IMPROVING FOOD ALLERGEN MANAGEMENT IN SMALL FOOD SERVICE BUSINESSES SERVING LOOSE FOOD

by

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STUDENT DECLARATION

I declare that while registered as a candidate for the research degree, I have not been a registered candidate or enrolled student for another award of the University or other academic or professional institution.

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ABSTRACT

Food allergens, a concern for an increasing number of people, are common food ingredients found in most kitchens. For the majority of the population these ingredients are harmless yet for about 2% of the global adult population, these ingredients pose a health risk and at times could also be life threatening. There is no known cure for food allergies; therefore abstinence from consumption is the only assurance of food safety which means that controls of ingredients and preparation practices are imperative. This becomes more complex when the food is not prepared by the sensitive individual. To date, literature on food allergens has not sufficiently engaged in the management of allergens in the food service industry.

The food service industry, irrelevant to size, is legally obliged since 2014, to inform the food allergy sufferers of food allergens present in the food served. This requires staff to be knowledgeable of the food allergens. The practices of producing safe food for allergy sufferers are hindered by barriers which are synonymous with the nature of the business and compounded in small food service businesses, however food allergy sufferers trust small business more when eating out.

Understanding key factors in the preparation and serving of food to sensitive individuals required this research to adopt a mixed-method approach in analysing the procedures required in food production and preparation. Initially four allergy sufferers drew attention to their concerns of the practices in the food service industry during a focus group discussion held in Malta. This was followed by investigating the proper management of food by observing current practices in preparation, identifying gaps in training and discussing behavioural change.

This thesis introduces an innovative multi-faceted toolkit which was developed to manage food allergens and tested in three small food businesses. Taking into account the literature review, the innovative toolkit provides a system which logs ingredients for recipe building through matrices, meets the sufferers' requirements to be informed about the food through QR codes, and overcomes the barriers the food industry has to produce allergen free food.

The research identifies lack of understanding of food allergens and their consequences by the food service staff and the influence this has on the quality of life, as contributors to the lack of trust the allergy sufferers have in the industry. Seventeen staff were trained in food allergen management. The participants' knowledge was evaluated pre and post training. It was determined that the required change in behaviour to prepare safe food for allergy sufferers requires external drivers, as traditional classroom training alone failed to entrench better practices.

The work provides a holistic understanding of the requirements of food allergens management and the improvements required to achieve effective allergen management training programmes in small food services businesses.

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I dedicate this thesis to the food allergy sufferers who would wish simply to dine outside their home safely.

LIST OF ABBREVIATIONS

CPU	Central Production Unit
EHOs	Environmental Health Officers
ESCO	European Skills, Competencies and Occupations
EU	European Union
FSA	Food Standards Agency
GMP	Good Manufacturing Practice
HACCP	Hazard Analysis Critical Control Point
HRQL	Health Related Quality of Life
QOL	Quality of Life
RFID	Radio Frequency Identification
SMEs	Small and Medium-sized Enterprises
SOP	Standard Operating Procedures
UK	United Kingdom
USA	United States of America

GLOSSARY

Conviviality - A social gathering of people where they can eat, drink and talk in a friendly way with others.

Crohn's disease - Bowels disease which causes inflammation of the lining of the digestive tract causing abdominal pain, diarrhoea, fatigue and weight loss.

Food operation – A food business activity that prepares meals for consumers not in a home environment.

HACCP – (Codex Alimentarius) A system which identifies, evaluates, and controls hazards which are significant for food safety.

Health Related Quality of Life – relates to the impact a health status has on mental, physical, emotional, and social functions in life.

Innovative Multi-Facet Toolkit – a set of actions and elements used to bring about the change required.

Irritable Bowel Syndrome - A common disorder which effects the large intestine causing cramps abdominal pain and diarrhoea.

Loose food - Foods that are sold not prepacked. Prepacked food prepared on the sale premises are considered under the same category.

Micro food business - A food business which employs fewer than 10 persons and whose annual turnover does not exceed Euro 2 million.

Mise-en-place – refers to the French culinary term 'to put in place'.

Other than by design - Any other actions that were not in the design. In this research design refers to recipes or standard operation procedures.

Ready To Eat Food- food that need no further preparation to achieve food safety.

Regeneration - A process which will bring stored food (normally cold) to required serving temperature and consistency.

Somatoform – Mental illness that cause bodily symptoms, including pain.

CHAPTER 1

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FOOD ALLERGEN MANAGEMENT

1.1 INTRODUCTION

Food is a substance that maintains life and growth. It is easily accessible and can be prepared by the individual or by others as in the case of the food service industry. It is for people who suffer from life threatening food allergy (Coutts & Fielder, 2009), that this natural and simple activity impacts severely their lives (Allergy UK, 2015a). Preventing the ingestion of the offending food is desirable (Bailey et al, 2011) however this becomes very complex in a society where food is presented to the consumer most of the time not in its natural state. In other words food becomes a complex recipe of ingredients that most of the time the consumer has no control in their use especially when dining out.

Customers who suffer from food allergies rely primarily on the accurate ingredient information they receive from the different sources within the food businesses; however menus tend to mislead the consumer (Pratten & Towers, 2003) in making their educated choice of food which is safe for them to consume. Their need to know exactly the composition of the food is by no means an act of social modelling, that is, the eating behaviour of what and how much to eat cannot be a result of following others eating behaviour as a result of social behaviour (Cruwys, Bevelander & Hermans, 2014). For food allergy sufferers the need to know what ingredients make up the food is a matter of preventing an allergy incident and in severe cases, death.

For many years, allergens were only required to be declared in packed food. This meant that the allergy sufferers could find comfort, to some extent, in consuming packaged food that was prepared days or months before as they could decide if this food was suitable for them from the label declarations. Although this gives some peace of mind, reports of recalls due to mislabelling are very common (Shravani, 2012; Gendel et al,

2014) and consuming packed food is far from ameliorating the quality of life that is expected in our contemporary life style.

1.1.1 Consumer Rights

More people want to experience the social integration of eating outside the home without fear of ill health (Ernest & Young, 2013). To go further, it is the right of the consumer, who is protected by law, to expect safe food whenever and wherever food is sold for human consumption. As of December 2014, consumers are further protected in their choice of foods, since the European Union (EU) Regulation EU 1169/2011 requires that the characteristic information of a food is now mandatory to be available for the consumer to make educated choices. The same regulation states that compositional attributes of the food which might be harmful to certain groups of consumers are now mandatory information (EU 1169/2011). The legislation aims to bring food information to the consumer, even in loose food, which is food that is available for human consumption which is not prepacked. This encapsulates all food preparation businesses, from the smallest coffee shop to the larger and more sophisticated fine dining restaurants.

1.1.2 The Allergic Consumer

The food allergy sufferer's perception of the food service industry is that there is a lack of knowledge and understanding of the consequences food allergens have on the sensitive individuals (Bailey et al, 2011). Allergy sufferers seek to be given the attention necessary to ensure that their requirements are met not because of any culinary preference but because any misunderstanding or error could lead them to endure ill health and in extreme cases death.

People suffering from these diseases manifest a higher level of anxiety when they eat in any food service business for fear of ingesting the offending food. Pratten & Towers (2003) reported that in general, 60% of consumers find restaurant menus misleading or lacking information, which could prove to be a serious issue for those suffering from allergies. This shortcoming in delivering accurate ingredient information triggers a chain of discomforts and lack of trust in the whole industry. Allergy UK (2016) has reported that 75% of allergy sufferers decide not to eat out due to their lack of trust in the knowledge of allergens of the food service industry and the working staff. The perception (of food allergy sufferers of the loose food industry, as it is also known) is that most of the front of house staff do not check the allergen status of the meals (Leitch, Walker & Davey, 2005; Bailey et al, 2011). This lack of knowledge discourages the food allergy sufferers from integrating wholly with other consumers at social events or even at a simple casual lunch. Social isolation could be the hardest part of living with food allergy (Allergy UK, 2016; Sampson, Munoz-Furlong & Sicherer, 2006).

Both the industry, through improvement of food allergy management, and the sensitive individuals have a role in ensuring that food allergy incidents reduce in occurrence. Better communication of accurate ingredient information in addition to better knowledge of food allergens and their consequences could lead to improved food allergen management in small food service businesses serving loose food.

1.1.3 Health Related Quality Of Life

Understanding the complexity of living with a food allergy and how this affects the Health Related Quality of Life (HRQL) is vital to any improvement required in the management of food allergens in the loose

food industry. HRQL refers to the perceptions a person or a group have of the effect the illness and its therapy demand on the daily functions (Drossman et al, 1999). This will affect also their daily activities to a point that everything planned conditions their behaviour and that of their caregivers especially in young children. The cautiousness to avoidance and fear of occurrence can increase anxiety which could diminish the HRQL (Noone, Sicherer & TePas, 2016).

As food allergies have an effect on what seem to be simple activities in normal lives, e.g. going out for a coffee or a meal, for food allergy sufferers this presents significant difficulties with high levels of stress and anxiety (Teufel et al, 2007). For such people the joy of eating food prepared by others is diminished due the concern that they might ingest a food or food ingredients that could evoke an adverse reaction (Taylor & Hefle, 2001). The lack of available knowledge of the food available tends to frustrate the consumers as to what type of risks consuming this food would expose them to, with uncertainty being a concern that food allergy suffers would have to live and cope with (Madsen et al, 2010).

1.1.4 The Food Service Industry

The food service industry is by definition those businesses, institutions and operators responsible for the preparation of any meal produced outside the home (USDA, 2014). This definition also encompasses street food vendors, micro and small sized businesses and any other food preparation operation which intends to supply food directly or indirectly to the end consumer.

Micro and small sized operations, which represent 99.1% (Eurostat 2009; FoodDrinkEurope, 2015) of the food service industry, present diverse and sometimes very complex challenges to ensure food safety (FAO/WHO,

2006). One dimension of this problem is the need for effective management of food allergies in environments where control of allergen cross contamination is difficult. Another bearing of the problem is the lack of effective staff knowledge of food allergens and their consequences.

People suffering from one or more food allergy are on the rise (Allergy UK, 2015b) as a result of a number of factors. Turner et al, (2015) reported an increase of 615% in hospital admissions for anaphylaxis in 20 years, 1992-2012 in the UK. Adding to this is the growing popularity of people wanting to eat out, the social inclusion of people suffering from different dietary requirements, including food allergy, has brought about the necessity for food businesses to be obliged to provide the consumer with accurate ingredient information and practices (EU 1169/2011) employed in the food provided, all this, besides other legal obligations to provide wholesome food.

1.1.5 Defining Small Businesses

Small businesses by definition employ less than 50 employees (European Commission, 2015). This study refers also to micro businesses which employ less than 10 employees. The requirements to implement Regulation EU 1169/2011 have different economic and administrative implications (ACTSO, 2014) on small food service businesses rather than on larger chains. Understanding the limitations of small businesses and on the other hand the legal requirement to provide food information to clients present challenges to improve the already very low understanding of food allergen management within the food service industry (Lee & Kwon, 2011; Pratten and Towers, 2003). It is more difficult for small businesses, which are profit concerned, to implement any system within their operation to address any improvement in the management of food allergens. Taylor has

reported that time and money are burdens which hinder the small food businesses from applying a Hazard Analysis Critical Control Point (HACCP) based food safety management system within their business (Taylor 2001). The limitations of small businesses tend to affect directly the safety of the food through lack of good hygiene practices , layout and size of facility and poor staff training (FAO/WHO, 2006), yet it is still required by law to be well prepared to satisfy the requirements of food allergy sufferers.

Food preparation in the food service industry is complex not only because of the vast number of ingredients and products involved, but also because of the human element. Staff mobility within the industry and working patterns (Eden-Jones, 2006; EuroFound, 2012) make it more difficult to apply standards within the small businesses which could affect the safety of the food.

1.2 LITERATURE REVIEW OF THE CURRENT SITUATION

1.2.1 Food Allergy and Intolerance

To people who might have had training and acquired knowledge, the difference between food allergy and intolerance could be clear and quite distinctive; however to those who have not, the two conditions might be interchangeable and not very clear to what exactly each one refers to. True food allergies are reproducible adverse reactions to a specific food (FSA, 2006), mostly protein (AFGC, 2007). Food allergies and other food sensitivities are food related illnesses that affect only a small percentage of the population. Depending on the type of adverse reaction involved to food consumption, it is determined whether these are immunological sensitivities, food intolerances or secondary sensitivities (Taylor & Hefle, 2001).

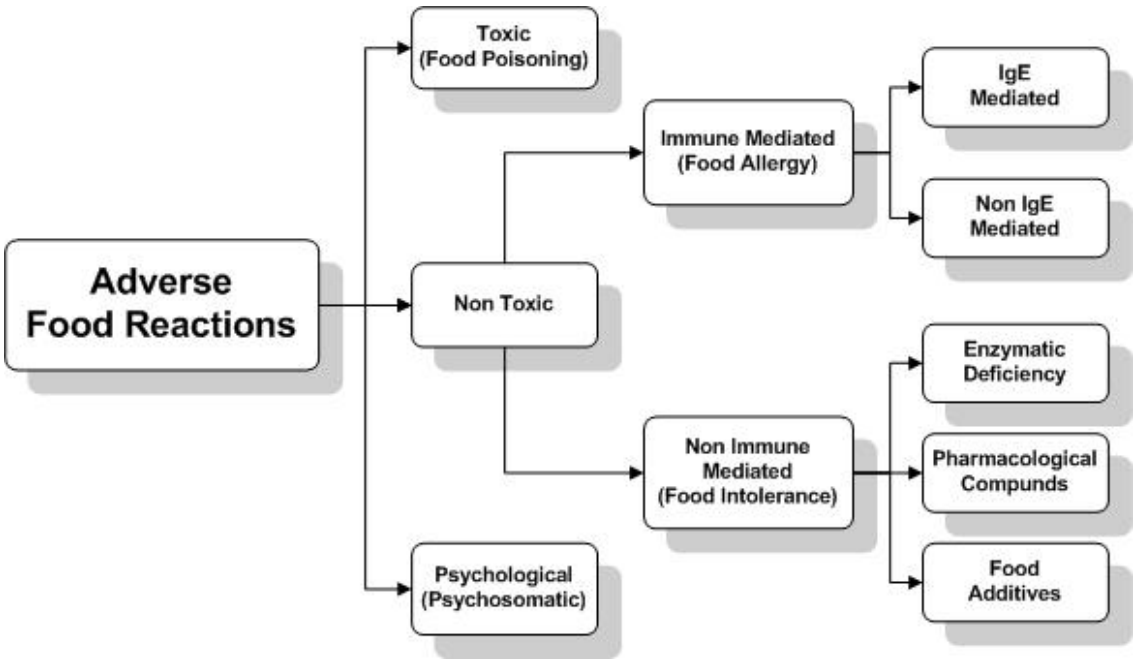


Figure 1.1: Food Adverse Reaction Including Food Allergies (Bakker, 2014)

True allergic reactions involve the immune system (EUFIC, 2006) where a rapid release of chemicals such as histamine (National Institute of Health, 2012) in the human body will cause symptoms (FSA, 2006) that can occur within a few minutes up to a few hours from ingesting the offending food. Food intolerance involves the body's metabolism, but not the immune system, and occurs when the body cannot digest a food or food component properly (EUFIC, 2006). Adverse reaction to food or food components can also occur with or after the effect of other conditions such as lactose intolerance secondary to gastrointestinal disorders as in Crohn's disease (Taylor & Hefle, 2001). This occurs during a stomach infection where the bacteria attack the lining of the stomach and causes the villi to wither away. Lactase which is produced by the villi will be reduced drastically thus any consumed lactose will not be broken down and will pass into the large colon (UK Health Centre, 2016). Thus lactose intolerance can occur not only as a genetic disorder but also as a consequence of other disorders. Figure 1.1 illustrates food adverse

reactions as reported by Bakker (2014). This research will investigate the non-toxic strand and only discuss the food allergies and intolerances.

The lists of allergic ingredients vary across the world (Coutts & Fielder, 2009); for example in the EU the 14 most common allergens, that could cause adverse reactions in a category of people, are listed in the current legislation (FSA, 2006), whilst in United States there are 8 allergenic ingredients listed by the Food Allergen Labelling and Consumer Protection Act (FDA, 2016). Annex II of the most recent Food Information Regulation (FIR) EU 1169/2011 lists the fourteen major foods together with products thereof which are now required to be listed as food allergens in the EU.

The symptoms that allergic people suffer when they consume the offending food can vary from mild to severe and on rare occasions can also be fatal (FSA, 2006). An intolerance to a specific food might sometimes trigger some of the same symptoms (e.g. Asthma, itching) however food intolerance does not involve the immune system (FSA, 2006). Whatever the condition and the level of sensitivity, food allergies and intolerances affect a significant number of people in the overall population (Taylor & Hefle, 2001), up to 150 million people (Elucidare, 2011).

However not all perceived food allergies are real. The fact that a consumer could feel uncomfortable with a particular food through past experience might provoke the thought that he/she could be allergic to that particular food. In several population studies, 20-45% of adults believe that they suffer from adverse reaction to food (Teufel et al, 2007). These symptoms vary from true food allergy, food intolerance to irritable bowel syndrome, somatoform or other mental disorders (Teufel et al, 2007). Explained differently, not all people who think have a food allergy are genuine food allergy sufferers.

1.2.2 Misconceptions of True Food Allergies

The general public has a widespread belief that many people are allergic to food although very little research has been carried out to actually investigate people's awareness of food allergies or their perception towards people suffering from food allergies (Lyons & Forde, 2004). Self-diagnoses, parental diagnoses or other misconceptions about the true definition of food allergy lead a percentage of the public (10 to 20%) to believe that they have food allergies (Taylor & Hefle, 2001). This misconception of true food allergies limits people from their activities due to incorrect self-diagnoses, which in itself is a self-inflecting unnecessary hardship.

1.2.3 Food Allergic Clients

Food allergy has been estimated to affect around 1-2% of the global adult population and about 8% of children less than 3 years of age who suffer from one or more food allergies (Mills et al, 2004). These people, who have to deal with this potential life-threatening situation, might have less confidence than others to consume food prepared by the loose food industry (Coutts & Fielder, 2009). At first glance, the suffering individual at risk of food allergy only needs to avoid the consumption of the particular offending food that could cause harm, however the complexity of food products means that this is not always obvious and ensuring that the information provided is accurate and is communicated effectively to the consumer is far from simple (Boye & Godefroy, 2010). Boye and Godefroy (2010) also reported that studies have shown that food-allergic individuals are at risk of negative emotional and social outcomes which include anxiety, avoidance and risky behaviour. These behaviour disorders have a profound effect on the population and economy. These complex emotional issues are further compounded when one considers the

different socioeconomic background of people suffering from food allergies (Mills et al, 2007). Each category has its own difficulties and challenges to cope with what seems to be a simple everyday activity, eating. The social function of food allergy sufferers or a family with an allergic child or family member may be seriously disrupted by the need for continuous alertness to avoid foods that are believed to cause the allergy (de Blok et al, 2007). To further understand the complexity, it also needs to be stated that sex and gender (DunnGalvin et al, 2006) are multipliers of the ramifications (consequences) food allergies have as an element that could affect the Quality of Life (QoL). It is clear that food allergy does not only impact the QoL of food allergic individuals but also their caregivers who generally are perceived to be women; mothers of allergic children have a significantly poorer psychological QoL and greater anxiety and stress than the fathers (DunnGalvin et al, 2006; Mills et al, 2007). It is also noted that the biological sex differences have an effect of the QoL of the food allergy sufferers. Sex hormones are reported to have a role in food allergies in the age when the body would be going through puberty and/or menopause. In females the immune response is reported to change during the menstrual cycle (Kelly & Gangur, 2009). Food intolerance could get worse for women of childbearing age just before their period. This is due to guts bacteria which become more active under the influence of the female sex hormone progesterone (Hunter & Huntley, 2009) which increases immediately prior to menstruation and stays high till the end (Reifsnyder, 2007).

1.2.4 Risk Taking Behaviour and Perceptions of Allergens at Different Ages

Risk taking behaviour of food allergy sufferers can be linked to varied situations. Age, knowledge, peer pressure, severity and frequency of

occurrence of allergy reactions, all have an influence on the risk behaviour taken by allergy sufferers. Besides the differences in culinary practices and demographics, age seems to be a major factor in the occurrence of serious or fatal reactions among consumers (Yun and Katelaris, 2009).

The percentage of children suffering from food allergies is considerably higher than in adults, with up to 8% of children less than 3 years of age (Mills et al, 2004) suffering from one or more food allergy. More than 50 million children between the age of 0-9 suffer from three main allergens (egg, milk and peanuts) (Elucidare, 2011).

Young children (age 6-15) also have an illusionary perception of control (Madsen et al, 2010). This age group tends to rely on their parents' protection, which could give a false sense of security to the children when in the presence of their parents, as they might have a notion that nothing can harm them or if something goes wrong their parents would have an immediate remedy to the situation; thus this could ease their sense of caution, encouraging them to take risks. Literature also suggests that children were noted to feel insecure, apprehensive and fearful of the safety risks that they would have to accept to live a normal life which might also increase the risk of socio-emotional development difficulties (Sanagavarapu, 2011).

In young teenagers the feeling of losing control is a very real part of their lives especially when they are uncertain of the food allergy they have to live with (Madsen et al, 2010). This age group also identifies the lack of awareness and understanding in society as a frustrating factor which contributes to their living with uncertainty thus anxiety. Ormrod (2004) defines anxiety as the feeling of uneasiness and apprehension about a situation with an uncertain outcome. This further compounds their concept

of risk and sense of threat along their developmental pathway. In trying to find some sort of normality in their social being, this group would want to be assured that they are safe at all times and that they can interact freely and be accepted as normal by others (Madsen et al, 2010).

Teenagers walk a very narrow path between, on one hand the management of uncertainty of risk control and on the other, normal living (Madsen et al, 2010). Responsibility of care shifts from parents to the teenagers as they grow older and with this also anxiety appears particularly strong as the lives of the consumer becomes more peer- and less parent-based (Madsen et al, 2010). With reduced parental oversight, teenagers with food allergies would need to make their own food choice decisions and thus, the burden and the consequences of these choices is placed upon them or those around them, often not their parents (Sampson, Munoz-Furlong & Sicherer, 2006). Noone, Munoz-Furlong & Sicherer (2003) reported that teenagers might be at the highest risk for fatal food allergy incidents because of their reluctance to use medication. The same study reported that social ramifications had a higher impact on the teens rather than the fear of reactions to food. The beliefs that dangers and consequences can be controlled are generally attributed to the behaviour among teenagers (Sampson, Munoz-Furlong & Sicherer, 2006).

Young adults will experience first-hand challenges when they venture out of their parents protection. When they meet up with their peers, they tend to start socialising more and experience eating out or at friends' houses. Prior to their novel life experience, food allergy sufferers would have had their food checked for allergens by their guardians (Newman, 2008; DSHS, 2012). As they assemble in groups the last thing that young adults would want is to be different to the rest of their peers (Shepherd & Raats, 2006).

This age group has identified that social isolation could be the hardest part of living with food allergy (Sampson, Munoz-Furlong & Sicherer, 2006). This will create a situation where the allergy sufferers might try to take chances (risks) with their health and edge forward and eat the offending food. Research carried out in the United States of America (USA) found that fatal food-allergic reactions are most common among adolescents and young adults (13-21 years old) (Coutts & Fielder, 2009; Sampson, Munoz-Furlong & Sicherer, 2006).

Adults and parents of children who suffer from food allergies have a different perspective of risk living with food allergy. Although it is thought that adult sufferers might have a better sense of control of their food disorder, it is quite different with parents of children suffering from food allergies. Both situations, that of an adult sufferer and parents of children suffering from food allergies, potentially lower the health related quality of life (HRQL) because of additional demands and stressors (Madsen et al, 2010).

In adults, even if the risk of a severe allergy attack was to be reduced or eliminated, the HRQL is affected in a significant way, due to anxiety and withdrawal which takes hold of the allergy sufferer. Uncertainty of what might happen due to the consumption of food would be the focus of living with food allergies (Madsen et al, 2010). Adult food allergy sufferers tend to socially isolate themselves from others at gatherings where part of socialization would involve sharing or consuming food (Cummings et al, 2010; Buttigieg & Schembri, 2015 (Appendix 1)).

The different age of the sufferer influences the management of food safety risks which could be controlled through a wider acceptance of the conditions by peers and broader knowledge by parents. Ultimately the

sufferers themselves have to be in control of what could put their health at risk.

Children and teenagers perspective of acceptable risk could be the level at which they feel normal in terms of safety and social acceptance (Madsen et al, 2010). This indicates that the perception of risk associated with food allergies is not always related directly to the consumption of food but has a more complex psychological effect on these young people.

Perception of food allergy tends to have different facets depending on the age of the sufferer. In teenager groups, research suggested that although they were concerned of risk when they come into contact with an allergen, such as kissing someone who just has consumed an allergen, yet they were less concerned of potential high risk situations where they actually consumed food prepared by others as for example in restaurants, parties and friend's homes (Sampson, Munoz-Furlong & Sicherer, 2006). In other words the young adults can only associate risk when this is directly linked to the recognisable situation like when someone has consumed an allergen and therefore the mouth region is contaminated, hence kissing can become a risk. It is more difficult to know what is in the food prepared by someone else. However they trust the food provision as safe without discussing the risks assuming that the food prepared is also safe for them to consume. In adults, food allergy has an effect on the health–related quality of life (HRQL) even in those allergy sufferers who thought that they had no risk of dying from inadvertently ingesting the offending food (Madsen et al, 2010).

As perception of risk is a very subjective matter and depends greatly on the individual, the psychological and social aspect of managing food allergy (Madsen et al, 2010) on a day to day basis affect the HRQL of the individual.

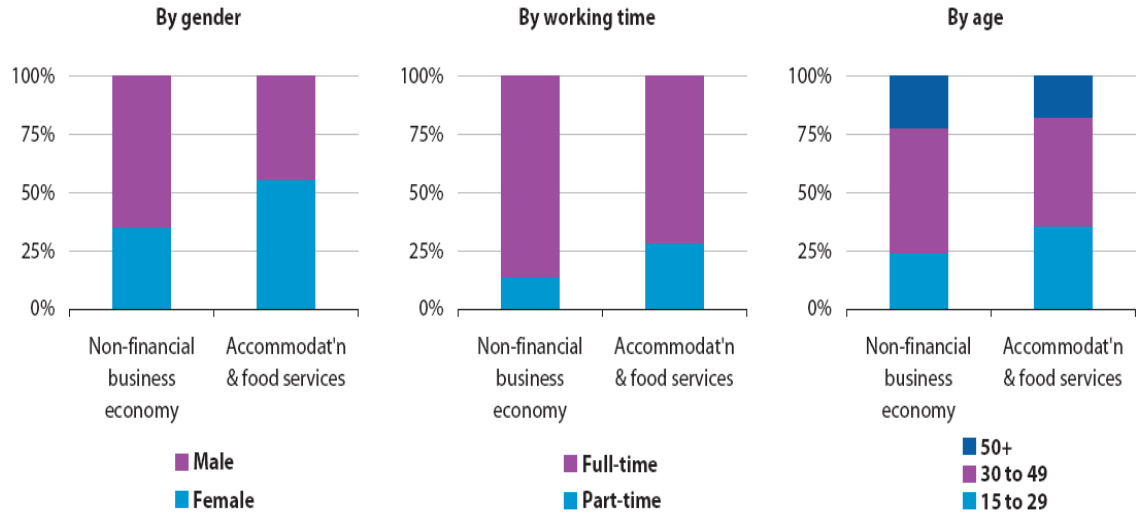
1.3 FOOD SERVICE PERSONNEL

1.3.1 Workforce

The food service industry encompasses an extensive group of activities that incorporates the preparation of food for various types of operations (Hospitality and Management Training, 2016). This industry needs large numbers of people at different levels of competence to prepare, produce and serve food for the customer being either the end consumer, as in a restaurant, or part of a unit that would produce food en-masse for other operations, such as in a Central Production Unit (CPU). The EU through the European Skills, Competencies and Occupations (ESCO)/scheme, has initiated a project for the hospitality industry which will describe the most relevant skills, competencies and qualifications needed for several levels that would be identified within the industry (ESCO, 2010); however the real situation in terms of catering staff and knowledge is likely to be highly variable. The level of competence required to enter the catering industry is quite minimal. Both the proprietors and chefs do not need to be in possession of qualifications to operate within the industry let alone be knowledgeable of food allergies (Pratten & Towers, 2004). Greater knowledge among catering staff is required as it is not enough simply to serve food; they also need to know the potential effects it will have on the consumer's health (Oxford Research/Eurofound, 2008).

Data from the hotel, restaurants and catering services statistics NACE Rev.1.1 of the European Commission of 2009 has shown that across the EU-27 there were 1.7 million enterprises employing 9.3 million persons in 2006 within this sector. It also registered that in terms of enterprise size, micro and small enterprises (with less than 10 and 10 to 49 employees respectively) employed 70.9% of the workforce in 2005.

The workforce within this industry tends to be younger than in other activities with 35.7% of the workforce having an age of 15-29 years, a characteristic linked to relatively low skills and low paid nature of many of the jobs within the industry (EU (NACE Rev 1.1)) (Figure 1.2). This might prove to be problematic in the employees' knowledge advancement which could affect the performance and food security offered to the consumer. Employers might also be discouraged to invest in training staff due to low retention which again might affect the safety of food.



Source: Eurostat (LFS)

Figure 1.2: Characteristics of Catering Services Workforce NACE Rev.1.1 (Eurostat European Commission, 2009)

Although there is a new trend to undertake training in food preparation and production, very little effort, if any, is dedicated towards allergen management. The greater emphasis in food safety training, as part of food production programmes is on food hygiene (Pratten & Towers, 2004); however food allergy management should be integrated as part of any food safety programme. Although many studies cite lack of staff training and knowledge as a serious problem in food safety, Roberts et al (2008) indicated that, even when knowledge increased through training yet behaviour did not. This suggests that training alone does not improve the

behavioural practice in food safety. Effective training has been identified as a critical factor in the successful implementation of HACCP. Wallace identifies awareness and motivation, and technical and practical knowledge as key elements in HACCP training which will assist staff to meet their responsibilities in the implementation of a successful HACCP (Wallace, 2001). With the high level of staff turnaround within the food service industry, the problem of the staff being knowledgeable of the correct behaviour towards food allergy management seems to be a complex issue yet, legal obligations and customer rights to safe food demand that food served should be safe and up to the standard demanded by the customer (Bailey et al, 2011).

