

**An Investigation of Allergen Management and
Awareness within the Food Industry:
A Comparative Study**

By

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Table of Contents

Declaration.....	2
Abstract.....	3
List of Figures	4
List of Appendices	7
Acknowledgments.....	8
1. Literature Review	10
1.1 What is a Food Allergen?	10
1.2 Prevalence of Food Allergies.....	12
1.3 Regulation of Food Allergens in Prepacked food and Non-Prepacked food in Ireland ...	13
1.4 Regulation of Food Allergens in Prepacked and Non-Prepacked food in the US	14
1.5 Food Allergens in the Catering Sector	16
1.6 Food Allergen Training for Food Handlers in Ireland.....	17
1.7 Food Allergen Training for Food Handlers in America.....	18
1.8 Aim of the project	20
1.9 Objectives of this study.....	20
2. Methodology.....	22
2.1 Food Allergen Questionnaire	22
2.1.1 Hard Copy Survey.....	22
2.1.2 Online Survey	23
2.2 Observational Audit	23
3. Results	26
3.1 Food Allergen Questionnaire Results.....	26
3.2 Observational Audit Results.....	51
3.2.1 Observational Audits in Ireland	51
3.2.2 Observational Audits in America	54
4. Discussion.....	56
4.1 Allergen Awareness	56
4.2 Allergen Knowledge	56
4.3 Allergen Training	58
4.4. Allergen Management	59
5. Conclusions	62
6. Appendices.....	64
References	70

Declaration

I hereby certify that this material, which I now submit in part fulfilment of the requirement for the award of B.Sc. (Environmental Health) is entirely my own work and has not been taken from the work of others save and to the extent such work has been cited and acknowledged with the text of my own work.

Signed: 

Date: 11 – 04 - 2020

Abstract

Consumption of food allergens can result in serious allergic reactions, which in some cases can be fatal. For this reason, food allergen awareness among food handlers and allergen management within the food service industry is extremely important. There is a great onus placed on food business operators as evidence suggests most food allergy incidents arise from non-prepacked food. The overall aim of this project was to examine food allergen management in the food service industry and ascertain the level of allergen awareness and knowledge among food handlers who work in the sector.

A 23 questioned survey was designed to gather primary data from food handlers who work or had worked in the food business industry and was distributed to participants in hard copy and online. A total of 101 respondents completed the survey of which 39 were hard copy surveys and 62 were completed online through an online survey platform. A total 40 premises, 20 businesses on the North East of Ireland and 20 premises in the Mid-West of Indiana in the U.S.; were audited through unannounced, observation inspections to assess allergen management and compliance with regulations and best practice guidelines applicable to their geographical location.

Analysis of the survey responses demonstrated food handlers who worked in Ireland generally demonstrated stronger knowledge retention on regulated food allergens within their area compared to those who worked in America. Audits conducted as part of this study also found 75% of American food establishments had no allergen management control plan in place.

On the basis of the findings of this study, the lack of food allergen knowledge and awareness amongst American food handlers appeared to be attributable to the lack of participation in food allergen training. Based on this conclusion, it is recommended that food allergen training should become a requirement for all food handlers.

List of Figures

Figure 1.0: Gender of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.1: Gender of respondents who completed a survey conducted between May 2018 and November 2018 in America and Other Countries* (n=30)

Figure 1.2: Geographical working area of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland, America & other countries (n=101)

Figure 1.3: Age category of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.4: Age category of respondents who completed a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.5: Food establishment type respondents reported they worked, or had worked in, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.6: Food establishment type respondents reported they worked, or had worked in, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.7: Role in the food business respondents reported to carry out in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.8: Role in the food business respondents reported to carry out in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.9: Years respondents reported to work as a food handler in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.10: Years respondents reported to work as a food handler in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.11: Level of food safety training of respondents reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.12: Level of food safety training of respondents reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.13: Training respondents received on food allergens reported to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.14: Training respondents received on food allergens reported to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.15: Amount of food handlers who reported food allergen management a priority where they worked, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.16: Amount of food handlers who reported food allergen management a priority where they worked, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.17: Importance of allergens reported to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.18: Importance of allergens reported to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.19: Respondents who reported that there was a food allergen plan in place in their place of work, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.20: Respondents who reported that there was a food allergen plan in place in their place of work, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.21: Prevention of food allergen ingredient cross contamination in the food businesses reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.22: Prevention of food allergen ingredient cross contamination in the food businesses reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.23: Legal requirement for allergen information respondents reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.24: Legal requirement to put allergen information respondents reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.25: How consumers can find information on non-prepacked foods reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.26: How consumers can find information on non-prepacked foods reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.27: Knowledge on consuming allergens reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.28: Knowledge on consuming allergens reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.29: Making a meal safe by removing an allergenic ingredient, responses to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.30: Making a meal safe by removing an allergenic ingredient, responses to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.31: Amount of food handlers who would be able to specially prepare a dish for an individual with food allergies who responded to a survey conducted between May 2018 and November 2018 in Ireland, America and other countries (n=101)

Figure 1.32: Use of shared equipment reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.33: Use of shared equipment reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.34: Practices carried out when preparing an allergen free dish if shared equipment was used in the food businesses reported by respondents to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.35: Practices carried out when preparing an allergen free dish if shared equipment was used in the food businesses reported by respondents to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.36: Destroying food allergens present by processing a foodstuff reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Figure 1.37: Destroying food allergens present by processing a foodstuff reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Figure 1.38: Provision of written allergen information available for consumers during observational inspections between May 2018 and November 2018 in Ireland (n=20)

Figure 1.39: Accuracy of written allergen information for consumers during observational inspections between May 2018 and November 2018 in Ireland (n=13)

List of Appendices

Appendix 1: Food Allergen Survey

Appendix 2: Observational Audit Results (Ireland)

Appendix 3: Observational Allergen Management Audit Results (Ireland)

Appendix 4: Observational Audit Results (America)

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Chapter 1: Literature Review

1. Literature Review

1.1 What is a Food Allergen?

A food allergy can be defined as an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food. An adverse immunological reaction can occur in the body after consumption of a component of a foodstuff or ingredients within a foodstuff is recognized by allergen specific immune cells within the body. These components or ingredients are known as food allergens (Boyce, *et al.*, 2010).

The European Academy of Allergy and Clinical Immunology task force has proposed that any adverse reaction to food be called 'food hypersensitivity' (Skypala, *et al.*, 2009). A food allergy is a type of food hypersensitivity, which can be divided in clinical terms into food allergy and non-allergic food hypersensitivity such as lactose intolerance. Food allergy can then be further subdivided into IgE-mediated food allergy and non-IgE-mediated food allergy (Flanagan, 2014). IgE-mediated allergic responses are the most widely recognized form of food allergy and are characterized by the rapid onset of symptoms after ingestion. During initial '*sensitization*' to the food, consumption of the allergenic food protein stimulates production of IgE antibodies specific to that food which then bind to tissue basophils and mast cells. When one consumes a food containing an allergenic protein component, the protein binds itself to the IgE antibodies. This signals the immune cells to release chemicals which cause allergic symptoms. The onset of these allergic symptoms is generally quite quick after the ingestion of a food allergen as chemicals, such as histamine, are rapidly released from the body cells (Waserman, *et al.*, 2011).

Individuals may also experience cross reactivity which is when a food allergen shares the same structure as a different food allergen and this can trigger an adverse reaction extremely similar to a reaction which would be triggered by the original food allergen (Boyce, *et al.*, 2010).

Symptoms of IgE-mediated reaction can vary from mild to severe and the frequency and severity of the reactions can vary greatly from person to person. The skin, gut and airways are the usual arena for the IgE allergic reactions (Braly, *et al.*, 2006). Mild symptoms would include oral allergies such as the itching and tickling of the mouth

and pharynx. This usually occurs due to the cross reaction between proteins in pollen (e.g. birch, ragweed, grass) and fresh fruit and vegetables. The most severe condition which could occur due to an IgE-mediated reaction is a condition known as anaphylaxis, which can be very serious as it could result in death. This can be triggered by any major food allergens, but historically foods including shellfish, peanuts and nuts appear to be the most common causes. Onset indicators of anaphylaxis includes a drop in blood pressure, respiratory difficulties and persistent gastrointestinal symptoms and should not be ignored (Waserman, *et al.*, 2011).

Non-IgE mediated food allergies are less common than IgE-mediated, and unlike the IgE-mediated food allergy, the symptoms are typically delayed from hours to weeks after ingestion. In addition to this, compared to IgE-mediated food allergies, the diagnosis of the various non-IgE-mediated food hypersensitivity syndromes can be challenging given the lack of non-invasive confirmatory tests for most of these disorders (Connors, *et al.*, 2018).

Non-IgE mediated allergic reactions often occur with the generation of T cells that respond directly to the consumed food allergen protein. Inflammatory responses often occur such as Eosinophilia inflammation, caused by the release of mediators, such as histamine. Such allergic reactions affect the gastrointestinal tract and the skin and lead to symptoms including vomiting, bloating, diarrhoea, celiac disease and its related skin disorder dermatitis herpetiformis (Waserman, *et al.*, 2011). Due to their late symptom onset it is very difficult for professionals to make the association between the offending food allergens and the symptoms. However, it has been identified that the most common food allergens which cause this type of allergy are cow's milk and soya (Royal Children's Hospital Melbourne, 2016).

Food intolerances and sensitivities are when an individual cannot digest certain foods properly. It may be very easy to confuse these with food allergies as the symptoms experienced are similar. However, food allergies are more severe as they are life threatening because they involve multiple organs in the body (Berggren, *et al*, 2017).

1.2 Prevalence of Food Allergies

Food allergy literature derived from reports and epidemiological studies provides informative and statistical data on the amount of individuals whom experience and suffer from food allergies in many different parts of the world. However, as Prescott, *et al.* (2013) states in an article on the changing patterns of food allergy burden in children, *“despite food allergies being amongst the most common chronic non-communicable diseases in children in many countries worldwide, quality data on the burden of these diseases is lacking”*. With an aim to collect data on the global patterns and prevalence of food allergy he found that of the 89 countries surveyed, which were all national member societies of the World Allergy Organization and neighbouring countries, only 10% had accurate food allergy prevalence data and more than half of the countries did not have any data on food allergy prevalence (Prescott, *et al.*, 2013).

The Irish Food Allergy Network reported in the year of November 2017 that in Ireland, 4% of children now have a food allergy. In the year previous, Ruth Charles (2016), a registered dietician and secretary to the Irish Food Allergy Network stated the prevalence of food allergies in Irish adults were between 1-2%.

Comparing this to published American literature, The Food Allergy Research and Education (FARE) published statistics that stated *“approximately 15 Million people in the United states have food allergies”* (FARE, 2019). This figure is representative of roughly 4.6% of Americans. In a report on food allergy prevalence in America, published by the Internal Medicine Journal, Tang and Mullins (2017) identified *“Prevalence is greatest in young children, but recent evidence indicates it is also becoming more common in adolescents and young adults and in developing nations as well”*.

However, when collecting such data for statistical analysis from medical and hospital admissions reports, surveys, secondary published data such as journal articles, researchers have found it problematic to conclude a figure which is representative of the world, continents of the world, and even countries due to the extensive list of factors, including diets, culture and food sources, that impact these results.

In 2017, The World Allergy Organisation stated, *“food allergy affects approximately 2.5% of the general population, but the spread of prevalence data is wide, ranging from 1% to 10%”*. Reasons for the vast spread of prevalence are most likely due to the factors which impact the results. Some factors include the misuse and misinterpretation of the term ‘food allergy’, specific cohorts, dietary requirements of individuals, their age and ethnic category, geographical location or the known ‘priority’ allergens of that area, diagnostic methods and the use of different methodologies to name a few (Sicherer, *et al.*, 2018). The Food Safety Authority of Ireland (FSAI) alluded to some of these factors by stating,

“Though it is generally accepted that the incidence of food allergies and intolerance in industrialised nations appears to be increasing, determining precise numbers is difficult due to relatively mild symptoms in some cases and the unreliability of self-diagnosis” (FSAI, 2015).

In addition to this, the National Institute of Allergy and Infectious Diseases (NIAID) report on the Guidelines for the Diagnosis and Management of Food Allergy in the United States (2010) found a 10% differentiation rate between prevalence rates in American adults and children from self-diagnosis to the percentage of food allergy cases confirmed by a double blind placebo controlled oral food challenge.

The findings of a 2019 article on the prevalence and severity of food allergies among U.S. adults verifies this finding as the study found that a population-based survey of 40,443 U.S. adults, on estimate 10.8% had a food allergy at the time of the survey in comparison to the 19% of adults who believed they were food allergic (Ruchi, *et al.*, 2019).

1.3 Regulation of Food Allergens in Prepacked food and Non-Prepacked food in Ireland

Prepacked Food

Although there are an extensive amount of foods that one may have an allergic reaction or suffer intolerance to, *“EU Law stipulates that only the use of 14 specific food allergens in producing or preparing a food (including beverages) must be*

declared” (FSAI, 2015). These 14 known allergens are listed in Annex II of the regulation.

Regulation (EU) No. 1169/2011 on the provision of Food Information to Consumers (FIC) came into effect in all European Union member states in December 2014. The new legislative text introduced key changes to the way in which allergen information is displayed on prepacked foods. These identified substances must be indicated on the label through the list of ingredients with a clear reference to the name of the substance or product as listed in Annex II to FIC. The name of the substance must also be emphasised through a typeset that clearly distinguishes it from the rest of the list of ingredients by means of font, style or background colour. In the event that the product does not require a list of ingredients, the indication of the allergen must comprise the word ‘*contains*’ followed by the name of the allergen (FSAI, 2014).

Non-Prepacked Food

In addition to the new regulation on prepacked foods, FIC now requires new mandatory allergen information to accompany non-prepacked food, such as meals from takeaways, caterers and restaurants or loose foods sold at supermarkets. As it was at the discretion of each Member State to decide upon which manner they would implement these new rules nationally, Statutory Instrument (S.I) No. 489 of 2014 was developed by the Department of Health. This instrument (2014) stipulates that *“the food business operator shall not present or make available food for sale or supply, or sell or supply food, unless written particulars of any allergen in the food are indicated at the point of presentation, the point of sale, or the point of supply”*.

1.4 Regulation of Food Allergens in Prepacked and Non-Prepacked food in the US

The U.S. Food and Drugs Administration (FDA) have reason to believe that although many foods have been reported to cause food allergies, there is a scientific consensus that only eight specific foods can cause a serious allergic reaction in sensitive individuals, which account for 90% or more of all food allergies. These eight specific foods can also be defined as the ‘major’ or ‘priority’ allergens, which are listed in the FDA Food Code (2017) as: Milk, Egg, Fish, Crustacean Shellfish, Tree Nuts, Wheat, Peanuts and Soybeans (FDA, 2017). It is interesting to note that the European Union

has declared, for the most part, these same 8 ingredients as food allergens across Europe, however they have minor modifications to the name by which they are called and have 6 additional allergens which are listed in Regulation 1169/2004 as: Celery, Mustard, Sesame seeds, Sulphur Dioxide, Lupin, and Molluscs. In the United States, the Food Allergen Labelling and Protection Act (FALCPA) of 2004 requires that any pre-packed food, which contains any of the 8 major allergens, must be declared on the food label.

However, this law which was brought into effect from the 1st of January, 2006, only applies to the labelling of pre-packed FDA-regulated foods and does not currently extend to apply to non-prepacked foods in the United States. This was the biggest contrast between Europe and the United States of America on the regulation of food allergen labelling which was noted when critically analysing and differencing between the Food Allergen Labelling and Protection Act of 2004 and the Food Information for Consumers Regulation.

