can lead to a reliance on pre-prepared foods and takeaways, which in turn can result in an unintentional increase in intakes of energy and fat and an insufficient intake of fruits and vegetables.

With regard to food skills on the island of Ireland, no comprehensive assessment has been carried out and the relationship between food skills and health is currently unknown. This report offers a basis for defining food skills and will help guide those who wish to investigate this issue further.

8.2 Recommendations

Key finding	Public Health Implication	Recommendations	Relevant for
The study of food skills and domestic kitchen practices of consumers is hindered by a lack of a detailed, theoretically based definition of food skills, resulting in a lack of reliable measurement tools and empirically gathered data.	Without consistent, empirically gathered data, the relationship between food skills and health cannot be reliably assessed. Varying definitions used by different studies prevent comparison across populations, settings and time.	<ul style="list-style-type: none"> Those working in this field should not assume a shared and implicit understanding of what constitutes food skills and that these are the same for everyone. A clear definition of food skills must be developed that will allow for comparisons across populations, settings and time. 	<ul style="list-style-type: none"> Public health academics Food behaviour researchers Health promoters Educators
Food skills may be linked to health as their procession encourages proper attitudes to healthy eating and provides an ability to translate healthy eating guidelines into everyday practice. Therefore, a lack of adequate skills may undermine health promotion efforts.	Those lacking adequate food skills may also lack the ability to choose and prepare healthy meals for themselves, resulting in an increased reliance on pre-prepared and ready made foods. Although these foods are generally higher in fat, sugar and salt, a lack of food skills may render consumers unable to distinguish better choices of pre-	<ul style="list-style-type: none"> When designing and planning healthy eating campaigns, public health professionals should be aware of the lack of food skills as a barrier to dietary improvement and aim to address this issue in order to increase the effectiveness of healthy eating campaigns. 	<ul style="list-style-type: none"> Public health professionals Health promotion agencies Food skills educators

	<p>prepared foods by interpreting nutrition information labels.</p>	<ul style="list-style-type: none"> • Special attention should be given to population groups such as men, which have been shown to be lacking adequate food skills.
<p>It is important to emphasise learning of food skills, particularly among children, as traditional sources of learning such skills (i.e. learning from mothers) have changed over time, thus placing higher importance on non-domestic sources of learning food skills. The learning of food skills in the home remains important, however.</p>	<p>Some children these days may not have the opportunity to emulate their parents and learn food skills at home as due to various life/work commitments, parents may not be cooking from basic ingredients very often. On the other hand, the uptake and engagement with practical school courses has also been reduced.</p>	<ul style="list-style-type: none"> • Policy makers and educators should place a greater emphasis on teaching and passing on life skills, such as food skills, to children through practical lessons at schools. Although courses such as home economics currently exist, food skills constitute only a small part of such modules. In addition to the above, such modules exhibit varying levels of student engagement, particularly among boys who as shown previously, may grow up to rely on pre-prepared foods or others such as mothers and partners to make their food • Policy makers. • Educators • Parents and other care givers who can pass on skills to children

decisions.

- Parents and other caregivers, particularly older women who tend to have greater food skills, should be encouraged to pass on these skills to younger generations.
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