1.3.2 Knowledge

The food service industry employs large numbers of people, with restaurants being the largest employer (1.62 million in the UK in 2014 (DEFRA 2014)) in the industry (Pratten & Towers, 2003). As the industry requires seasonal extra workers, one can understand that due to the globalisation and the somewhat free mobility of people (Koikkalainen, 2011), language (Nerb et al, 2009) and different cultural backgrounds could present complex challenges to ensure food safety (FAO/WHO, 2006) and compliance to a set standard within a food operation.

In a perfect world, one would expect that all those hired to serve in the food service industry would have received training that would be commensurate with the task that they have been assigned within the operation; however this is not always the case. Studies carried out in various countries – San Paolo, Brazil (Ajala et al, 2010), New York, USA (Madsen et al, 2010) and the UK (Hall, 2004) – have shown that service staff lack knowledge of practice and ingredient information of foods that

are served within their operation. Clayton et al (2002) also reported that of food workers admitted that they did not always implement food safety practices they knew they should. The required specialised training to cater for food allergy is uncommon in the hospitality industry not only within the work force, but also at management and enforcement level (Pratten & Towers, 2003). There is a considerable variation in the level of knowledge of a HACCP system, as a method of controlling food allergens, by the environmental health officers (EHOs) as was noticed in a study carried out in Northern Ireland (Leitch, Blair & McDowell, 2001). This fact could have a detrimental effect on the staff working within the food service industry and might mean that the interpretation of regulations might be inconsistent and varied between different officers. The lack of essential accurate knowledge by the relevant reference points seems to confuse the food service working staff. Leitch, Blair & McDowell (2001) reported that EHOs had poor knowledge of the effects of food allergies on hypersensitive individuals. This can be exemplified when relevant reference points, in this case EHOs, have not acquired training in specific areas, such as the application of HACCP in relation to the control of food allergies within the overall HACCP approach (Leitch, Blair & McDowell, 2001).The industry will not have a direction and reference in the implementation of the regulations.

Many guidelines (e.g. Welcoming Guests with food allergies (FAAN, 2010); Buying Food when you have a food allergy or food intolerance (FSA, 2009)), and written literature by food safety control agencies give good outlines of the requirements and practices that are essential to manage food safety hazards and food allergies. In many of these guidelines, it is indicated that the best person to answer a query in a food service business would be the chef; however even trained chefs are unlikely to have studied food allergies

(Pratten & Towers, 2004). This presents a problem that the person preparing the food might not be qualified to answer questions of this sort with accurate information. Chefs qualifications are not regulated in many countries and people who have knowledge of cooking are sometimes considered as chefs and would require very little evidence of prior training in allergen management to be hired. This lack of knowledge (Karajeh et al, 2004) could lead to serious issues of unintentional contamination of food that is to be prepared for allergy sufferers, putting their safety at risk. A number of studies have also indicated that although training improves knowledge of food safety within food businesses, this does not always result in a positive change in the food handling behaviour (Clayton et al, 2002; Roberts et al, 2008; Wallace, Sperber & Mortimore, 2011). Therefore a change in the approach to training might be needed to ensure that training brings about the change desired. This might not be a simple exercise which could place unnecessary burdens and cost on the food businesses (Postnote, 2009). Effective food allergy management training design needs to encompass more than just what needs to be regulated. It is also important to indicate the social aspect of food allergy risks that sufferers deal with on daily basis and the responsibility that the food service industry has towards this ever growing number of the population (de Blok et al, 2007). A multifaceted approach is needed to effect the behavioural change desired to bring about a better understanding of the barriers that food preparation staff perceive as the restrictions in their understanding of food protection.

1.4 CONSUMER'S EXPECTATIONS OF THE INDUSTRY

Besides quality and value for money, consumers have a growing awareness of food safety and an increasing demand for better information on food prepared by the food industry (FAO/WHO, 2008). In this regards the food safety law EC 178/2002 states that the consumer is to be sold exactly what

he/she expects and that the information available is accurate and up to date (Boye & Godefroy, 2010). The safest and most obvious solution for food allergy sufferers not to endure an attack would be not to ingest the offending food; however in an era when people are purchasing many food products and prepared meals, in reality this is not always the case (Pratten & Towers, 2003). Pratten and Towers also reported that 60% of consumers find restaurant menus misleading or lacking in information however fail to ask for fear of appearing "fussy". This in itself might indicate that the consumer expects that the food offered should be safe for them to consume regardless of their conditions. Lee & Kwon (2011) reported that diners assume that food is safe if the food allergies were not mentioned in the menu; on the other hand food business operators felt that the customer should inform them about their allergies at the time of ordering food. This mismatch of expectations between the provider and the consumer has been the focus of the new legislation EU 1169/2011 where the information about the food provided to clients by the food businesses needs to be accurate and instantly available. The food service industry must have a great interest to provide food allergy information to sensitive individuals as this would protect their business and increase the frequency of food allergy sufferers eating at their outlets. This needs to meet customers' expectations of food safety to win the trust and increase the QoL.

1.5 ALLERGENS IN THE FOOD SUPPLY CHAIN

Food suppliers are normally the source of ingredients and food products for the next step process, within a chain of processes.

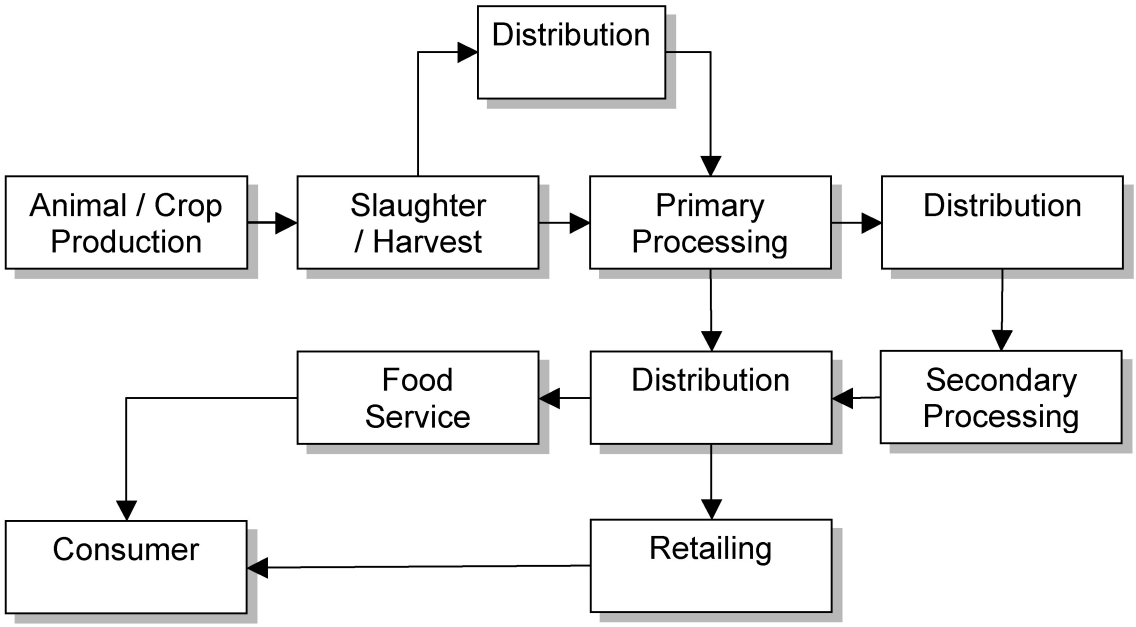


Figure 1.3: Farm to Fork Food Pathway (Wallace, Sperber & Mortimore, 2011)

Raw materials, from land, sea or farm, will later be transformed into finished foods that the end consumer will finally ingest (Figure 1.3). Food products could also be finished or semi-finished complex processed recipes of a variety of ingredients. Each step of these processes would modify or leave a trace on the product which, in the case of allergen presence, should be listed either on a label, if the product is pre-packed, or documented if the food is not packed; thus modification or any process should be noted. It is recognized that in some manufacturing operations, due to a variety of factors, total avoidance of cross contact is not always practicable; therefore it might well be that specific allergens which are not part of the recipe by design end up as part of the formulation (Madsen et al, 2010). While large food manufacturers are usually aware of the allergen situation and have in place appropriate measures of control, it is not necessarily the same for micro and small size businesses. Lack of knowledge and very limited budgets are factors which do not always allow for the assessment of the situation of the production site (Boye & Godefroy, 2010).

Importers within the European Union (EU) require that their food suppliers have production methods in place which guarantee food safety at each and every step of the process and like any business operator in the supply chain, are responsible that foods satisfy the requirements of food law (Will & Guenther, 2007; CBI, 2010). With the system of one-step back and one step-forward (Regulation (EC) 178/2002), safe products should be the result of adequate control at each step of the supply chain rather than complicated corrective actions further down the process (Will & Guenther, 2007). This will ensure that the previous supplier has in place a food safety management system that should guarantee the delivery of safe food with accurate information which will assist further processors to produce food that would have no ill consequences on the consumers, even food allergy sufferers. These systems are intended to reduce risks to an acceptable level. The HACCP plan, which is developed to address the identified risks, has a strategic value in the improvement of relations in the supply chain. Effective communication between the supplier and the customer is critical to demonstrate that the supplier understands the intended and possible requirements of the product (Surak, Cawley & Gavoor, 2007). Within the EU, HACCP has been a favoured food safety management system and it is a legal requirement for all businesses to manage food safety according to its principles (Regulation (EC) 852/2004). Different food legislation across the globe adds to the complexity of food allergy management.

Throughout the whole supply chain suppliers are important guardians of food safety management and are required to ensure that their supplies will not cause any harm to consumers (CBI, 2010) due to their inadvertent lack of transfer of the accurate information to the third party (Regulation (EC) 178/2002). This is communicated through labelling in prepacked food as required by law (Ward et al, 2010). The situation gets complicated with

loose food products. The potential risks of cross contamination from handling activities at the raw material suppliers' sites and during transportation (FSA, 2006) also needs to be taken into consideration when approving reputable suppliers. Small businesses might find that ensuring the products bought from suppliers are safe, could create a burden on the practice employed to run their operation (Taylor, 2001). Food manufacturers are closely monitored by the customers who want an assurance that the food purchased is safe. To achieve this level of confidence the customer could ask for an onsite and operation audit of the food manufacturer's facility (Losito et al, 2011). This could work well for large food businesses; however for small businesses, to ask suppliers to carry out an on-site food safety audit of the facility could create logistical and technical difficulties (Taylor, 2001). In theory, a certificate of compliance to food safety management by the effective application of a HACCP system (Losito et al, 2011) endorsed by reputable accreditor e.g. a certification body, can provide assurance that the products met the required standards including allergen-free products (Boye & Godefroy, 2010), although this might not be true in practice, as many intermediate factors could alter the state of the product. As for auditing, small businesses may find it difficult to obtain such certificates of compliance, particularly if they are also buying from small suppliers.

1.6 FOOD PREPARED FOR THE INDUSTRY

As costs of industrial cooking equipment escalates and the physical space is limited by factors such as finance, food operators with such constraints might opt to engage the services of a central production unit (CPU) to prepare finished or semi-finished meals which would need regeneration (bring back to a serving quality e.g. by heating) before these are served to the end consumer. Food production is a complex process that involves

many situations where the equipment used for production could be shared for various food products. From transportation of raw materials through manufacturing and final processing, small amounts of food allergenic ingredients could inadvertently be introduced into the food which could possibly pose a risk to allergic individuals (Madsen et al, 2010). If properly managed, remote food production should ensure improved consistency and greater control of food safety. This depends greatly on the commitment of the management to verify that the supplies and the operation are being controlled and monitored and that any deviations are immediately corrected. This principle is well established amid food safety systems with the intention of proactively ensuring that the food is produced with quality assurance rather than quality control (Coutts & Fielder, 2009) in other words that the food is assured as safe rather than tested to be certified as safe. This principle is also relevant to food allergens. Although most of the preparation is done offsite, the onus of providing safe food still lies with the end food service provider. This practice puts the small business dependent on the food safety management of the CPU and thus at a greater risk due to the lack of direct control on the food production.

As CPUs are normally large operations, expert staff are recruited to operate and manage the unit; however all relevant personnel should be trained so that they are aware of the hazards posed by food allergens. To this effect, food manufacturers should have in place a food allergy management policy (Madsen et al, 2010) robust enough to reflect the intricacy of the operation. Prepared meals need to have documentation that would declare their contents and other information that is mandatory and legally required. Further preparation should ensure that the information delivered by the CPU is transmitted accurately throughout the

receiving operation and that the information is accurately recorded. The food service business needs to consider the impact that the food provided by a CPU has on its own operation. With this information available, relevant procedures and staff training should be implemented to ensure safe food (Madsen et al, 2010). Any additional ingredients, however small and seemingly insignificant, need to be recorded and also included in the list of ingredients when the recipe is incorporated in the operations menu at the receiving restaurant/ caterer.

1.7 FOOD INDUSTRY LEGAL AND MORAL OBLIGATIONS- REGULATIONS EU 1169/2011, EC 178/2002, EC 852/2004, EC 854/2004

The recent European Union Regulation (EU) 1169/2011 addresses the provision of food information to the consumer with the scope of providing a basis for the assurance of a high level of protection of the consumer's information needs, including non-pre-packed food also known a loose food. Article 44 of the same regulation states that the provision entrenched in Article 9(1) refers to, *"any ingredient or processing aid listed in Annex II or derived from a substance or product listed in Annex II causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product, even if in an altered form;"* needs to be made known to the consumer in order to provide an assurance of a high level of protection in relation to the food information (Regulation (EU) 1169/2001) (Annex II).

Food business operators are legally bound to devise systems to ensure that the food they supply is safe (Regulation (EC) 178/2002). The same regulation also goes on to state that it aims to protect the interest of the consumer and that it would provide a basis for the consumer to make

informed choices about the food to be consumed. Article 14(4)c states that food should not be placed for sale if this could be injurious to particular health sensitivities of a specific category of consumers where the food prepared is intended for that category of consumer. This suggests that when food is prepared for allergic or intolerant consumers, it should not in any way put their health in any risk of injury. The information provided should help consumers determine if the consumption of a particular food or a category of foods could have an adverse health effect (Regulation (EC) 178/2002). This clearly puts a moral responsibility on the food producer to offer only food that will not put the health of the consumer, including sensitive individuals, at risk. It is noted however that the front of house staff do not always refer food queries made by the allergic consumer back to the kitchen and try to be convincingly knowledgeable but wrong as to the status of the meal (Leitch, Walker & Davey, 2005) that is, the staff who have little knowledge of the ingredients of the meal pretend to be well versed as to the actual composition of the meal. The study by Leitch, Walker and Davey (2005) reported that commercial catering caused 76% of food-related reactions where, neither the serving staff nor the caterers were aware of the presence of the offending ingredients. This worrying situation clearly indicates that there is lack of knowledge of ingredients within food and incorrect behaviour, that most of front of house staff did not check the allergen status of the meals and that there is a need for further training in the subject of food allergen control (Leitch, Walker & Davey, 2005; Bailey et al, 2011) within the food operations. This demonstrates a shortfall in capability to meet the legal requirements stated above.

Up till recently the EU did not provide any specific controls that should be in place to control the storage, handling or use of allergenic foods in loose food businesses (FSAI, 2012); however since 2006 Regulation (EC) 852/2004

has entrenched in Article 5, that food operators should operate a safety system based on the HACCP principles. HACCP systems identify the food safety hazards, and through control and monitoring, help ensure food safety. It is therefore logical that allergens should be controlled through the HACCP plan under the control of chemical hazards and thus control of allergens in food service should not be a new concept. Regulation (EC) 854/2004, Article 3 requires that onsite visits by competent authority are held to approve the operation, however it has been noted that EHOs have limited knowledge of allergen control (Leitch, Walker & Davey, 2005). This could indicate that when designs are approved, little if any consideration is given to the control of these foods within a food business. This might be due to the oversight by inspectors who may look at HACCP plans/food safety systems and not necessarily spot absence of allergen control. To rectify this recognised deficit, specialised food allergy training was initiated in 2006 with the aim to deliver knowledge of allergen control to EHOs. The scope was to equip EHOs with new knowledge and skills that could flow down to the food service businesses (Leitch and McIntosh, 2014). No evaluation of this training has been published.

Although the food law does not exclude size of business from the implementation of HACCP, it is known that different food businesses need different food safety management policies which will be robust enough to ensure safe food products within their operations (Regulation (EC) 852/2004). Regulation EC 852/2004 recognises that sufficient flexibility should be applicable to small food businesses. Micro and small sized businesses, in particular, might have many misconceptions about HACCP and its implementation (Wallace, Sperber & Mortimore, 2011) as these might find it laborious and difficult to implement. It is therefore important to understand that food safety systems need only to be as complex as the

business itself and should only be installed by knowledgeable individuals. As micro and small size business operators might tend to obtain such information or systems via consultants, it is important that such information would be accurate and written by a reputable source; however in reality information regarding HACCP may be misleading or out of date (Wallace, Sperber & Mortimore, 2011). Skilled trainers who can interpret the application of HACCP to micro and small businesses are seen as an important factor to ensure a successful implementation of a food safety management system based on the principles of HACCP which will include the identification, control and management of food safety hazards (Mayes & Mortimore, 2001) including food allergens.

The complexity of legislation is further compounded by the different lists of allergens prescribed by diverse regions or nations and also the threshold level of allergens in food. Whereas in the EU the list of allergens is 14, in the United States this is 8 (FDA, 2016) and in Japan this is 27 (Institute of Agriculture and Natural Resources, 2016), which only partially overlaps other legislatures. This is complicated with the level of detail that needs to be available including threshold levels of specific ingredients. Whilst in the EU the requirement for thresholds notification is limited to only a few allergens, Switzerland has set the mandatory threshold for labelling of allergens at 1000mg/Kg; however this threshold seems to be exceedingly high when considering that most allergic individuals react to doses in milligram range (Boye & Godefroy, 2010). For example Regulation EU 828/2014 has set the threshold to claim food gluten free to be at 20 mg/kg. This means that there is differential ratio of 50:1 in the claims of gluten free products. This complexity could be reduced if a consensus could be reached on what amount of allergen renders the food unsafe (Kerbach et al, 2008).

1.8 RISK ASSESSEMENT

In a loose food business e.g. a restaurant, the control of the allergenic food needs to be part of the risk assessment process (FSA, 2006), therefore all ingredients listed as allergens within the EU, need to be considered and whether these ingredients could contaminate other food products (FSA, 2006). Risk assessment involves the likelihood that an incident could occur and the severity of its potential effect. The result of this assessment would determine the significance of the hazard. A study carried out in Ireland revealed that some staff in food businesses, including food service outlets serving loose food, were unable to give accurate food information to allergy sufferers (Safefood, 2008). The recent case of Paul Wilson in the United Kingdom indicates that peanut protein was present in food which was marked as peanut free thus the advice given to the consumer failed to safeguard the health of the consumer with fatal results (BBC, 2016). With products that emerge from countries like Switzerland where, if the amount of allergen is <1g/Kg then it does not need to be declared (Allen et al, 2014) the risk of having hidden allergens in the product presents a concern for food businesses and consumers. This risk needs to be related to the consumers to allow them to make informed choices. These issues are complex and could be above the knowledge of small businesses when preparing food. As the amount of the allergenic food might vary in provoking a reaction in sensitive individuals and there is insufficient literature to draw firm conclusions regarding thresholds of allergens that cause an adverse effect (FSA, 2006), in a loose food environment it would be recommended that zero presence of allergens would be the standard to ensure safe food. Further studies show that zero risk for food-allergic people is not a realistic or attainable option (Madsen et al, 2012), although one can minimise or achieve zero risk in specific allergen free controlled operations, thus making allergen-free food production claims (FSA,2006).

The new Food Information Regulation (FIR) EU 1169/2011 does not allow that the food business operator disclaim responsibility by declaring that the food provided may contain allergens or does not know what the allergens are within the food (FSA, 2014).

1.9 THE MISUSE OR LACK OF USE OF HACCP

HACCP is a tool used in the prevention of food safety hazards through food safety management based on product design, hazards analysis and process control (Wallace, Sperber & Mortimore, 2011). Food safety systems implementing HACCP are intended to control food safety hazards which are mainly divided into three categories (physical, biological and chemical). For the purpose of this research only one of the three hazards is of interest in the control of food allergens which are considered as chemical hazards (FDA, 2009). Despite general acceptance that food allergy poses a severe risk to sensitive individuals, little action is taken to reduce this risk compared to other food hazards such as biological hazards involved in food (Leitch, Blair & McDowell, 2001). The EU list of allergens, as entered in Annex II of the most recent Regulation EU 1169/2011, are common food products found in many food businesses. It is important to understand that if these products are not known to all food service staff as food safety hazards which could have a severe or fatal consequence on sensitive individuals; it is possible that when HACCP is being implemented in any food business, these products would be omitted from the hazards analysis. Understanding what makes food safe (Wallace, Sperber & Mortimore, 2011) will aid in implementing an effective HACCP. Many misconceptions about HACCP which remain hinder the correct acceptance of this tool in food safety management (Wallace, Sperber & Mortimore, 2011). Food allergens are health hazards to sensitive individuals and therefore should be controlled as part of a HACCP plan (Barron & Haley-

Zitlin, 2002). The lack of knowledge and appropriate training are the main reasons for not applying HACCP as a system to reduce food allergy risks outbreaks (Leitch, Blair & McDowell, 2001).

Food safety management systems rely on the people who manage them to be functional and successful. It is therefore essential that staff are given the right tools to ensure that special meals and allergen handling is correctly done according to the food safety plan addressing the appertaining issues (Sheward, 2006).

Large food businesses which have implemented HACCP principles as part of their food safety management have reported a better awareness and understanding of the system as opposed to small businesses which justified failures due to personnel deficiencies (Losito et al, 2011). Although HACCP is used as the bedrock of food hygiene inspections across the EU, there seems to be little effort exhibited by micro and small sized food businesses to have an effective food safety system in place (Yapp & Fairman, 2004). EHOs are normally the link between the food businesses and the regulatory authority and as such are seen as a respected source of advice and guidance; however they showed a limited level of advice that they could provide to producers and processors during inspections of food premises (Leitch, Blair & McDowell, 2005). In a 2007 report by the House of Lords Select Committee on Science and Technology, it was recommended that, it was imperative that EHOs would be adequately trained in practical allergen management (House of Lords, 2007). Training programmes for environmental health practitioners to allow them to better support businesses have since been developed (Safefood, 2008) but no data are available on the impact on food businesses. HACCP principles have been used for a number of years as a tool to assess the risks which occur in food

production. It is important to integrate the risks associated with food allergies in the food safety management system as part of a HACCP risk assessment process. Although there are still misconceptions about HACCP, it is the common language spoken in food safety system that many countries use as a benchmark for food exportation (Lee & Hathaway, 1998). HACCP is a tool designed to enhance food safety and is recognised by the World Health Organisation as the best way to ensure food safety (Wallace, Sperber & Mortimore, 2011). It is very common that food businesses get a sense of having adopted HACCP when in fact these would have in place prerequisite programmes (PRPs). Although PRPs provide the hygienic foundation for any food business (Wallace, Sperber & Mortimore, 2011), HACCP is not a mere sanitation programme. Used well, HACCP principles together with the applications of good hygiene practices (Regulation (EC) 852/2004) should eliminate or reduce risks to acceptable levels. Supported by documentation, where necessary, to provide evidence of due diligence, HACCP is the key food safety control of the food along each stage of food production from primary production up to the final consumer (FAO/WHO, 1997).

1.10 BURDENS AND CONSTRAINTS IN THE APPLICATION OF HACCP IN SMEs

It is noted that particular barriers can constrain food businesses from the implementation of HACCP based procedures. Whilst these barriers can occur in any business regardless of size, it seems to be more problematic in small food businesses, where a number of limiting factors hinder the implementation of a food safety management system based on HACCP principles. HACCP is generally perceived as complex by small businesses, particularly in the food service industry where many different products are used on regular basis. It must also be noted that small businesses criticise

HACCP as a complex system of documentation; however it is reported that excessive documentation is the result of a system developed inappropriately (Mayes & Mortimore, 2001). This could be a result of the implementation of 'off the shelf' systems which are generic and by nature would have a blanket use. Micro and small size food businesses contribute substantially towards the whole food industry accounting for a large share of the activity. More than 99% of the food and drink companies are reported to be Small and Medium-sized Enterprises (SMEs) and the turnover is also substantial accounting for 51.6% of the food and drink industry (FoodDrinkEurope, 2015). It is evident that food prepared by SMEs has an effect on the entire food industry. The application of HACCP systems within SMEs is therefore a considerable factor to ensure that food produced by this significant industry has no ill health effect on the general public (Taylor & Kane, 2004); however micro and small sized businesses have limited resource to invest other than to ensure that their business is operating smoothly and with a profit. These types of businesses are generally managed by the owners or a small group of people who deal with all issue with little other help (Mayes & Mortimore, 2001). Noticeably the main issues that concern these entrepreneurs are; financial resources, time, and technical expertise which are discussed below (Postnote, 2009).

Financial resources; HACCP is perceived as expensive to operate and SMEs seem to be less able to see the benefits against the cost (Mayes & Mortimore, 2001). Controlling food allergens through the implementation of HACCP in micro and small size operation, compounded by required specific HACCP training i.e. food allergen management, might be seen as a financial burden which these businesses feel that the regulators should offer support to minimise costs (Taylor, 2001; FAO/WHO, 2006). SMEs normally

maintain tight control over costs, restricting resource allocation for the implementation of HACCP systems (FAO/WHO, 2006).

Time; Within small food businesses the number of staff is typically limited and the owner would normally form part of the working force. Even when training and consultation was delivered free of charge the participants complained that *"time was money"* and it was *"costing too much"* (Taylor, 2001). Time used for training needs to be equated into important investment, similar to infrastructural or any other improvement in the operation, as the outcome should be better knowledge of food safety which result in less wastage and less negative feedback from the consumers. Small businesses which normally communicate verbally their operational practices and procedures fear that operating HACCP would require time in documentation and consider this as a burden to implement HACCP (Taylor, 2001).

Technical expertise; The lack of training which effects the knowledge and the behaviour is also of concern and could create barriers in preparing allergen free food. The Food Standards Agency (FSA) has indicated that formal food safety training could place unnecessary burdens and costs on business (Postnote, 2009); however the primary cause for failing to provide allergen free food is lack of formal training (Lee & Kwon, 2011). Some states in the USA have now mandated that at least one employee with food allergen knowledge has to be present during operation times (Lee & Kwon, 2011). Lee and Kwon (2011) also noted that consumers participating in a focus group felt that the employees in restaurants were not aware of the seriousness and adverse effects

of food allergies. Formal (mandatory) hygiene training courses available have limited training related to food allergies and might not include the correct knowledge of food allergen management (Pratten & Towers, 2003); therefore policy makers should ensure that training provided is adequate and fit for purpose. An appropriate common policy is needed in order to achieve uniformity among trainers (FAO/WHO, 2006).

1.10.1 Inadequate Knowledge of Operating Obligations

Lack of knowledge of legal obligations and regulations could also be regarded as a constraint in the food operations in the preparation and serving of allergen free food. Sixty two per cent of proprietors of micro and small enterprises demonstrated lack of knowledge in both food safety and environmental regulations (Yapp & Fairman, 2006). This situation is further compounded by lack of trust that small businesses have in the relevance and importance of certain legal requirements in food safety which may contribute to lack of compliance (Yapp & Fairman, 2006). The lack of adequate food safety training which highlights the legal obligations towards sensitive individuals will result in the operators committing legal infringements with detriment to the health of allergy sufferers. The change in law, by the introduction of Regulation EU 1169/2011, dictates that the food service operator has to have accurate knowledge of what allergens are in the food being served. It is also not permissible to state that all the food served could contain an allergen (FSA, 2014). This responsibility therefore requires a change in operational behaviour and a good knowledge of the 14 allergens and their derivatives listed in Annex II of the new regulations (Table 1.1).

Table 1.1: List of Allergens as per Annex II of EU Regulation 1169/2011

1. Cereals containing gluten, namely: wheat (such as spelt and khorasan wheat), rye, barley, oats or their hybridised strains, and products thereof, except:
(a) wheat based glucose syrups including dextrose
(b) wheat based maltodextrins
(c) glucose syrups based on barley
(d) cereals used for making alcoholic distillates including ethyl alcohol of agricultural origin
2. Crustaceans and products thereof
3. Eggs and products thereof
4. Fish and products thereof, except:
(a) fish gelatine used as carrier for vitamin or carotenoid preparations
(b) fish gelatine or Isinglass used as fining agent in beer and wine
5. Peanuts and products thereof
6. Soybeans and products thereof, except:
(a) fully refined soybean oil and fat
(b) natural mixed tocopherols (E306), natural D-alpha tocopherol, natural D-alpha tocopherol acetate, and natural D-alpha tocopherol succinate from soybean sources
(c) vegetable oils derived phytosterols and phytosterol esters from soybean sources
(d) plant stanol ester produced from vegetable oil sterols from soybean sources
7. Milk and products thereof (including lactose), except:
(a) whey used for making alcoholic distillates including ethyl alcohol of agricultural origin
(b) lactitol
8. Nuts, namely: almonds (*Amygdalus communis L.*), hazelnuts (*Corylus avellana*), walnuts (*Juglans regia*), cashews (*Anacardium occidentale*), pecan nuts (*Carya illinoinensis*), Brazil nuts (*Bertholletia excelsa*), pistachio nuts (*Pistacia vera*), macadamia or Queensland nuts (*Macadamia ternifolia*), and products thereof, except for nuts used for making alcoholic distillates including ethyl alcohol of agricultural origin
9. Celery and products thereof
10. Mustard and products thereof
11. Sesame seeds and products thereof
12. Sulphur dioxide and sulphites at concentrations of more than 10 mg/kg or 10 mg/litre in terms of the total SO_2 which are to be calculated for products as proposed ready for consumption or as reconstituted according to the instructions of the manufacturers
13. Lupin and products thereof
14. Molluscs and products thereof

1.11 LIMITATIONS DUE TO OPERATION SIZE

The physical size of the operation could also constrain the preparation of food free from allergens. The risk of cross contamination due to lack of space and overcrowding in storage areas and units could create unintentional contamination of other products. Receiving products from suppliers who also have space limitation, could also present unintentional contamination which will go unnoticed by the food operation, especially when products are bought from markets or small suppliers (Figure 1.4 & Figure 1.5), due to the small quantity or quality required by the operator. Even when the production of food has been taken into consideration the processes to produce safe products, the possibility that the ingredients have been contaminated due to incorrect handling has to be considered when especially assessing the risk associated with food allergens. Figures 1.4 shows fish and crustaceans displayed for sale, where the two products, which are listed as allergens within the Annex II of Regulation EU 1169/2011, are in direct contact thus cross contaminating one another. When further processed the consumers would not be aware of this cross contamination with the consequence of a high risk of a reaction by sensitive individuals to any of the two. The same practice is shown in Figure 1.5, this time with celery at a vegetable stall.