Illinois, Massachusetts, Maryland, Michigan, Rhode Island, Virginia, New York City and St. Paul Minnesota have passed acts or implemented similar measures which make it safer for individuals with food allergies to dine in restaurants. For example, restaurants in Massachusetts are required by law to display a food allergy awareness notice on menus and menu boards which advises the customer to inform their server if they have a food allergy prior to placing their order. Similarly Rhode Island passed a Food Allergy Awareness in Restaurants Act which now requires restaurants in Rhode Island to display a notice to customers on all menus informing them of their obligation to inform their server of their food allergies (FARE, 2019). To date, the U.S. state of Indiana has not been known to pass a similar act.

Under Section 209 of the Food Allergen Labelling and Consumer Protection Act of 2004, FDA is to work in co-operation with the Conference for Food Protection (CFP) to pursue revision of the Food Code to provide guidelines for preparing allergen-free foods in food establishments including restaurants, delicatessens, bakeries, and elementary and secondary school cafeterias (FDA, 2004).

1.5 Food Allergens in the Catering Sector

In Regulation (EU) 1169/2011, the importance of providing any food additive, substance, ingredient, or processing aid to the end consumer prior to their purchase, particularly those whom may suffer from a food allergy or intolerance is expressed. In this binding legislative act, recital 48 states, *“evidence suggests that most food allergy incidents can be traced back to non-prepacked food. Therefore information on potential allergens should always be provided to the consumer”* (European Commission, 2011).

As briefly mentioned, to comply with the requirements set out in S.I 489 of 2014, food allergen information must be provided for any non- prepacked food intended for sale or supply, which contains one or more of the 14 allergens in a written format, *“either at the point of presentation, the point of sale, or the point of supply”* . In the absence of a list of ingredients, the accompanying written information can include the word ‘contains’ followed by the allergens by name. In addition, there are minimum requirements under this law for the way in which the food business operator (FBO) provides this information, for example this information must be provided in the English language and in a conspicuous place, such that it is easily visible and available to the final consumer or mass caterer (Health Regulations, 2014).

The FSAI (2014) understood that the affected food businesses would need to *“adapt their processes”* so that they could trace the food allergens in a foodstuff from the point of entry to the point of sale so that customers could be *“accurately informed”*. The FSAI’s Safe Catering Pack, which is an easy to use, practical, food safety management system (FSMS), was revised to include a new section on food allergens following the introduction of S.I 489 of 2014. This section, which consists of a Safe catering plan and new allergen control review document, aids the food business operator in identifying all food allergens from the point of goods inwards to the point of sale and records checks of all allergen controls.

In an analysis of Regulation (EC) 1169/ 2011 Fransvea, *et al.*, (2014) concluded the final aim of the regulation is the protection of public health and consequently to ensure a good level of consumers protection. This in turn places the onus on food business operators through all levels of the food chain.

Since there is no law which requires FBO's in all States of America to provide allergen information in a written format for non-prepacked foods, best practice guidelines is the only assistance available for FBO's to manage of food allergens. Since the establishment of the Food Allergen Labelling and Protection act in 2004, the FDA's Food Code has required the '*person in charge*' to be able to identify the major food allergens used on their premises and to be aware and informed on the symptoms that such allergens could cause if an individual is sensitive to such allergens. As this Food Code is updated roughly every four years, several additions to the management of allergens within the food code have been made. Since 2009, the food code has included that all employees should be "*trained in food safety, including allergy awareness, as it relates to their assigned duties*" (FDA, 2009).

It would appear that the onus is predominantly placed on the consumer in order to obtain any information on allergens in American establishments serving non-prepacked food. This is evident from the notices displayed informing customers of their obligation to inform their server of their food allergies and from guidance on the Food Allergies Research and Education for consumers to communicate with restaurants chefs and managers with the Food Allergy Alert Chef Card. This chef card is a SafeFARE tool designed for individuals who suffer from food allergies and intolerances. Once this card is completed, individuals carry the card on their person and present it to a chef or manager when dining out in food establishments.

1.6 Food Allergen Training for Food Handlers in Ireland

Regulation (EC) No. 852/2004 requires that food business operators must ensure food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activity (European Commission, 2004). In order for food business operators to fulfil this legal requirement, the FSAI states that Food Business Operators can develop their own training course for their staff, they can recruit a food safety trainer for in-house or external training, or they can complete online e-learning modules.

The Food Safety Authority of Ireland (2015) in consultation with industry representatives, authorised officers and training providers, published a *Guide to Food Safety Training*, for those who wish to develop their own training course for their staff

which outlines the standard of food safety training required for all food handlers within a food business. This guide is broken down into three levels, where by Level 1 outlines employees must be able to demonstrate safe food handling practices, which includes following the procedure in place for the management of food allergens, before they start handling food (FSAI, 2015). In support of this, the guide also outlines the resources or support employees may need from employers to help demonstrate such good food safety practices, including *“instruct staff on the procedure in place for the management of food allergens”* (FSAI, 2015).

As there is no national accreditation body for training courses in Ireland, food safety trainers must have a background in food safety and possess the relevant food safety skills, including allergen management (FSAI, 2016). In addition to this they must have relevant experience in the food industry and it is advisable they have knowledge on how people learn and possess training skills. If FBO's choose e-Learning to fulfil their legal requirements for training, management support and follow up to this is vital.

Various companies provide food allergen training courses in Ireland, either online or by delivering the course in person. The training encompasses the content of the EU Food Allergen Regulations, how this applies to FBO's and what action they need to take to comply with the regulation (Safe Hands, 2020).

1.7 Food Allergen Training for Food Handlers in America

In the state of Indiana, the Retail Food Establishment Sanitation Requirements, Rule 410 IAC 7-24, avows food handler certification as a *“public health intervention to protect customer health”*. Under section 118 of this rule, the person in charge is required to demonstrate, to the regulatory authority, knowledge of foodborne disease prevention, application of the HACCP principles, and the requirements of this rule by *“Having a certified food employee who has shown proficiency of required information through passing a test that is part of an accredited program, as per 410 IAC 7-22”* (Indiana State Department of Health, 2004).

ServSafe (2019) offers training and certification across America and is widely recognized by more federal, state and local jurisdictions than any other food safety certification. According to the Indiana Restaurant and Lodging Association (2019), and

in line with the requirements of the FDA Food Code, in the state of Indiana “*one certified person is required to be onsite during operating hours*”. In order to meet this requirement, a food establishment must have more than one certified food protection manager so that one can be present on every shift. Completing the ServSafe Manager Course and passing the ServSafe Manager Certification Examination meets the above requirement.

ServSafe also delivers a ServSafe Allergens online course which contains vital information on how both managers and food handlers can accommodate guests with food allergies by covering topics including the identification of allergens, communicating with the customers, preventing cross contact and utilizing food labels etc., (ServSafe, 2019).

In addition to this, Food Allergy Research and Education developed FARECheck, an audit programme for internal food allergen handling and preparation training, to help provide an additional layer of education and awareness around food allergies and anaphylaxis among food handlers who serve food allergens (FARE, 2019). Any training must address the following topics in order to receive the FARECheck Certified mark:

- Overview of Food Allergies
- Anaphylaxis
- Emergency Response
- Communications Protocols
- Reducing Risk for Cross-Contact
- Use of Recipes & Ingredient Disclosure
- Knowledge Test

In a 2018 study on Food Allergy Awareness Training for the Food Service Industry, Stoneman, (2018) aimed to determine if an instructor led food allergy training programme could produce an increase in knowledge and potentially a change in behaviour that could help minimise the risk of food allergy reactions in food service establishments. Results of his study revealed 97% of participants showed an increase in knowledge, 98% felt the training provided them with new ideas to minimize the risk of food allergy reaction and 100% indicated they would recommend food allergen training to others in the food service industry.

1.8 Aim of the project

The overall aim of this project was to examine food allergen management in the food service industry and ascertain the level of allergen awareness and knowledge among food handlers who work in the sector.

1.9 Objectives of this study

The specific objectives of this comparative study were to compare and identify compliance (where appropriate) of Irish and U.S food establishments with intent to:

- Ascertain the level of allergen awareness and knowledge of food handlers who work, or have worked in the industry
- Review if food handlers had received food allergen training commensurate to their work duties.
- Assess the compliance with allergen management regulations and best practice guidelines applicable to the geographical area of research
- Compare and contrast the control of food allergens in areas of food preparation in different geographical locations (Identify how allergens were being managed in kitchens)
- Consider how the allergen management practices correspond to the training which the food handlers had received in order to identify knowledge gaps and the benefits of training

Chapter 2: Methodology

2. Methodology

2.1 Food Allergen Questionnaire

A 23 question survey (see Appendix 1) was designed to gather primary data from food handlers. The survey was composed of 3 open-ended text questions, 16 single-select multiple choice questions, 2 multiple-select multiple choice questions and 1 question which offered a rating scale answer choice. The questions within the survey aimed to collect data such as the level of food safety training the respondent has received to date, their opinion on the importance of food allergens, their knowledge of food allergens and the law around the labelling of non-prepacked foods, the information about food allergen management plans in their place of work and how they implement them. Other short questions in the study were included to give an overview of the demographic of the respondents and to aid in the filtering of this data during the data analysis stage; such as the type of establishment they work in and roles which they were responsible for in these establishments etc.

Suitable participants for this study were individuals who work or had worked in the food business industry and had a role and responsibility in managing the control of food allergens. Such participants included food handlers such as chefs and cooks of all grades, managers and supervisors, front of house staff such as waiters and waitresses, back of house staff such as kitchen porters and other persons such as a maître d'.

The questions in the survey tested the knowledge of what is required of Irish food businesses under Regulation EU 1169/2011 and what has been published as best practice by the FDA in the Food Code. The estimated completion time of this survey was under 6 minutes for an Irish food handler when tested.

The questionnaire was distributed in hard copy and was also accessible via an online survey platform. All feedback on the questionnaires from the respondents was anonymous.

2.1.1 Hard Copy Survey

The questionnaire (see Appendix 1) was printed and distributed in hard copy to 55 food premises in the vicinity of the North East of Ireland and to 40 food premises across the mid-west of the state of Indiana, U.S. As the hard copy was handed out to

each premise, an account of the food establishment name, location, and number of questionnaires distributed was accounted for on an Excel spread sheet in order to ensure to return to these premises to collect completed surveys and also to ensure the same premises were not visited twice. Only two hard copy surveys were given to each food establishment to prevent biased results. 39 hard copy surveys were collected and this data was manually entered into the online survey platform.

2.1.2 Online Survey

The questionnaire was uploaded to an online survey platform called Free Online Surveys. The URL and Quick Response (QR) link to access the survey online was distributed to the wider public through private social media to target potential respondents. The link to access this online questionnaire was also shared on the Tippecanoe Health Department social media accounts with intent to reach potential respondents, as most of the health department followers and audience on social media consisted of food handlers from local food establishments. The questionnaire link was emailed to 50 food businesses both in Ireland in the United States. 62 questionnaires were completed through the online survey.

A total number of 101 completed questionnaires were safely stored on the online survey platform for data analysis. This online programme facilitated data analysis including percentage rates on answers to compare data and standard deviations. It also provided a function which allowed data to be exported to Excel. The data was more accessible, easily understood and manageable when exported to Excel were most of the data analysis was preformed such as the frequency, the mode and the median of responses.

2.2 Observational Audit

A total number of 20 businesses on the North East of Ireland and 20 premises in the Mid-West of Indiana in the U.S were audited through unannounced, observation inspections. These business types included a mixture of restaurants as part of a chain (n=4) independently owned restaurants (n=13), takeaways (n=6), retail establishments (n=4), butcher shops (n=1), public houses which serve food (n=6) and school cafeterias including crèches (n=6). The premises were selected at random due to access to them during professional placement under the Health Service Executive in Ireland and the

Tippecanoe County Health Department in the U.S. The aspects of non-prepacked food allergen control which was examined throughout the unannounced audits in Ireland were:

- The compulsory allergen information which should be provided and compliant for the public as per the way in which it is required under S.I 489/2014
- Ensuring that this information was accurate and up to date, and
- Witnessing if there was an allergen management control plan in place in the food preparation areas of the kitchen

During the audits in the U.S., observations of how the food establishment and food handlers were controlling food allergens were recorded on the audit template (Appendix 4). Through inspections, the objective was to examine if there is an allergen management control plan in place and if it was being implemented in the preparation areas of the food establishment. This includes observing the food handling activities of the food handlers to witness if they are competent and aware of allergen cross contamination and also to assess if there is allergen controls being implemented in the food storage, preparation and cooking areas of the food business.

In Ireland, when accompanying an Environmental Health Officer to food premises, an item or dish was chosen from the menu and the declared allergen ingredients of this item was cross checked to ensure the accuracy of the written allergen information provided. For the recording of this compliance, a five column chart was designed on a spread sheet document. The first and second column contained the premises unique identification number and the type of establishment. The third column recorded if the compulsory written allergen information required under S.I 489/2014 was provided for customers. In the fourth and fifth column, a yes or no was recorded if the information provided was accurate and up to date and if not, why it was not accurate (Appendix 2). A separate template (Appendix 3) recorded the witness of any allergen control management plan which may be in place. For American food establishments, a detailed note was recorded of any measures taken to control allergen management in food storage and preparation areas (Appendix 4).

Chapter 3: Results

3. Results

3.1 Food Allergen Questionnaire Results

By adding the number of completed, hard copy questionnaires (n=39) with the number of completed responses submitted through the online survey platform (n=62), it was found that a combined number of 101 respondents in total completed the food allergen survey.

Q.1 What is your gender?

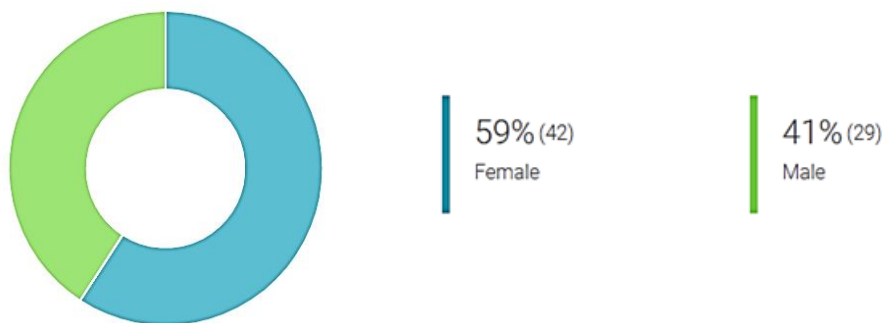


Figure 1.0 Gender of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland (n=71)

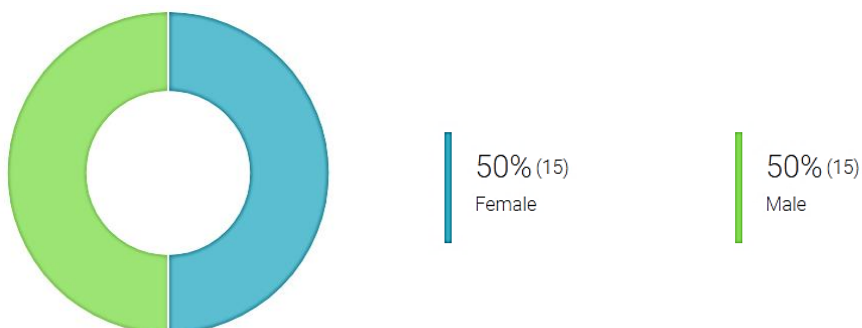


Figure 1.1 Gender of respondents who completed a survey conducted between May 2018 and November 2018 in America and Other Countries* (n=30)

***Other countries in this survey consisted of Spain and Australia**

- Question 1 identified that 56% of the respondents who completed the survey were female (n=57), resulting in the remaining 44% of respondents being male (n=44). An equal amount of males and females completed the food allergen survey outside of Ireland whilst 59% of females compared to 41% of males completed the survey in Ireland.

Q.2 What part of the world do you work in?