Proper facility design can significantly reduce this potential hazard (FoodDrinkEurope, 2013); however in small food businesses, space is a critical limiting factor and an unavailable resource. The preparation and sale of food in extreme restricted areas contribute towards the risk of cross contamination. The new FIR does not make any distinction in its application due to size; however, it is a fact that physical size restriction, will create a high possibility of cross contamination, will not allow segregation of products and will force the operator to use areas that have not gone through thorough cleaning and sanitation between processes.

Figure 1.4: Possible Cross Contamination of Allergen Products at Markets: in this case the known allergens (Fish and Crustaceans) are stacked together resulting in possibly contaminating one another. This image is from a personal source

Figure 1.5: Possible Cross Contamination of Allergen Products at Markets: in this case the known allergen of celery is stacked adjacent to and on top of non-allergenic food. This image is from a personal source

It is understandable that, due to the lack of knowledge of the common allergens that could provoke a food allergy reaction to the consumer, when products are purchased, delivered and stored, these could end up touching one another or even worse, cross contaminating the whole stock. Anecdotal evidence show the sale of fish, molluscs and crustaceans could be one of the most common cross contaminations in this regard. Not only were these products lying on ice touching one another but these were bagged together as one. This might go unnoticed by the staff and when asked if a certain dish prepared by them contains a specific allergen e.g. molluscs, the answer could be misleading as although the allergen is not present as an ingredient yet it would be present through cross contamination. This scenario could have potential fatal consequences due to incorrect information provision that exist between visible content and cross contamination (Leitch, Walker & Davey, 2005) exposing allergy sufferers to risks due to food allergen presence in the food other than by design (Madsen et al, 2010).

Whilst not directly related to the operation size, the potential impact of food processing on allergenicity is also important to consider. Verhoeckx et al (2015) have concluded that heat treatment has different allergenicity effects on various foods, for example they have reported that boiling peanuts reduced the allergenicity whilst roasting them increased the elicitation of an allergic response. In food preparation this variance could be a risk which could have serious consequences on the consumer. Therefore, it is not appropriate for small food businesses, which have limited knowledge of food allergens and their consequences (Leitch, Blair & McDowell, 2001), to attempt to use heat processing to remove the risk of allergen presence in their foods.

Other cases could be related to food fraud. Although the intention might not be to harm anyone, it is still the action of food criminals who adulterate food sources for financial gains that could cause ill effect. The case of cumin contamination in 2015, as reported by the Anaphylaxis Campaign by the media, where cumin was substituted with cheaper ingredients like peanuts and almonds, gives cause of concern to what levels of risks food allergy sufferers are being exposed to, even when all the food information provided indicated no risk was associated to the food. Food fraud is the intent to adulterate the food which might be worse than unintentional cross contamination. Usually food fraud is operated on large scales thus exposing a larger number of people to the contamination. This criminal activity impinges on matters of grave importance including public health (Wilson, 2008).

1.12 TRACEABILITY

The Food Safety Law Regulation (EC) 178/2002 defines in Article 18, traceability and the requirements that food businesses need to uphold in order to be compliant. The system adopted within the community is dual carriage which means that both the supplier and the food business operator must be able to identify and trace the food within their control; therefore a one step-back and one step-forward system, as described earlier, will secure that throughout the food supply chain continuous traceability can be adopted. This will ensure that every product incorporated in prepared food has its own history information available if required. Regulation (EU) 1169/2011 reinforces these requirements by stating that it is mandatory to have information on the identity and composition, properties or other characteristics of the food. Traditional tracking in a production environment might cause a considerable amount of paperwork to be able to track products and ingredients within a

complex environment such as a kitchen. New emerging technologies could aid in the identification of the product, give instant composition and properties, such as nutritional declarations, list of ingredients and allergens that are listed under Article 9 of (EU) 1169/2011 as mandatory particulars. One such platform is provided by BT Foodnet (BT Foodnet, 2006), where synchronised data on the current and historical status of all stock items can be accessed in real time as it follows through the supply chain. This information, which is carried through radio frequency identification (RFID) is accurate from end-to-end of the supply chain, can then by transmitted without errors to the food business operation through RFID or barcode printed on the invoice or official document. The concept of this system is to transmit accurate data, including composition and properties of the food, from one source to another, which will assist the operator to identify the potential presence of food allergens. Whilst this will not prevent cross contamination, it offers distinct potential for recording the pathway of allergens through a kitchen and into final products. Although this sounds complex for micro and small food businesses, it could be the way forward to reduce the burdens that were discussed earlier. Modern technology tools are advocated as a means to provide food information up to the final consumers (Regulation EU 1169/2011). The use of the smart mobile phones to scan bar codes with essential food information could ease a considerable amount of laborious ingredient analysis. These systems which are readily available and freely downloadable from the internet should assist small businesses gather information without much expertise; therefore reducing the burdens to manageable actions.

1.13 KNOWLEDGE OF OPERATION PROCESS (RECIPE)

In a food business operation, where food is not sold in a pre-packed form, the importance of the recipe knowledge impacts greatly the safety of the

food prepared with special regards to food allergens. Shaffer (2010) attempts to explain the difference between "simple" and "standardised" recipes by quoting Berger & Luckman (1966), who described recipe knowledge as "knowledge limited to pragmatic competence in routine performance". This statement is quite true for most of the operational performance in many food businesses however lack of knowledge within the industry is still a concern. Here Shaffer indicates that *"simple"* recipes which apply the *"rule of the thumb"*, are assumed reliable whereas *"standardised"* recipes demonstrate reliability. This suggests that only standardised recipes should be employed in delivering accurate information to the consumer. When this is not the case, it is likely that different ingredients and products will be used by different chefs with the risk that this modification in recipe will expose the consumers to ingredients that could have an ill effect on their health. Although this might restrict the food preparation staff to a set scheme, it also could have an undesired implication on the reputation of the business, should it move away from the standardised recipe causing a consumer to experience a food allergy reaction episode. In small operations, where the number of staff is related to the size, the chef would normally have the recipe memorized, however the rest of the staff might not be knowledgeable of all the ingredients used. To avoid these situations, recipes need to be established and set in Standard Operating Procedures (SOPs). It is legally required that the accurate ingredient information is provided to the consumer; therefore terms like 'special' or a 'mix of ' which are used in menus and recipes by *"ego chefs"* who are not willing to modify their recipes or reveal their ingredients (Lee & Kwon, 2011) could expose the allergic consumer to the risks of consuming the offending ingredient. The need for standardisation of recipe goes beyond the requirement of reproducing the food to the same visual and taste standard. It also is

required by the food allergic individual to be able to make educated food choices.

1.13.1 The Importance of Accurate and Consistent Recipe Information

Good Manufacturing Practice (GMP) built on reliable knowledge and expertise is essential to construct a framework that could reduce food safety risks to acceptable levels. Standard Operating Procedures are verification of accuracy of ingredient declaration (Wallace, Sperber & Mortimore, 2011). SOPs by definition are operational instructions that are documented to carry out an operation correctly and always in the same manner (FAO, 1998), thus once SOPs are established within a food business, taking into account all the necessary factors including food allergens and possible contaminants, no food preparation staff should interpret the recipe by adding a personal touch of 'secret' or 'special' ingredients that could alter the recipe. Such a practice could have ill effects on the consumers, who would have decided on a specific dish due to the absence of the offending food.

The preparation of food within the food service industry is a complex operation since a large variety of ingredients (Ahuja & Sicherer, 2007; Uguz et al, 2005) are used even in simple recipes or dishes for example the making of a sandwich. To keep to the same example, it is not as much the complexity of the cooking techniques but the ingredients that are incorporated in the preparation of complex ingredients such as butter and spreads, cheeses and salamis or hams and other fillings and the bread itself which need to be scrutinised to determine the presence of food allergens or otherwise. In order to be able to identify if a product contains an allergen, one first needs to be knowledgeable of the food allergens that

are predominant in the EU which are listed in Annex II of Regulation EU 1169/2011.

In order to be able to produce loose food that would be suitable for allergy sufferers, the accurate ingredient information, complete knowledge of any previous preparation, knowledge of correct transportation and storage facilities and the accurate preparation of the recipe according established SOPs is of utmost importance.

1.14 SUMMARY AND RATIONALE FOR RESEARCH UNDERTAKING

There are some 150 million people worldwide who suffer from one or more food allergies (Elucidare, 2011). These people might not all be knowledgeable of the potential life-threating situations due to a variety of factors which are out of their control, especially when the food that they consume is prepared by someone else. The challenging nature of daily life, coupled with a variety of social factors, indicate that more people are resorting to eating food that has been prepared by others. Food allergy sufferers might have less confidence than others to consume food prepared by the loose food industry (Coutts & Fielder, 2009).

Through the introduction it was noted that gaps in the preparation of safe food for the allergic consumer exist. This mismatch between the production and requirements of food consumption deserves to be studied. These factors need to be established so that a better application of food allergen management can be developed. The status of food allergy management within the loose food industry alongside the researcher's background in the sector elicited the compulsion to investigate how allergen management can be improved within micro and small sized food businesses serving loose food.

Throughout this review it was noted that the lack of effective staff knowledge and poor management of food allergies within the food service industry have a serious effect on the quality of life of food allergy sufferers. It was also noted that complex issues contribute to the current situation which burden micro and small size food service businesses in their daily operations mainly time, finance and space restriction. Although these issues are real, a system which mitigates the current situation needs to be discussed in order to establish a baseline of the current level of confidence (assurance) that the allergic consumers have in the loose food industry and how this can be improved through the application of a multi-facet toolkit.

The study will establish the perception that food allergy sufferers have of the food service industry capability to serve them safe food. Focus group discussions will identify the gaps that exist in the industry which need to be addressed to satisfy the comfort of the food sensitive individuals to feel safe to eat in food service outlets. Allergy sufferers seek to know what is in the food prior to deciding to consume anything. This need to learn the composition of the food comes from their knowledge that if they are not cautious, the food could cause them ill health and in extreme case even death.

It is not only the declared ingredients which could have an ill health effect on the allergy sufferers. Food might already be contaminated on arrival at the food service business. This study will discuss cross contamination and observe the practices within food preparation areas. This will give the study real world evidence of the practices within live food preparation. The outcome will identify what gaps need to be addressed to produce safe allergen free food.

Establishing the level of knowledge of the food service staff will highlight which barriers deter the working force from producing safe allergen free food. Once this is established, adequate effective training can be developed to address the identified gaps.

Tools need also to be developed to assist in the delivery of accurate ingredient information to the consumer. This will be discussed through the introduction of the multi-facet toolkit which will review ways to improve food service staff knowledge of the predominant allergies in the EU and the consequences on the health of allergy sufferers. By contrast, other applications which have been developed are complex to read and are limited to the fourteen allergens that are prescribed by law. These are also restricted to food produced by large suppliers; therefore these systems eliminate small businesses from utilising digital applications. For example, McDonalds delivers the ingredients information through scanning of the barcode on the packaging material of each product therefore delivering the information after the purchase. The information is also delivered through websites (www.mcdonalds.com.mt) where the ingredients information of each item is made available however this is limited to the 14 allergens. MenuCal (www.menucal.fsai.ie), a system developed by the Food Safety Authority of Ireland, organises the recipes for the food preparation staff however it does not deliver recipe information to the consumer. This is transmitted in printed form on the menu thus omitting the additional ingredient information which is not prescribed by law. There is no interactive information to the consumer. Part of the multi-facet toolkit would be the development of a new tool that would assist staff record the presence of allergens at production level and the accurate delivery of this information to the consumer without the need of third party assistance. This would ensure that the data would not be adulterated or abused by the service staff.

1.15 RESEARCH AIMS AND OBJECTIVES

1.15.1 Aims

The aims of this research are to evaluate the following;

1.1 The current situation of food allergen management in micro and small sized food service industry and the level of knowledge the staff have in order to prepare safe food for allergy sufferers.

1.2 The mechanics by which accurate ingredient information could be hindered throughout all the steps required from food preparation, up to service, and how these issues could be overcome.

1.3 The expectations of allergy sufferers when eating outside their home with special attention to micro and small sized food service industry and their perception/ confidence in the industry.

1.4 The applied use of current technology to log and provide accurate ingredient information to all those requiring it, including customers.

1.5 The situation pre and post the application of the innovative multi-facet toolkit which was developed to address critical elements in the management of food allergies in the micro and small size loose food businesses.

1.15.2 Objectives

The research will develop a structure to produce data that will measure the gaps identified within the scope of the study. In order to achieve the listed aims, the research will be conducted in the real world of the food service industry.

The objectives are to;

1. Observe through videos a real account of the practices in the food service industry.
2. Conduct a questionnaire to measure the level of knowledge the food service industry staff.
3. Establish through a focus group, the perception food allergy sufferers have of the food service industry.
4. Deliver accurate ingredient information to the allergic consumer at loose food businesses.
5. Determine the gaps in traditional training which are detrimental to improve practices in the preparation of food for allergy sufferers.

1.16 THESIS STRUCTURE

The thesis involves a blend of the research methods that best reflect the needs of the approach of the study. The literature review gives a background of the perceptions and difficulties food allergy sufferers encounter when eating out. The burdens and limitations of small food service businesses are also highlighted.

Chapter 2 describes the research design and methods used which addressed both the consumers and the producers. This chapter also describes the blend of qualitative and quantitative research of this thesis in the following Chapters 3, 4 and 5. The introduction of an innovative multi-facet toolkit is also described within this chapter. This was developed as part of the study design.

Chapters 3, 4 and 5 of this thesis describe the different aspects of the study which involved the mixed method approach. Each of these chapters

presents a result and discussion section, strengths and limitations and also an interim conclusion.

The integration of all the discussions and findings of the research are brought together for consideration in the final chapter. The structure of the thesis is illustrated in Figure 1.6.

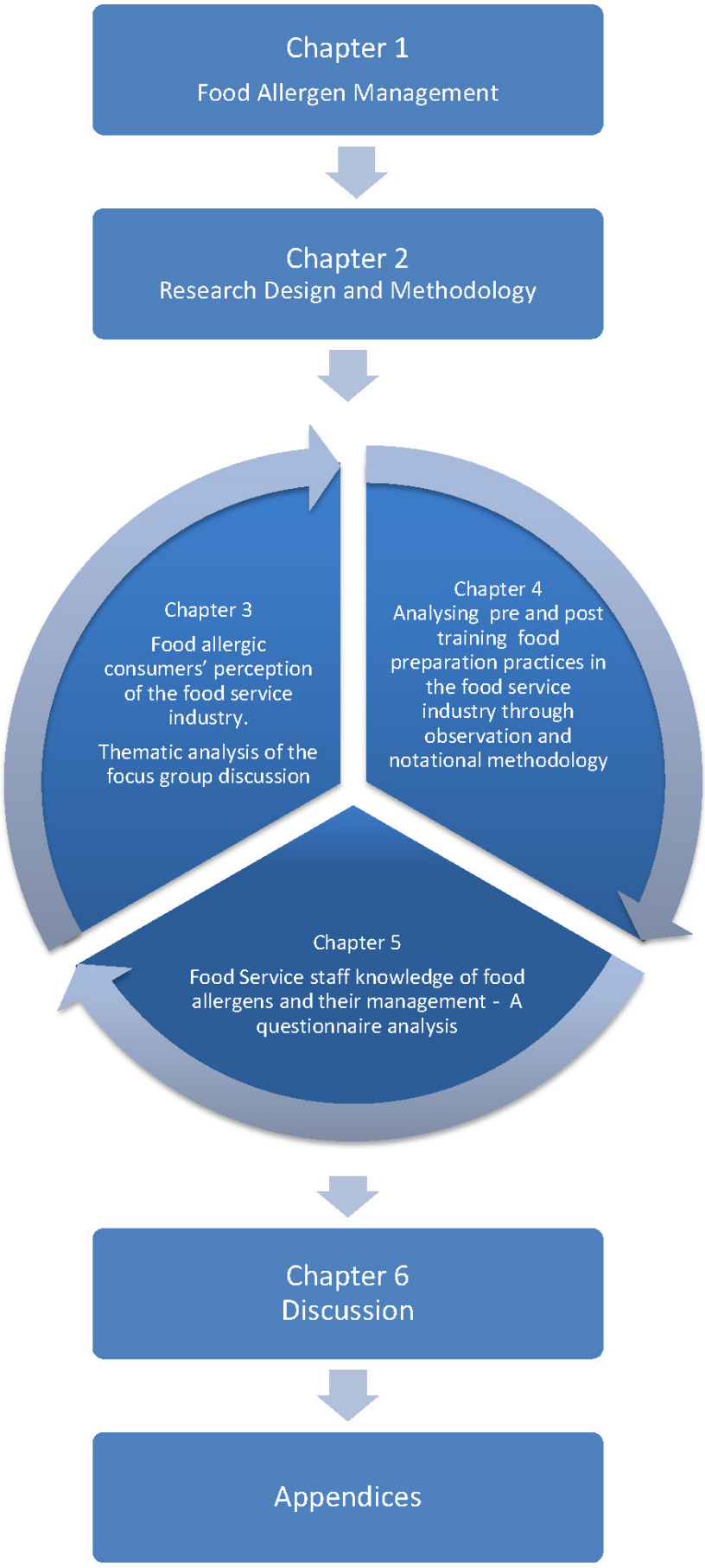


Figure 1.6: Overall Thesis Structure

CHAPTER 2

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RESEARCH DESIGN AND METHODOLOGY

2.1 INTRODUCTION

The literature review has indicated that gaps exist in the delivery of accurate ingredient information throughout the complex food supply chain from the farming of produce through to the end consumption (FDA 2005; Gowland, 2002). In addition, the fact that the EU Regulations do not address the issue of cross-contamination before or after an ingredient is received means that careful management of allergens is essential at all links of the food supply chain (IFST, 2015). It is also evident that people suffering from food allergies have difficulties in assuming even the simplest food-related social activities, for example a staff meal, which, for people without any food related health conditions do not raise any concern. These situations pose a considerable concern to the quality of life of sensitive individuals to the extent that they fear for their life when their food is prepared by others (Allergy UK, 2015). One dimension which is very evident in the literature is the problem of effective management of food allergies in environments where control of food allergens is difficult with the consequence of cross contaminating other food. Another bearing of the problem is the lack of effective staff knowledge of food allergens and the consequences these have on sensitive individuals. This research intends to study the management of food allergens in the loose food industry with special attention to small size food service businesses in the Island of Malta. The research was limited to these operations as it has transpired through research, that it is more difficult for SMEs to manage food allergens and also because of the greater percentage of restaurants falling into this category. Due to the number of small food businesses (frequency) and the lack of adequate knowledge (severity), SMEs represent a higher risk to the allergic consumer, yet it is also argued that the small food service businesses give great attention to consumers' requests (Lee & Kwon, 2011).

2.1.1 Main Research Streams

There are three main strands to the research (Figure 2.1):

1. Consumer understanding – to confirm current perceptions of allergic consumers identified in literature review and assess impact of innovative multi-faceted toolkit package on consumer perception/experience when eating out.
2. The Food business practices of producing food for allergy sufferers and their understanding of the consequences food allergens have on the sensitive individuals.
3. Supply chain and allergen information – application of innovative multi-faceted toolkit elements to effective handling and transfer of allergen data.

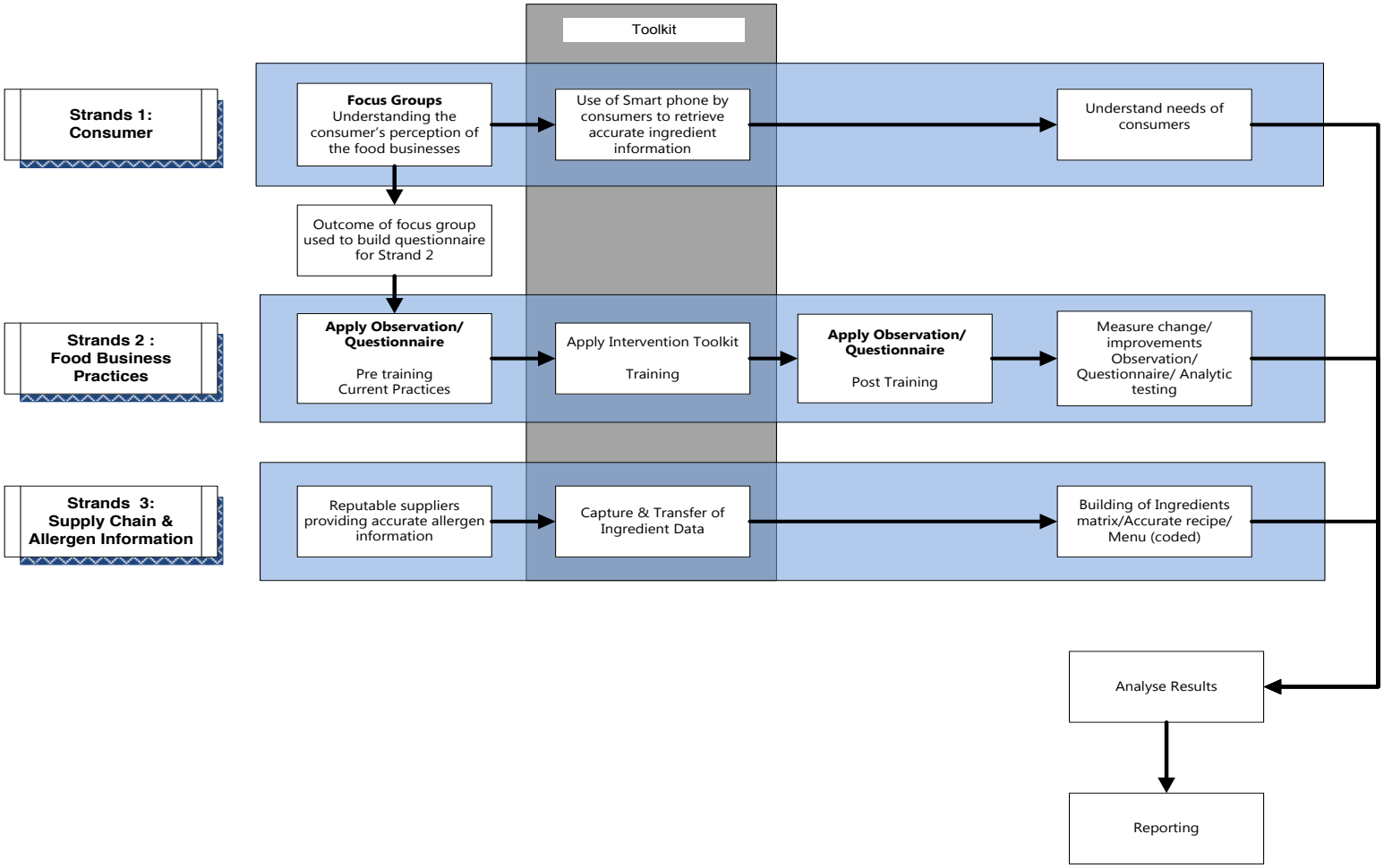

Figure 2.1: Work Packages within Each Research Strand

The Innovative multi-faceted toolkit intervention within small catering businesses, which is transversal to all strands, was developed to improve allergen management practices through training, capturing ingredient information, providing accurate allergen data handling and transferring the ingredient information to the consumer with the use of a smart phone. The development of the multi-faceted toolkit was the outcome of addressing gaps identified through literature review. The progression steps taken after data gathering indicated the final format. This multi-faceted toolkit will be explained in detail within this chapter.

The research was performed in the setting of small catering businesses within the island of Malta, which are typical of the main types of small restaurants within the EU. Having a total western life style as mainland Europe, Malta is governed by the same food regulations of other EU countries being part of the bloc. The research involved a variety of data collection approaches and analysis techniques.

The intention was to start the research when business would be slow. Typically in Malta most restaurants are busier in the summer months, starting May till October (Malta Independent, 2007); however no special difficulties were encountered in the recruitment of the businesses. The study was conducted between mid-summer till the early winter months. The initiation of the study was not linked to any period of the year which also reflected the different eating trends of the consumers and seasonality; therefore these different factors added value to the study although this was not researched.

The intervention was intended to address all the identified circumstances in the delivery of information of the food prepared by the food service businesses. The structure of this research necessitated a mixed method

design which would address the three identified strands (Figure 2.1). The design intended to triangulate the data which each strand produced.

Strand 1 was the initial stage of understanding the needs and perceptions that food allergy sufferers had of the food service industry through a focus group. This produced a clear account of the difficulties and fears food allergy sufferers endure when they are not in control of the preparation of their food.

Strand 2 outlined the practices within the food service industry. The design administered a questionnaire pre and post specially designed training in food allergy management. Within the same strand, observation of food handling practices was ongoing. This highlighted if the concerns mentioned by the food allergy sufferers during the focus group were genuine and identified what gaps exist in food safety procedures within the businesses concerning food allergens. As the study aimed to retrieve accurate information of the current practices of the food allergy management within the operations, it was important to ensure that the measurement method was both valid and reliable (Robson et al, 2001). Testing the questionnaire prior to the actual run of the program add validity and reliability to the study. The questionnaire was designed with close ended questions to be able to measure quantitatively the situation in the operation. This was verified through qualitative measures and through triangulation approach; the different methodologies measured the study in order to establish consistency (Robson et al, 2001).

In Strand 3 the food business captured the food information, at the right stage of production and processed this data into an ingredients matrix. This was in preparation of the development of accurate information for menu building.

All the results from the different strands were analysed and reported. The study has a significant qualitative and quantitative approach through the engaged methodologies.

2.1.2 Ethics Approval

The research obtained ethical clearance from the University of Central Lancashire ethics committees. This was achieved in two phases. The first approval was to conduct the focus group discussion (Appendix 2). The outcome of this phase determined the questions which were administered to the food service staff. The second approval was granted to carry out the rest of the research (Appendix 3).

2.2 RESEARCH METHODOLOGY - INSTRUMENTS AND APPLICATIONS

2.2.1 Focus Group Discussions to Determine Allergenic Consumers' Expectations and Requirements

(This section will address research aims 1.3 and 1.4 of the project).

Allergenic consumers should play a significant role in the development of any tool that could alleviate the food safety barriers which they encounter and have to overcome when they eat food prepared by others. Their contribution can be used to develop tools to retrieve vital information about the ingredients within the product or dish they would be about to consume. The perceptions and the expectations of food allergy sufferers of the food service industry are of immense importance when discussing issues that would affect their quality of life. The focus group method interviews a group of people on a specific topic (Robson, 2002) who interact on the topic that was selected by the researcher (Gibbs, 1997). This methodology gives a rich set of data, thoughts, feelings and perceptions of the group members in their own words (Steward and Shamdasani, 1990). In

the case of this study the discussion captured the data that had a significant contribution towards the development of a questionnaire. Obtaining qualitative data was important in order to develop more structured instruments that would assist in collecting quantitative data through questionnaires and observations (Newman & Benz, 1998).

2.2.1.1 Methods – Focus Group Design

To collect this data one focus group discussion with food allergy sufferers, aged 18 years and over, took place at a private venue where the discussion was audio recorded. The recording was undertaken in the presence of a qualified computer engineer to reduce the risk of technical failures. The equipment used was specially selected to have the least intrusive effect on the participants. This was achieved by using high audio gain microphones which were placed about two meters away from the participants. The intention was to achieve an easy discussion atmosphere rather than being constantly conscious of the recording apparatus. A backup system was also engaged with the use of an analogue Dictaphone and a secondary computer backup. A skilled facilitator was engaged to ensure that the participants stayed focused on the topic and encouraged the participants to share their opinion and speak (Robson et al, 2001) freely about their expectations of allergen management in the loose food industry; however questions of personal nature were avoided as far as possible so that respondents who did not wish to disclose their status (Robson et al, 2001) were not put in awkward situations.

The focus group discussion had two main scopes, both of qualitative nature. The first one was to establish the correct set of questions that were required for further investigations within this study. The second scope was to understand the perceptions of food allergy sufferers of the food service industry and what improvements in delivering accurate ingredients

information could alleviate or reduce their concerns about food prepared by others to an acceptable level.

Focus groups are efficient ways of gathering a set of people who would like to share their thoughts and opinions about a selected topic. The participants are empowered to make comments in their own words (Robson, 2002). When this focus group came together the participants felt relieved to meet other sufferers who were willing to speak about their condition and discuss what could be done within the food service industry to improve the management of allergens and enable them to feel safer when eating out.

2.2.1.2 Sample and Recruitment

Selecting participants was undertaken through social media, website invites and adverts and also through local associations of allergy sufferers. An advert was developed and posted through the communication vehicles (Figure 2.2). A Facebook page was developed (Food Allergy Management UCLan Malta) which was used as a platform to advertise and inform *friends* of developments and current issues which could be of benefit to those visiting the page. The participants were given an information sheet (Appendix 4) and consent forms were signed (Appendix 5).

Figure 2.2: Advert for Recruitment of Focus Group Participants

The focus group discussions were held in the Maltese language and recordings were translated and transcribed in English later. Transcription and translation was designed to stay faithful to the discussion/true conversation. The translation was not always possible to be word for word, as different languages tend to use different terms to express a situation. To overcome this situation the sense of the context was first understood and then written in a fashion that the translation was faithful to the conversation. The participants felt free to communicate their opinion partly due to the horse shoe effective seating configuration which proved to be ideal and informal.

2.2.1.3 Data Collection- Administration of the Focus Group

The focus of the meeting was established through preset questions (Table 2.1) which were read to the participants without making any reference to specific individuals. The questions were designed on the literature review and based on the requirements of the aims of this study.

Sampson, Munoz-Furlong and Sicherer (2006) discussed the social isolation of food sufferer, while Pratten and Towers (2003) reported that menu information sometimes mislead the consumer and thus eroded the trust in the information provided. Pratten and Towers also reported in their 2004 study that chefs would be unlikely to have been trained in food allergy management. Leitch, Blair and McDowell (2001) had reported that small businesses had limited knowledge of food allergens and their consequences therefore it was appropriate to investigate where allergy sufferers felt that their demands would be best served. These themes were built into the focus group discussion (Table 2.1). The intention was to focus around their perception of food allergen management within the food service industry in preparation of the questionnaire. The questions were short and without any supplementary questions. Although the questions were not pilot tested, they were restructured under supervision to ensure that the data outcomes would reflect the initial aims.

The participants were allowed to intervene at any time, giving them the unrestricted freedom to express themselves. As part of the exercise, and to also capture qualitative data, the focus group participants were asked to experience the proposed additional food allergen information, which forms part of the innovative multi-faceted toolkit, by using a smart phone to download the required information of a prepared menu and were asked to comment on the process. The group was not in real hospitality environment (restaurant) and no service staff were present to assist them with the process. This was purely a desk-top exercise and no food was consumed.