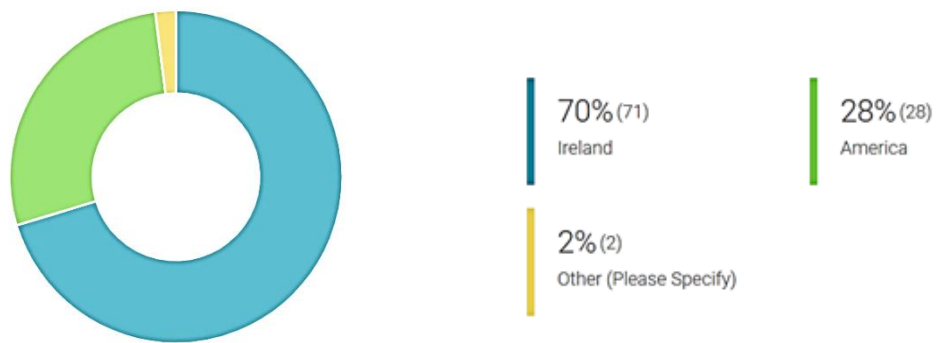


Figure 1.2 Geographical working area of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland, America & other countries (n=101)

- Question 2 examined the geographical working area of the respondents. Out of the 101 responses, 71 respondents worked in Ireland, 28 worked in the United States of America (USA), 1 respondent worked in Spain and 1 respondent worked in Australia.

Q.3 Which age category would you fall under?

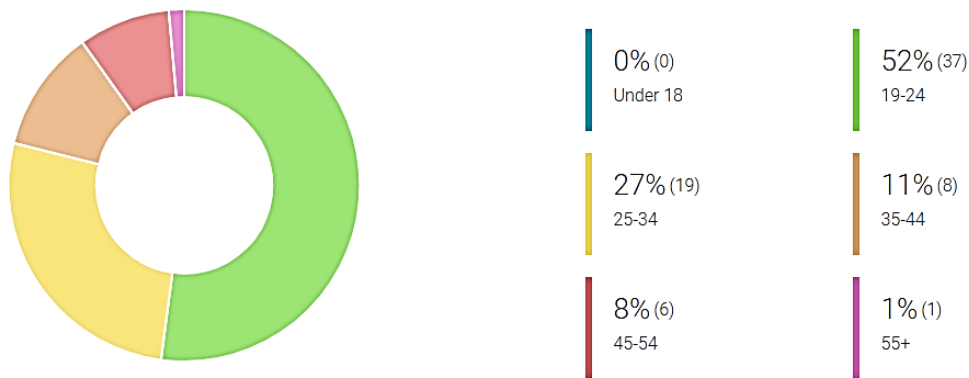


Figure 1.3 Age category of respondents who completed a survey conducted between May 2018 and November 2018 in Ireland (n=71)

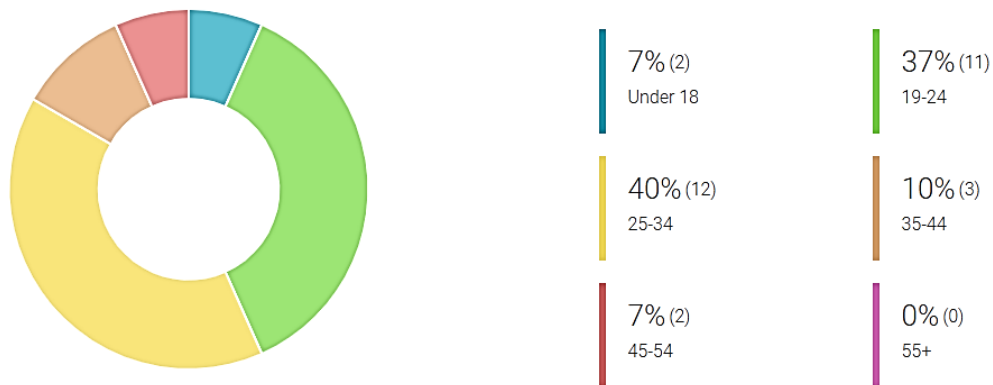


Figure 1.4 Age category of respondents who completed a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 3 revealed the overall age of respondents who completed the survey. Of 101 respondents, 2% were under 18 years of age and they worked in Ireland. Near to half of all respondents were aged between 19-24 (48%), with 37 of them working in Ireland and 11 of them working in the U.S and other countries. 31% of respondents were aged between 25-34 years of age making this the second largest age category, 11% were in the age group of 35-44, 8% of respondents were aged 45-54 and only 1 respondent was aged either 55 or older.

Q.4 What type of food establishment do you work in?

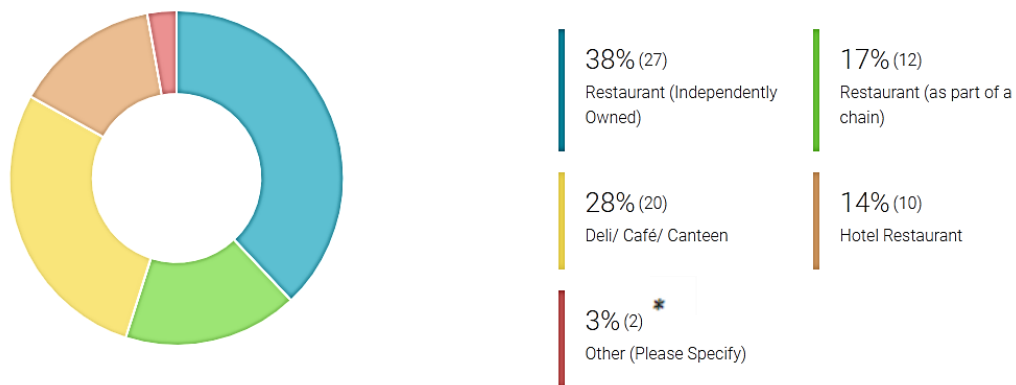


Figure 1.5 Food establishment type respondents reported they worked, or had worked in, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

**Other in this instance was a bar and the health service*

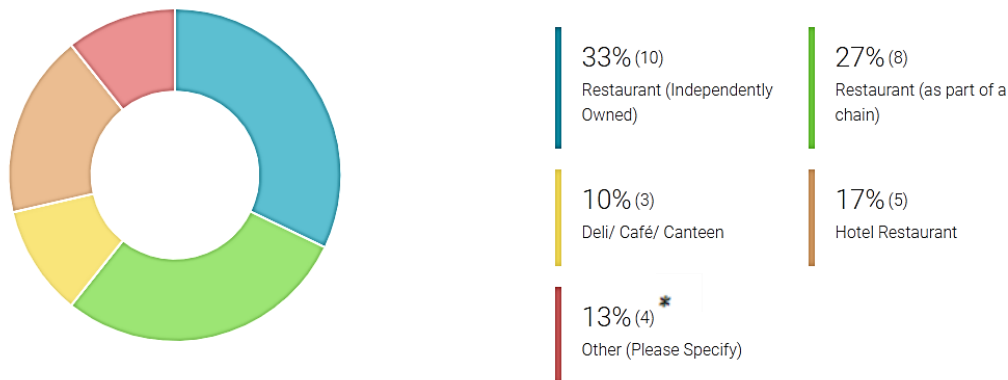


Figure 1.6 Food establishment type respondents reported they worked, or had worked in, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

**Other in this instance were convenience stores, a marine ship, and the health service*

- Question 4 examined the type of food establishment the respondents worked in, as per figures 1.5 and 1.6. Out of 101 respondents, 37% worked in independently owned restaurants. A higher percentage of respondents from outside of Ireland worked in restaurants as part of a chain (27%) in comparison to food handlers that worked in Ireland (17%). Overall, 23% of respondents reported working in a deli, café, or canteen, 15% reported they worked in a hotel restaurant and 6% reported they worked as a food handler in other establishments including convenience stores (n=2), the health service (n=2), a bar (n=1), and a marine, oil and gas ship (n=1).

Q.5 What is your role in the food business?

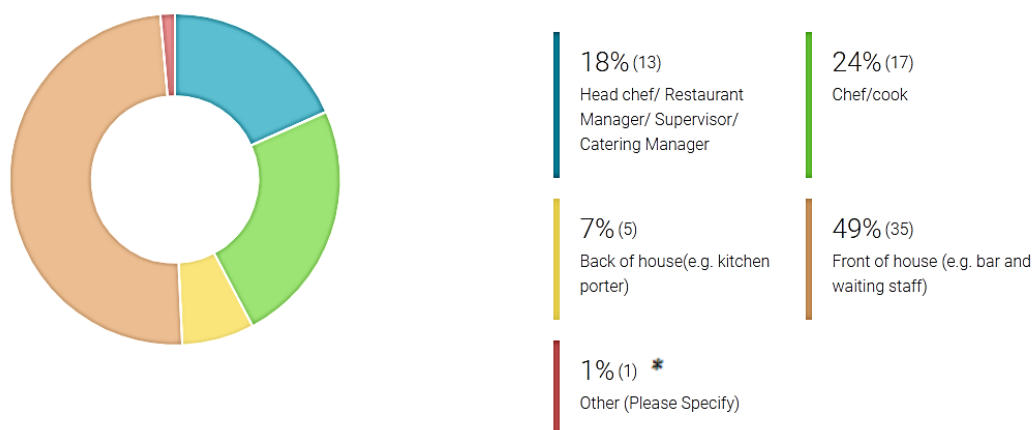


Figure 1.7 Role in the food business respondents reported to carry out in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

**Other in this instance means the role of Back and Front of House*

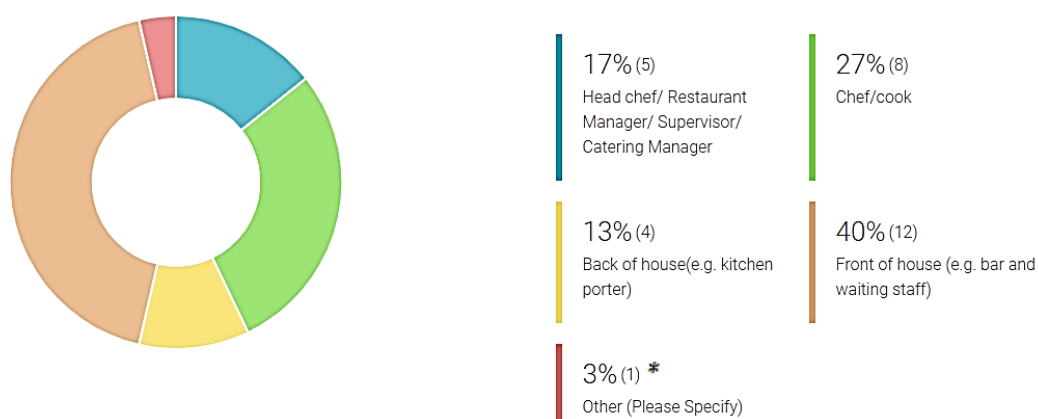


Figure 1.8 Role in the food business respondents reported to carry out in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

**Other in this instance means the role of a health officer.*

- Question 5 identified the respondent's role in their food business. Nearly half of all respondents reported working as front of house staff with 49% of respondents in Ireland and 40% of respondents outside of Ireland, respectively. Overall, 18% of respondents reported as a Head chef/ Restaurant manager/ Supervisor or Catering Manager and a quarter of respondent reported as chefs or cooks (25%), as per figures 1.7 and 1.8. Nine (9%) of respondents reported as back of house staff, 1% reported as both back of house and front of house staff (Other) and 1% reported their role as a health officer (Other).

Q.6 For how many years have you worked as a food handler?

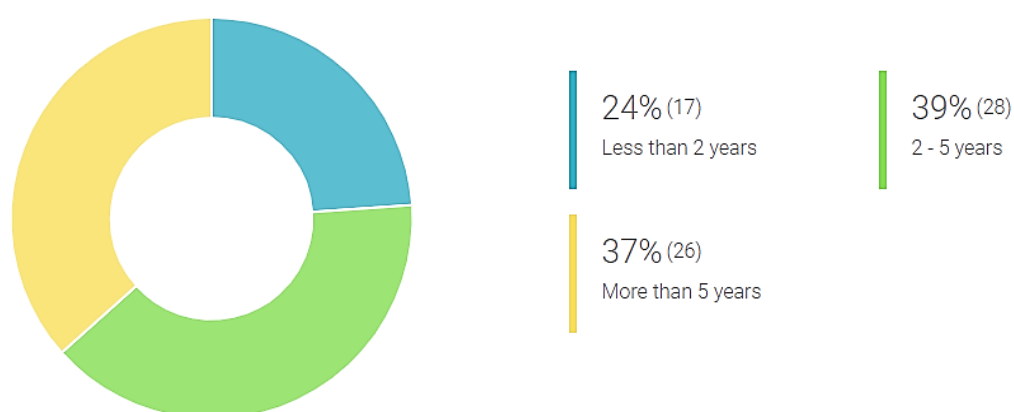


Figure 1.9 Years respondents reported to work as a food handler in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

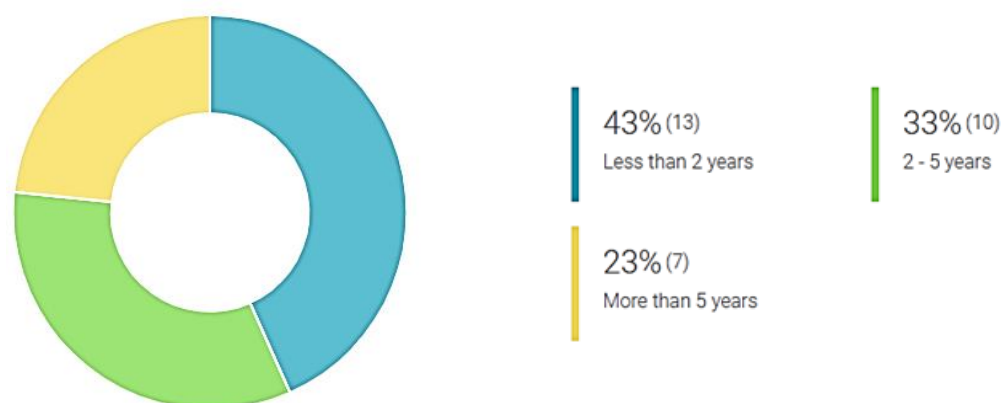


Figure 1.10 Years respondents reported to work as a food handler in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 6 established how long the respondent had worked as a food handler. The combined data showed 30% of respondents worked as food handlers for less than two years, 38% of respondents had worked as a food handler from 2-5 years and 33% had worked as a food handler for more than 5 years. A higher percentage of respondents (37%) had worked as a food handler in Ireland, than respondents outside of Ireland (23%).

Q.7 What is your level of food safety training?

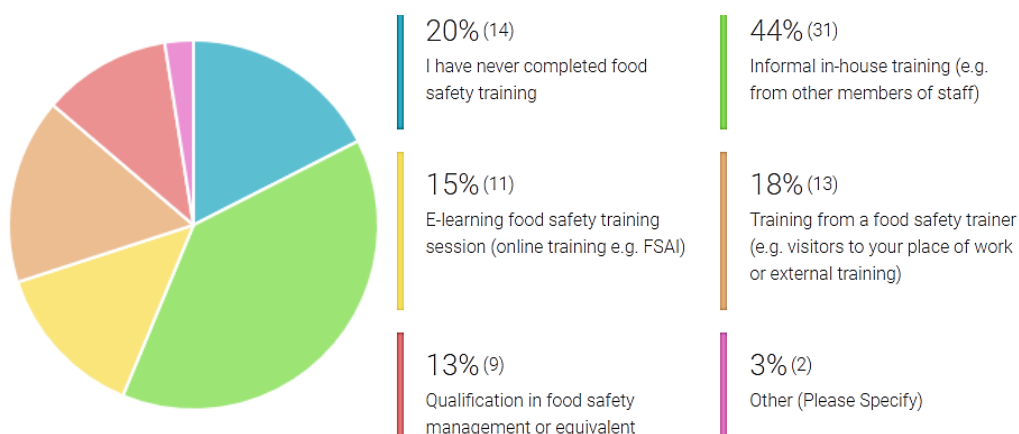


Figure 1.11 Level of food safety training of respondents reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

**Other in this instance was food safety training received as part of a module in college*

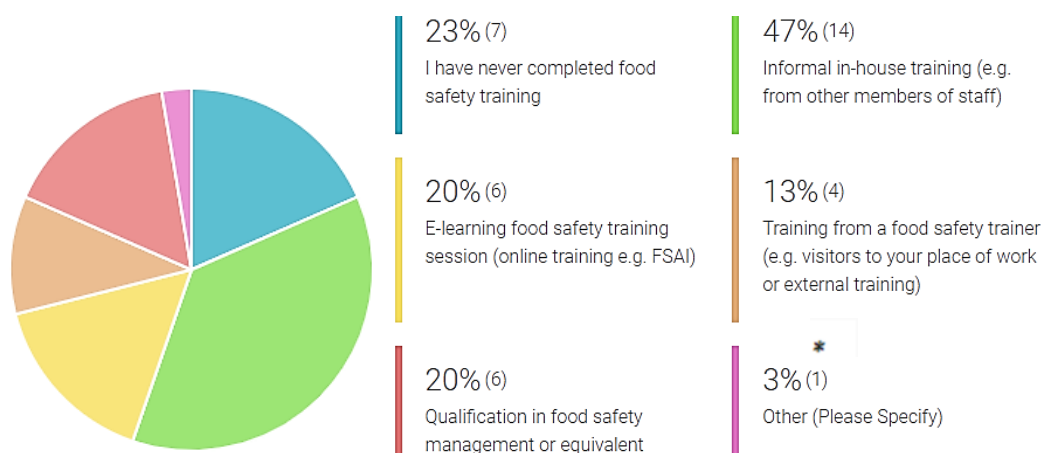


Figure 1.12 Level of food safety training of respondents reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

**Other in this instance was fully qualified to deliver food safety training*

- Question 7 gathered data on the respondent's level of food safety training. Twenty respondents had never completed food safety training, 14 of which were food handlers working in Ireland. Forty-five respondents said they received 'informal in-house training', 17 said they completed an 'E-learning food safety training session', 17 received training from a food safety trainer whilst a further 15 reported to have obtained a qualification in food safety management or equivalent. Two respondents received food safety training as part of a college food safety module and 1 respondent reported fully qualified to deliver food safety training. The remaining 8 respondents had received a combination of two, three, and even four of the options listed.

Q.8 Have you ever received any training on food allergens?

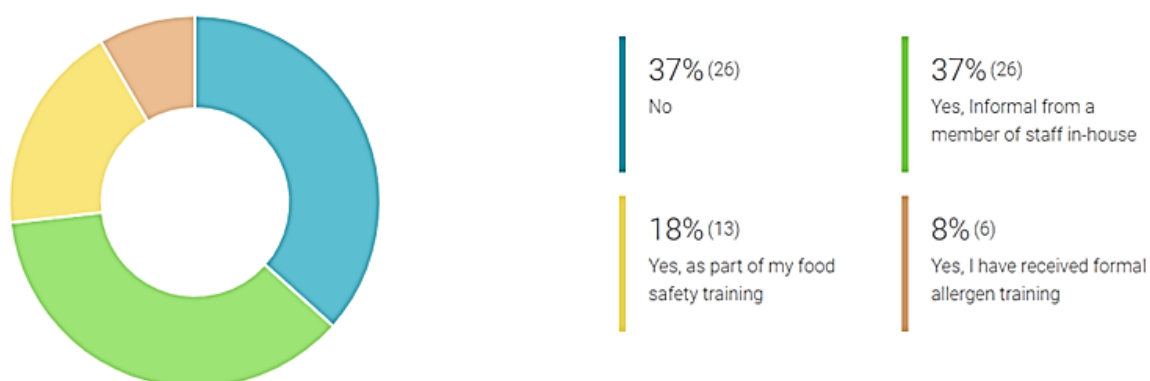


Figure 1.13 Training respondents received on food allergens reported to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

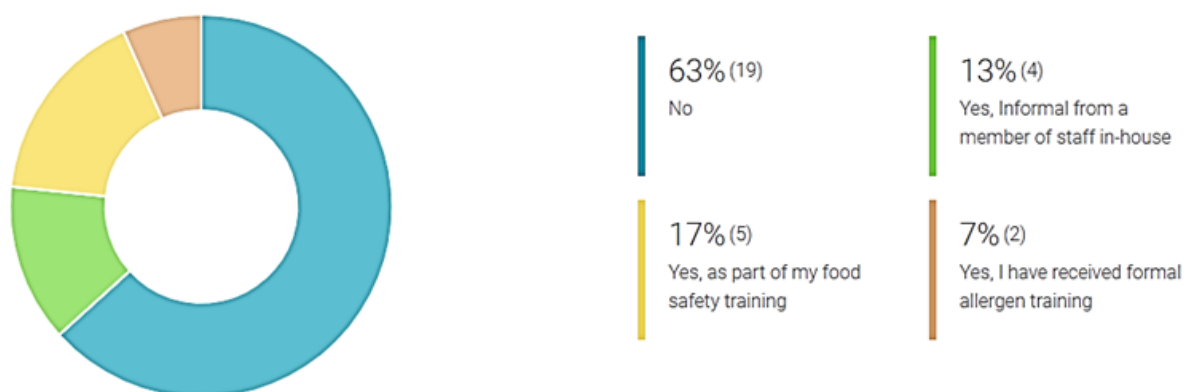


Figure 1.14 Training respondents received on food allergens reported to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- This question distinguished whether the food handler had received training on food allergens. Final statistics confirmed 45 of 101 respondents received no training on food allergens, whilst of the remaining 56 which had received training, 63% of food handlers who worked in Ireland had received training in comparison to the 37% of food handlers who worked outside of Ireland. Figures 1.13 and 1.14 show 30 of 101 respondents received informal training, 18 had received allergen training as part of food safety training and only 8 respondents received formal allergen training.

Q.9 Would you consider food allergen management a 'priority' where you work?

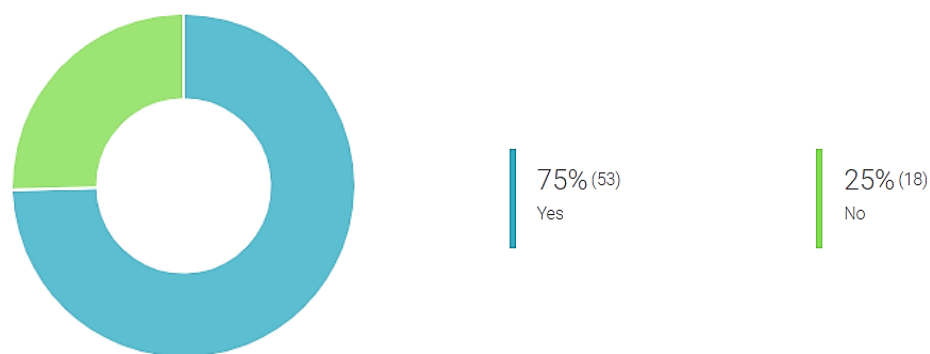


Figure 1.15 Amount of food handlers who reported food allergen management a priority where they worked, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

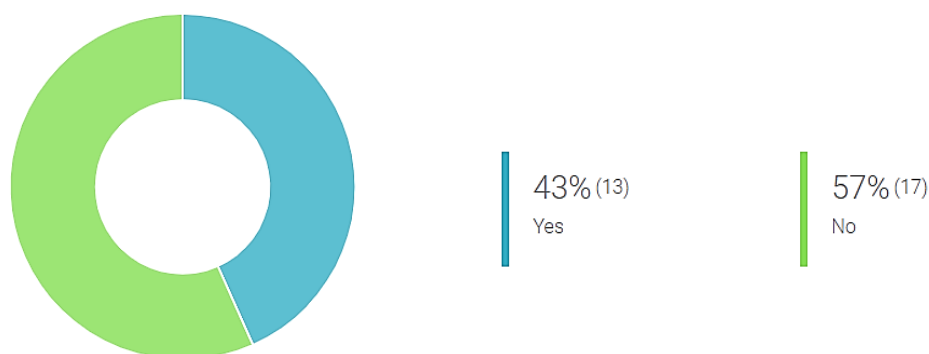


Figure 1.16 Amount of food handlers who reported food allergen management a priority where they worked, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- When respondents were asked their opinion on whether they would consider food allergen management a priority in their place of work, 65% of respondents said yes, they would consider it a priority. 75% of respondents who worked in Ireland said they would consider it a priority in comparison to 43% of respondents who worked in America and other countries.

Q.10 On a scale of 1-4, how important do you think allergens are?

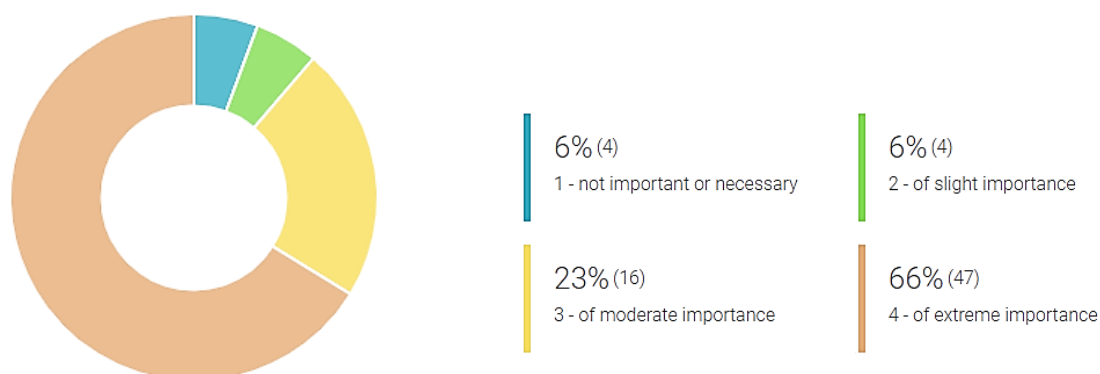


Figure 1.17 Importance of allergens reported to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

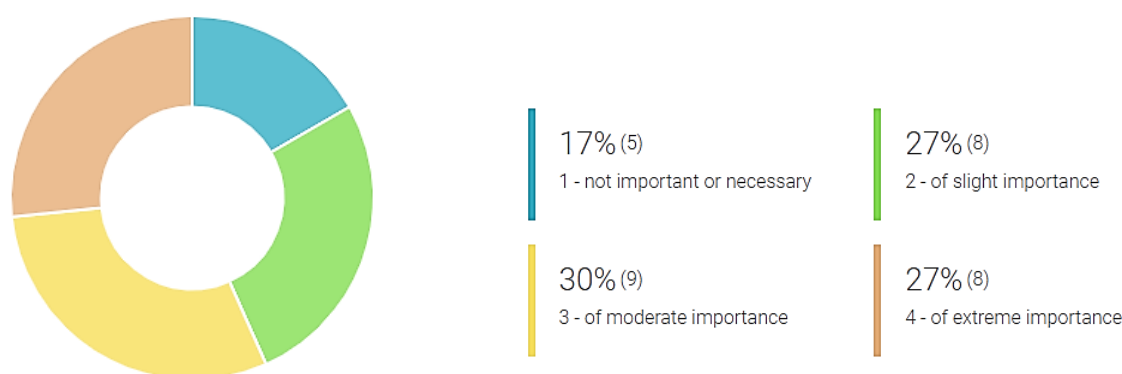


Figure 1.18 Importance of allergens reported to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 10 asked responders to rate the importance of allergens on a scale of 1-4 with 1 being of no importance or not necessary to 4 being of extreme importance. A total of 9 respondents felt allergens were of no importance, 12 respondents felt allergens were of slight importance and 25 respondents rated allergens of moderate importance. Out of 101 respondents, fifty-five reported allergens were of extreme importance. Forty-seven of these were respondents from Ireland and the remaining 8 were food handlers in America and other countries.

Q.11 Is there a food allergen plan in your place of work?

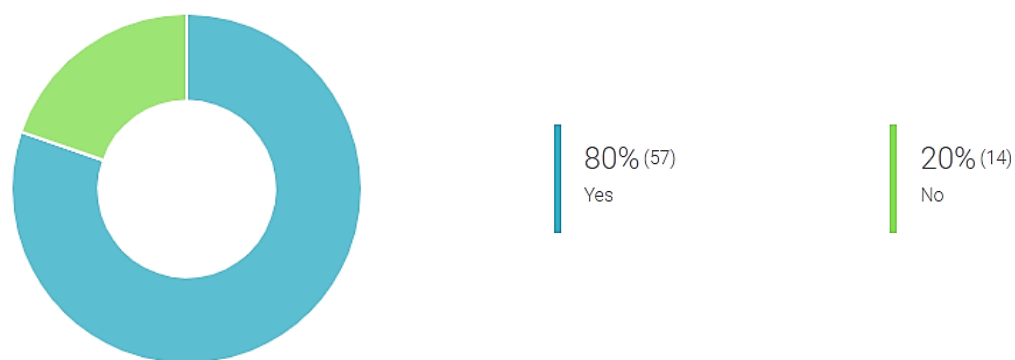


Figure 1.19 Respondents who reported that there was a food allergen plan in place in their place of work, in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

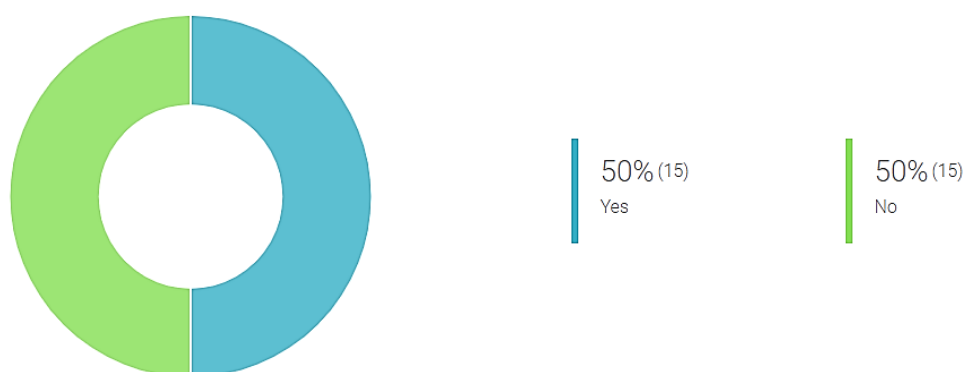


Figure 1.20 Respondents who reported that there was a food allergen plan in place in their place of work, in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 11 asked respondents of the survey if there was a food allergen plan in their place of work. 80% of the respondents who worked in Ireland reported there was an allergen plan in place, while the remaining 20% said there was not. Half of the respondents from America and other countries reported there was an allergen plan in place in their place of work, whilst the remaining 50% of these respondents said there was not.

Q.12 How do you prevent food allergen ingredient cross contamination in your food business?