Table 2.1: Typical Questions at Focus Group Discussion

Does your condition limit your social activities when food is present e.g. receptions or eating outside?
Have you experienced an ill health episode when eating outside?
If yes, what was your personal immediate reaction and that of the restaurant staff?
After the ill health episode did it affect your decision to eat outside?
When eating outside are staff helpful and accurately knowledgeable of the food ingredients.
What is your feeling when you take your children to eat outside if they are food allergenic? *(anxiety, fear, rejection)*
What is your perception on who is responsible of your food (chef, staff, yourself)
Do you expect service staff to be accurately knowledgeable of the food content?
What is your perception of a system where no staff or other person would be involved in transmitting accurate ingredient information?
Do you think that the size of the business has any effect of the food safety especially with food allergens?
Here the Smart Phone scanning system of the menu will be introduced
(IT specialist comes in)
After being introduced of the multi-faceted toolkit would you feel more secure eating at restaurants offering this system knowing that the information here is accurate?
What is their perception if the service staff assists you in using the system. *(Will you feel that there is too much fuss).*

2.2.1.4 Data Analysis

The qualitative data from the focus group discussion transcripts was analyzed through thematic analysis and coded. The questions for the next step (questionnaire) were developed with the scope of measuring the current situation in the management of food allergies in the loose food industry. The questions were designed to investigate the concerns flagged by the focus group participants. Later the data was measured for improvements/changes of the implementation, validation and verification of the proposed innovative multi-facet toolkit.

The second scope of the focus group was to code data through thematic analysis which gave a rich and comprehensive description of the aspects discussed. Thematic analysis identifies patterns that emerge from the data set. This methodology suits research that is related to people's experience, views and perceptions and has been widely used across social and behavioural studies (Clarke and Braun, 2013). The design method of the research is based on the model reported by Braun and Clarke (2006) where a detailed step-by-step guide to conduct thematic analysis is explained. The process suited the purpose of this research and this gave reason for the adoption of the model. In order to analyse the data, the follow six phases were engaged;

- Familiarisation with data
- Generating initial codes
- Searching for themes
- Reviewing themes
- Defining and naming themes
- Writing a report (Braun & Clarke, 2006).

The above phases will be explained in depth in Chapter 3 of this thesis. The data was analyzed first through careful listen of the recordings and understanding the discussion in relation to the questions and the participants' contributions.

2.2.2 Observations Carried Out in Food Operations Pre and Post the Implementation of Multi-Faceted Toolkit

(This will address research aim 1.5 of the project.)

Onsite observation exercises were performed to document specific practices within the operation and give depth to the study. In order to overcome limitations of researcher's bias which could affect validity and reliability of the observations and observing actions which are not relevant to this study such as personal hygiene or other food safety issues, the design of the observation had a structured pre-determined coding scheme and not a narrative account (Robson, 2002) to acquire quantitative data. Robson (2002) describes non participator observation as unobtrusive. This meant that the absence of the researcher within the observed area, which is a characteristic in the interests of being non–reactive, reduced the affects that the observer could have on the observation if present.

2.2.2.1 Method- Observation Design

Video recording needed to capture the behaviour of the food preparation staff prior to the training session as part of the innovative multi-facet toolkit to establish the existing situation of the food allergen management within the selected businesses. This was achieved by a session of daily recordings of a pre-set time plan according to the most active period of day of each business. These sessions were conducted over a period of five consecutive days within all businesses. These video sessions were followed

by a six hour training programme which was developed for the purpose of this study. After the training session the video recording sessions were continued for a further five consecutive days at the same pre-set time.

2.2.2.2 Sample and Recruitment- Food Businesses Participants for Observation Research Method.

The samples for observation and questionnaire method were the same therefore the recruitment was one. The food businesses were randomly selected each from their own category to fit the research requirements. Three different types of operations which have been selected helped identify the requirement of the implementation. The reasoning behind this was to test the system under different operational patterns and observe the reaction of the staff and consumer to the programme.

The three operations selected were;

- Chef Patron (Micro Business)
- Catering operation (CPU)
- Restaurant with roster operation of staff.

The operations within the 3 categories above were approached initially via telephone and briefing was verbal, based on the information provided in the information sheet (Appendix 6). At the first meeting proprietors were asked to sign the consent forms (Appendix 7) and were given a copy of both the signed consent form and the information sheet to keep.

Participants within the Selected Food Businesses

Within each operation, participants included the head chef/manager/proprietor and staff involved in preparing, handling and serving food where the interaction with customers about special dietary considerations regarding allergens took place. The numbers of participants

depended on the set-up of each individual operation. Participants were briefed verbally based on the information provided in the information sheet (Appendix 8) and were handed a copy of this sheet to keep. They were asked to sign a consent form and were given a copy of their signed form to keep (Appendix 9).

Food Businesses Descriptors

A. Chef Patron (Micro Business)

As chefs patrons have more freedom not to apply Standard Operating Procedures (SOPs) (in this case standardized recipes), it was a good opportunity to observe the procedures within the operation and use it as a testing ground (pilot) for the implementation of the innovative multi-facet toolkit. It was therefore suggested to use a family restaurant as a baseline for the study to test the observation model and revise it accordingly to establish validity before the implementation in the other two operations. Although the staff in this business were well trained in food allergen management, it was felt that there was still room for improvement especially when the chef was not available.

B. Catering Operation

Within a catering operation of a CPU the foreseeable difficulties would be the staff turnover (OHSA Malta, 2013; Eurofound, 2012) which could have an effect on the continuous trail of knowledge betterment of the staff. It was therefore suggested that the span of time between the first and second questionnaire would be kept to a minimum however staff turnover is a reality and this could also give insight into the difficulties of delivering accurate information within the operation. Here the scope of the study was to

investigate the delivery of safe food with accurate information even if the business was compounded by these difficulties. Therefore this also tested the robustness of the multi-faceted toolkit.

C. Restaurant with Roster Operation of Staff

Although this type of operation seems similar to the previous one, in reality it is quite different. The chefs working different shifts would prepare the mise en place (food prepared ahead) for the next shift or for the next day if they are working the evening shift. Here staff, due to the nature of the specific work, where the chefs are required to handle more products and prepare a large variety of dishes in restricted time frames, would probably be more qualified and thus the retention rate is significantly higher (Hjalager & Andersen, 2001). The different level of education between the operations presented the opportunity to record if there were any differences in allergy management between the operations in this study.

Although many other types of food businesses could be studied, these three types seemed to the most common in Malta, where this study was conducted. In the Malta Tourism Authority (MTA, 2016) and the Government of Malta Trade Department lists of businesses (Ministry for the Economy, Investment and Small Business, 2016), restaurants and catering units respectively, are significantly higher than other categories. In the EU27 statistical report, micro and small businesses employed the highest number of people; this is also representative of Malta (Eurostat European Commission of 2009). Restaurants and catering enterprises accounted for 91% of the enterprise in the hospitality sector in Malta (Ernest & Young,

2013). They also represented the catering industry out-of-home market based on standard activities and food offered in a consistent manner. It was also argued that the study was better implemented in these businesses rather than others where the level of acceptance could have been very low e.g. take-a-ways/street vendors due to inconsistency in operational procedures.

2.2.2.3 Data Collection- On Site Procedures

As the study was conducted in three different locations, the equipment was uprooted and set up in the next location. This exercise had to repeat itself for six times. The approximate time to set up was reduced from over an hour to twenty minutes. This was essential to reduce the time in the food preparation areas thus reducing the disturbance time.

The computer was visited every two days to ensure that the system was working and that the data was being captured, no audio was recorded. An external hard disk was used to retrieve the recorded data as a backup during the visits. The placement of the cameras was noted so that when the equipment was replanted, it was exactly in the same place it was originally. This was done so that the angles of the observation were identical throughout the process. These recordings gave the research the chance to analyse the pre and post training behaviour and measure any changes. A further session of video recordings of two days was conducted about 10 months later to establish if the practices had changed.

Confidentiality was assured to the consenting staff that the recorded actions would not be used in any disciplinary manner and that all recorded actions would only be used for the purpose of the study (Chapman, MacLaurin & Powell, 2013). The recordings were performed with the minimum disturbance to the operation.

2.2.2.4 Data Analysis

The method used to discuss the data was notational analysis. Hughes and Franks (2004) define notational analysis as the procedure that could be used in any discipline that requires assessment and analysis of performance. As the study needed to analyse the performance of the kitchen staff preparing food, this method of analysis best suited the requirements. The videos were meticulously viewed and stopped to analyse the action from different angles through the different cameras. A decision tree was developed to structure the observations and the incidents were coded according to the identified categories. The development of the decision tree was a result of literature review and researcher expertise of the possible pathways of cross contamination in the preparation of food in the food service industry.

Decision Tree for Notational Analyses

The captured actions during the recorded sessions needed to be analysed in a structured manner which addressed the research question of establishing the situation of food allergy management in food business pre and post training. To enable the recording of the actions and their frequency notational analysis was used during this study. Notational analysis is a generic tool that enables the researcher to record the observed actions and the sequence of occurrence (Clayton & Griffith, 2004; Chapman, MacLaurin & Powell, 2013).

A decision tree was developed around the model used by Chapman et al, however this was modified to satisfy the requirements of this study (Figure 2.3). Three pathways were developed to take decisions whether a recorded action could constitute a cross contamination of food with known allergens as per Annex 2 of Regulation EU 1169/2011. This research observed food preparation staff in the kitchens of their respective business.

Rationale of the Decision Tree

The rationale of the decision tree is that it breaks down complex decisions into simpler decisions which could finally answer the initial question. In this research the question is to understand how food could be cross contaminated with other foods by means of hands, equipment or other than by design. The coding questions at each step needed to be focused and required little inference from the researcher (Robson, 2011) to be answered. Therefore the questions needed to be simple with clear outcomes so that the progress could be achieved without the intervention of the researcher thus reducing the risk of researcher bias. Each step needed to be coded and led to the next decision which finally answered if an action, which was observed, would result in a cross contamination of food with food allergens.

The advantage of using a decision tree to analyse the data collected is that this tool is simple to understand and interpret, and the flow diagram leads from one decision to another. At construction level, it was however important to understand the process that was to be analysed. Therefore pilot operation needed to ensure that all possible scenarios were noted and included in the design.

The decision tree design in this research is based on the prior experience of food handling and the verification of its validity within the pilot restaurant. The three pathways which were identified as possible practices of cross contaminations were;

- By equipment (Route 1)
- Other than by design (Route 2)
- By hand (Route 3).

The decision tree was developed around the logic of how food goes through steps of preparation and what equipment or handling is required in its preparation. It was obvious that hands and equipment were needed in the preparation of food however a further route of possible cross contamination was developed. The ‘other than by design’ was probably the most difficult code to analyse however a keen eye for abuse of recipe design could capture incidents where food was contaminated by other ingredients ‘other than by design’ i.e. not intended in specific recipe.

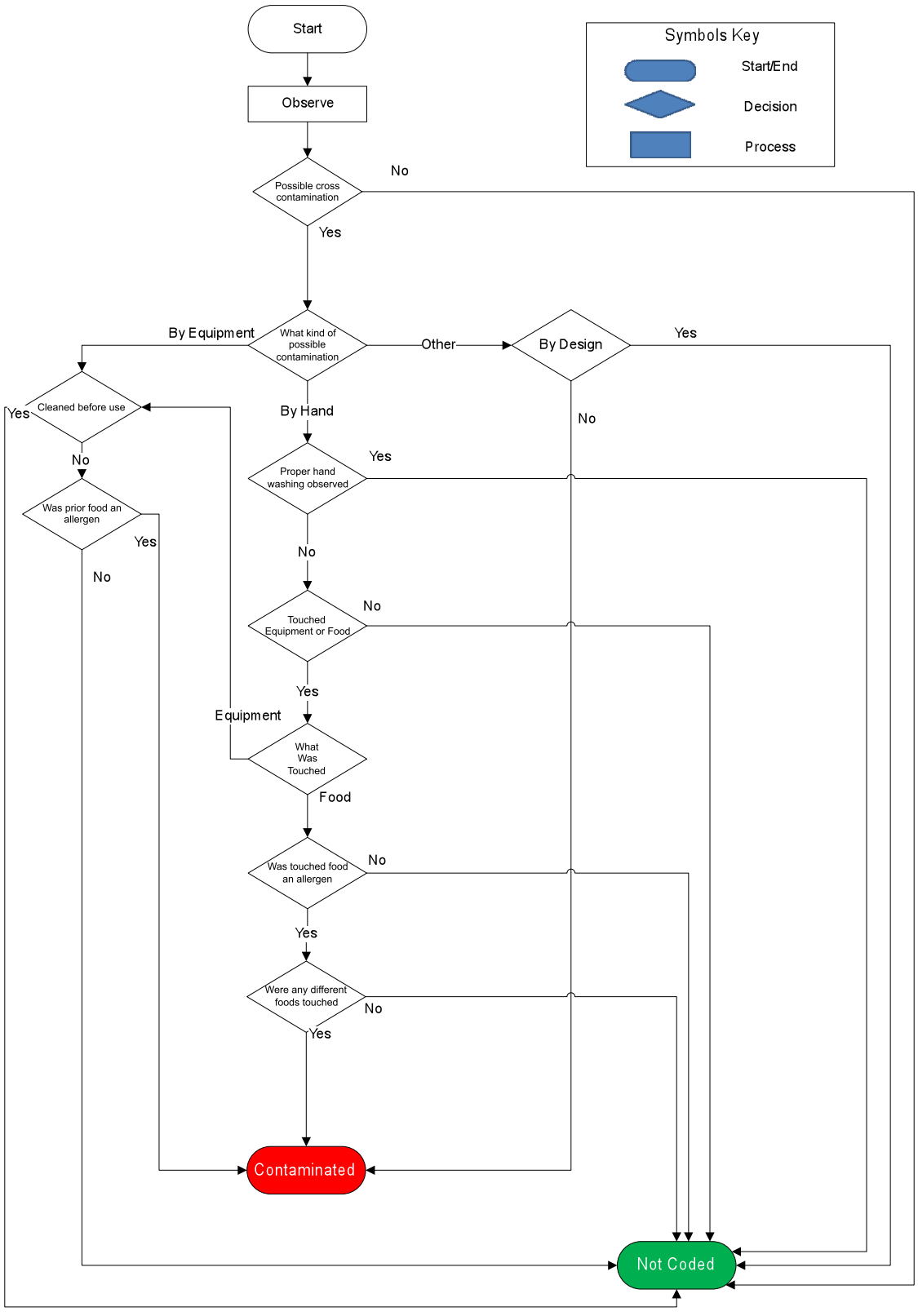

Figure 2.3: Decision Tree Developed for Notational Analyses

Keys to type of contamination;
By hand means any cross contamination of food when hands are involved.
By equipment means when food is cross contaminated by equipment for example knifes
Other than by design is the cross contamination with ingredient which are not intended as part of a recipe or SOP

2.2.3 Questionnaire

(This will address research aims 1.1 and 1.2 of the project.)

In order to achieve quantitative information that would measure the current status of food allergen management knowledge within the food businesses, a structured questionnaire was administered to the staff of three food service businesses which gave a snapshot of the operations prior to the implementation of the innovative multi-facet toolkit. Questionnaires are a set of questions, in the case of this research close ended questions to give quantitative results, which make it is easy for respondents to give the necessary information and for the researcher to record the answers with the intent to analyze and interpret the results (FAO, 1997). The same questionnaire was again administered to the same people after the implementation of the multi-faceted toolkit and the difference measured.

2.2.3.1 Method - Questionnaire Design

The questionnaire was designed and based on the outcomes of the allergy sufferers perception from the focus group discussions and the experts knowledge of what the food handlers were supposed to know when working in an industrial/restaurant kitchen. The questionnaire session, in each business, was preannounced and all participants received the research information sheet and signed the consent forms. Initially the participants were invited to read and answer the twenty questions which were developed. The questions had multiple choice answers and the respondents needed to tick their preferred choice. Some questions had more than one correct answer and the respondents could, if they wished, tick more than one answer. The respondents were allowed the time they required to complete the questionnaire.

The same process was repeated post training session, which forms part of the multi-faceted toolkit, to the same cohort of participants. In order to achieve this, the businesses kept a list of the participants; however the questionnaires were anonymous. This guaranteed anonymity to all participants.

2.2.3.2 Sample and Recruitment for Questionnaire Research Methods

At each business, the participants were selected by the owners. This might be a limitation to the study, as chosen participants could have been the better trained or the longest serving staff within the business, yet there was no direct access to the participants prior to the first meeting. The participants who were selected for the observation were the same persons who participated in the questionnaire. This was part of the research design as in small businesses the number of employees is limited; therefore to ensure that the least number of employees were disturbed from their work routine this model was preferred.

2.2.3.3 Data Collection

The data was collected by the researcher. The results indicated what would be achieved through traditional classroom training and what gaps needed to be addressed when designing professional development. It also indicated if training had any influence on the participants' behavior and knowledge to produce safe food for allergy sufferers.

2.2.3.4 Data Analysis

Spreadsheets and descriptive statistics were used and the results were portrayed in graphs with the two outcomes showed the difference between pre and post training knowledge of the food service staff. The results were represented in percentage of the sample.

2.2.4 Analytical Tests for the Presence of Food Allergens

(This will verify aim 1.4 of the project).

To add further validity and reliability to the study, allergen analysis of the prepared food verified that cross contamination risks were being managed and that allergens were absent from dishes. This process required specialised rapid test kits which are a key contributor to assuring safety of the food-allergic consumers (Kerbach et al, 2008). Rapid lateral flow test devices (strip test/ dipstick) are used primarily for sanitation assessment, but can be used for food product testing (Taylor, 2011). These tests were the most suited to detect the presence (or absence) of the targeted allergens within the scope of this study; however other detection methods such as General Protein Tests or Polymerase Chain Reaction (PCR) which require laboratories or specialised analytical knowledge, could defeat the principle of controlling the risks through management of food allergens as results obtained from these tests take a considerable amount of time and therefore are not suited for instantaneous results. Elaborate, reproducible and sensitive methods for the detection of allergenic constituents in food makes a critical contribution to allergen management (Kerbach et al, 2008) however this in itself is not enough to manage allergens in loose food businesses. If 100% destructive testing would guarantee food safety there would be no product left for consumption (Wallace, Sperber & Mortimore, 2011). Therefore analytic testing could be part of the HACCP plan in the methodology to verify the study and give confidence that the management systems are working following the intervention.

2.2.4.1 Method - Rapid Lateral Flow Tests

In order to measure the presence or absence of a targeted allergen in the kitchens especially if residues of allergens are found in cooking utensils, it was intended to use 'Reveal RAPID 3-D' tests. Besides the fact that the

tests satisfied the requirements of the research, it was required that the quantity of test units supplied was what was required. Other suppliers had stated that they only shipped sealed boxes (10 test units) of each allergen test, therefore 'Reveal RAPID 3-D' tests were selected because the supply was convenient in relations to quality and quantity, price and delivery. Unlike other complicated laboratory test, rapid lateral flow tests gave immediate results.

Two allergens were targeted for this analysis namely egg and gluten, as these are very common ingredients that could be found in most kitchens. The method which best suited this research was by means of swab sampling. The test required that a specific measured area (10cm X 10cm) would be marked (Figure 2.4), for this research this was the inner surface of a pan. The extraction buffer was emptied into the sampling tube. A swab was dipped in the extraction buffer and the sample was retrieved from the specific area by using a crosshatched technique revolving the swab on the surface. This action was repeated using the same movements at right angles to those of the first swabbing. The swab was returned to the extraction buffer in the sample tube and tap secured. The tube was then shaken for 1 minute. The lid was then removed and filled with the liquid. The Reveal 3-D device was then dipped into the lid and ensured that the cavity was filled with the liquid. The test window showed that the liquid had saturated the device. The device was then allowed to rest for 5 minutes. The results could be read on the side of the device. Four possible results could be obtained; negative, positive, high positive or invalid. The tests were administered using specified parameters to achieve reliable results.

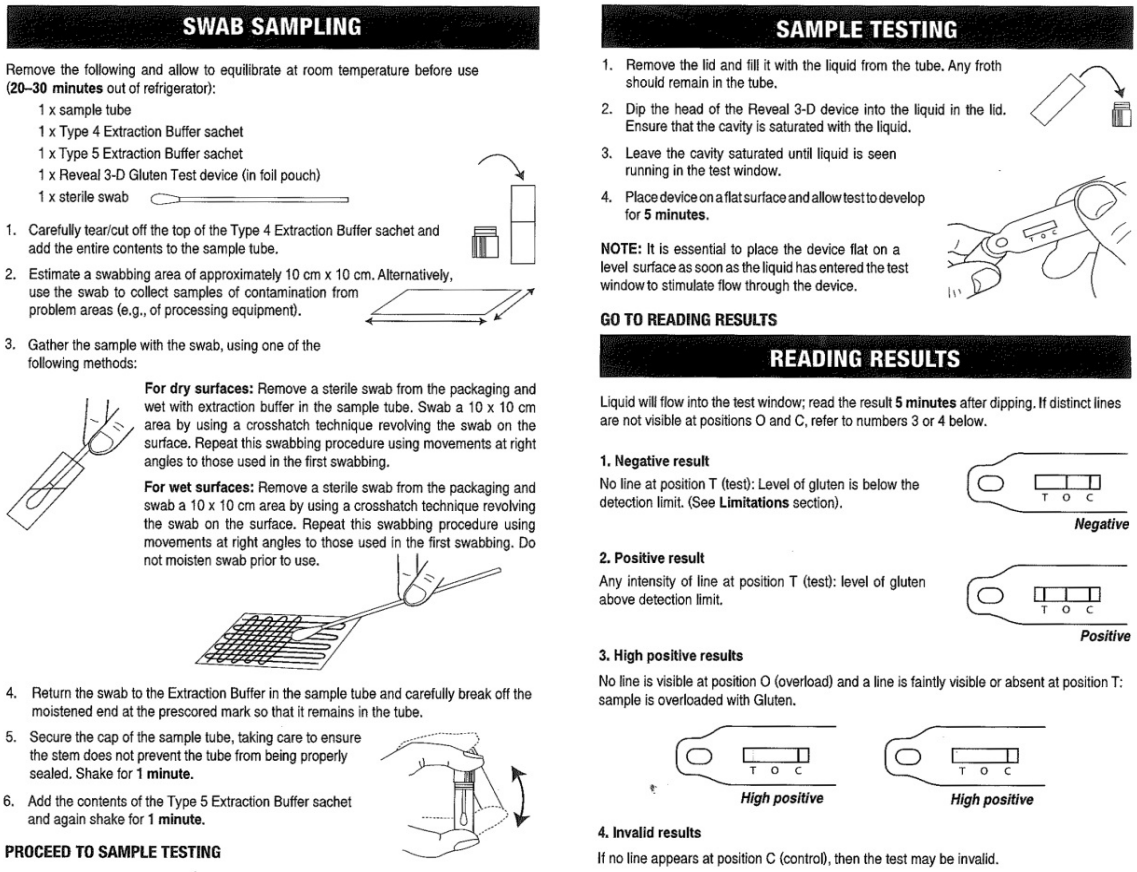

Figure 2.4: Rapid Lateral Flow Tests, (Neogen Reveal 3-D Allergen Tests)

2.2.4.2 Sample Selection

The tests were repeated twice to establish reliability. The pans were picked from one of the selected business and the tests were conducted within the business. This was conducted at the chef patron restaurant where the numbers of pans were limited due to the size of the business. Therefore the risk of cross contamination may be higher due to the rapid turnover between individual meals.

2.2.4.3 Data Collection

The tests within this research established if residues from previously cooked food were still present on the pans surfaces. This was achieved by using a pan which was spiked with the targeted allergen, then washed, yet not sterilized, and tested to achieve a positive result. The same pan was

then sterilized, using an industrial dish washer. The test was repeated and the results cross referenced. The Egg test uses highly specific antibodies to detect hen's egg Ovomucoid. Extracted egg protein from whole egg powder can be detected as low as 0.5 ppm. The Gluten test uses a monoclonal antibody that demonstrates reactivity to both the toxic fractions of the gluten molecule namely gliadin and glutenin. In addition to common bread wheat, the antibody used detects also durum wheat, rye and to a lesser degree barley (Neogen Corporation, 2010).

2.2.4.4 Data Analysis

The parameters for the Reveal RAPID3-D test of the two targeted allergens are listed below;

Gluten lower detectable level .....1.0 ppm

Egg lower detectable level.....0.5ppm

The test conditions were recorded to avoid generalization.

The results established if industrial dish washing equipment would remove traces of the targeted allergens from pans.

2.3 INNOVATIVE MULTI-FACET TOOLKIT

(This will address research aims 1.1, 1.2 and 1.3 of the project.)

This study aims to establish the current situation of the food allergy management in small food service industry and the level of knowledge the staff have in preparing safe food for allergy sufferers. It is also the aim of this study to transfer accurate ingredient information throughout all the steps of food preparation up to service.

The vehicle designed to achieve the latter aim in this study is referred to as the 'Innovative Multi-Facet Toolkit'. This would affect the food allergy management in the provision of safe meals for the allergic consumers (Ahuja & Sicherer, 2007) when eating outside their homes.

2.3.1 Critical Elements Addressed by the Innovative Multi-Facet Toolkit

The management of food allergens depends on elements that mould the effectiveness of any intervention in an effort to produce safe food for the sensitive individuals. Throughout the literature review the supply chain operators and the food service working staff have been identified as the first guardians of the food and any information that is related to its further processing (Will & Guenther, 2007; FAAN, 2010). The supplier and the food preparation staff represent the first two important elements which affect the safety of food and in the case of this study the knowledge of food allergens. Other elements that emanate from these two elements are the practices and the design including space (FoodDrinkEurope, 2013) that effects the production of safe food. Within this study the focus is on food allergens and therefore only the elements which effect the safe production of food free from allergens are considered. These critical elements, which have been identified as the main contributors towards the safe production of food free from allergens and the transfer of accurate ingredient information as part of the management of the food allergens, are addressed using the following designed interventions within the multi-faceted toolkit;

Table 2.2: Critical Elements & Interventions applied in Multi-Faceted Toolkit

Critical Elements		Intervention
People	The staff involved in the preparation of food should understand the implication and consequences of the presence of food allergens have on food allergic consumers such as that they take appropriate preventative measures.	Training session
Suppliers	The required knowledge of suppliers understanding and application of food allergen management.	Food Allergen Management policy Training session
Raw Material Handling	Identifying the incoming raw materials and ingredients. Establish their allergen status and the possible cross contamination involved. Appropriate storage and segregation as needed.	Food Allergen Management policy Training session
Equipment and Kitchen Design	The appropriate use of equipment to perform the task at hand without contaminating the food which will come into contact with the same equipment.	Food Allergen Management policy Training session
Production Process	The understanding of the process that food production requires to prepare food that would be safe for allergenic consumers.	Food Allergen Management policy Training session/lectures
Consumer Information	The ability to inform the consumer of the accurate ingredient information that is required to make educated choices.	Food Allergen Management policy Training session
Product Development and Changes	Ensuring that accurate ingredient information is available to produce new products or improve others.	Food Allergen Management policy Training session Simplified recipe building for tracing allergens
Documentation	Record keeping will assist in the delivery of efficient and accurate allergen management within the operations food safety program.	Food Allergen Management policy Ingredient matrix to formulate recipe and identify allergens

As noted in Table 2.2 there are multiple elements that affect the management and delivery of safe food to allergy sufferers within the loose food industry; therefore the multi-facet toolkit had a sequence of steps that were delivered and implemented within the selected businesses.

The multi-facet toolkit included;

A. Setting up Food Allergen Management policy

B. Training sessions delivered to staff of the selected businesses;

C. Acknowledge the Allergens within the EU with infographics (Poster)

D. Simplified recipe building for tracing allergens

E. Ingredient matrix to formulate recipe and identify allergens easily.

A. Food Allergen Management Policy

As with all types of management procedures it is important that communications between all parties (external and internal) are well established. This will ensure that any communication gaps will be bridged and no operational islands are created (Kerzner, 2003). Within food preparation, the supply chain and process complexity needs to be harnessed into a management policy that would control critical elements that must be considered when assessing allergen risks (FoodDrinkEurope, 2013). This should be an integral part of the existing food safety management system (FoodDrinkEurope, 2013) based upon the principles of HACCP. It would be therefore appropriate to ensure that the food safety system is robust enough to absorb the management of allergens rather than treat this through a parallel system. Building a policy needs to take into considerations all the operational aspects of

the food service business and the limitations. With this information at hand the policy should be achievable and functional thus ensuring that all the persons involved would feel that they could embrace the policy and implement its principles.

B. Training Sessions

The training sessions to all operatives within the food service businesses focused on the main concept of allergen management and explained with easy understandable language (FDA, 2005), what consequences the offending foods have on food allergic consumer and the expectations food allergy sufferers have of the food service industry. The scope of the training sessions was to generate general food allergen awareness of the nature and possible consequence of their unintended or undeclared presence in the products (FoodDrinkEurope, 2013) prepared. The training programme was designed on points that were accentuated in the literature review. The importance of further training is evident (FDA, 2005) and should cover foundation areas of allergen management through a series of well-planned sessions directly targeting the following (Appendix 10);

- Consequence to consumption of allergens
- Segregation/ Alternative Ingredients
- Sanitation
- Rework
- Tracing rework
- Internal Labeling (QR Codes)
- Cross Contamination
- The use of equipment
- Purchasing

- Communication
- Application of HACCP principles.

C. Acknowledge the Allergens within the EU with Infographics

Through studies it has been noted that lack of knowledge has been a prime barrier for food business operations to prepare and offer for sale allergy free food (Bailey et al, 2014). An important step to help ease this deficiency was to indicate the most common allergens within the EU. This assists working staff to recognize which ingredients were the allergens of concern (FSA, 2006) in order to be able to manage them better in avoiding cross-contamination. At the onset of the training sessions the staff were asked to name the food allergens they knew about by means of the questionnaire. This part of the study helped measure the current situation within the business regarding staff knowledge of food allergies.

Infographics (communication graphics) are visual representations of data and information that convey the story through illustrations. In healthcare protection, infographics are established methods to improve knowledge and are promoted as the preferred method to communicate successfully with the target audience (CDC, 2016). A poster (infographic) of the most common allergens within the EU was designed to serve the same purpose as an SOP where staff could, through visual reference, determine whether the ingredients within their products falls into one of the categories which could cause harm to sensitive individuals (Appendix 11). Each allergen was named in the local language and other languages which the management would identify as

common amongst the working staff. Within this study four languages were chosen namely English, Maltese, Italian and German. This poster assisted the staff to familiarize themselves to the allergens on regular basis as it was displayed in the preparation areas (Figure 2.5). The poster had sections that showed a picture of the allergenic food followed by the names in the four languages. The next tabulation gave examples of typical ingredient source and the last column listed the example of derived products and compound ingredients containing allergens.