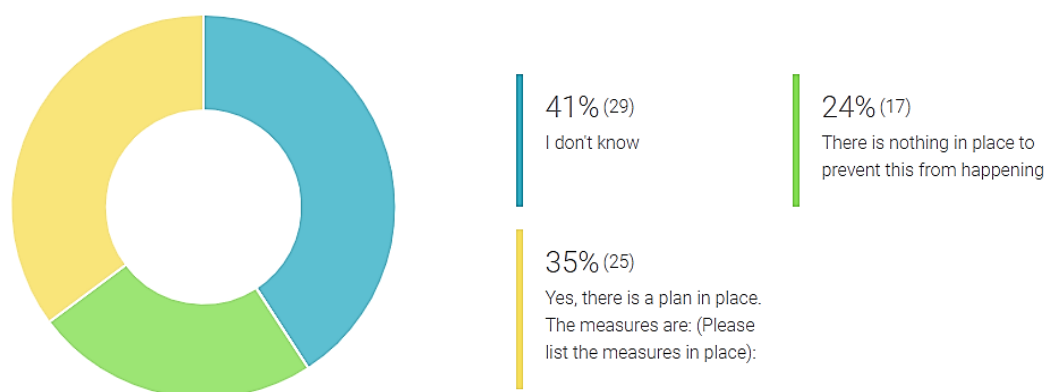


Figure 1.21 Prevention of food allergen ingredient cross contamination in the food businesses reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

Question 12 examined what business procedures were conducted to prevent food allergen ingredient contamination from occurring. Twenty-nine respondents to the survey in Ireland said they did not know how this was achieved and 17 of respondents confirmed there was nothing in place to stop this from happening. Twenty-five respondents who worked in food businesses in Ireland reported there was a plan in place to prevent food allergen ingredient cross contamination. The following measures were reported to be in place:

- Separate food contact materials such as chopping boards and utensils (n=9),
- Staff training and awareness on allergens, allergen signage and information available for food handlers (n=9)
- Designated preparation and cooking areas to prevent cross contamination (n=6)
- Separate storage areas for allergen ingredients, sealed and labelled containers (n=5)
- Cleaning and sanitizing of equipment, utensils and preparation areas after use (n=4)
- Food handlers washing their hands and changing their gloves accordingly (n=3)
- Supplier and delivery control (n=1)

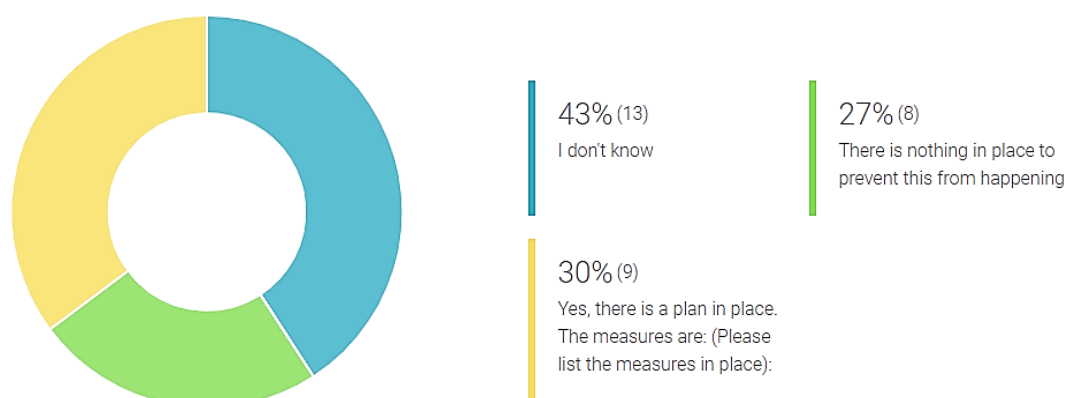


Figure 1.22 Prevention of food allergen ingredient cross contamination in the food businesses reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

Thirteen (43%) respondents from America and other countries reported they did not know how food allergen ingredient cross contamination was prevented in the food business they worked in, whilst eight (27%) said there was nothing in place to stop this from happening.

Nine respondents who worked in food businesses in America and other countries reported there was a plan in place to prevent food allergen ingredient cross contamination. The following measures were reported in the survey to be in place:

- Separate food contact materials such as chopping boards and utensils (n=4)
- Ensuring food handlers are aware of a customer's allergy or intolerance (n=2)
- Designated preparation and cooking areas to prevent cross contamination (n=1)
- Cleaning and sanitizing of equipment, utensils and preparation areas after use (n=1)
- Allergen signage and information for food handlers (n=1)

Q.13 Are you legally required to put allergen information in written format for the dishes you are serving, or non-prepacked (loose) food etc. that are for sale?

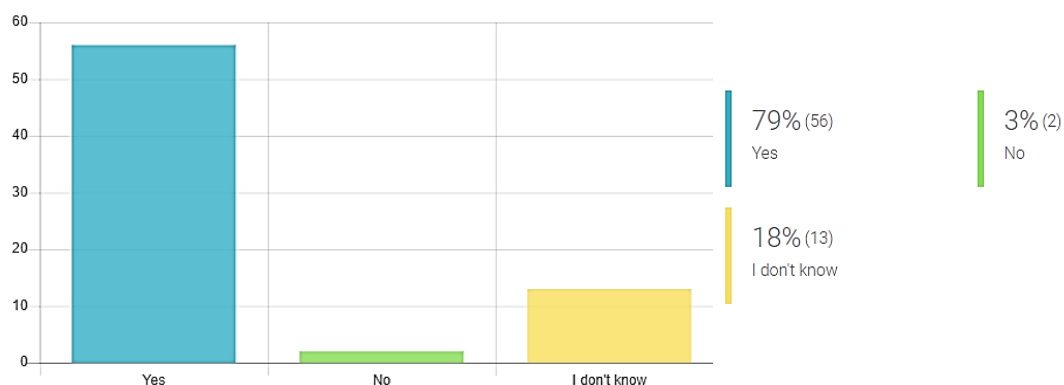


Figure 1.23 Legal requirement for allergen information respondents reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

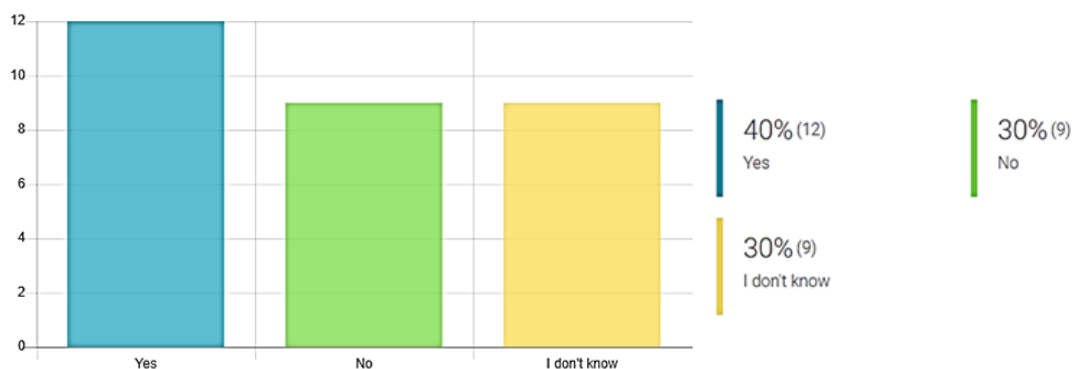


Figure 1.24 Legal requirement to put allergen information respondents reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 13 queried if food businesses were legally required to declare food allergens on non-prepacked food. Of the 28 American responders, 9 food handlers said they did not know, 8 respondents said they were not legally required and 11 respondents believed they were legally obliged. Of the 71 Irish responders, thirteen respondents did not know, fifty-six reported they were legally obliged and two responders (3%) believed they were not legally obliged. One food handler working in Australia believed they were obliged and one food handler working in Spain reported they did not believe it was a legally requirement.

Q.14 How can a consumer find our information for a dish you are serving, or non-prepacked (loose) food you are selling in your business?

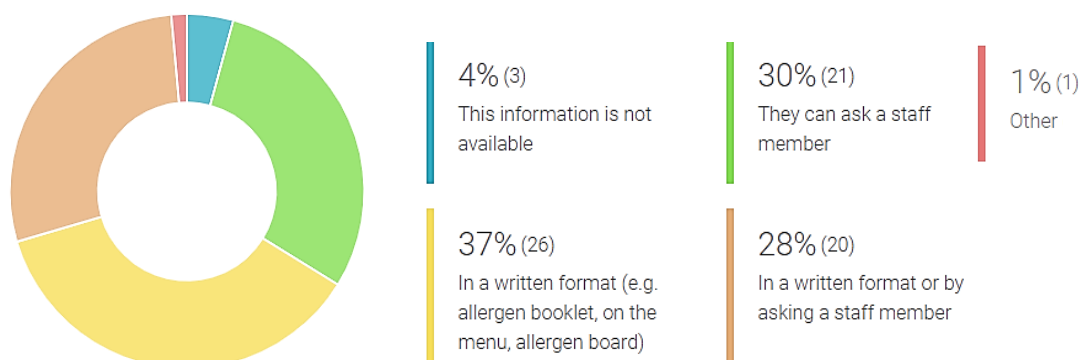


Figure 1.25 How consumers can find information on non-prepacked foods reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

**Other in this instance means the respondents did not know and would have to ask the chef*

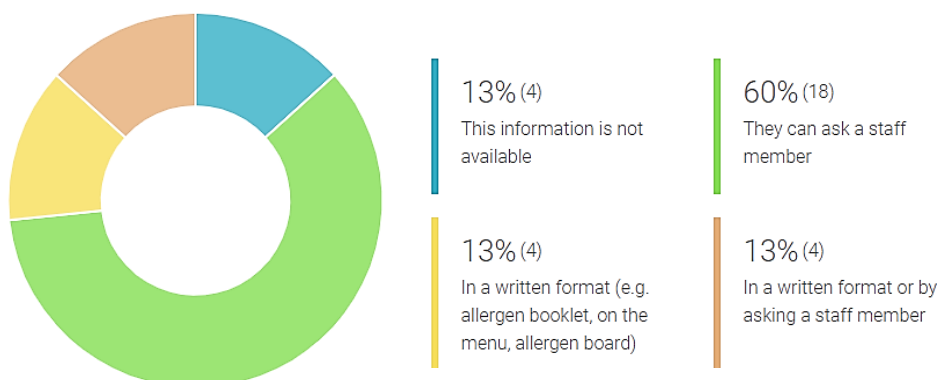


Figure 1.26 How consumers can find information on non-prepacked foods reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Question 14 asked respondents to the survey where customers could locate allergen information for a dish they were serving, or non-prepacked food being sold from the business. Seven respondents said this information was not available and 39 respondents said a customer could ask a member of staff. Thirty respondents confirmed the information was in a written format, of which 26 of these were respondents from Ireland. Twenty-four respondents said a customer could both ask a member of staff and access it in a written format, 20 of these were respondents from Ireland. One respondent from Ireland said they would not know and would have to ask the chef.

Q.15 Do you know how many food allergens there are by law and could you name them?

Question 15 asked respondents did they know how many food allergens there were by law and could they name them. Qualitative responses from food handlers who worked in different geographical locations are illustrated in Tables 1 and 2 below.

Table 1: Summary of responses from 70* food handlers who worked in Ireland to a survey conducted between May 2018 and November 2018

Listed at least one but less than seven allergens correctly	34% (n=24)
Answered 'No' or 'I don't know'	17% (n=12)
Listed seven or more allergens correctly	16% (n=11)
Listed the fourteen allergens correctly	14% (n=10)
Answered an incorrect number and did not list any	10% (n=7)
Answered '14 Allergens' but did not list any	9% (n=6)

*Only one respondent did not complete this question

Table 2: Summary of responses from 28 food handlers who worked in America and other countries* to a survey conducted between May 2018 and November 2018

Answered between one and three correct allergens	39% (n=11)
Answered 'No' or 'I don't know'	28.5% (n=8)
Answered between three and six correct allergens	28.5% (n=8)
Answered more than six but not all eight correct allergens	4% (n=1)

*One food handler from Australia did not know how many allergens there were and didn't list any. One food handler from Spain answered 14 allergens and listed them all correctly.

- Twenty-four respondents listed 1 allergen but less than 7 correctly whilst 12 food handlers from Ireland reported they didn't know how many food allergens there were. Eleven respondents listed 7 or more allergens correctly, 10 respondents listed 14 allergens correctly, 7 respondents gave an incorrect number and did not list any and 6 respondents said there were 14 allergens but did not list any.
- Eight food handlers who worked in America didn't know how many food allergens there was by law. Eleven respondents listed between 1 and 3 allergens correctly, 8 listed between 3 and 6 allergens correctly, 1 respondent answered more than 6 but not all 8 allergens correctly. No respondents answered all 8 allergens correctly.

Q.16 Would you agree that individuals with food allergies can safely consume a very small amount of an allergen without having a reaction?

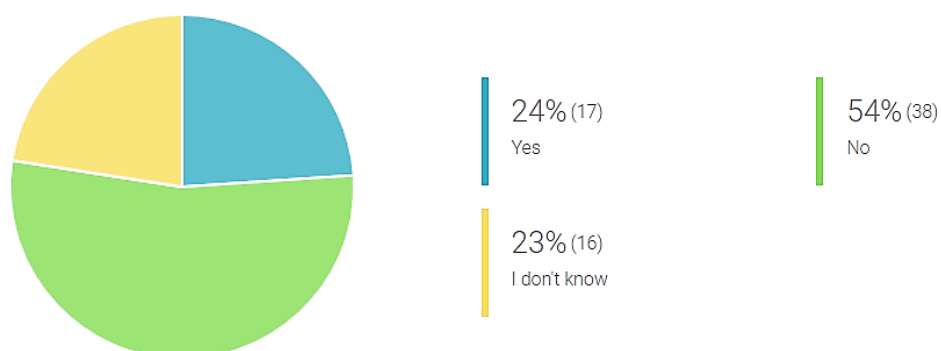


Figure 1.27 Knowledge on consuming allergens reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

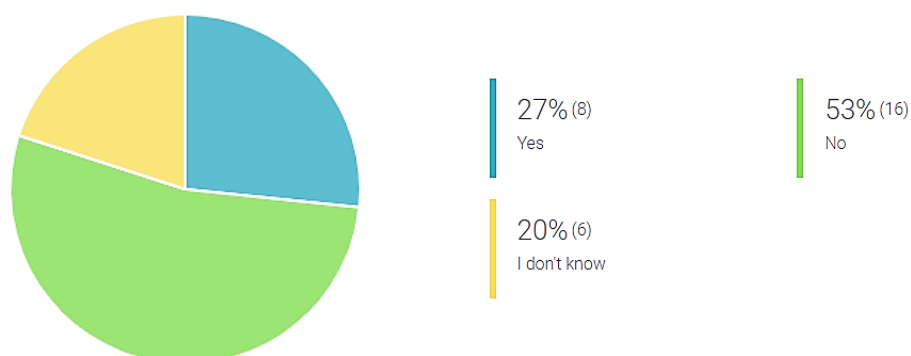


Figure 1.28 Knowledge on consuming allergens reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- 24% of respondents from Ireland and 27% of respondents from America and other countries believed individuals with food allergies could safely consume a very small amount of an allergen without having a reaction. Fifty-four respondents believed they could not, with 38 of these respondents from Ireland and 16 from America and other countries. The remaining twenty-two respondents to the survey did not know.

Q.17 Would you agree that by removing an allergen from a finished meal e.g lifting an allergen out of a salad dish or removing a garnish etc. would make the meal safe for a food allergy customer?