Figure 2.5: The Allergen Infographic in Dominant Spaces in Two Kitchens

D. Simplified Recipe Building for Tracing Allergens

When using a SOP system to write recipes, it is required to have in place a system that would record the suppliers of the ingredients that are used for that dish. This is in view that different suppliers

might have a different recipe of the same generic product as for example mayonnaise and it might, therefore, contain different allergens from one supplier to another. If one would operate a computer program similar to for example Calcmenu (eg-software.com), this would be one of the steps required in order to formulate a recipe; however small operations, besides the knowledge, time and cost required to operate such systems, could find it impractical as volumes might not justify the effort. It would therefore be more practical to generate a series of matrices that would allow SMEs to still be accurate in giving ingredients information to whoever requires further details.

E. Ingredients Matrix to Formulate Recipe and Identify Allergens Easier

Identifying the allergens within the food products has a huge influence in the proper formulation of a safe recipe. Once a complex product (containing multiple ingredients) is purchased, the person responsible would scrutinize the product by reading through the information attached to the product, normally a label, and determine if it contains any allergens. This is mainly for compound mixtures or complex processed/semi processed food products, for example bouillons. There are also unexpected allergens in food products for example fish in Worcestershire sauce or egg albumin in wines. These products are either used as taste enhancers or as in the case of wine as a clarifying agent. Other ingredients might not need to be scrutinized if these are still in their natural state. The ingredient matrix would start to be generated and would hold the most important information (i.e. name of supplier, bar code, brand, name of product, name of

allergen and status) for future reference (Figure 2.6). This matrix will be used whenever a recipe is to be built (engineered) and the presence of an allergen would be recorded in the recipe's SOP. The recipe would also be written on a matrix, which would clearly indicate the allergen presence (Figure 2.7) (Figure 2.8). Once this is done, a Quick Response Code (QR Code) would be generated through freely available QR code generator, which is linked to all the data necessary to deliver accurate information to the clients (Figure 2.9). The QR code takes the user to a web interface where the unique code is passed to a backend system which retrieves the entire ingredient list that make up the recipe. The codes would be printed next to the item on the menu where clients can scan, using their smart phone and retrieve the data from the cloud without the need of assistance (Figure 2.10).

Supplier	EAN Code (Barcode)	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
A	5000354902383	Sarson's	Worchester Sauce				■										
B	8425741008566	Chef Kurt Bäcki	Bullion		■	■	■	■	■								
C		Tobasco	Green Pepper Sauce														
D	5352001003364	Mayor	BBQ Sauce						■	■							
A	20020835	Harvest basket	Potatoe Pure (Dry)						■								
X	20058012	Combino	Spaghetti			■		■									
X	8003180903491	Bravo Crem	Vegetable Cream						■					■			
X			Bacon														
X			Eggs			■											
X			Onion														
X			Garlic														
X	5425014709018	Delizio	Vegetable Oil											■			
X	2254990006407	Antichi Maestri	Parmesan Cheese			■			■								

Figure 2.6: List of Common Ingredients Matrix

Recipie	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
	Combino	Spaghetti														
	Bravo Crem	Vegetable Cream														
		Bacon														
		Eggs														
		Onion														
		Garlic														
	Delizio	Vegetable Oil														
	Antichi Maestri	Parmesan Cheese														
Spaghetti Carbonara																

Figure 2.7: Recipe Matrix Expanded

Recipie	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
Spaghetti Carbonara																

Figure 2.8: Recipe Matrix Collapsed

Figure 2.9: Barcode with Encoded Data to Be Printed Next To Menu Item

Figure 2.10: Decoded Data Retrieved onto Smartphone

As previously noted, Coutts and Fielder (2009) argued that food allergy sufferers are less confident to eat food prepared by others, while Boye and Godefroy (2010) reported that the accurate ingredient information communicated to the consumer is not as easy as it seems. The use of QR

code as part of the multi-faceted toolkit to deliver the accurate ingredient information has the potential of delivering accurately all the ingredient information used in the selected dish. This novel approach of delivering the ingredient information will also address the findings reported Ajala et al (2010), Madsen et al (2010) and Hall (2004) which have shown that the service staff have limited knowledge of the ingredients, thus the information would be available primarily to the consumer and also the working staff. The information received by the consumer would have surpassed the minimum legal obligation as set in the new EU 1169/2011 regulation which is based around the fourteen allergens. This system will deliver the list of all ingredients and thus if someone is sensitive to any other ingredient outside the EU recommended list, would be able to identify the presence of that ingredient.

2.4 VALIDITY AND RELIABILITY

As the study aimed to retrieve accurate information about the current practices of the food allergy management within the selected operations, it was important to ensure that the measurement methods are both valid and reliable (Robson et al, 2001). Testing the questionnaire prior to the actual run of the program added validity and reliability to the study. This was tested in the pilot restaurant and the design adjusted to ensure that the process would produce data that could be measured for any difference. The questionnaire was designed with closed questions to be able to measure quantitatively the situation in the operation. This was reinforced through qualitative measures and through triangulation approach; the different methodologies will measure the study in order to establish consistency (Robson et al, 2001). The methods employed in this research design intended to investigate the allergen management from different perspectives. The focus group discussion highlighted the

perception of the consumers of the food service industry. This gave the study a first-hand account of the actual situation. The observation indicated the practical behaviour in the working kitchen thus allowing the research to investigate the behaviour of the working staff without researchers' presence. This was an important factor to achieve uncontaminated data. The questionnaire, which was developed around the obtained data and the researcher's expertise, confirmed to be a good method to obtain data which addressed the questions and expectations of the focus group and indicated the change in cognitive knowledge after training. The questionnaire design intended to obtain accurate measures of opinions, experiences and behaviours of the participants (PewResearchCenter, 2017). The results of the questionnaire also measured any changes that the training session could have had on the participants and this could then be triangulated with the observations to investigate if the responses reflected any behavioural changes.

CHAPTER 3

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ALLERGIC CONSUMERS' PERCEPTION OF THE FOOD SERVICE INDUSTRY - THEMATIC ANALYSIS OF THE FOCUS GROUP DISCUSSIONS

3.1 INTRODUCTION

Retrieving information has become an essential part of life. Information has never been as easily accessible in real time as today, with the applications available on hand held apparatus (Horrigan, 2008). The eagerness to understand and become knowledgeable of anything that presents uncertainty has become routine with instantaneous results and answers, most of the time very accurate (Anderson & Rainie, 2014).

Yet with all this information at the tip of the fingers, a section of our society lives a life which at moments could display signs of fear and anxiety to perform what is to most a simple and enjoyable natural activity, eating (Taylor & Hefle, 2001; Allergy UK, 2015).

Food allergy sufferers are normal individuals with an immune system disorder that could at times, in severe cases, be life threating. To this ever increasing section of society (Allergy UK, 2013) eating outside the home presents itself as a hurdle which is sometimes misunderstood and ridiculed by the food service industry. Food allergy sufferers' perception of the food industry is based on their past experience of the industry. Lee and Kwon (2011) reported that food allergy sufferers experienced difficulties in restaurants due to the lack of knowledge and training of the food service staff regarding food allergies. A study by Allergy UK (2015a) reported that 92% of allergy sufferers surveyed stated that panic and distress had an impact on their ability to eat out in restaurants and 82% considered the impact as worrying when going on holidays abroad.

This element of the research is to explore the perceptions of a focus group of allergy sufferers of the food service industry and what fears constrain

them from eating in restaurants. The data from the focus group would give a qualitative contribution to the research and will help to inform the development of the questionnaire for the food handlers.

3.2 APPLICATION OF METHOD

The thematic analysis aimed to examine and record patterns within this research across the data collected. The transcript of the focus group discussion was studied using thematic analysis. Seven people were initially recruited however only four had arrived on the arranged date. The group was made up of two females and two males, all of Maltese origin, who could speak and understand Maltese well. They were strangers to each other and only one of them was known by the researcher. No details of their background were acquired except for their sex and their food sensitivities. As part of the research design it was decided to carry out the focus group with whatever number attended the session. The recruitment and the administration of the focus group discussion are described in Chapter 2. The data was analysed via the six stage model of Braun and Clarke (2006) as follows;

A. Familiarisation with data; Reading the data repetitively started to form a clear idea of the areas for coding. This was achieved through noting the transcripts, where the initial formation of themes regarding the focus group discussion was developed. Here the emerging codes started to develop.

B. Generating initial codes; The first rough list of ideas generated a perspective of the sufferers' perception around the discussion of their safety when visiting restaurants. This also gave a sense of grouping codes which linked to each other. A more refined list of

basic elements that could be assessed in a more valid way regarding the topic of the discussion was later developed.

C. Searching for themes; The codes were highlighted within the transcripts to research for pattern which had a common assimilation (themes) (Appendix 12). Each of these themes was pulled out and identified to a specific subject within the discussion. This process assisted the identification of possible codes which were than collated into four columns (Table 3.1). These codes are common to themes which are the pillars of the discussion with the intention of identifying the gaps between the expectations and the provision of ingredient information to food allergy sufferers by the food service industry. The themes were identified as common collations of codes which were related to the specific outcomes from the discussion and addressed the particular research questions indicated above. It was important that features of participants accounts which characterise particular perceptions and experiences were captured and noted as relevant to the data collection (Braun & Clarke, 2006). In turn this data was coded into specific fields which are tabled below. Some themes were very close in their features and could fit under more than one category for example the participants claimed lack of awareness of food allergens by food service staff as a characteristic of lack of knowledge and explained that training could address this gap.

A thematic map started to emerge which showed particular themes in connection to specific codes which were identified through the familiarization phase of the thematic analysis.

D. Reviewing themes; The thematic map was initially drawn up through manual sketching and developed through further analysing the data. The raw data was analysed by referring back to the context of the transcripts to ensure that the themes were appropriate to the discussion. The codes referred to situations within the text that were of significance to the subject which was being discussed. The initial manual sketching assisted in searching for potential themes in relation to each code which was extracted from the text. This was the first attempt at refining the main themes.

E. Defining and naming themes; The themes were refined to ensure that there was a meaningful cohesion between the titles and that each theme was distinct from the other. At this stage some codes needed to be relocated under different headings as their relevance seemed to be more linked to certain ideas. The re-homing of certain extracts to a different theme was finalised through the thematic map which reflects the meaningful data as a whole. The thematic map defined the names of the themes which will be reported later in this research (Braun & Clarke, 2006). Once the codes were defined as specific to a theme the final thematic map was drawn (Figure 3.1).

F. Writing a report; The final phase of this model was to write the report which describes the relationship between each code and how theses fitted under a particular theme. This now follows in the results and discussion section.

3.3 RESULTS AND DISCUSSION

3.3.1 The Thematic Map

The codes which are indicated in the blue boxes within the thematic map relate to the discussion topics identified from the focus group discussion transcripts. Each code from the relevant discussion is linked using an arrow to the next code which was identified through the analysis of the transcript. An example of this is the code named 'Restaurant size'. From the raw data it has emerged that the focus group participants felt that they could 'Trust' small restaurants better than larger ones. This had an effect on their 'Quality of Life' since they could experience eating out and it also affected their 'Behaviour' in relation to anxiety and fear. All the codes were analysed in this manner to establish a relation between each one and finally these codes related to a particular theme in the red boxes.

The study by Gupta et al (2008) is very similar in the methodology to this research in how the themes emerged from the focus group discussion. The study by Gupta et al discussed primarily the Quality of Life of the allergy sufferers, although not all the participants were sufferers themselves, the majority being parents and physicians. In their study Mirosa et al (2012) reported that a major limitation in available literature is that it lacks the qualitative research studies. An attempt to address these gaps in literature has been undertaken in this research by linking the focus group results with the actual practices in the preparation of food. Mirosa et al also stated that the available literature is split into different disciplines with the probability of overlooking some issues that might not be considered as relevant. To overcome this gap this research looked at all the aspects involved in food production, preparation and consumption in relation to food allergen management.

Table 3.1: Themes with Codes as emerged from the Transcripts

3.3.1.1. QOL	3.3.1.2. Behaviour	3.3.1.3. Knowledge	3.3.1.4. Training
Trust Behaviour Fear Anxiety Security Selecting restaurants Feeling secure Family & Peer support Concern of children well being Coping with disease Severity of allergy	Confidence in food businesses Responsibility Misconceptions Claims List of precautions	Perception of allergy consequence Lack of awareness Accurate ingredient information Responsibility Attitudes Language barriers Ignorance Expectation of kitchen practices Vulnerability Isolation Let down by authorities	Human error Contamination concerns Reliability Right to know Restaurant size Lack of knowledge

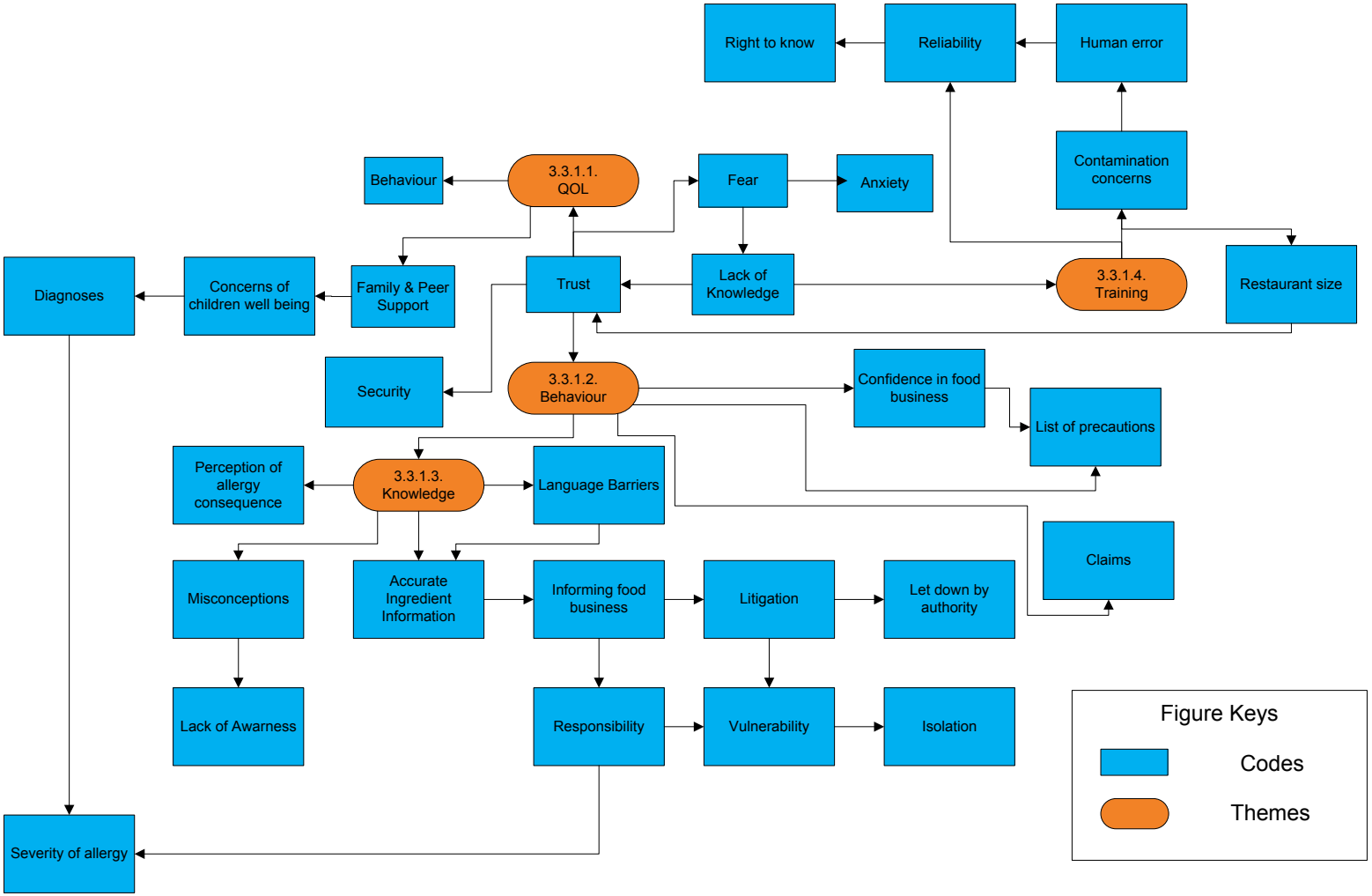


Figure 3.1: Thematic Map of the Focus Group Discussion Data

3.3.1.1 Quality of Life

Through literature review it was noted that emotional behaviour of allergy sufferers towards food tends to have a negative bearing when faced with the prospects of having to eat food where they had no control in its preparation (Allergy UK, 2015; Pratten & Towers, 2004; Allergy UK, 2015). These negative emotional and social outcomes must have a profound effect on the Quality of Life (QoL) of the allergy sufferers. Therefore the focus group participants were asked if their condition had a limiting effect on their social activities when food was present for example at receptions or simply dining out. Throughout this chapter quotes of the participants are represented in this study in *italic* font.

As part of human interaction, conviviality seems to be an important aspect of socialization. The emotional feeling of restriction to the freedom of being able to socialise with others at events where food is present, fosters significantly important aspects of caution in the lives of food allergy sufferers (Buttigieg & Schembri, 2015) (Appendix 1). The fact that food is present signals a weary feeling by the allergy sufferers that a food which could cause them harm or ill health is being offered to them. It is very common that at social gatherings food is present, especially in Malta where the study was conducted. Challenged with these situations, it was important to understand the reactions of food allergy sufferers in circumstances where food presented was not specially prepared for their requirements. The participants stated that;

> '*When I am at wedding receptions I will not eat anything'* Participant A.
>
> *'I will not eat….'* Participant A.
>
> *'Reception might not exist for me…….. I either take my own food, it makes me laugh, this is limiting but I live in a world of my own'* Participant B.

It is noted that in similar circumstances, allergy sufferers abstained or in some cases took their own food with them which is very limiting and at time might also be embarrassing. This is a sign of distrust in the capability of the food service industry to prepare food safe for allergy sufferers. It also demonstrated that the food allergy sufferers did not take chances with food prepared by others. Trust or the lack of it tends to isolate the allergic individual into a segregated environment, away from the main food prepared for the general audience. This behaviour had an impact on how food allergy sufferers regarded normal or special events that fulfilled life, limiting their options and adjusting to the burdens of thinking ahead to provide food for themselves even at social events. These situations are a mixture of emotional and logistical predicaments which affected the manner allergy sufferers planned their lives.

The participants had discussed their own experience of being invited for a meal at a friend's house or even more complex when they planned to go on holiday which added concerns to their health issues. This correlates with and confirms the study of Allergy UK (2015a) which was mentioned earlier in this chapter. The participants stated that;

> *'I will be shocked when we are invited as I know that I will experience a tammy ache and head ache, and to explain to them, to be extremely safe I will take food with me'* Participant B.

> *'holidays are always in self-catering… I always carry my own food, I carry big boxes of food with us'* Participant B.

It is understood that food allergy sufferers were uneasy when friends or family invited them to share a meal, knowing that they will experience some sort of ill-health afterwards. Allergy UK (2016) reported that 62% of allergy sufferers felt that people avoid inviting them because of the discomfort involved. When sufferers decided to attend social events their

first option was to take with them their own food. This was a result of past experiences where even after the host would have been alerted of their dietary condition and food was specially prepared for them, they still experienced an ill health episode. However it might not be considered as normal practice and slightly embarrassing to take one's own food to social gatherings yet health issues have been noticed to have a higher priority to emotional and logistical predicaments. Food allergy sufferers work their way through life and seem to approach and control their ailment in manners that fit their personality. This can also be related to the large individual differences in the extent of food neophobia (Shepherd & Raats, 2006). They sought to be understood especially by their peers and family in situations that seemed strange to those who had limited knowledge of food allergies and the related consequences (Coutts & Fielder, 2009). This behaviour, especially in adults who have experienced similar situations which caused them ill health, affects their trust in other people preparing their food. There seems to be a link between the behaviour and the quality of life (QoL) of the allergy sufferers which is brought about as a consequence of a lack of knowledge of food allergies by peers and in a more serious manner by the food service staff. The latter situation affects the quality of life in respect to the selection of food businesses where food allergic individuals can eat without the fear of consuming any offending food which they would have alerted the food business of, prior to their visit (Allergy UK, 2015). It seems restrictive and somewhat wrong that this lack of knowledge by the food service industry affects their prospective clients from choosing to eat at their business due to lack of trust claimed by the allergy sufferers. The data that emerged from the research is represented in Figure 3.2. The codes which are listed in Table 3.1., under the heading of Quality of Life 3.3.1.1., as seen in the thematic map (Figure 3.1.), indicate that these circumstances are linked. This circle of behavioural

circumstances affects the QoL of allergy sufferers, which limits their attendance at social event and environments where they can feel secure.

Figure 3.2: Circumstances which affect QOL

Quality of life is the general well-being of the individual and in this study, health and social behaviour (de Blok et al, 2007) have been indicated as factors that reduced the level due to circumstances which came about mainly due to lack of knowledge. This means that the relationship with food could affect the QoL of food allergy sufferers due to uncertainty and lack of trust in the food service industry.

The participants had expressed their concerns when it came to their children especially those who had atopic children. Gupta et al (2008) also reported emotional tensions in the family relationship due to lack of understanding by the extended family members of the severity of food allergy and the risk of cross contamination which could be life threating to

children. Parents with such children had a different fear and anxiety experience to that of an adult allergic sufferer. They state that;

> *'My son is the same as me, he is 14 years old, for instance, he had an opportunity to go to Turin, and I had to refuse him going because although I just said that in Italy they are more conscious and what not, he is still so skinny, my son we had some problems, that I cannot trust that he goes for two weeks'* Participant B.

> *'a bit of fear almost, if we are going out to eat; my God where are we going to eat not for my sake I am not much bothered but for my daughter I am more aware'* Participant C.

It seems that the parents who themselves are allergic were more aware of the problems and from early age they instructed and taught their atopic children how to cope with allergies. This helped children build a personality based on awareness of the condition. Yet it is also true that allergic parent might have been over protective and deprived their children from experiencing social events where food may have been present. A good example discussed during the focus group is highlighted above of the mother who is a coeliac and lactose intolerant herself. The mother did not allow her teen age son, who had the same conditions as her, to go on a two week long school trip for fear that something might happen to the youngster. Although confident that the right teaching and environment was being ingrained with the allergic children, parents still feared that the children will not be able to cope with every situation (Sampson, Munoz-Furlong & Sicherer, 2006). Excessively anxious parents may over restrict the social development of their children causing them to isolate themselves, avoiding social situations that include food (Cummings et al, 2010).

Research by Shephard and Raats (2006) indicate that people tend to reject food for three main reasons;

1. Dislike of sensory characteristics of such as texture
2. Fear of negative consequence of consuming the food and
3. Disgust arising from the origins of the food.

Within the analysis process of the focus group discussions, fear of negative consequences of consuming food which could cause the allergy sufferers harm was a constant topic. Statements such as;

> *'it was going to kill me'* Participant A.
>
> *'yes I got an attack after eating out'* Participant A.
>
> *'Honestly I cannot say that I would go to a restaurant and I feel assured 100%'* Participant B.
>
> *'imaging that you would have gastric flu every day, I came down to 45 kilos '* Participant B.

indicated that fear and anxiety were constantly the allergy sufferer's main concern when entertaining the idea of eating out. However the degree of fear was linked to the severity of the allergy. Those participants who had a good control of their food exhibited that they were more confident to tackle fears of ingesting the offending food. Yet anxiety was still a major factor. This came about due to previous experiences where the food ordered and the food prepared, when eating at food businesses, did not match. The next extract is a good example of this situation;

> *'I went into the kitchen to speak to him about my allergies. I spoke to three waiters in the restaurants and to the chef. I told him that I don't mind if I eat fish or meat as long as it is peanut and nut free and he told me to put my mind at rest and he got me beef marinated in peanut oil'* Participant A.

When the sufferer ordered the meal, instructions not to use peanuts or any other nuts were noted by three waiters and the chef, yet the meal was prepared with peanut oil. This episode had left the sufferer with fears of death although he had conveyed his dietary requirements to the food service staff.

Selecting the right restaurants where allergy sufferers felt that their condition was understood, allowed them to feel that they could trust the food business to prepare their food. The participants had commented that;

> *'in small restaurants where the staff understands the practices is crucial, from my experience this is where I felt safest'* Participant A.
>
> *'I am afraid, I would say to myself that in the confusion of many foods and people I will not trust them, I prefer a small business'* Participant B.
>
> *'if it is a small restaurant he would be sooner prepared to listen to you, he would have a better control of the kitchen'* Participant B.

They had come to these conclusions, whether a restaurant could be trusted to prepare their food, through their own personal experience. The decisions were based on the building of trust between the restaurant staff and the consumer which were not established immediately. There are parameters that the allergy sufferers seek to identify within the operation of the food business to ensure their own safety. The main issue was to ensure good communication with the service and food preparation staff (Pratten & Towers, 2003). This important factor provided the sufferer with a means to alert the food business of their requirements. It also contributed to their selection of restaurants. Selecting restaurants seemed to be the first hurdle that the sufferers needed to overcome. On ensuring that their requirements could be met and a clear communication could be established, the sufferers embarked on building confidence in the selected

restaurant. This seemed to be more difficult in larger restaurants as the personal relationships seemed to be non-existent or that there was too much going on in the restaurant for them to feel that their request could be given the utmost attention. This level of relationship required effort and a great deal of trust, and when this was established the sufferers felt that the restaurants could be secure enough for them to eat at with considerably less anxiety and fear of ill-health incidents. When this relationship was established, the sufferers retained the selected restaurant as their only secure food source where they could dine since they did not trust anywhere else.

3.3.1.2 Behaviour (of Allergy Sufferers)

While the general public considers elements such as cost, convenience, taste and health in their food choices, food allergy sufferers are more concerned with the latter. The other elements, although also considered as important factors towards food choices, were considered as secondary and food allergy sufferers tended to *'adapt'* to this restriction. Their dietary behaviour was built around elements of individual differences and conditions. Changes of behaviour could also have been the result of being in an environment that was constantly challenging and distressing since the food choice was restrictive and without accurate and secure ingredient information. Depending on the severity of the allergy, the individuals planned their behaviour which affected their food choices (Sommer et al, 2012). Personality also added a weight on the manner allergy sufferers tackled and overcame the daily hurdles of food choices knowing that they were the sole keepers of their health.

Misconceptions of food allergies by the food service industry were considered to be a health threat by the food allergy sufferers. It is evident

that food businesses concentrated their efforts to eliminate the offending food from specially prepared food yet they failed to understand the other elements and conditions that rendered a meal not suitable for an allergy sufferer. In other words for example, knowing that a plate of gluten free pasta should be prepared with special type pasta, it was not always the practice to boil the gluten free pasta in gluten free boiling water, which is fresh boiling water. The food business might have served the product as demanded yet the preparation of the meal could have compromised the safety of the sufferer due to the misconception that the water in the pasta boiler had no effect on the gluten free pasta. The same situation can be contemplated for fried foods. The medium used for frying food is not considered when offering gluten free fried food to allergy sufferers assuming that this cooking procedure has no effect on altering the status of the food. Yet residues of battered products clearly alter the state of gluten free food through cross contamination (Stier, 2007).

Allergy sufferers felt, that after explaining their dietary requirements to the food business and receiving a confirmation that their food would be prepared in a safe manner, only to find out that the food has been contaminated with the offending food, that there was *'misinformation'* on food allergies. The extract below is a clear example of this situation;

> *'I was in a restaurant in Malta where I had advised them before hand, supposedly they know about me and they had prepared food for me, there I ate fish, the fish was OK as it seem not contaminated with other foods, but when it came to the potatoes it was the same chips as all others had, and I asked him if the potatoes were good for me as it seemed frozen pack potatoes not fresh and I asked where it had been fried and there was other foods, as this was a restaurants which specialise in battered food, like prawns in batter and my heart missed a beat, and he said sorry but yes it was fried in the same oil,*

> *meaning if I did not ask I would have lumped it, meaning that there is a lot of misinformation'* Participant B.

Another very clear example of misconceptions is;

> *'.....when I went home yes I got an attack after eating out, yes after eating out it happen once I had a simple take away, I order a chicken fillet in a bun and I made clear that I don't want anything made from milk and he made me butter and as I bit into it I started to taste something, but it did not pass my mind that he would put on butter, I ate another piece and then I noticed and I went back and told him' you made me butter' . He told me 'yes I put in some butter for taste' he continued 'but you told me not to put any milk'. Today I make it clear, so I give a list, no butter, no milk etc.'* Participant D.

The first example clearly indicates that emphasis was given to the fish and they ensured that no gluten was added to the meal yet the food business failed to prepare a gluten free meal due to lack of proper knowledge of food allergy management. Food allergy sufferers claimed that these and similar circumstances are due to *'lack of awareness'*, *'ignorance'* and *'misinformation'* by the food businesses of food allergies, which reflects in the lack of confidence shown by the allergy sufferers in the food service businesses.

Offers of compensation were seen as an approach to atone a situation that could have caused a discomfort to a client however allergy sufferers were concerned as the after effects of erroneous consumption of the offending food might have serious long lasting ill health effects which they felt cannot be compensated. Whilst lack of hospitality or other culinary shortfalls have limited or no effect on the consumers health, food related situations are different especially to food allergy sufferers. The consequences of the misconceptions of food allergies within the food businesses affect severely the behaviour of the allergy sufferers when the

former dents the trust of the individual. The next extract sets the scene of an example where the consumer ended up with new sensitives after an incident, which means that this has changed negatively the behaviour of the consumer towards the food service industry.

> *'I am very sensitive and that is why I only trust two restaurants, I cannot afford that they think that they are serving you something and something else will happen as the last time that I had a severe attack when I was in America and it took me three months to recoup, imagine that you would have gastric flu every day I come down to just 45 kilos which for my height is bad, so it is not worth it. I become sensitive to other foods which I was not sensitive too before, and that is why I absolutely will not trust anyone'* Participant B.

Although requests for special dietary requirements would have been communicated and acknowledged, it still seems that what was requested and what was delivered were quite different with consequences that could be very serious as is documented above. Bearing in mind that allergy sufferers are very cautious when ordering food, the responsibility of understanding and producing a meal exactly to those specifications must now lie with the food business. It is here that the food business must understand that once the allergy sufferer has made a food order with certain dietary requirements, the responsibility is shifted onto the food business, which assumes the responsibility to produce a meal which is exact to the requirements. This is not only because the client and the food business have entered into a contractual situation once the order has been made, it is also because it is a legal requirement to protect the interest of the consumer and not place for sale food that could be injurious to particular health sensitive individuals where the food prepared is intended for that particular consumer (Regulation EC 178/2002). The food allergy sufferers knew well that they must inform the food business of their dietary requirements in order to protect their health and they expected

the food business to '*co share'* the responsibility to avoid unpleasant food allergy incidents. The next few examples accentuate the perception of food allergy sufferers of who is responsible for the safety of their food.

> *'if I tell the chef what my allergies are then it is up to him to execute, so it would be co- sharing'* Participant A.
>
> *'….when I go to a restaurant and I order food the waiter will come, the first thing I will do is ask if I can speak to the chef. I will not talk to the waiter to tell the chef that I am allergic to peanuts and that I don't want nut or contamination or peanut oil or peanut butter etc. etc. No I want to speak to the chef. I will not trust the third party as he might write it down and the message will not be delivered. I will speak with the chef'* Participant A.
>
> *'It is a chain, it is shared, it has to be every one'* Participant D.
>
> *'Even you are responsible as you need to explain……* Participant D.
>
> *'I say that everybody is absolutely responsible, even a kitchen hand who is cleaning in the kitchen'* Participant B.

The extracts have indicated that the food allergic consumers had ensured that the information about the offending food had been clearly communicated and at times insisted that they must speak to the chef, excluding the third party from communicating their dietary requirement fearing miscommunications.

3.3.1.3 Knowledge (of Food Service Staff)

It is reported through research that food service staff have a poor knowledge of the effects of food allergies on hypersensitive individuals (Gupta et al, 2008; Lee and Kwon, 2011; Leitch, Blair & McDowell, 2001; Radke et al, 2016). Gupta et al (2008) and Mirosa et al (2012) also identified that the lack of knowledge is a major gap in addressing the needs of the food allergy consumers. This gives rise to serious concerns to what level of

diligence is employed in the preparation of food for allergic consumers. With food service staff having limited or no knowledge of the consequence of the food allergies, it is understandable that when food was prepared for sensitive individuals little or no special attention was given to ensure that the food prepared had no traces of the offending food. This also suggested that the service staff must have had little or no knowledge of which ingredients are listed as the most common allergens in the EU.

Many factors in the preparation of food could render it unsafe for sensitive individuals to consume yet is seen as safe by the food service staff. Some of these factors are directly related to food; others are indirectly related yet could affect the safety of the food.

The main ones which emerge from this study are;

- Language Barriers
- Lack of Awareness
- Lack of accurate ingredient information
- Misconception of food allergies.

In the literature review reference was made to the free mobility of people across borders (Koikkalainen, 2011), especially in the EU (European Commission, 2013). This phenomenon brought about a new challenge for allergy sufferers. When placing a food order to someone who has little knowledge of the local language or at least an international language, such as English, could present the allergy sufferer with a serious concern on how to communicate the dietary requirements. These concerns revolve around the thought that if misunderstood the food could cause an ill health episode. For example, a peanut allergy individual claimed that;

> *'….when I go in (restaurant) I need to know that they can speak English,…'* Participant A.

His statement clearly indicated that there must have been instances when language barriers were a hurdle which had been met before. It also suggests that the allergy sufferers needed confirmation that their dietary requirements have been clearly understood. This was not the case of a misunderstanding in the order and a different food was brought to the table. Here is the case where the right food was brought to the consumer yet the ingredients may not have been exactly what were requested with serious consequences if consumed. This scenario was more critical than the former where the food could have been identified as being the wrong order. However when placing an order with specific instructions to how the food should be prepared and what ingredients should not be in the order and yet that specific ingredient is present but not automatically visible, presents a situation which could have detrimental consequences on the food allergy client. Clearly when the client ordered the food which was requested to be *'peanut and nut free'* and the service staff confirmed *'to put one's mind at rest*', however the food turned out to be *'marinated in peanut oil',* signified that the staff had limited knowledge of the consequences and effects the offending food had on the food allergy sufferer. It also indicated that the food service staff had limited knowledge of the ingredients within their control. This could be a shortfall of the management which did not permeate the accurate ingredient information to all staff working within the food business.

It could also be that because the offending food was not in its true natural state, it was not considered to be present and that any effect from the ingredient would not be serious. This misconception of what constitutes an ingredient dangerous to the consumer is echoed throughout the transcripts. This could be seen in the example mentioned earlier where butter was not considered as having a milk element.

Clearly this indicates that the knowledge of food allergies and the potential severity of consequences upon ingestion by the sensitive individual are lacking within the food service industry staff.

It is assumed that food preparation staff had no knowledge of the hidden ingredient in the food, it must also be assumed that no real scrutiny of more complex ingredients had taken place which indicates a serious lack of awareness of the potential consequence food allergic ingredients have on the sensitive individuals. Yet the legal obligation lies with the food business to ensure that such situations do not expose the allergic consumer to risks which could have serious consequences and in rare case can even be fatal.

Food businesses seemed to react defensively when faced with situations where a client was affected negatively by the food prepared by them. Their main concern at the moment of the incident was to ensure that they safeguard their interest yet the most important issue should have been the health of the allergic individual. In a specific case which is noted below the food business was recorded to have portrayed the client as being obsessive;

> *'it was going to kill me, within 5 minute of eating it I lost consciousness and when I told them that I was getting an allergy attack they laughed and said that I am paranoid'* Participant A.

It is noted that the demising attitude shown by the service staff toward the allergic consumer was a lack of knowledge of the consequences of food allergies and how to identify and manage situations where a consumer needed to be assisted. Yet because of the *'ignorance'* that has been mentioned, the allergic consumers felt that they were being labelled as *'paranoid'* or fussy. When the participants were asked to comment on what

were their immediate reactions and that of the food business staff after an incident, their responses commensurate to the severity of the allergy. Those who suffered from severe allergy reactions showed that they were more reactive than those with lesser sensitivities. It is also noted that not all those who suffered an incident complained to the food business.

The sufferers needed to feel that their safety was at all times being cared for. From the discussions extract, it is noted they felt very *'vulnerable'*. Although they assumed prime responsibility for their health, they also noted that the authorities have not done enough to secure their safety when in food businesses quoting that;

> *'if you get an attack in a restaurant it would be hard to take legal action against them, if you do not have evidence, a plate sample; you need to take it to the dietician. This happened to me and I tried to take legal action against this restaurant which almost killed me'* Participant A.

These situations *'single out'* the food allergic consumer, which in reality appears to be a form of social discrimination leading to isolation. This lack of knowledge discourages the food allergy sufferers from integrating fully with other consumers even at social events or a simple casual lunch. Social isolation could be the hardest part of living with food allergies (Sampson, Munoz-Furlong & Sicherer, 2006).

It is to address these issues and others related to food information that the latest food safety Regulation EU 1169/2011 of the 13th December 2014 has been implemented. Food Information Regulations (FIR) are the latest tools that will address the shortfalls that have been highlighted above. Legislation is a concept of good governance however it takes more than just more legislations and regulations to address the gaps that exist in the requirements of the delivery of safe allergy free food to the allergic

consumer. The right knowledge of managing food allergies within the complex operations of food service must be delivered through effective training to improve the behavioural practices of the working staff. This means that it is not the frequency of the training courses or their duration but rather the demeanour of the training which will have a desired effect on the food service staff to prepare food that is safe for the allergic consumer.

3.3.1.4 Training (the Food Service Staff)

The complexity of preparing safe food for allergy sufferers goes beyond the knowledge delivered in training in basic food hygiene courses. Food allergy management training should be integrated as part of the food safety management with emphasis on the practical key elements which have great effects in the change of the practical behaviour of the food service staff. Mirosa et al (2012) reported that food allergy training for the food service providers would not only improve the food safety for the allergy sufferers but will also likely reduce the impact on the quality of life of the sufferers. Behavioural change towards the understanding of food allergies is a pivotal factor in the implementation of good practice which will have lasting effects on the improvement in the preparation of safer allergy free food by the food service industry. It is not enough to simply understand that people suffering from food allergies should not be served the offending food with no further special training undertaken to indicate the consequences specific foods have on sensitive individuals. This has been evidently amplified by the focus group participants who have resonated through their own experience the lack of food allergy management knowledge within the food industry to the extent of calling it ignorance. The following are clear examples of the lack of knowledge of

the consequences the offending foods have on sensitive individuals exhibited by the food service staff.

> *'…I don't accept to go to a restaurant and the waiter will not write correctly or something like that, I will not accept that. Basically the last time I went to famous place and I explained to the waitress clearly what are the ingredients that absolutely should not be featured in my plate, and when the plate came it was evident that one component had lactose, I told her that I had explained that it should not have lactose, and she replied that she will remove it, but I insisted that the whole plate should be changed…'* Participant D.

> *'…and found nothing that was gluten free and they made me a platter and it came with nice Maltese bread….'* Participant C.

These scenes portrayed the serious lack of food allergy knowledge by the food service staff (Lee & Kwon, 2011) and even go to the extent that when a solution was offered no further reference was sought to alleviate the risk. Clearly this indicates that the lack of knowledge caused bad practice. The participants had reported how the service staff thought that the removal of the undesired food from the plate would be enough to satisfy the customer's request. This gave rise to concerns of cross contamination, which might be the hardest part of preparing an allergy free meal in the food service industry due to various aspects of food preparation. Space, utensils, shared equipment are a few of the main factors that are indicated as contributors to cross contamination of foods. The food allergy sufferers had expressed their concerns not only about the actual food not being what they had specifically ordered, but were also perturbed about the sharing of utensils to cook food without the possibility of cross contamination. Their comments on this issue are documented in the following text;

> *'in my opinion they should have special pots for celiac; I don't think that washing removes the allergen'* Participant D.
>
> *'it very hard, almost impossible, however as participant D is say there are some restaurants and I go to one of them who knows that I cannot eat garlic, he does not have nuts as he cooks rabbits, but he has special utensil for me so that there will be no cross contamination to garlic'* Participant A.
>
> *'I am saying is that celiac and nut allergies should have segregate pots and pans, lactose in reality if you would wash the pan the allergen will go away , nut and starch might stick to the pans as these are things that are more common and dangerous'* Participant D.

These extracts indicate that allergic consumers had concerns also in what utensil their food was being prepared. It must be noticed that such concerns might not be justified. It also suggests that pots and pans and other utensils should be employed for every food allergy that is listed in Annex II of EU 1169/2011. Yet again one of the participants spoke about garlic allergy, which is extremely rare (Sharma, 2013) and not one of the fourteen most common food allergies in Europe listed in the annex. This lays down the foundation for the discussion that with the reasoning of having separate utensils for different foods, one either has to limit the number of ingredients in the kitchen or must have an enormous amount of segregated utensils which will generate a logistical nightmare. The extracts also have suggested that the allergic individual thought that not all the allergies could have the detrimental effects on sensitive individuals and that certain allergies only could be removed from the utensils by sanitation.

One has to remember that 99.1% of food businesses are small and medium size operations (Eurostat, 2011) therefore it is assumed that the same

operational burdens would be common to most of them if not all. Despite all the limitations of small restaurants, the focus group participants claimed that they felt safer eating at a small restaurant. These are a few extracts which indicate their claims;

> *'I feel safer when the restaurant is family run or when the chef is the chef patron, there I will feel safer as here the chef will be more cautious'* Participant A.
>
> *'I feel safer in a family run restaurant or a chef patron'* Participant A.
>
> *'...in a small restaurant he would be sooner prepared to listen to you, he (the chef) would have a better control of the kitchen not so many hands, however in practice he would have one counter and would it be clean enough to work or might there be a problem, as now we are talking about having doubles, as in pans and whatnot, I think it is down to attitude, in a small restaurant that the staff understands the practices is crucial , from my experience this is where I felt safest '* Participant B.
>
> *'I prefer a small business'* Participant B.
>
> *'You cannot just say big or small, it depends, it is too general'* Participant D.

The last comment indicates that other factors are also considered when food allergy sufferers selected their restaurants. However the fact remains that the sensitive individuals sought specific attention and reliability through direct contact with the chef when possible, which gave them a sense of reassurance. Although large food businesses might have better and more knowledge of the food allergies at top management posts this does not mean that this can be felt by the sensitive individual if the *'confusion of many foods and people'* erode the trust of the allergic consumer. The feeling of direct contact with the person preparing the food was non-existent in large operations and therefore this void transpired into lack of trust in the food business.

Fear and anxiety of consuming food prepared by others that could cause ill-health emerged as a main focus from the analysis. These emotional behaviours have an effect on the way the food allergy sufferers approach their daily lives and can have extensive mental health implication (Allergy UK, 2015). It has been noted that the sensitive individuals refuse to trust others preparing their food, even when this was prepared by family or friends. In a society where being away from home is the norm, even if it is for a few hours daily, presents certain concerns to the allergy sufferers. This might not be comprehended by non-allergic individuals; however sensitive individuals have to plan what, when and where they might be able to eat during the course of the day. Although reason dictates that sensitive individuals will get used to this routine, it must be noted that when the restaurants of their trust are not an option due to distance or any other limiting factor, they would face a situation of uncertainty thus leading them to anxiety over the most basic activity such as eating. Perceiving these restrictions from the perspectives of the allergy sufferers, who have to live with these disorders mostly all their life, can have an effect on how they socialise in what is considered to be a norm in contemporary society. Going out to eat or even being invited by friends for a meal is a part of our way of life. Living with food allergies means that every time one needs to eat, one triggers into action a process of verifying the food available to ensure that no ill-health reactions will occur. In other words they feel that they are living in a hostile world. For parents who themselves are food allergic, teaching their atopic children how to deal with precarious circumstances have shown that the youngsters would be well prepared with bedrock experience. However not all children are well equipped with such crucial knowledge, thus these rely on the responsible adults to check for them if something is acceptable for them to eat. Assuming that parents of such children are knowledgeable of what could

harm their children, there remains the fact that persons preparing the food might not be conscious of what could cause ill-health. Preparing the young to negotiate a menu in a restaurant would be a fundamental life lesson for children growing up with these conditions (Cummings et al, 2010). Learning to deal with food allergies and to be able to evaluate the risks of eating food prepared by others will enhance the quality of life of the food allergy sufferer.

It might be difficult to accept that food allergy sufferers take their own food to social events or even when eating out. While other people would be eating freshly prepared meals, allergy sufferers would be eating out of a box, food that they would have prepared beforehand. They would want to enjoy the experience of dining out yet the fear of falling ill from ingesting the offending food drives them to lose their trust in the food service industry.

3.4 PHONE SCANNING SYSTEM TRIAL

As part of this study, the focus group participants were asked to experience data retrieving from a printed menu which gave ingredient information of the chosen menu item. The data, which is a result of previous ingredient analysis, was available through Quick Response Codes (QR Codes) scanned by smart phones. This method was explained in the previous chapter.

The response of the participants was that they felt much safer and they would consider eating out more frequently, indicating that their trust in the food service industry would multiply. The system proposed had indicated that the participants would reduce their anxiety. These are few of their statements;

'I would feel a lot safer, much safer, that is very good' Participant A.

'it is very simple' Participant D.

'It is really good, I would feel much safer, I would eat out every day ' Participant A.

' it is a wow, it is a great achievement ' Participant D.

'so are you working on this system to introduce it in Malta' Participant A .

Lino; No it is part of my research for the doctorate, this is my project;

'if it works then you can introduce it ' Participant D.

'I hope that you can introduce it. Well done.' Participant A.

'here you have the ingredient, but what about contamination ' Participant B.

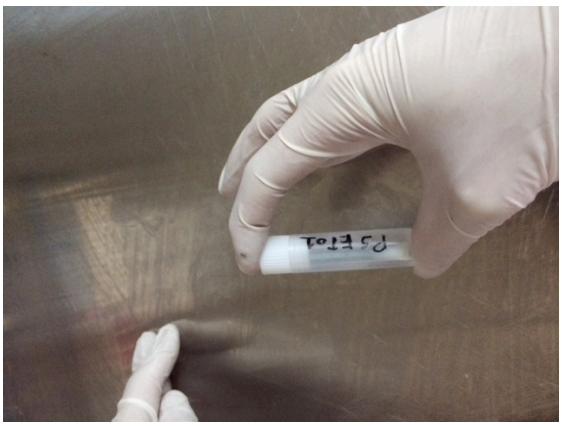
The last statement signifies the preoccupation of the allergy sufferers with regards to the food preparation processes and the risks of cross contamination. Although this risk can never be at zero it can be reduced and controlled through effective food allergy management. The next chapters will delve into the analysis of the practical operations in the kitchens. The study will investigate the results of the implementation of the innovative toolkit including the behavioural change towards the preparation of allergy free meals.

3.5 RESULTS OF THE RAPID LATERAL FLOW TESTS, (NEOGEN REVEAL 3-D ALLERGEN TESTS)

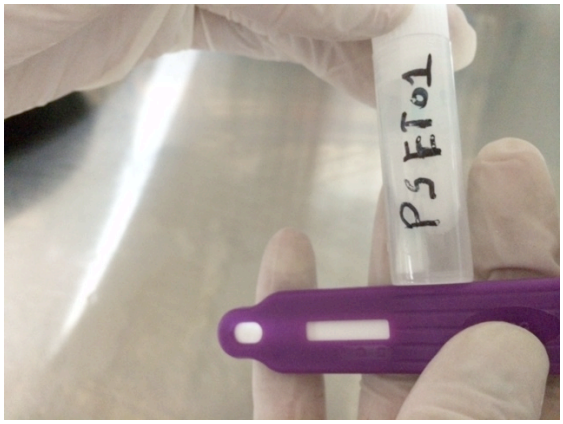
During the focus group discussions the element of food residue on cooking utensils suggested that this claim justified verification to prove if food allergens were still present even after washing. Participants suggested that separate pots and pans should be used for different food. Reveal

RAPID 3-D tests were carried out and the methods employed for these tests were described in Chapter 2. Two allergens (egg and gluten) were targeted for testing ingredient residues after washing of pans. Figure 3.3a and 3.3b represent the sequence of the tests carried out for both allergens. The reading of the test can be compared to the chart (Figure 3.4) provided with the tests. The egg allergen test kit was purple in colour whilst the gluten was green. The results are represented in Table 3.2.

Neogen Reveal 3-D Allergen Test kit components.

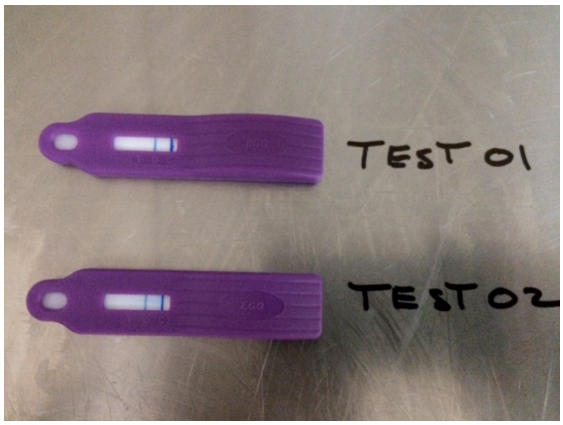


Shaking the extraction buffer for a minute.



Ensuring that the cavity was saturated and waiting for 5 minutes.

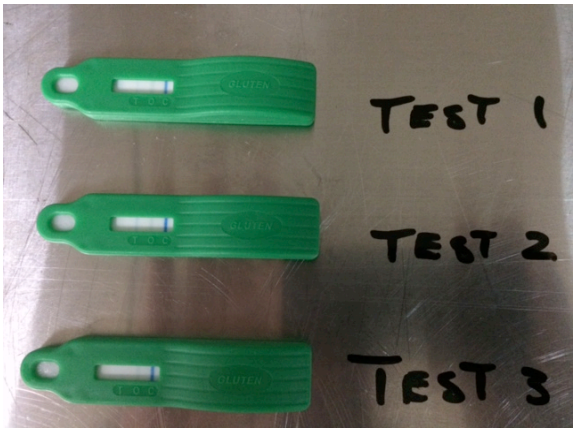
Reading the results. This show a negative. Please note *EGG* embossed on device.



Comparing results of tests 01 and 02. Both show a negative

Figure 3.3a; Neogen Reveal 3-D Allergen Tests; Egg Test

Neogen Reveal 3-D Allergen Test kit components.



Test 1 and 2 show a positive result as a third line can be seen. Test 3 shows a negative result. Only two lines can be seen.

Test 3 in detail shows only two lines and no line can be seen on the T. Level of gluten is below the detection level which is at 1.0 ppm. Please note *GLUTEN* embossed on the devise.

Figure 3.3b; Neogen Reveal 3-D Allergen Tests; Gluten Test

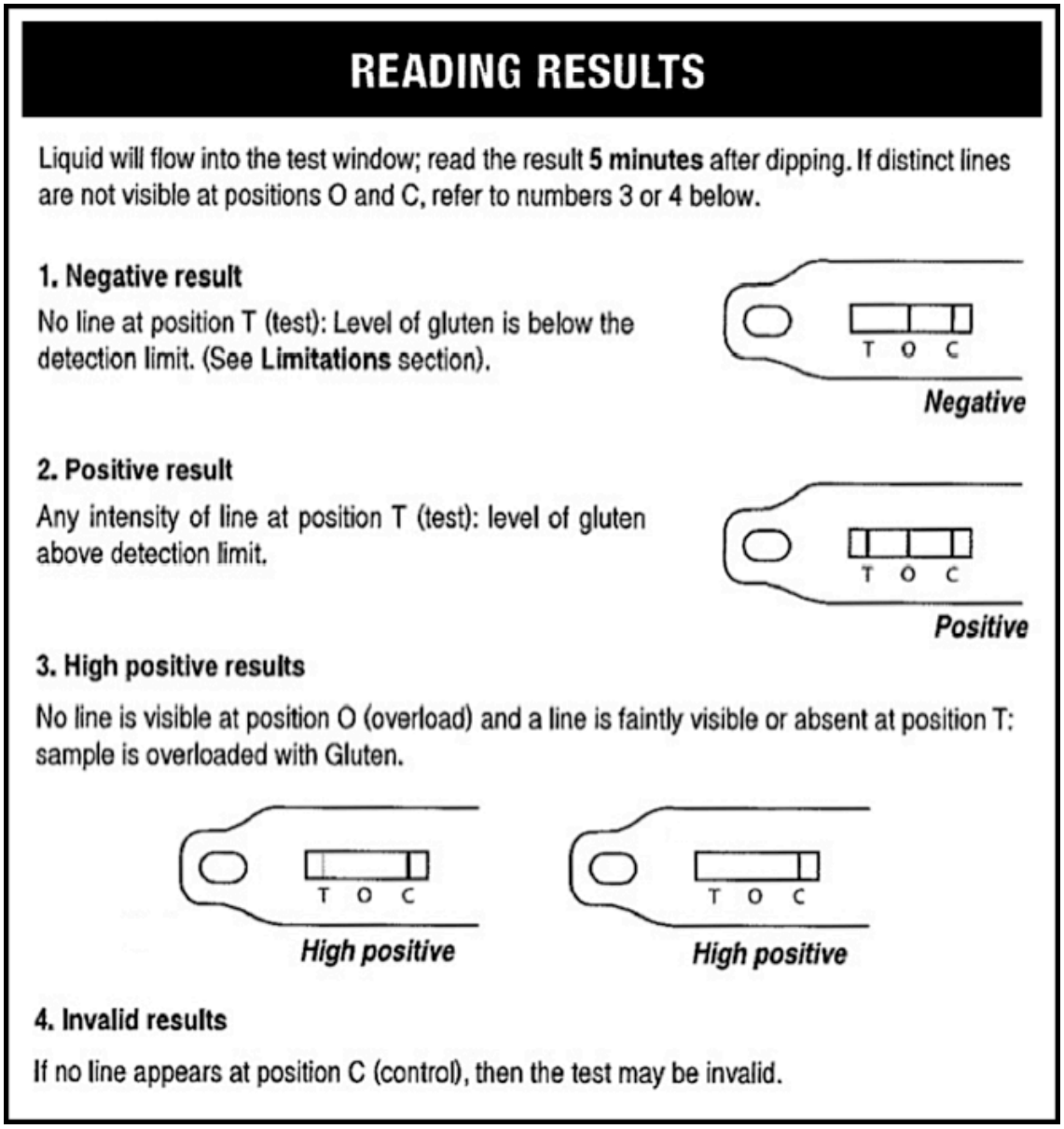


Figure 3.4; Reading Results Instructions

Table 3.2: Results of Reveal 3-D Allergen Tests

Neogen Reveal 3-D Allergen Tests)	Egg	Gluten
Pans hand washed after spiking	**PSET 01** Negative	**PSGT 01** Positive
Pans dish washed after spiking	**PSET 02** Negative	**PSGT 02** Positive
Pans brisk hand washed with dedicated brush after spiking	N/A	**PSGT 03** Negative

The egg (purple) tests 1 and 2 in Figure 3.3a show two lines thus denoting a negative result after washing the pans by hand and also by an industrial dishwasher. As can be seen in Figure 3.3b, the gluten (green) tests 1 and 2 have three lines denoting a positive test, whilst test 3 only has two lines denoting a negative test. This was achieved after brisk hand washing the pans with hot soapy water with a dedicated brush. The results show that residue was detected for gluten even when the pans appeared to be clean. Courtney (2016) reported that residue of milk soils could be detected by lateral flow tests on four different surfaces after these were cleaned with cleaning solutions typically used in food production. This correlates with the perceived anxiety the focus group had mentioned in their discussion as noted earlier in this chapter. In their study van Hengel et al (2006) had tested two commercially available lateral flow devices for the detection of peanuts in cookies and found that the tests performed well with some limitation of false-negative results at a specific concentration. Roder, Vieths and Holzhauser (2009) also reported that lateral flow tests are useful analytic tools for sanitation in the industrial food manufacturing. The results also show that with egg the tests indicated negative residue which suggests that certain allergens have a stronger adhesion to the surfaces than others. Whilst this is a very small sample of only 2 allergens, the results suggest that the consumer fears about allergen cross contamination of equipment seem to be well founded, and, in the case of gluten, that vigorous washing is needed to remove the contamination. The presence of any cleaning agent or sanitizer could have an effect on the limit of detection; therefore although the tests are certified (Appendix 13) the external factors might have influenced the results.

3.6 STRENGTHS AND LIMITATIONS

The strength of focus groups as a means to discuss in depth the perception and expectations of allergy sufferers when eating outside their home has proved to be very effective. The participants responded positively to the questions and felt that they were free to answer in their own words their opinions. The study is rich with qualitative data of personal experiences and contributed to report a wide and clear account of the difficulties food allergy sufferers encountered when eating out. The study model adopted proved to achieve the objective set out prior to the initiation of the discussion. The thematic analysis tools also proved to achieve the objective of retrieving the data that was embedded in the transcripts. This methodology made comprehensive sense of the extracts which supported the analysis and allowed for the four main categories to emerge from the data.

The focus group discussion which was held in Maltese needed to be translated and transcribed in English. Although great care was given to be as faithful as possible to the participants' intervention, it proved to be challenging.

It is understood that the group was small (4) and therefore the data cannot be generalised to the whole population. The group however was larger (7) yet on the day of the intervention only four participants turned out. It was determined prior to the session that the discussion would be held with the cohort which would turn out on the arranged day. The recruitment methods could have also been a limitation to the study as only those who had access to the mediums employed for recruitment could actually participate. These were for a limited time and specific to those who had access to the social media and the local association of allergy sufferers.

Thematic analysis might not be considered by some as a rigorous methodology to analyse data however the flexibility of this method gave the advantage to interpret the themes and report the results. This type of analysis is fundamental and provides core skills that are useful in conducting qualitative research. Thematic analysis pinpoints, examines and records themes which develop a pattern that describes the circumstances associated to the research (Braun & Clarke, 2006).

Although the later flow tests gave a rapid indication if allergens were present within the tested equipment, there are limitations to the tests mainly the threshold as these only indicate presence/absence results. No replications of the tests were performed. It is also reported that external factors could alter the results. The fact that only three tests were carried out could also limit the reliability of the results however these are relatively expensive tests and there was a financial limit to what could be spent on a test to support a claim made by the participants.

3.7 CHAPTER'S CONCLUSION

Food allergy sufferers are concerned with what ingredients are incorporated in their food and how this is prepared. The sense of lack of essential knowledge to manage food allergies within the food service industry is evidenced throughout the analysis. This is established through the responses that the service staff had made when confronted with issues that allergy sufferers felt that could cause harm. The weak and sometimes overconfident, yet incorrect solutions implied, proved to be inadequate to render the requested food safe. These responses indicated that the lack of individuals is a real hurdle to the preparation and serving of an allergy free meal.

Training to address issues stated above needs also to improve the handling behaviour of the food service staff in such a way to be able to register positive change. Change should come through effective food allergy management designed to affect all the aspects which will render food safe for sensitive individuals, and therefore win the trust of allergy sufferers to eat outside their homes. The improvements of food allergy management within the loose food industry are complex when considering the entire approach, yet it can be managed with the principles of HACCP. Identifying the actual allergens within a complex ingredient for example a cake mix, would be the first step. This analysis needs to be performed for all the ingredients within the food business. The next step would be to identify the product's intended use which is normal registered within a standard operating procedure (SOP). This would already give the food preparation staff insight into the make-up of the complex ingredient thus being able to verify the presence of an allergen if it forms part of the complex ingredient (mixture).

Although this process gives a clear indication of the presence or not of an allergen, the crucial procedure after analysis would be to prevent cross contamination. Knowing the true consequences of food allergies on sensitive individuals and the responsibilities that comes with food preparation should also form part of an effective allergy management. To avoid ramifications of food allergy incidents is the main objective of food allergy management; however nothing is zero risk and therefore as part of an effective management, a policy should be developed to handle incidents.

CHAPTER 4

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ANALYSING PRE AND POST TRAINING FOOD PREPARATION PRACTICES IN THE FOOD SERVICE INDUSTRY THROUGH OBSERVATION AND NOTATIONAL METHODOLOGY

4.1 INTRODUCTION

Establishing the current status of the food allergy management within the food service industry requires a defined baseline with the intention of analysing the knowledge of the food preparation staff of food allergens and their management. This requires different means of data collecting to ensure that reliability can be established. This study employed two methods (observation and notational analysis) of data collection with the aim to establish the current status of food allergen management in micro and small sized food service businesses serving loose food.

This chapter will discuss the data obtained during observations carried out in the selected food service businesses in order to obtain a baseline understanding of the situations in the food preparation areas and then measure the difference of the impact the multi-faceted toolkit had on the practices of the working staff. The data collected will later be triangulated with the questionnaires data, which will be discussed in the following chapter.