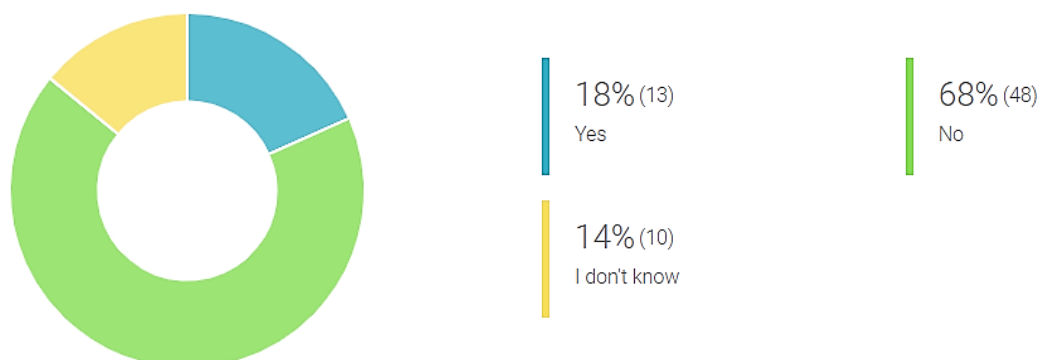


Figure 1.29 Making a meal safe by removing an allergenic ingredient, responses to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

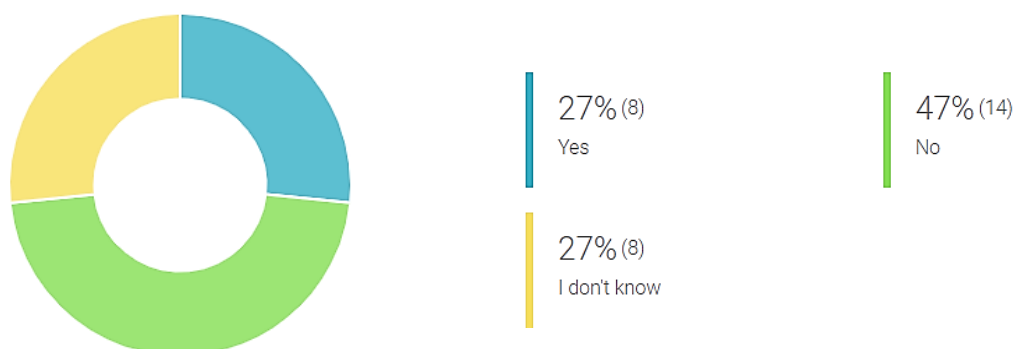


Figure 1.30 Making a meal safe by removing an allergenic ingredient, responses to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Twenty-one food handlers who responded to the food allergen survey agreed that a meal would be safe for an individual with food allergies to consume if the allergenic ingredient was removed out of a meal at the end of preparation. Sixty-two respondents believed the meal would not be safe, 14 of which were food handlers in America and other countries while 48 were food handlers in Ireland. Eighteen respondents, 10 of whom were food handlers in Ireland, did not know if it would render the meal safe for a food allergy customer.

Q.18 Would you specially prepare a dish for an individual with food allergies, if requested to do so?

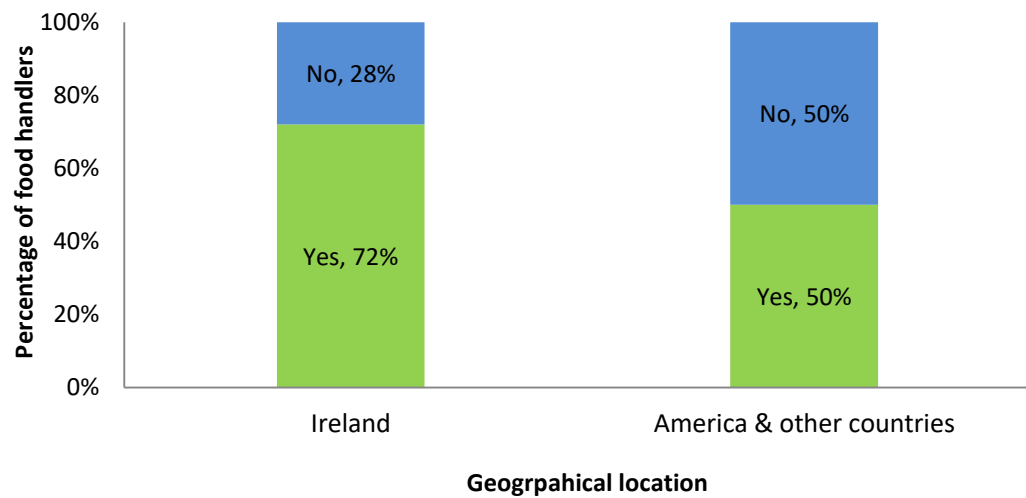


Figure 1.31 Amount of food handlers who would be able to specially prepare a dish for an individual with food allergies who responded to a survey conducted between May 2018 and November 2018 in Ireland, America and other countries (n=101)

- Thirty-five respondents (35%) to the food allergen survey admitted they would not be able to specially prepare a dish for an individual with food allergies, if requested to do so. Fifteen (50%) of these were from America and other countries and 20 (28%) were food handlers in Ireland. The remaining 66 respondents agreed they would be able to. Fifteen (50%) of these were from America and other countries, and fifty-one (72%) were food handlers in Ireland.

Q.19 Do you use shared equipment for preparing regular meals and allergen free meals?

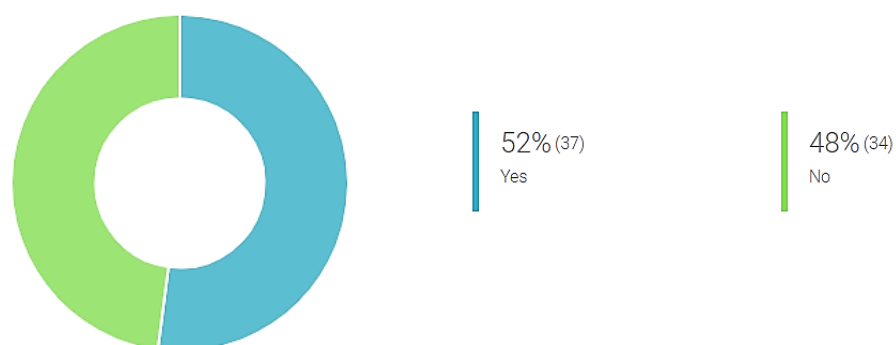


Figure 1.32 Use of shared equipment reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

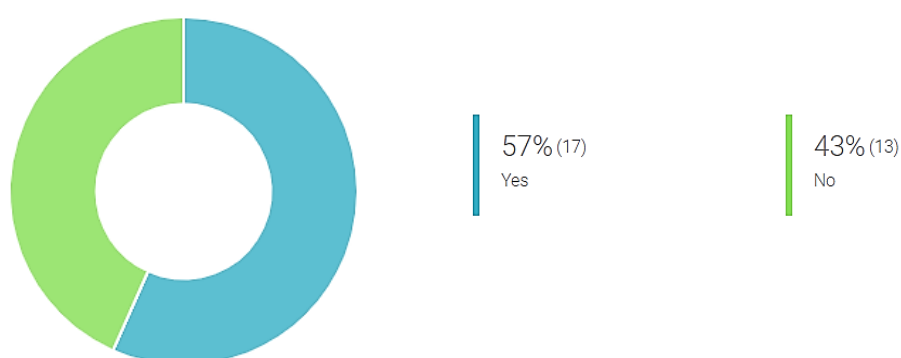


Figure 1.33 Use of shared equipment reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- This question assessed how many food establishments used shared equipment when preparing both regular meals and allergen free meals. Fifty-four of the respondents said they did use shared equipment. This accounted for 52% of food handlers in Ireland and 57% of food handlers in America and other countries. The remaining forty-seven respondents said they did not use shared equipment when preparing regular meals and allergen free meals.

Q.20 If yes, please indicate which of the following practices would be carried out if your business is preparing an allergen free dish.

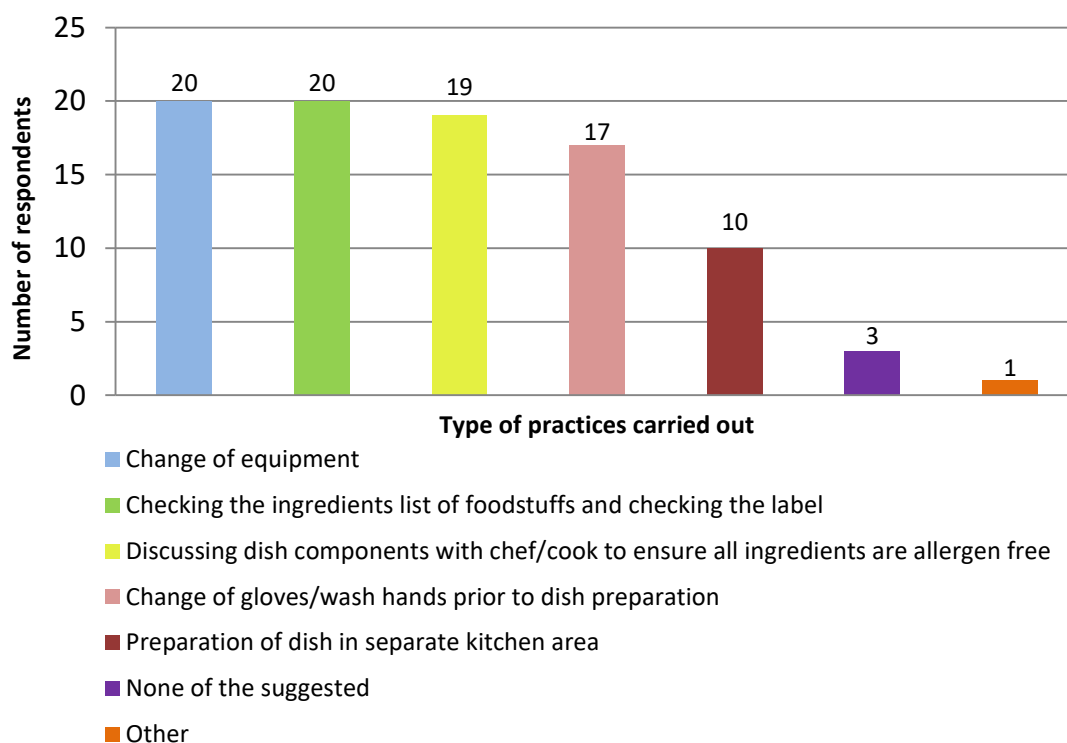


Figure 1.34 Practices carried out when preparing an allergen free dish if shared equipment was used in the food businesses reported by respondents to a survey conducted between May 2018 and November 2018 in Ireland (n=71)

- Question 20 asked food handlers which practices would be carried out when preparing an allergen free dish if shared equipment was used in the food establishment they worked in. The respondents could select more than one answer. Data of the 37 food establishments in Ireland who used shared equipment is illustrated above. 54% (n=20) of these establishments who used shared equipment checked the ingredient list and label of the foodstuffs, 51% (n=19) discussed dish components with the chef to ensure all ingredients were allergen free and 46% (n=17) of them changed their gloves and washed their hands prior to dish preparation. 54% (n=20) said they would change over equipment for the sole purpose of allergen free foodstuffs, 27% (n=10) said they would prepare the dish in a separate kitchen area, 8% (n=3) said none of the suggested and one respondent specified they did not know what practices were carried out.

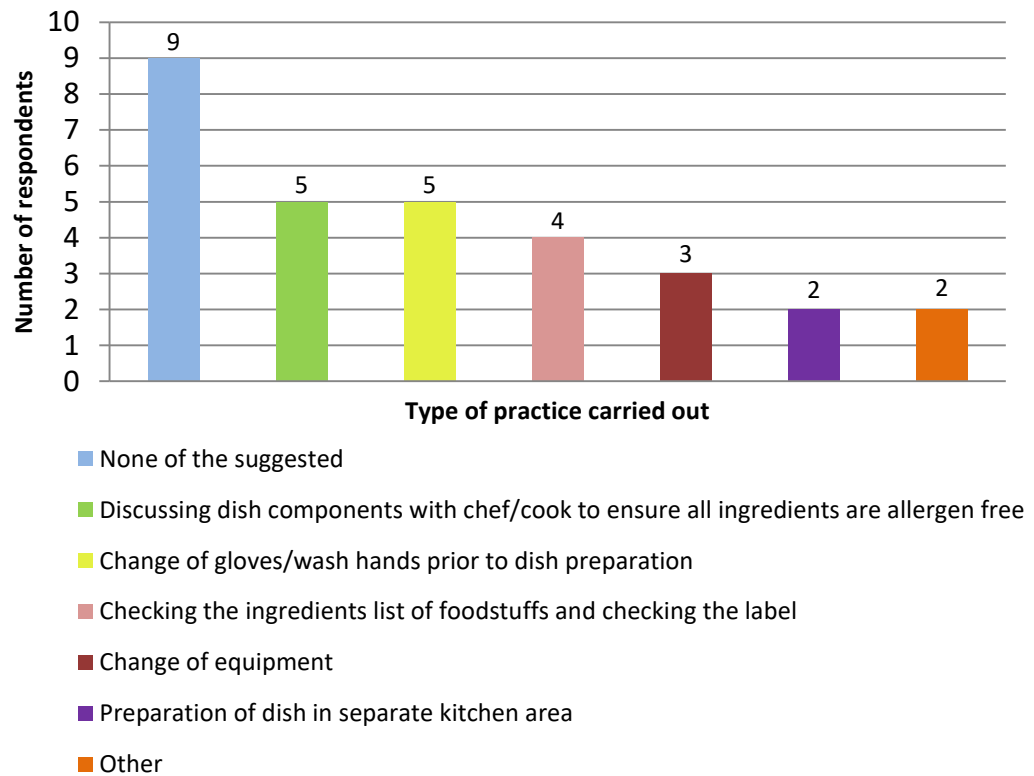


Figure 1.35 Practices carried out when preparing an allergen free dish if shared equipment was used in the food businesses reported by respondents to a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- Data from 17 food establishments in America and other countries who used shared equipment is illustrated above. Four of the seventeen respondents reported they checked the ingredient list and the food label, five respondents reported dish components were discussed with the chef to ensure all ingredients were allergen free and five respondents reported they changed their gloves and washed their hands prior to dish preparation. Three of seventeen respondents who reported they would change over equipment for the sole purpose of allergen free foodstuffs and two respondents said they would prepare the dish in a separate kitchen area. Over half of respondents (53%) said none of the suggested practices were carried out. One respondent specified they washed down the area between the preparation of allergen free and regular meals and one respondent said they wash the equipment between preparing allergen and allergen-free meals.

Q.21 Do you think the processing of a foodstuff would destroy any food allergens present? (E.g. Frying, boiling, liquidising etc.)