Studies using different methodologies such as focus groups, surveys and self-reporting exercises have reported that food handlers' intentions were not always what were realized in practice (Adesokan, Akinseye and Adesokan 2015; Anderson et al, 2004; Clayton et al, 2002; Griffith and Redmond, 2014). Clayton and Griffith (2004) reported that although self-reporting could provide an indication of the food safety practices within the industry, the staffs' knowledge of food safety does no always depict the true reality of food hygiene practices. Bailey et al (2011) reported that restaurant staff confidence was not reflected in their knowledge of food allergies. Inspections are also considered to have limitations in producing reliable data due to inspectors' bias judgement (Chapman, MacLaurin &

Powell, 2013). Observation is considered by researchers as a method which captures actual behaviour (Robson, 2002). Chapman et al (2013) further argues that the impact of physically being present to observe a practice could affect the reliability and validity of the observation. In the same study by Chapman et al, a video observation framework had been developed and this study has adopted this framework.

The intention of this element of the research was to video observe the food service staffs' practices and interactions with products in their customary surrounding. The main advantage of this type of research is that the participants, although having given consent, will often be unaware that they are being observed allowing the researcher to make objective analysis. Non-participatory video observation has been shown to be an effective method to generate valid and reliable data (Chapman, MacLaurin & Powell, 2013). This non-participatory method needed to capture the food preparation practices during production.

Video observations can also assist the research in verifying if an action actually took place by stopping, reviewing and slowing down the recorded action. This gives the opportunity to analyse any dubious actions (Chapman, 2011).

4.2 APPLICATION OF THE VIDEO OBSERVATION METHODOLOGY

As discussed in Chapter 2, the method of video observation has been developed based on the Chapman et al (2013) framework. This study used non-participatory principles of observation methods to achieve reliability and validity of the data collected.

The video recordings gave the research the chance to analyse the pre and post training the behaviour of the staff and measure any changes. A

further session of video recordings of two days was conducted about 10 months later to establish if the practices had changed. Recordings were conducted within the same period of time for each business however the time of day varied from one business to another as the operational hours were very different. The chef patron was recorded over lunch time, the CPU was recorded from late morning to early afternoon and the rotational staff restaurant was recorded from late afternoon to mid evening (Table 4.1). A total of 240 hours of video recordings from both cameras combined, were analysed averaging 80 hours per business. The number of staff recorded was highest at the chef patron with 4 persons and 3 persons for each of the other food businesses.

Table 4.1: Details of Observation Plan carried out in Selected Businesses

	Pre Training	Training Session	Post Training	10 Months Later
Chef Patron	5 Consecutive Days 10am – 2pm		5 Consecutive Days 10am – 2pm	2 Consecutive Days 10am – 2pm
CPU	5 Consecutive Days 10am – 1pm		5 Consecutive Days 10am – 1pm	2 Consecutive Days 10am – 1pm
Rotational Restaurant	5 Consecutive Days 5pm – 8pm		5 Consecutive Days 5pm – 8pm	2 Consecutive Days 5pm – 8pm

4.2.1 The Equipment and Set-Up

The recording equipment had to withstand the high temperatures of the food service kitchens. A tower computer with 120 GB hard disk was assembled to satisfy the requirement of the research. Two Samsung Pleomax webcams were installed and additional USB cables gave the opportunity to achieve greater distances thus allowing a better viewing

angle. The cams named Cam 1 and Cam 2 were strategically positioned to capture actions from different angles. This allowed for overlapping views of specific areas which was useful to verify actions from different angles. The recording programme used for video recording was Blue Iris Security and Webcam software. This allowed for pre-setting the recording sessions. The software proved satisfactory to slowdown the recordings for verification and to speed it up when no action could be observed.

Figure 4.1a: Cameras Set-Up

Figures 4.1b & 4.1c: Still Footage from Cams 1and 2

Having multiple cameras gave the opportunity to analyse the action from different angles which overlapped the recorded actions (Figure 4.1 a, b, c). In this study all the food service video observation set up used this configuration which proved to be useful. The cameras were placed high above the worktops (Figure 4.1a cameras circled in red) with the intent to capture the overhead view and therefore the hand movements. These angles proved to be ideal during video viewing which made coding easier.

Actions were coded in three routes as explained in Chapter 2. Each route was given a code number and each step was given a letter therefore the codes became alpha numerical. These codes were formulated into a spread sheet which indicated the codes and each step of the decision tree. The

analysis of the video recording required that when an incident of cross contamination occurred, this was coded in its respective column. The cam number and the time of the code were recorded which could be used as a means of verification (Appendix 14). The recordings were viewed using Blue Iris software on a laptop. When an incident was identified the recording was stopped, rewound and reviewed sometimes more than once. This action was to verify that the incident would be coded under the correct route. The coding templates of the incidents also needed to be developed and cross referenced with the decision tree to ensure that no steps were omitted.

4.3 RESULTS AND DISCUSSIONS

The three categories (routes) of practices which contributed to cross contamination with food allergens are listed as; by equipment, other than by design and by hand. The study intended to identify where cross contamination occurred and what measures could have been taken to ensure the safe delivery of food to food allergic consumers.

The framework in principle helps capture actions of any kind. This is analysed against a decision tree that was developed for this research as described in Chapter 2.

4.3.1 Aggregate Observation Results

During the video observation the highest number of incidents of cross contamination (pre and post training) was recorded to be 'by equipment' (Figure 4.2). Each of the cross contamination category discussed in this study incorporates all the three types of food businesses observed.

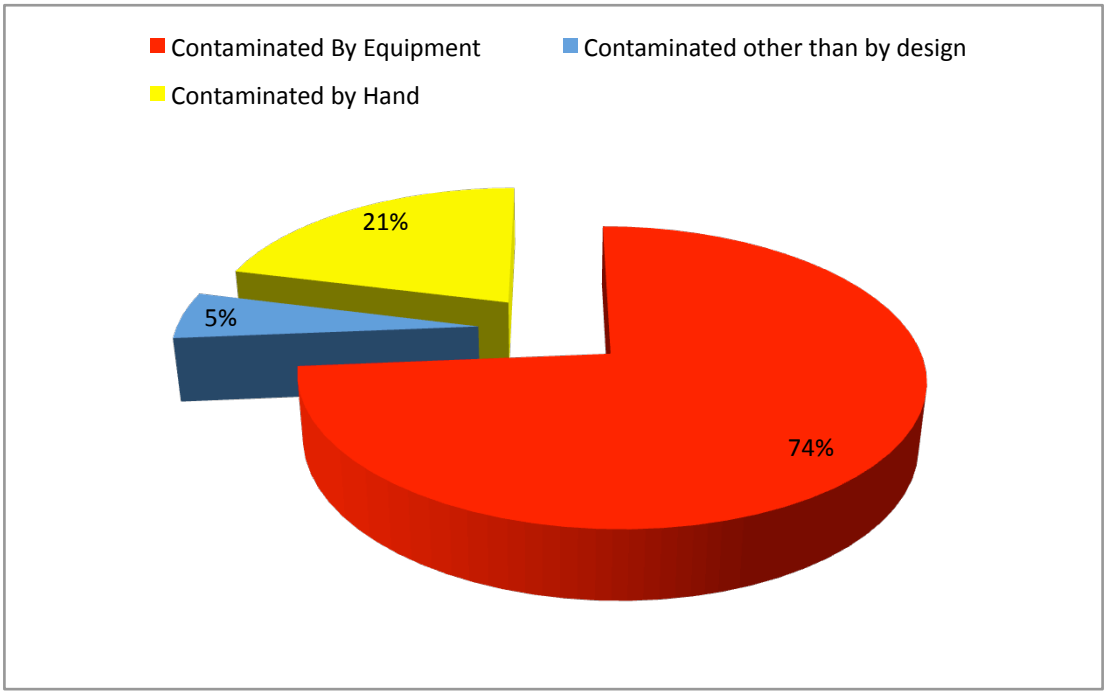

Figure 4.2: Aggregate Total of Observations (Pre and Post) Training Cross Contamination Results

The figure (Figure 4.3) below gives an overview of the observation results per cross contamination category and per business type.

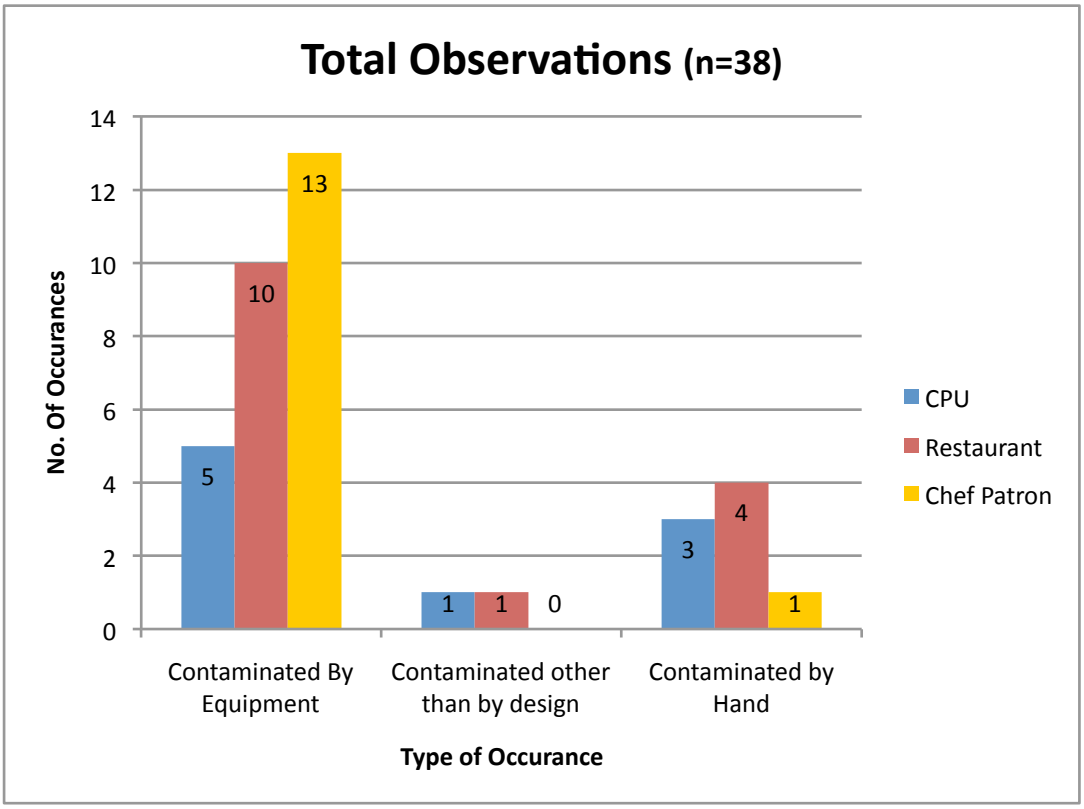

Figure 4.3: Cross Contamination Results per Category and Business Type

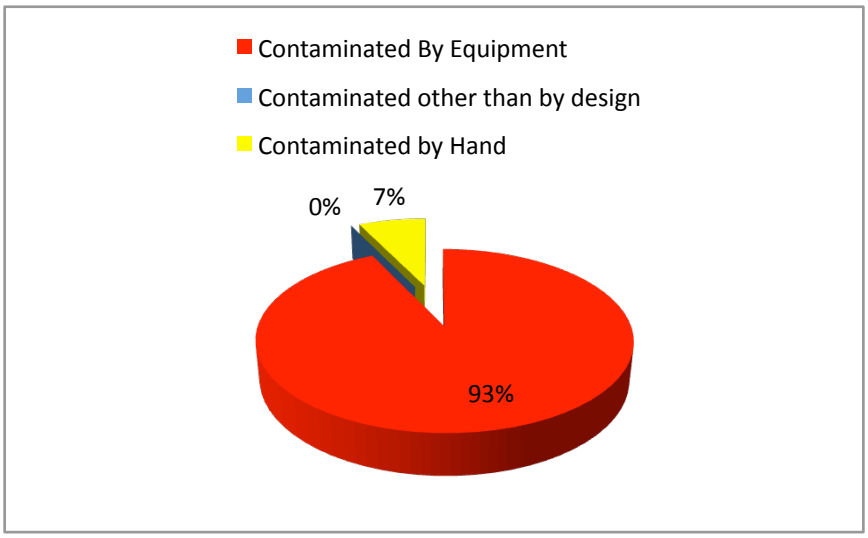

Figure 4.4a: Chef Patron

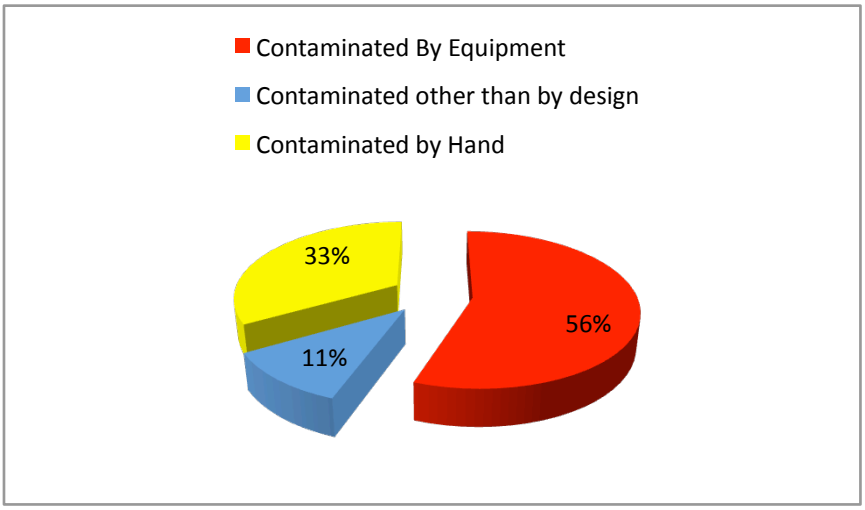

Figure 4.4b: CPU

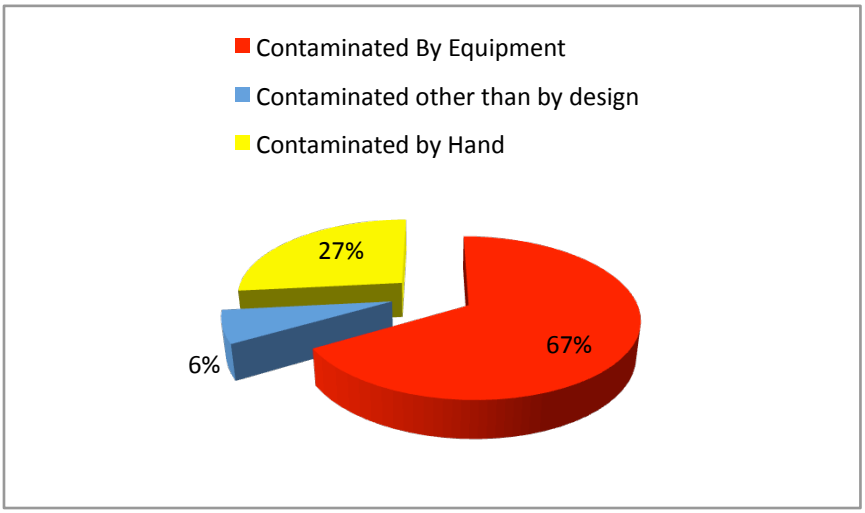

Figure 4.4c: Restaurant with Rotation Staff

Figures 4.4: Observation Results by Restaurant Type

4.3.2 Contamination By Equipment

The results above show that the cross contamination 'by equipment' had the greatest need of attention when addressing food allergen management in every business. All the three businesses displayed cross contamination 'by equipment' as the highest percentage of incidents when compared to the other two categories.

In the chef patron business, where food preparation was the fastest paced, contamination by equipment was the highest compared to the other two categories within the same business, 93% or 13 out of 14 incidents observed in total (n=14) (Figure 4.4a). It is also the highest when compared to the other two businesses. This reflects that space and time are crucial elements to reduce or eliminate cross contamination. Chapman et al. (2013) have also noted that these two limiting factors in their study. Space is a constraint which is a common factor in small businesses by nature of the size. Therefore managing food in restricted areas needs to be planned according to the ingredients used in the food prepared in the business. Excessive stocks and overcrowding of the limited storage space will contribute towards high risk of cross contamination. Time on the other hand is a result of the limited amount of people working in the business which is commanded by size. Therefore the smaller amount of people working in a small business means that they would have more diverse work to carry out and cleaning, being one of them, is not seen as important as delivering the dish on time. Nash (2014) also reported that cross-contamination was causing most of the serious issues in small businesses.

The restaurant with rotational staff had a lower percentage of cross contamination 'by equipment' which was recorded at 67% (n=15) when compared with the chef patron restaurant, and the CPU was recorded at 56% (n=9). The reason for the comparative difference between results can

be attributed to the nature each of the food service businesses. In the chef patron business most cross contamination came about by the reuse of the same knives and chopping boards after these had been used and came in contact with food allergens. Slicing machines could also be observed being used without prior sanitation between slicing cheese and ham. This could have resulted in the contamination of the whole batch of the sliced ham. This also correlates with was previously mentioned in the focus group discussion which indicated the need for segregated areas and specific tools for specific foods. The situation seemed to get better when food production concentrated around one specific preparation as in the CPU. Within this food business the cross contamination 'by equipment' could still be noted to be through knifes and chopping boards, thus although the number of incidents through equipment is reduce (56%) (Figure 4.4b) the practices which cause cross contamination are very similar in all businesses. This also denotes that culinary practices are common for diverse businesses which are carried along from one business to another when staff change jobs. Staff turnover, which is high within the food industry, coupled by the limited level of education, is an ongoing struggle especially in small businesses which are unable to have centralised training programmes (Nash, 2014). Although the results show a difference in the number of incidents between the businesses the practices were observed to be the same.

Within the restaurant with rotational staff it was observed that other utensils such as ladles were involved in cross contamination. This was synonymous with the nature of the business however no special attention was observed to avoid cross contamination. This was also observed when a complex ingredient was added to a dish. The same spoon used to scoop a product was used to stir and then re-introduced into the container to

scoop more of the same product to be added to the dish thus contaminating the remaining product with the food which might have contained different allergens. When this complex ingredient was used again, it contained traces of the foods which were not listed on the label and would therefore potentially cross-contaminate the finished dish. Although this might seem farfetched the case observed was the introduction of a spoon which came in contact with fish and returned to the complex ingredient (e.g. spice mix or a roux) with the consequence that the remaining product was then contaminated with fish. This can be reduced if the containers used to hold certain products, where possible, would be shakers or in case of liquids, squeeze bottle. This could reduce the contamination of the remaining product since no access to enter with a contaminated spoon is left available. The lack of allergen management knowledge could be observed clearly in such examples. This is a result of inadequate knowledge of the consequences food allergens have on sensitive individuals. The results indicated that observed staff did not show any concern of the consequences the contaminated equipment had on the food they were preparing.

Although the incidents are not linked specifically to a certain type of food preparation it has been observed that the triangulation of the data indicate that certain observed actions are more likely to happen in certain types of food businesses than in others due to the nature of the operation. For example the likelihood of cross contamination through chopping boards was observed to be higher in the chef patron rather than in the CPU because of the amount of different food/ dishes being prepared. In the CPU this was more remote to happen as the operation was observed to clean and change the worktop setup after each task.

Cross contamination by equipment has been discussed earlier in this study and could be a result of many factors. Some of these factors are a result of the type of food business and the nature of the food service which is very complex and fast paced without the advantage of multiple kitchens to prepare meals for diverse people. These factors could limit the attention required to ensure that no cross contamination occurs in the preparation of food.

4.3.3 Contamination Other Than By Design

It is difficult to code actions of cross contamination with ingredients used if one does not know the recipe. Adding one ingredient after another seems to be part of the design of the food being prepared. However there are instances where a sudden addition of an ingredient can be immediately noticed as being 'other than by design'. A total of two incidents were captured, amounting to 5% of the total observed incidents (n=38). This represents 11% of the incidents at the CPU (1 of 9) and 6% at the rotational staff restaurant (1 of 15). Although these incidents are rare, it would be difficult to explain how cross contamination would have occurred if observation was not in place. These incidents are the results of human error and lack of true understanding of food allergens. In the focus group discussion this was amplified in the case where the participant had ordered peanut free food yet the food was prepared in peanut oil marinate. Although not indicated, the allergen was still present and could have had detrimental effects for sensitive individuals.

The two incidents observed can be listed as unintentional contamination of food however these could have been avoided with better knowledge of the consequences of food allergens have on sensitive individuals. The main reason for cross contamination 'other than by design' to happen is where there is poor SOPs practices in place without prior hazard analysis

(Lombardo, 2014). Referring to the argument in the literature review that considers allergens as chemicals, clearly indicate that even if SOPs were being used as a tool to prepare consistent food, these did not embed important information about hazard and highlight the presence of allergens. The lack of standardized procedures was observed to be the main concern of cross contamination in this category. The use of SOPs which are ideally developed and written not under work pressure would ensure that the staff would follow instructions which would have taken into consideration the limitations of the kitchens. Therefore SOPs need to written specifically to the food business requirements by individuals who are trained in identifying the hazards that need to be eliminated to produce a meal that is safe for food allergic individuals. The incidents within this study could be coded in this category after observing the prior actions. On one occasion pasta was boiled in the pasta boiler, which is a vessel containing hot water. Pasta was seen to be boiled regularly during the observation. The cross contamination occurred when the chef added some water from the pasta boiler to a sauce which was being prepared. Here the contamination occurred not because it was in the design of the recipe but because the need to add hot water prompted the chef to take the closest source of hot water not considering that the added water was contaminated with gluten.

Here even if great care would be given to the scrutiny of the other ingredients to identify their composition, as described in Chapter 2, the bad practice of adding pasta water to the dish would have probably gone unnoticed. The other incident was the contamination of sandwiches which were prepared and layered down ready for packing. The food handler had accidentally disturbed the prepared sandwiches while moving his hand. While re-arranging the sandwiches with his hands, he was contaminating

the sandwiches with fish which was the last food that he had touched. Although this seemed to fall under the 'by hand' contamination, it was felt that because this would have gone unnoticed and it was not in the design to touch the sandwiches, this incident was coded in the 'other than by design' category.

4.3.4 Contamination By Hand

In this study it is noted that cross contamination 'by hand' was not as high as 'by equipment'. The aggregate total observation resulted in 21% of incidents directly related to contamination 'by hand' (n=38) (Figure 4.2).

There seems to be an inversed pattern in this category between the 'by equipment' and the 'by hand' contamination between the CPU and the chef patron. The CPU was observed to have 33% of incidents (3 of 9) related to 'by hand' contamination whilst the chef patron observation resulted in 7% (1 of 14) 'by hand' contamination. The restaurant observation resulted in 27% (4 of 15) of the incidents to be 'by hand' contamination (Figure 4.4c).

The pattern seems to indicate that where food was being prepared in advanced, as in the case of the CPU, hands were used more without the interval washing. This was due to the time spent preparing a particular batch of the same food, whilst in the chef patron operation, between one dish and another hand washing was observed to be a regular practice. This further indicates that the constraints related to the business, such as space, are direct contributors to cross contamination. The chef patron business had shown greater knowledge of hand sanitation yet the nature of the business had restricted the staff from avoiding cross contamination by equipment.

Incidents of cross contamination by hand were observed mainly at the assembly of 'Ready To Eat' foods, as in the CPU, where different products

were handled without any evidence of hand washing in between tasks thus whilst assembling a salmon sandwich, the same food handlers were assembling chicken sandwiches. Here the remote consumer of the chicken sandwich would have no knowledge of potential cross contamination of the product with fish.

It is recognised that the lack of handwashing and cross contamination are identified as the most problematic concerns for food handlers within the food services (Chapman, MacLaurin & Powell, 2013). Guidelines on hand washing are very frequently more concerned about the protection of food from microbial contamination and indicate that hand washing should be performed before handling food, after using the toilet, after handling raw food or waste, before starting work, after breaks and blowing the nose. These guidelines even explain that cross contamination is when bacteria are spread between food, surfaces or equipment (FSA, 2015; Clayton & Griffith, 2004). What fails to be explained is the other facet of cross contamination of food with food allergens which, although effects only 1-2% of the adult population as reported in the literature review, poses a serious threat to food allergy sufferers. The research by Clayton & Griffith (2004) reports that hand washing is one of the most important factors to prevent food poisoning. Although the relation to this study is limited to cross contamination by hand, the fact that hands cross contaminate food indicate that this category pose serious concern to the production of safe food. Kendall et al (2004) reported that errors in the method of hand washing are common between food preparation tasks. The time required to wash hands according to established standards (CDC, 2011) might be seen as too long yet a difference must be made between rinsing and the proper method of hand washing.

4.3.5 Implications for the Consumers

Disclaimers that other foods are handled in the same premises are usually written on packed foods however when loose food is being prepared for remote consumption, this might be more difficult. Most of the food produced at the CPU did not have any labels or written information attached. Although the production seemed to be operated with SOPs, the information was not being transferred to the remote consumer to make informed choices. The industry must provide the food allergic consumer with the necessary information for them to make informed choice in avoiding the offending food effectively (Taylor & Hefle, 2001). Although the offending food might not be present as an ingredient, the fact that cross contamination could have affected the 'free from status' might have serious implication for the allergic consumer. During the focus group discussion (Chapter 3), the participants had noted that although the offending food was not present in their dish, the food service staff had admitted that the food prepared was in fact contaminated with the offending food as for example when the food was prepared with peanut oil. Although it is inevitable that food must be touched by hand in its preparation care should be given how to handle the next product. The use of gloves does not reduce the risks which were highlight above. It might be the case that this practice actually increases the risk due to the length of time between changes. For example the longer the duration of wearing a set of gloves could increase the perspiration thus the warmth and moisture in the glove would increase the bacterial count, therefore increasing the risk of contamination if gloves are compromised through puncture. Gloves could also give a false sense of security due to lack of training in the proper use which increases the risk of cross contamination especially in the food industry (Todd et al, 2010).

4.3.6 Development of Food Allergy Management Policy

During the whole observation exercise of 240 hours of food preparation at three different types of food businesses, one can calculate an average of one incident every 6.5 hours of video observations. The outcome of this time consuming exercise is of importance in the development of the food allergy management policy and the change needed in the behavioural practices of the food handlers. The improvement that needs to be implemented is based upon the better knowledge of food allergens and how to handle the food in order to produce safe food that can be claimed to be free from specific allergens. It is not enough to know that a specific ingredient does not contain a food allergen but it is also important to produce a dish (food) safely free from cross contamination.

4.3.7 Pre and Post Results Evaluation of Training Impact

Training plays a significant role in the improvement of staff behavioural practices. Philips and Philips (2016) reported that frequently, training is seen as an event and the expectations of many is that the training would be the solution to the problem, in the case of this research, food allergen management. While training delivers information to bring about change, support systems are required to transfer what they know to what they should be able to do. Measurement and evaluation are a methodical part of a program delivery process which gives value to the newly acquired knowledge (Philips and Philips, 2016). Part of the design of this study was to evaluate the impact of the training and measure the difference pre and post training. The evaluation of training considered the degree of the reaction of the participants at the training session, if they had acquired the intended knowledge and their ability to apply their newly acquired knowledge on the job and to what degree. During the implementation of the 'multi-facet toolkit', the training session in food allergy management

was delivered. This was between the first and the second week of observation (Figure 4.5a). The coded results show that an improvement can be observed in two categories. The best improvement results were obtained in the 'by equipment' contamination category which showed a drop from an overall 12 incidents in the first week to 9 incidents in the second week. An improvement was also observed in the 'other than by design' category from 2 incidents in the first week to no incidents in the second week; however the 'by hand' cross contamination was noted to have increased in the second week from two to three incidents (Figure 4.5b).

The intent of this result was to analyse if any changes can be observed after training. Although the results show a slight overall improvement, the 'by equipment' and 'other than by design' categories show an improvement whilst a deterioration in the 'by hand' category.

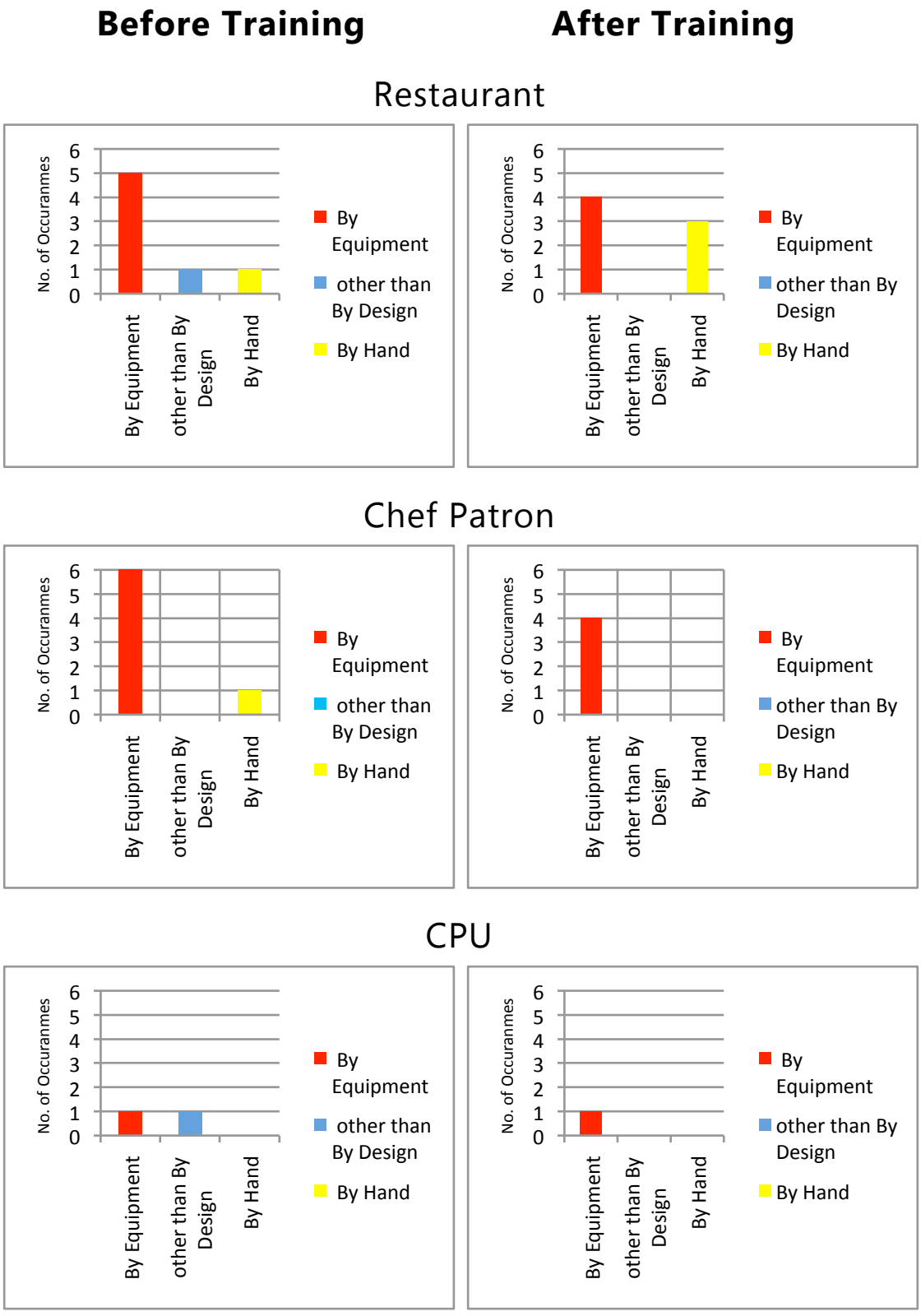

Figure 4.5a: Contamination Types and Number of Occurrances per Type and Food Business immediately pre and post training.