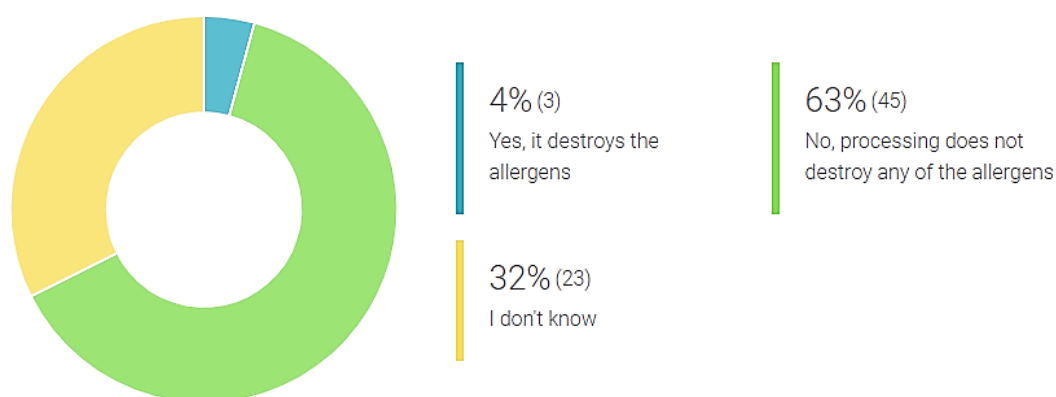


Figure 1.36 Destroying food allergens present by processing a foodstuff reported in a survey conducted between May 2018 and November 2018 in Ireland (n=71)

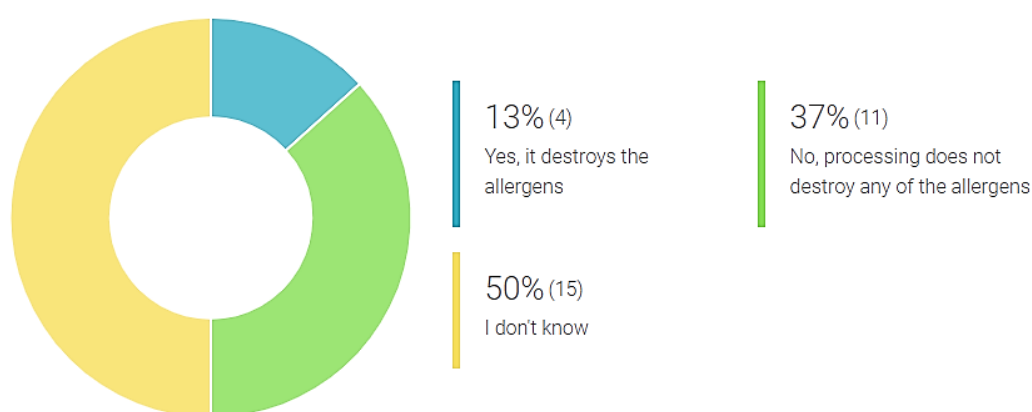


Figure 1.37 Destroying food allergens present by processing a foodstuff reported in a survey conducted between May 2018 and November 2018 in America and other countries (n=30)

- When all 101 participants to the survey were asked if they thought the processing of a foodstuff would destroy food allergens present in a meal, three food handlers from Ireland and four food handlers from America and other countries thought it would. 55% (n=56) of them reported processing would not destroy allergens, which accounted for 63% of food handlers who worked in Ireland and 37% who worked in America and other countries. Thirty-eight respondents said they did not know.

Q.22 What course of action would you take if someone took an allergic reaction to a food product on your premises?

- This open ended question gave participants of the food allergen survey the opportunity to detail what course of action they would take if someone took an allergic reaction to a food product on their work premises. Table 3 below summaries the data set received.

Table 3: Summary of responses from 68* food handlers who worked in Ireland, to a survey conducted between May 2018 and November 2018

Call emergency services/ seek medical attention	75% (n=51)
Call a manager	19% (n=13)
Administer an EpiPen or allergy medication if available	11% (n=8)
Investigate the incident and implement corrective action	9% (n=6)
Get assistance from a first aider	7% (n=5)
Answered ' <i>I don't know</i> '	4% (n=3)

*Three responses could not be counted

Table 4: Summary of responses from 29* food handlers who worked in America and other countries, to a survey conducted between May 2018 and November 2018

Call emergency services/ seek medical attention	66% (n=19)
Call a manager	31% (n=9)
Administer an EpiPen or allergy medication if available	21% (n=6)
Answered ' <i>I don't know</i> '	7% (n=2)

*One response could not be counted

- Seventy respondents to the survey said they would call emergency services / seek medical attention. Twenty-three respondents said they would call their manager. Twelve respondents said they would administer an EpiPen or allergy medication if available. Eight respondents, all of whom were food handlers from Ireland, alluded to investigating how it happened and implementing corrective action to ensure it did not occur again. Five respondents said they did not know what course of action they would take.

Q.23 What comes to mind when you think about the challenges of serving a person with food allergies?

Table 5: Summary of responses from 68* food handlers who worked in Ireland, reported in a survey conducted between May 2018 and November 2018

Cross contamination / Accidental consumption due to traces of allergens	19%(n=13)
Lack of knowledge on allergens / Requirement for allergen training	18% (n=12)
Difficulty / timeliness in preparing a meal for a customer who has an allergy	18% (n=12)
Danger associated with consuming allergens (an allergic reaction or death)	15% (n=10)
Safety of the consumer	9% (n=6)
Workload associated with maintaining allergen information on site	9% (n=6)
Nothing/ I don't know	9% (n=6)
Legal liability	4% (n=3)

*Three responses could not be counted

Table 6: Summary of responses from 29* food handlers who worked in America and other countries, reported in a survey conducted between May 2018 and November 2018

Lack of knowledge on allergens / Requirement for allergen training	24% (n=7)
Difficulty / timeliness in preparing a meal for a customer who has an allergy	17% (n=5)
Danger associated with consuming allergens (an allergic reaction or death)	17% (n=5)
Nothing / I don't know	14% (n=4)
Kitchen area is too small to facilitate allergen free meals	14% (n=4)
Cross contamination / Accidental consumption due to traces of allergens	10% (n=3)
Safety of the consumer	3% (n=1)

*One response could not be counted

- Question 23 asked respondents what came to their mind when they thought about the challenges of serving an individual with food allergies. Respondents noted the lack of knowledge around allergens in the workplace and the need for training and education in both Ireland (18%), and America and other countries (24%). Seventeen respondents alluded to the difficulty and timeliness of preparing an allergen-free meal. Sixteen respondents said accidental consumption due to trace allergens or cross contamination while 15 respondents alluded to the danger associated with consumption such as an allergic reaction or death.

3.2 Observational Audit Results

3.2.1 Observational Audits in Ireland

Observational audits were conducted, with the aid of an audit template (Appendix 2) in twenty food business establishments in Ireland to assess if food business operators, selling non-prepacked foods, were able to provide accurate, written allergen information for consumers in accordance with Regulation (EU) No. 1169/2011 and S.I. No. 489 of 2014.

Provision of Allergen Information

Results of these observational audits, illustrated in Fig. 1.39 below, found thirteen food businesses (65%) out of a total of twenty complied with requirements under S.I. 489 of 2014 by providing written allergen information for the non-prepacked food sold in their establishments. The remaining seven food businesses (35%) did not appear to provide any written allergen information for the non-prepacked food sold in their establishments and so were not compliant with the requirements.

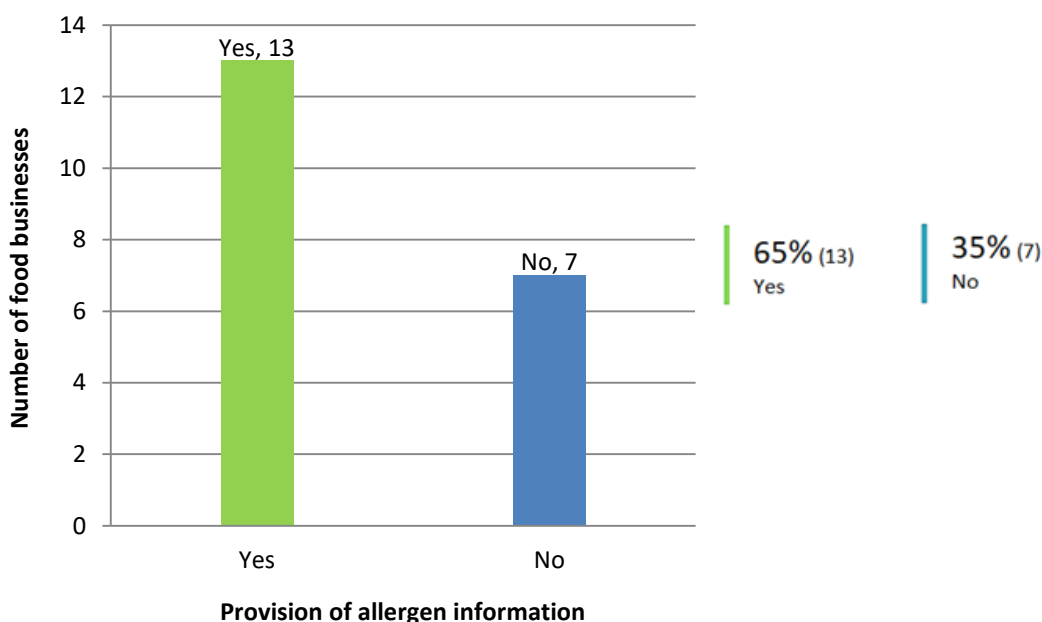


Figure 1.38 Provision of written allergen information available for consumers during observational inspections between May 2018 and November 2018 in Ireland (n=20)

Accuracy of Allergen Information

The accuracy of written allergen information provided in the thirteen food businesses was then assessed by cross checking the declared allergen information for dishes provided with ingredient labels.

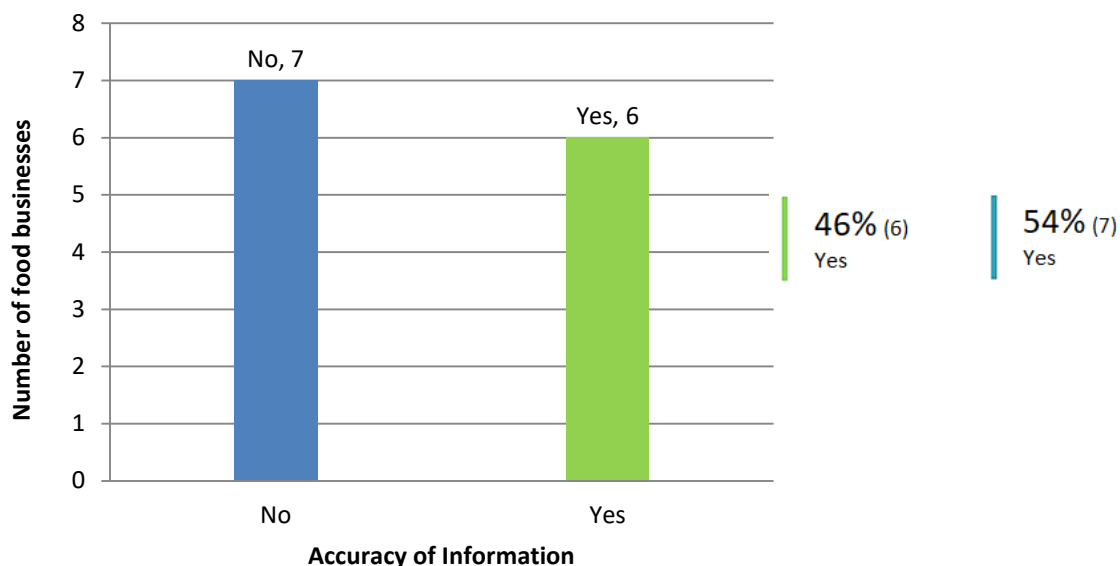


Figure 1.39 Accuracy of written allergen information for consumers during observational inspections between May 2018 and November 2018 in Ireland (n=13)

Table 7 Summary of reasons the information was found to be inaccurate during observational inspections between May 2018 and November 2018 in Ireland

Incorrect / incomplete allergen information provided	(n=2)
Written allergen information not reviewed / updated accordingly with the addition of new menu items and/or a change in supplier	(n=2)
Specific type of allergen not identified (E.g. Nuts instead of Hazelnuts)	(n=1)
Allergens present in a side salad accompanying a dish were not recorded	(n=1)
Provision of allergen information from suppliers incorrect	(n=1)

Allergen Management Control Plan

During unannounced inspections the researcher gathered a basic understanding as to what allergen control measures, if any, were in place in the food preparation areas of these kitchens. Table 8 below shows evidence of allergen control measures identified.

Table 8 Evidence of allergen control identified during observational inspections between May 2018 and November 2018 in Ireland (n=56)

Types of Allergen Control Identified	Premises Compliance
Allergen control through cleaning schedules	100% (n=20)
Allergen training documents available	55% (n=11)
Allergen awareness signage in place	35% (n=7)
Allergen control in storage	35% (n=7)
Allergen control in colour coding of equipment	30% (n=6)
Other (Chefs frequent review of menu declaration (n=3), change of gloves for preparation of allergen free meals (n=1), separate preparation area for gluten free foods (n=1)	25% (n=5)

3.2.2 Observational Audits in America

Observational audits were conducted, with the aid of a template (Appendix 4), in twenty food establishments in the state of Indiana, to assess if there was an allergen management control plan in place and if so, was it being implemented in the preparation areas of the establishment.

Fifteen food establishments (75%) out of a total of twenty had no allergen management control plan in place (See appendix 4) and food handlers showed no evidence of competency in controlling allergens or awareness of allergen cross contamination. The remaining five food establishments audited claimed to have an allergen control plan in place. Identified measures taken to control allergens in food storage and preparation areas are outlined in Table 9 below:

Table 9 Identified measures to control allergens through observational inspections between May 2018 and November 2018 in America (n=5)

Freshly prepared desserts which did not contain egg were prepared in a cleaned down area with clean utensils & equipment. Desserts which were free from egg were labelled and placed in separate section of the fridge	(n=1)
Colour coded spoons were specific to menu items containing peanut butter. Signage reiterated this food handling practice throughout the food preparation areas	(n=1)
Signage demonstrated pupil's specific intolerance and/or allergy to an ingredient. Individual's meals were to be prepared at home, stored in an airtight container, labelled with pupils name and placed in refrigeration	(n=1)
Allergen free meals were prepared at an allocated time of the day after clean down of food contact surfaces, utensils and equipment. Children with milk allergies were allocated table in the lunch hall where they did not receive milk	(n=1)
Meals available for consumers had allergen labelling signage at the point of display, however when food handling practices were audited, there was no allergen control plan and/or no evidence of food handlers awareness of cross contamination or competency in control food allergens	(n=1)

Chapter 4: Discussion

4. Discussion

4.1 Allergen Awareness

Despite the growing prevalence of children, adolescents and adults developing food allergies and intolerances, and the statistic that up to 31% of accidental allergen consumption incidents occur eating in restaurants (Soon, 2019), this study on allergen awareness revealed a significant amount of food handlers would still not consider allergen management a priority in their place of work. The survey results revealed that a quarter (25%) of food handlers questioned, who reported working in food establishments in Ireland, and 57% of those who reported working in food establishments in America and other countries, reported they would not consider the management of food allergens a priority. These results suggest that allergen awareness was greater in Ireland with 53 respondents considering allergen management a priority, compared to just 13 respondents from America, Spain and Australia. Similarly, this conclusion was reiterated by the findings to another question in the survey when respondents were asked to rate the importance of food allergens. Forty-seven food handlers in Ireland reported food allergens were of 'extreme importance' and 16 food handlers in Ireland reported food allergens were of 'moderate importance' compared to just 9 food handlers in America and other countries rating food allergens of 'moderate importance' and 8 food handlers rating food allergens of 'extreme importance'.

4.2 Allergen Knowledge

According to Soon (2019), *'Food allergy knowledge and awareness are critical to the safety of consumers with food allergy'*. This study interestingly found food handlers who worked in Ireland generally demonstrated stronger knowledge retention on regulated food allergens within their area compared to those who worked in America. This was evident through responses to survey question 15, where respondents were asked how many allergens there was by law and could they name them. 14% of food handlers in Ireland responded to the survey by listing all 14 allergens correctly by name and a further 16% answered at least 7 or more of these known allergens by name correctly. In addition to this 9% of respondents correctly reported there was '14 known food allergens' without listing any. In a 2019 study of food safety knowledge,

practice and training amongst food handlers in Ireland, whilst 16% of respondents (n=112) could name each of the named 14 allergens correctly as identified in Regulation (EU) No. 1169/2011, a further 51% of food handlers could name more than 7 allergens correctly (Gruenfeldova, *et al.*,2019).

Food handlers who worked in America appeared to have a weaker knowledge on the 8 known allergens in their region. Over 28% of respondents reported they did not know how many food allergens there were and did not list any, and only 4% could answer more than 6, but not all 8 food allergens correctly. Although the findings of this study suggest that there was greater allergen knowledge reported in Ireland, there still appears to be a gap in allergen knowledge amongst all food handlers which could potentially put allergen suffers at serious risk.

A large percentage (79%) of food handlers who worked in Ireland were also well informed on their legal obligation to provide allergen information in a written format for the non-prepacked food they were serving. Similarly, the findings of a food control study showed *“Seventy four percent of respondents were aware that allergen declaration must be in a written format”* (Gruenfeldova, *et al.*,2019). This level of knowledge amongst food handlers is very encouraging considering this mandatory requirement is a relatively new under Regulation (EU) No. 1169/2011. As this is not a legal requirement in America, it was interesting to see 40% of food handlers who worked in America believed it was a legal requirement to provide written food allergen information on non-prepacked foods for consumers and a further 30% did not know whether this was a legal requirement or not. This incorrect belief and uncertainty exacerbates the poor knowledge and awareness of food allergens amongst American food handlers in the industry.

Question 21 of the food allergen survey asked food handlers if they thought the processing of a foodstuff would destroy any food allergens. A guidance document by FoodDrinkEurope, (2013) on Food Allergen Management explains that *“as allergic reactions start with the recognition of the allergen (protein), any process that modifies the structure of a protein will have the potential to affect allergenicity”* and therefore certain methods of food processing may enhance, reduce, or eliminate the allergenic potential of a food. However, this guidance document also outlines that unless any

lawful confirmation states specific physical processing methods, such as thermal heat, reduces allergenicity, it should be taken that *“the allergenic potential of a processed food is identical to that of the food in its unprocessed form”* (FoodDrinkEurope, 2013). Whilst the data obtained from the food allergen survey showed 63% of food handlers in Ireland reported food allergens were not destroyed by the processing of a foodstuff, analysis of the survey results from American food handlers exacerbated the serious uncertainty in their knowledge with 50% of all respondents admitting to not knowing if processing destroyed the allergenic content of a food allergen.

4.3 Allergen Training

Although there is no requirement for written allergen information to be provided for loose, non-prepacked foods in America, revisions of the Food and Drugs Administration (FDA) Food Code, which encompasses the FDA’s best advice, states that the person in charge shall ensure that *‘employees are properly trained in food safety, including allergy awareness, as it relates to their assigned duties’* (FDA, 2009). In a 2014 study on restaurant food allergy practices, fewer than half of the 277 restaurant managers (44%), 211 food workers (41%), and 156 servers (33%) interviewed reported receiving food allergy training (Radke, *et al*, 2014). Results of the food allergen survey undertaken as part of this study in 2018, disclosed 63% of respondents who worked as a food handler in America reported they never received training on food allergens despite the revision to the FDA food code in 2009. These statistics are not surprising considering there is no legal requirement for food allergen training for food handlers under federal law nor is there a requirement for written allergen information to be provided on non-prepacked foods, however, these figures are concerning. The absence of this legal requirement for food allergen training in America could potentially explain the lack of knowledge retention and awareness of food allergens amongst food handlers discussed above. A 2017 publication on communicating the risks of food allergens, Tong Jen Fu states *‘Effective training programmes are also needed to educate staff on allergen control best practices’*. It is known that food allergen training programmes are available in America, however once more; the lack of uptake to this training is most likely attributable to discretion state.

A percentile of sixty-three respondents who worked as food handlers in Ireland had received training on food allergens either informally, from a member of in-house staff (37%), as part of their food safety training (18%), or as part of formal allergen training (8%). When these statistics were analysed, it was evident there was a strong correlation between the level of respondents in Ireland who received training and the overall level of awareness and knowledge of food allergens amongst food handlers in Ireland as previously discussed. Gruenfeldova, *et al.* (2019) outlines the importance of allergen training in her study of food safety knowledge, practice and training by stating *“the importance allergen training and its appropriate implementation, in order to produce safe food for all”*.

When distributing the food allergen survey across the North-east of Ireland food handlers in Irish food establishments were willing to take part in the survey when approached. This may be due to the recent enforcement of food allergen control in Ireland which has made food establishments more informed and aware of food allergens. However, when food handlers in West Lafayette, in the state of Indiana were approached and asked if they would be willing to take part in the survey, there was reluctance to take part in the study and quite a few establishments refused to take part. This, alike, may have been attributable to the lack knowledge and awareness of food allergens amongst food handlers in their region.

4.4. Allergen Management

Observational audits were conducted to assess food establishment’s compliance with relevant regulations and best practice guidelines applicable to their specific geographical location. One of the main reasons behind the chosen method of observational auditing is due to the findings of a Food Safety Authority Audit published in May, 2017, more than two years after the introduction of the FIC regulations to declare food allergens on non-prepacked (loose) foods in Ireland. In this targeted audit, the level of compliance with this new law was a ‘cause for concern’ as ‘88% of food business establishments had findings that require corrective action’ (FSAI, 2017). These findings included food businesses which failed to supply any allergen information at all and also businesses which had supplied deficient allergen information as it was unfinished and inaccurate.

This study revealed that of the 20 food businesses audited in Ireland, 70% required corrective action. This finding within the study suggests a possible decrease in the number of food businesses requiring corrective action compared to the FSAI audit results in 2017; however this slight improvement does not eliminate grounds for concern. Although 65% of food establishments complied with the requirements under S.I. 489 of 2014 by providing written allergen information for the non-prepacked food sold in their establishments, less than half of these food establishments had provided written allergen information which was accurate and up-to-date.

One of the most noteworthy findings of this study was discovered when examining allergen management controls through observational auditing in both Ireland and America. In a study on food allergen knowledge, attitude and practices, Soon (2019), highlights how *'recent fatalities due to food allergens in takeaway meals underscore the importance of food allergen management, food allergen labelling and allergy awareness among catering staff'*. This study found an alarming 75% of American food establishments had no allergen management control plan in place (Appendix 4) and food handlers showed no evidence of competency in controlling allergens or awareness of allergen cross contamination. These results indicate that allergen management is definitely lacking in American food establishments and poses the question, is it even safe for an allergenic customer to visit public restaurants?

A clear parallel can be made between the percentage of Irish food handlers who received training and the high level allergen management practices observed through audits, illustrated in the results chapter of this study. This also highlights the valuable benefits of the training conducted in Ireland internally, externally and online.

Similarly, this study also identified a knowledge gap in American food handlers and highlighted the need for eminent food allergen training for those who handle food for allergenic customers. Tong Jen Fu, (2017), agrees with these findings and reports,

'To prevent accidental exposure and tragic incidents, foodservice operations will need to increase awareness of food allergy and allergens, better understand risk factors, develop tools and programmes that foster clear communication of allergen information to customers and amongst staff and install controls that prevent allergen cross-contact'

Chapter 5: Conclusion

5. Conclusions

To conclude:

- The comparative study found food handlers working in Ireland exhibited a stronger knowledge retention and awareness of food allergens than those working in American food establishments
- An association was identified between the knowledge of food allergens amongst Irish food handlers and the successive numbers who had completed food allergen training in the cohorts examined. Allergen management practices observed during audits corresponded to the training received which displayed great benefit of training
- Notably, these survey results indicate that more food handlers are completing food safety training than not, however, at least 20% of food handlers who responded to the survey in both Ireland and America had never completed food safety training
- A large percentage of food handlers in America reported to have never received food allergen training
- Despite the accessibility and availability of online food allergen training, due to the absence of obligation placed on American food handlers under federal law, the undertaking of food allergen training was reported by less than 40% of food handlers working in American food establishments
- The study found the majority of food handlers in Ireland were aware of their legal requirement to provide written allergen information for non-prepacked foods. However, only 30% of Irish food businesses provided accurate, up-to-date written allergen information for the non-prepacked foods sold at their establishment
- Observational audits uncovered food allergen management ceased to exist in up to 75% of American food establishments

Appendices

6. Appendices

Appendix 1: Food Allergen Survey

Food Allergen Survey

Could you please take 5 minutes to answer all questions on my survey to help me gather as much information for my studies? Please answer all questions as honestly as possible; there is no right or wrong answers. Thank you very much!

1. What is your gender?

A) Female	B) Male
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2. What part of the world do you work in?

A) Ireland	B) America	C) Other (Please Specify)
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3. Which age group would you fall under?

A) Under 18	B) 19-24
C) 23-34	D) 35-44
E) 45-54	F) 55+

4. What type of food establishment do you work in?

A) Restaurant (independently owned)	B) Restaurant (part of a chain)
C) Deli/Café/Canteen	D) Hotel Restaurant
E) Other (please specify):	

5. What is your role in the food business? Please select one?

A) Head Chef/ Restaurant Manager/ Supervisor/ Catering Manager
B) Chef/Cook
C) Back of House E.g. Kitchen Porter
D) Front of House E.g. Bar Staff/Waiting Staff
E) Other (please specify):

6. How many years have you worked as a food handler?

A) Less than 2 Years	B) 2-5 Years	C) More than 5 Years
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7. What is your highest level of food safety training?

(Please tick more than one if required)

A) I have never completed food safety training
B) Informal in-house training (e.g from another staff member)
C) E-Learning food safety training session (online session)
D) Training from a food safety trainer (Visitors to place of work or externally)
E) Qualification in food safety management or equivalent
F) Other (please specify):

8. Have you received any training regarding food allergens?

(Please tick more than one if required)

A) No
B) Yes, I have received informal in-house training
C) Yes, as part of my food safety training
D) Yes, I have received formal food allergen training

9. Would you consider food allergen management a 'priority' in the food business where you work?

A) Yes	B) No
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10. On a scale of 1-4, how important do you think allergens are?

A) Not so important or necessary	B) Of slight importance
C) Of moderate importance	D) Of extreme importance

11. Is there a food allergen plan in place in the food business where you work?

A) Yes	B) No
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12. How do you prevent food allergen ingredient cross contamination in your food business?

A) I don't know
B) There is nothing in place to prevent this from happening
C) Yes, there are measures in place. Please list:

13. Are you legally required to put allergen information in written format for dishes you are serving, or non-prepacked (loose) food etc. that are for sale? (Examples include information on menus, menu boards, allergen information booklet, food tags/labels etc.)

A) Yes	B) No	C) I don't know
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14. How can a customer find out allergen information for a dish you are serving, or non-prepacked (loose) food you are selling in your food business?

A) This information is not available
B) They can ask a staff member
C) In written format (E.G. allergen booklet, on the menu, allergen board)
D) In written format, or by asking a member of staff
E) Other:

15. Do you know how many food allergens there is by law and could you name them? (Please list as many as you know)

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16. Would you agree that individuals with food allergies can safely consume a very small amount of an allergen without having a reaction?

A) Yes	B) No	C) I don't know
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17. Would you agree that removing an allergen from a finished meal, e.g. lifting an allergen out of salad dish, or removing a garnish etc., would make the meal safe for a food allergy customer?

A) Yes	B) No	C) I don't know
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18. Would you specially prepare a dish for customers with food allergies, if requested to do so?

A) No I would not be able to	B) Yes I would be able to
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19. Do you use shared equipment for preparing regular meals and allergen-free meals?

A) Yes

B) No

19. If yes, please indicate which of the following practices would be carried out in your food business is preparing an allergen free dish? If no, proceed to question 20. (Please tick all relevant points)

A) Checking the ingredients list of foodstuffs and checking the label

B) Discussing dish components with the chef to ensure ingredients are allergen free

C) Change of gloves/wash hands prior to preparation

D) Change of equipment e.g. utensils, chopping boards etc.

E) Preparation of dish in separate kitchen areas

F) None of the above

G) Other:

21. Do you think that processing of a foodstuff would destroy any food allergens present e.g. boiling, frying, blending etc.

A) Yes, it destroys all of the allergens

B) No, processing does not destroy any of the allergens

C) I don't know

22. What course of action would you take if someone took an allergic reaction to a food product on your food premises?

--

23. What comes to mind when you think about the challenges of serving a person with food allergies?

--

Appendix 2: Observational Audit Results (Ireland)

I.D	Type	Was written allergen information provided for consumers?	Was the written information accurate?	Why?
01LH18	Independent Restaurant	Yes	No	Allergens (Mustard) as part of side salads not listed
02LH18	Retail	Yes	Yes	Dishes cross checked were accurate
03LH18	Retail	Yes	No	Allergen information not reviewed with change of supplier.
04LH18	Public House	No		
05LH18	Retail	Yes	No	Following corporate redesign, more menu items added & allergen booklet not updated
06LH18	Crèche	Yes	Yes	Items cross checked accurate
07LH18	Takeaway	Yes	No	Allergen information booklet incomplete.
08LH18	Independent Restaurant	Yes	No	Allergens (nut) incorrectly specified
09LH18	Takeaway	No		
10LH18	Public House	No		
11LH18	Butchers	No		
12LH18	School Cafeteria	Yes	Yes	Items cross checked accurate
13LH18	Chain restaurant	No		
14LH18	Independent restaurant	Yes	Yes	Items cross checked accurate
15LH18	Independent restaurant	Yes	No	Incorrect allergen information for black pudding. Supplier labelling issue
16LH18	Retail	No		
17LH18	Crèche	Yes	Yes	No problems identified
18LH18	Takeaway	Yes	Yes	No problems identified
19LH18	Takeaway	No		
20LH18	Independent Restaurant	Yes	No	Incorrect information on sulphites & gluten. Missing allergens from dishes. Incorrect allergens listed.

Appendix 3: Observational Allergen Management Audit Results (Ireland)

I.D	Allergen Management control plan in place					
	Staff Training Documents	Signage	Control in Storage	Control in Colour Coding	Control in Cleaning	Other (detail)
01LH18	Yes	Yes	Yes	Yes	Yes	Chef frequently reviewed allergen information on menu
02LH18	Yes	No	Yes	No	Yes	Change of gloves for preparation of allergen meals
03LH18	Yes	No	Yes	No	Yes	None
04LH18	Yes	No	No	No	Yes	None
05LH18	Yes	Yes	No	No	Yes	None
06LH18	Yes	Yes	No	Yes	Yes	Separate area for gluten free bread preparation
07LH18	Yes	No	No	No	Yes	None
08LH18	Yes	No	Yes	No	Yes	Chef frequently reviewed allergen information on menu
09LH18	No	No	No	No	Yes	None
10LH18	No	No	No	No	Yes	None
11LH18	No	Yes	No	No	Yes	None
12LH18	Yes	No	No	Yes	Yes	None
13LH18	No	No	No	No	Yes	None
14LH18	Yes	No	Yes	Yes	Yes	None
15LH18	No	No	No	No	Yes	None
16LH18	No	Yes	No	No	Yes	None
17LH18	No	No	No	Yes	Yes	None
18LH18	Yes	No	Yes	Yes	Yes	Chef frequently reviewed the allergen information on menu
19LH18	No	Yes	No	No	Yes	None
20LH18	No	Yes	Yes	No	Yes	None

Appendix 4: Observational Audit Results (America)

I.D	Type	Measures taken to control allergen management in food storage & preparation areas
01US18	Chain Restaurant	Declaration of allergens present in meals. However no evidence of allergen management control
02US18	Independent Restaurant	No allergen management control
03US18	Takeaway	No allergen management control
04US18	Takeaway	No allergen management control
05US18	Crèche	Pupils allergies were listed on the fridge and their meals were stored in labelled, sealed lunch boxes
06US18	Independent Restaurant	Desserts with Egg were prepared in a cleaned down area with clean utensils. Control also in storage
07US18	Bar	No allergen management control
08US18	Bar	No allergen management control
09US18	School Cafeteria	Colour coded spoon used for peanut butter menu items. Signage displayed on the wall
10US18	Independent Restaurant	No allergen management control
11US18	Independent Restaurant	No allergen management control
12US18	School Cafeteria	Meals containing allergens prepared in a different area with separate equipment. Children with an allergy to milk sat at a different table
13US18	Chain Restaurant	No allergen management control
14US18	Chain Restaurant	No allergen management control
15US18	Independent Restaurant	No allergen management control
16US18	Bar	No allergen management control
17US18	Independent Restaurant	No allergen management control
18US18	Bar	No allergen management control
19US18	Independent Restaurant	No allergen management control
20US18	Independent Restaurant	No allergen management control

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