Aggregate

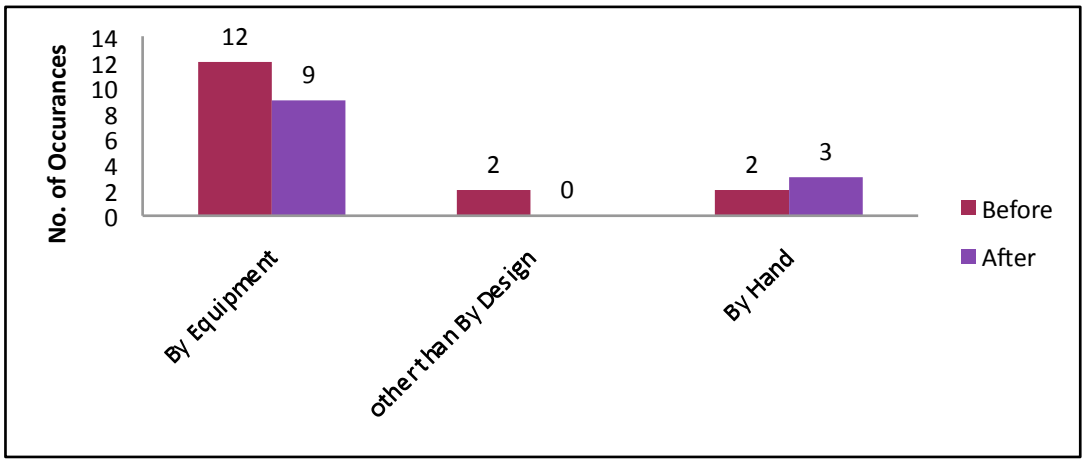

Figure 4.5b: Aggregate Results of Pre and Post Training Observation Results of Cross Contamination

Through observation, differences could be noted in how food was cross contaminated in restaurants and the CPU, although the focus of the study is not to do a comparative analysis. However it was also recognised that at restaurants the sensitive consumers have been noted to inform the food business staff of their sensitivities. This would be impossible to achieve with food prepared at a CPU. The food prepared at these remote food production units was delivered to the food outlets and therefore there was no direct contact between the sensitive consumer and the person who prepared the food. Referring to the clients concerns about the safety of the food was here limited to the ingredients, meaning that the whole food business supply chain assumed that the food only contained the declared ingredients. Cross contamination was therefore not being considered as a threat by the food business and the consumer relied on the premise that the food only contained the declared ingredients.

Restaurant would probably clean an area to prepare food requested by sensitive individuals therefore more care would be given when the kitchen

is alerted. This does not apply for a CPU, which means that if a food service business is handling food prepared by a CPU, caution should be taken to what claims can be made. Although the number of incidents observed was the lowest at the CPU, the number is still noticeable (9 of 38).

4.3.7.1 Observation Results 10 months after Training

The results of the two days of observation (Figure 4.5c), which were carried out 10 months after training, when compared to the immediate pre and post training observations results show that the highest deterioration can be identified at the CPU in the 'by hand' and 'by equipment' contamination categories; however comparison between the 10 months after training and the previous sets of results should be treated with caution since the period of observation was shorter. The other two businesses have shown an improvement on their previous results. The CPU was observed to have 6 cross contamination incidents, 3 in the 'by equipment' category and 3 in the 'by hand' category. At the chef patron 3 incidents were observed in the 'by equipment' category whilst 1 cross contamination incident in the same category was observed in the restaurant. The deterioration within the CPU could be attributed to change of staff or that the people observed 10 months later could have been different and therefore did not undergo the training. Although continuous training is required in food allergen management (FoodDrinkEurope, 2013) to reduce risks to acceptable levels, it should also be a prerequisite to produce food that is free from cross contamination especially food allergens. The results reinforce the other observations made within this research that food produced at CPUs could in fact cause food allergy incidents at remote food businesses without direct communication between consumer with the food producer; thus the food business lacks the certainty of safe food if the products used are produced or partially produced in CPUs with similar production procedures as reported.

10 Months After Training

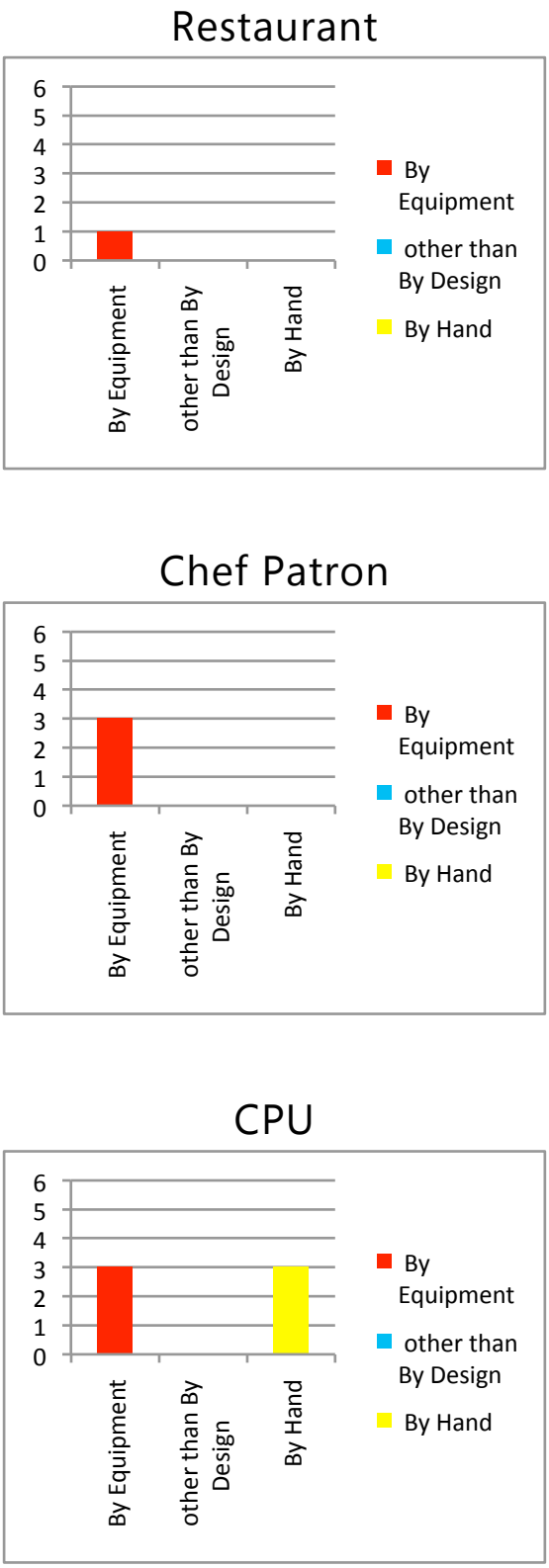

Figure 4.5c: Contamination Types and Number of Occurrances per Type and Food Business 10 Months After Training

4.3.8 The Impact of the Multi-Facet Toolkit

The multi-facet toolkit has been described earlier in this study. The components that form part of the multi-faceted toolkit included the training programme which was conducted and evaluated in terms of staff knowledge through a questionnaire which will be discussed in the next chapter; however the impact of the training on staff practices was observed and discussed in this chapter. The outcome of the training session suggests that the training programme has improved some areas of the practices which were observed, mainly the cross contamination by equipment and other than by design. It has also indicated that the training programme needs to include further information on the cross contamination by hand which was observed to have deteriorated after training. Other studies have also indicated that this bad practice is rife in food preparation. Hertzman and Barrash (2007) had reported that the lack of hand washing was one of the main violations in personal hygiene in food preparation areas. This study has confirmed that little if any attention was considered by the observed kitchen staff to wash their hands after every contact with the food allergen. This is understood to be the result that the kitchen staff had not changed their behaviour (practice) through knowledge (training). Therefore any training programme which is expected to bring about behavioural change needs to have the practical elements delivered over a period of time. This study has included measurements of the impact of training over a set period of time which has been reported above. Egan et al (2007) reported that training the management had resulted in a benefit on the influence of the managers on the premises hygiene and their impact on training other staff. This study did not include any management staff except in the chef patron business and here is where the best improvement in hand cross contamination results was observed. Therefore the training programme needs to address further the

need of hand washing amongst the working staff to avoid cross contamination of food allergens to other foods, introduce practical examples of how cross contamination occurs in the working environment and involve management in the training programme.

The training sessions which were assisted by PowerPoint Presentations have been observed to enhance the knowledge of the staff regarding the identification of food allergens yet the implementation of this knowledge is lacking from the training programme. With the assistance of videos or other interactive components within the training programme, it is believed that bad practices as described above should be reduced however further research into this area is needed to evaluate behavioural change in the acceptance that common ingredients found in the kitchens are in fact serious food hazards to food allergy sufferers.

4.4 STRENGTHS AND LIMITATIONS

Observation is a useful tool to record the behaviour of food handlers and through notational analysis and coding, the status of the food business practices will emerge. The real life food preparation practices can be observed and revisited as opposed to self-reporting data which is often very different to what is reported and what is actually done in practice. The recorded data is pristine; therefore researchers can analyse directly without referring to second hand information (Anderson et al, 2004). In this study the main researcher had prior knowledge to kitchen practices and therefore could assume that certain actions were results of shortcuts that could put the prepared food at risk of contamination with allergens. This was more evident in the 'Other than by Design' contamination observation where the knowledge of food preparation strengthened the coding process.

The framework of this study, based on the research by Chapman et al (2013), is time consuming and requires an amount of IT knowledge to be able to have a system in place that is robust enough to collect the huge amount of data over the set period of time. Video observation and notational analysis enable the recording of cross contamination incidents which would have been difficult to capture through other methods. Although as indicated this method is time consuming yet it is more efficient then participator observation in the value of the data and the time spent in observation.

This study is limited to the types of food businesses observed and only describes the portion of the food preparation that could be captured by camera, thus it is not representative of the whole operation. The purposive food businesses sampling limited the overview of other food service operations especially those which still offered food to consumers with limited ingredients involved in preparation for example fish and chips shops. In other words the selected businesses did not represent food businesses which have only a few constant ingredients to produce always the same food products. In these businesses the results might have given a different outcome due to the limitation of allergenic ingredients used. The selected businesses needed to produce varied foods with complex requests from the consumers with different food preparations that reflect possible cross contaminations. The research design required that businesses which constantly produce different foods for example restaurants, would be studied therefore these businesses were purposely selected however time and financial constraints limited the study from engaging a bigger sample. It is recognised that the sample is small.

The pre-set time was also a limiting factor to the observation which means that certain activities of food preparation might have occurred at times when no observation was ongoing. The participants, who were selected and might have been believed to be the best by the owners, limited the research in being more inclusive of the entire working staff therefore not all the possible knowledge of the staff was evaluated.

Viewing the videos takes a considerable amount of time especially when an action which is dubious or not easy to code would need to be slowed down and reviewed to ensure that the action is coded in the right category.

4.5 CHAPTER'S CONCLUSION

Hand washing practices within the catering industry seems still to be one of the major problems of cross contamination (Clayton & Griffith, 2003). Training appears not to have affected the 'by hand' contamination as the result show that there was an increase in the second week (Week 1, 2 incidents, week 2, 3 incidents). This might signify that cross contamination 'by hand' needs the highest level of attention when training programmes are devised and delivered. This also means that food allergy management policies should emphasise greater care on hand cross contamination to reduce or eliminate this bad practice. However the results might not be a real increase in incidents as sample was small, therefore a bigger study might be required as part of future work to understand whether contamination by hand really needs a higher level of attention.

In order to have a continuous chain of safe food production followed by accurate ingredient information delivered to the consumer, there needs to be a synergy between the kitchen and the service staff, each understanding the requirements of eliminating risks of cross

contamination. Unlike other studies which dealt with food-borne illnesses due to microbial cross contamination, this study has identified that cross contamination with allergens by equipment has the highest rate of occurrence (Figure 4.5b). In order to change this behaviour of food handlers, further intensive training seems to be needed to address this bad practice.

The results suggest that training has improved the status of food allergy management however it seems that the food preparation staff have not yet conceived that certain common foods could have a detrimental effect on the health of sensitive individual evidenced by their actions which could result in cross contaminating other food.

CHAPTER 5

FOOD SERVICE STAFF KNOWLEDGE OF FOOD ALLERGENS AND THEIR MANAGEMENT - A QUESTIONNAIRE ANALYSIS

5.1 INTRODUCTION

Part of this research was to investigate the current status of food allergen management in micro and small sized food service industry and establish the current level of staff knowledge in preparing food which would be safe for allergy sufferers; this will address aim 1.1 of the combined study. The quantitative aspect of the research was amassed through a structured questionnaire. Two identical questionnaires were administered pre and post a training session which was developed with a specific intent to provide detailed information on food allergens and their management. The questionnaire was piloted tested at the chef patron business and the questions were refined against the literature review to ensure that the outcomes would address aims 1.1 and 1.2 of this study.

The main purpose of this quantitative analysis is to establish the current situation in the management of allergens by the quantification of the data. This allows analysing the results from the selected sample and measuring the incidence of various responses and views given by the participants. It is also important to understand if any changes in knowledge and behaviour could be observed after the traditional classroom training session. The questionnaires were administered with the specific intent to understand if training could alter staff practices through enhanced knowledge. It is a legal requirement to have staff trained which commensurate to their working activity (Worsfold, 2005); therefore with the hind sight that food service staff should be able to prepare food for allergy sufferers without causing them any harm, it stands to reason that staff should be knowledgeable enough to produce meals that meet this requirement. The food service industry moulds itself around the requirements of the cultural needs of the location and therefore provides food that the local community considers as acceptable. The legal obligations of the industry,

as discussed in the literature review, puts the onus of preparing safe food on the food business and does not discriminate against people who suffer from food allergies. Therefore the dietary requirements of food allergy sufferers should not be given less attention then the culinary requirements of the general society.

Jenkins-Mclean, Skillton & Sellers (2004) reported that in numerous studies, the traditional classroom training alone may not result in behaviour change which could raise concern about the actual correct food preparation practices for sensitive individuals. To understand knowledge and behaviour of the selected participants, a set of twenty questions were put to the participants (Appendix 15). Their response established a baseline of the current situation and repeating the questionnaire after training showed what has been learnt through the multi-faceted toolkit training session. The barriers that could hinder food service staff from producing food free from allergens would also be highlighted. Worsfold (2005) noted that basic training in food hygiene is considered to be insufficient for trainees to perform more in-depth analysis and carry out risk assessment; logic suggests that this would also apply for food allergens as this might not be considered as basic training. Herztman and Barrash (2007) argued further on the validity of training and reported that training does not guarantee good practices.

This chapter will discuss the data collected from the questionnaires pre and post training. Since the participants were engaged under the condition of anonymity it was not possible to define which of them had dropped out of the study (started with 17 and concluded with 10); therefore it was not possible to identify the data of the drop-outs and omit their data. To obtain data that can be compared, the results are

represented in percentages due to the fact that the number of participants in the pre and post training questionnaire differ.

5.2 RATIONALE OF THE STUDY

This section of the research sets out to establish the level of knowledge of the food service staff in the practical implementation of their expertise in managing situations when sensitive individuals visited their businesses to dine. The aim clearly excludes all other practices within the food service sector but focuses on the level of knowledge of staff in the safe preparation of food for allergy sufferers. Through the measurements of the differences pre and post training, the results will give an understanding of the validity of training and what format training should be established to achieve outcomes that can be reflected in practical applications.

The structured questionnaire was administered to the participants with the assistance of the researcher. The assistance was limited to the explanation of the questions and the method in which they should answer. The questions reflected the aspects of food safety and food allergy management, results of which indicated the current state of food preparation within the selected businesses. This also highlighted how confident and prepared staff were in producing food for allergy sufferers. The development and administration of the questionnaire has been described in the research design and methodology Chapter 2. It is good to note that the participants were comfortable in answering the questions and were allowed free time to answer the questions. This ensured that no unnecessary pressure forced the respondents to answer the questionnaire without due thought.

5.3 RESULTS AND DISCUSSION

5.3.1 Food Safety Systems

Staff were asked if the business they worked in was operating a food safety system based on HACCP or if simply they had Pre Requisite Programmes (PRPs) in place. This question intended to establish the status of the food safety management within the selected businesses. The pre training results show that 82% (n=17) of participants claimed that HACCP was in place and 18% reported that PRPs was the system they used as a base for their food safety system. The post training results show that only 70% (n=10) claimed that HACCP was implemented at their work place and 30% reported that PRPs were their food safety system Figure 5.1.

Question; Does your food business operate a HACCP or PRPs food safety system?

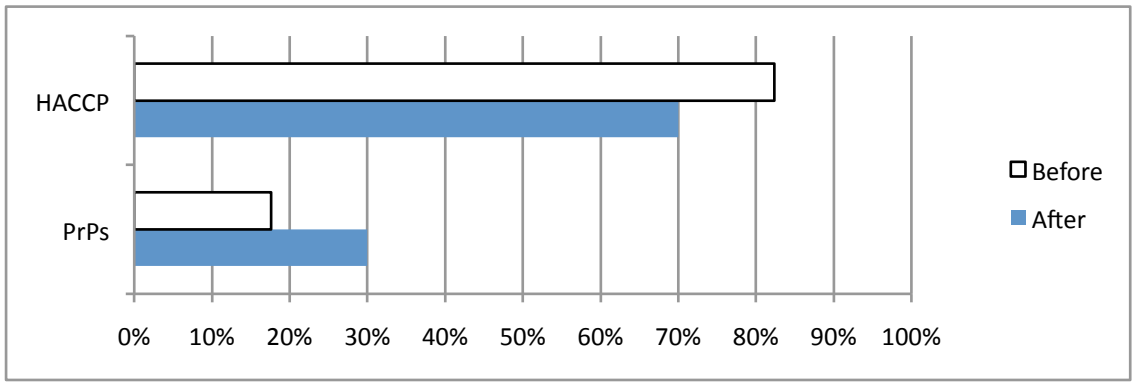

Figure 5.1: Food Safety Systems in Food Service Businesses

This drop in the claims that HACCP was the food safety system implemented in the food businesses suggested that the staff had no clear knowledge of a HACCP system and that post training they understood enough to know the difference between HACCP and PRPs, which lead them to report that they did not have HACCP in place. It also reflected that staff were not much involved in the practical application of their food safety system, in other words the staff were not part of the team which

identified food hazards and applied risk assessments. However the results indicated that all participants knew about a food safety system within their respective businesses and none of them was reported to be ignorant of food safety. It was assumed that food businesses had to operate a food safety system as this was a legal requirement in Malta (Dipartiment tas-Sahha Ambjentali, 2007). All participants claimed that they had received some kind of food safety training. Relevant to this study was if participants had received any training in food allergen management. It was reported that 24% had received training in food allergy management whilst 76% (n=17) noted that they never received training in this area. It is understood that post training, all participants reported that they received training in this area Figure 5.2.

Question: If yes, have you received training in food allergen management?

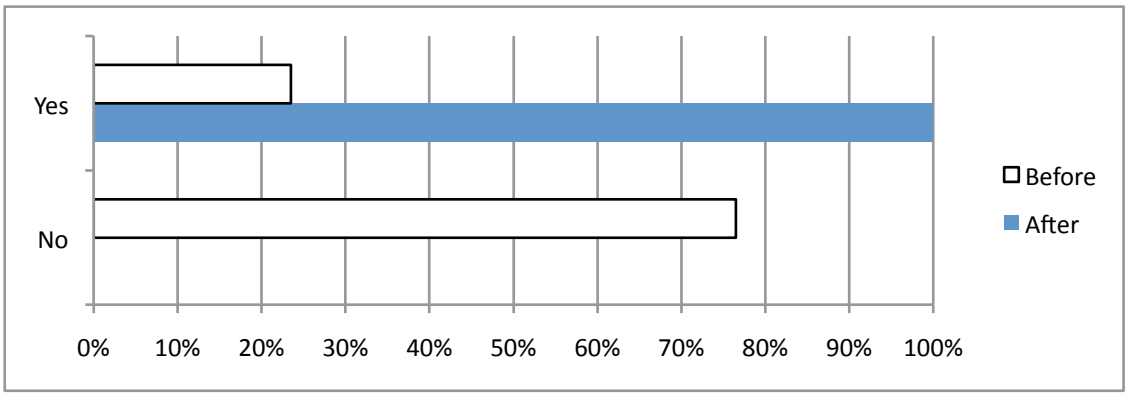

Figure 5.2: Training in Food Allergen Management

5.3.2 Knowledge of Food Allergens

A noticeable barrier which hinders the ability to identify the presence of an allergen in food was the knowledge of what was declared as an allergen. Each food business might have had past experience of clients who claimed to be allergic to a specific food which is not listed in Annex II of Regulation EU 1169/2011. To establish what food allergens the businesses considered

as food safety hazards within their businesses, the participants were asked to list the foods potentially considered as allergens.

Question: What allergens do your food safety system considers as food safety hazards?

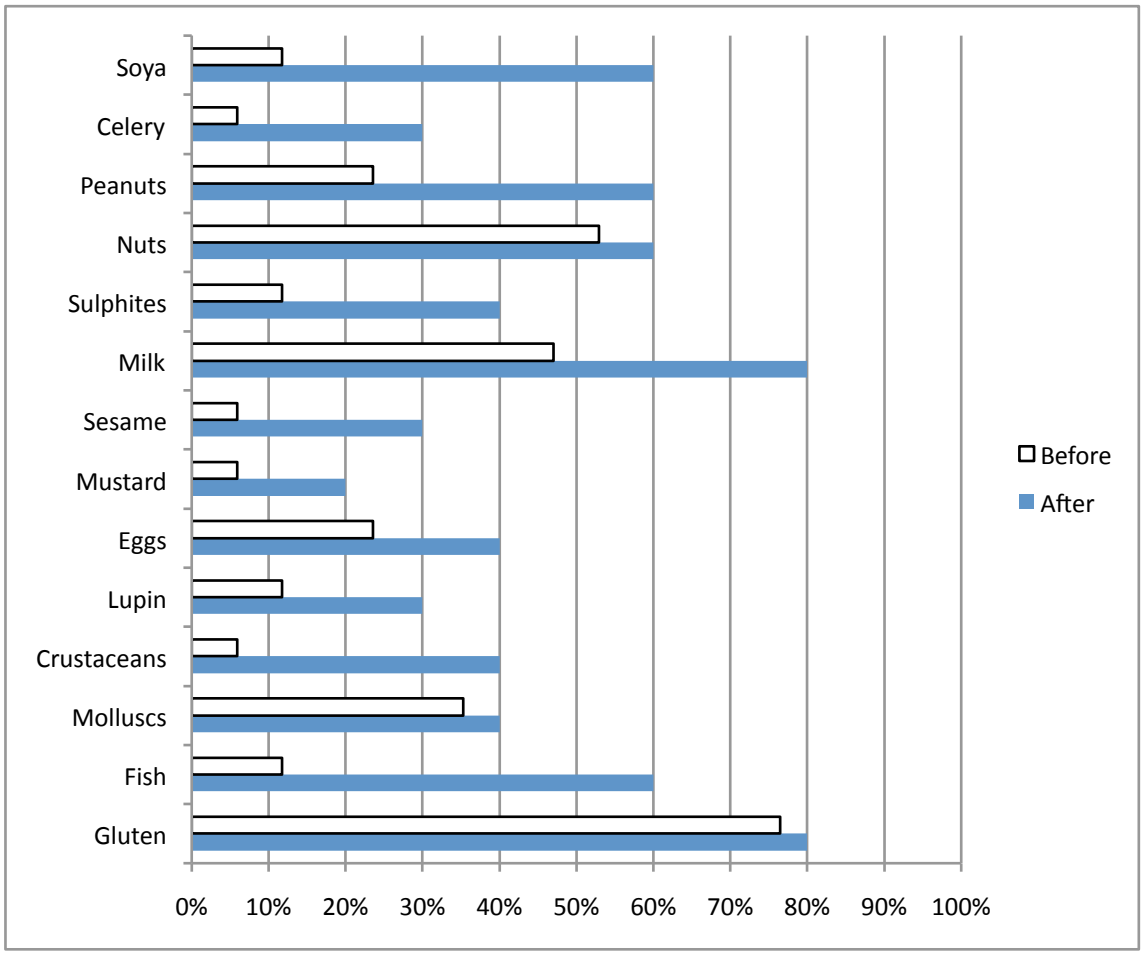

Figure 5.3: List of Foods (from EU 1169/2011) Considered being Allergens by Food Service Staff

The results indicate that pre training the knowledge of what was considered as a food safety hazard was highest for gluten. The difference in the pre and post training results are minimal in respect to this allergen. However all other allergens show that there was an increase of awareness in the post training results (Figure 5.3). Other food ingredients listed by participants considered as allergens and to be food safety hazards were citrus, garlic, MSG (mono sodium glutamate), peas, yeast, spices, food colouring and potato starch. These claims could have been imposed on the

participants due to clients' requests. It is understood that some clients tend to falsely state their predicament, leaving lasting impressions on food service staff. Food aversion has been diagnosed with people who are psychologically convinced that they suffer from a food allergy. They might have endured symptoms that are similar to food allergy reactions yet their conviction is not based on clinical diagnoses (Morris, 2015). Muriel Simmons, chief executive of Allergy UK commented, post a study carried out by the University of Portsmouth in 2005, that if those falsely claiming to be allergic to food continued with the practice, those who really have a food allergy would find it increasing hard to be taken seriously (BBC, 2005). Being sensitive to certain foods due to various health conditions does not make one allergic to that food. Literature review has indicated that consumers claimed sensitivities without testing thus they assume that they were allergic to specific food (Gavura, 2013; NHS, 2016). This presents questions to the validity of claims made by consumers and could cause negligence in the preparation of food for true allergy sufferers if other consumers are not believed by the restaurant staff; however the food service staff still should be able to produce an allergen free meal if requested.

It was also important therefore to understand which of the fourteen most common allergens within the EU the participants could list. Although this question was very similar to the previous one, the intention was to limit their focus to what is prescribed. The results showed again an increase in knowledge post training (Figure 5.4). Although no evidence is available, anecdotal evidence from talking to the participants suggest that the presence of the allergen posters (infographics) within the food preparation areas has left an impact on the participants and therefore increased their knowledge of the fourteen allergens as listed in Annex II.

Question: Can you name all the allergens listed within the EU? Please list them.

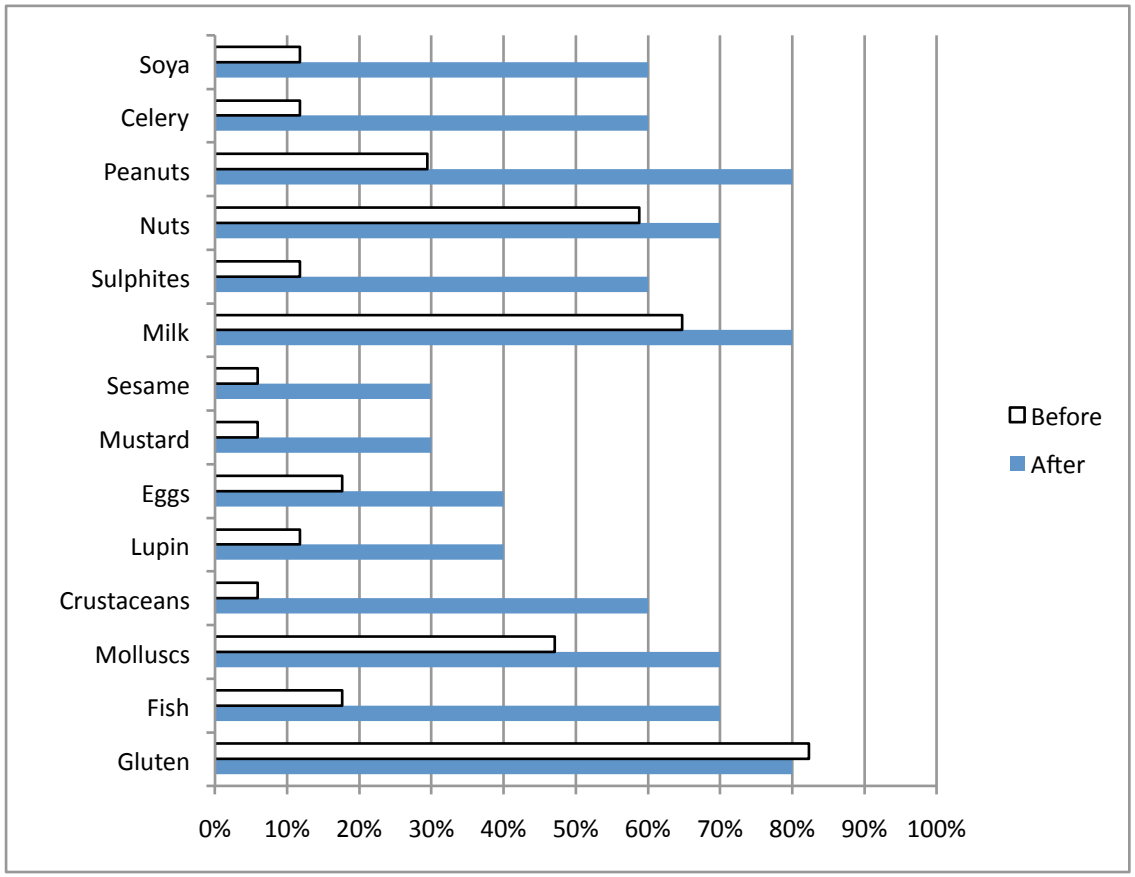

Figure 5.4: List of Common Allergens in the EU

5.3.3 The True Nature of Food Allergens

There seemed to be a misconception of the true nature of food allergens. Although training had indicated that allergens are considered as chemical hazards, it seemed that this information had little effect on the participants. Some of the participants reported that allergens could even be more than one element that is, a bacteria, virus, heavy metal or chemical. This was observed in both pre and post training. This could be the result of lack of familiarity with the different elements listed in the question, yet even after training the change in the result does not suggest that the participants could remember (recall) that allergens are considered as chemicals. Although there is a change in the results this seems to

increase in every element (Figure 5.5). It also indicated that because the participants were people who are used to manual work and therefore they were not well versed with abstract forms, the understanding of the true nature of allergens was not comprehended well.

Question: What do you think food allergens are?

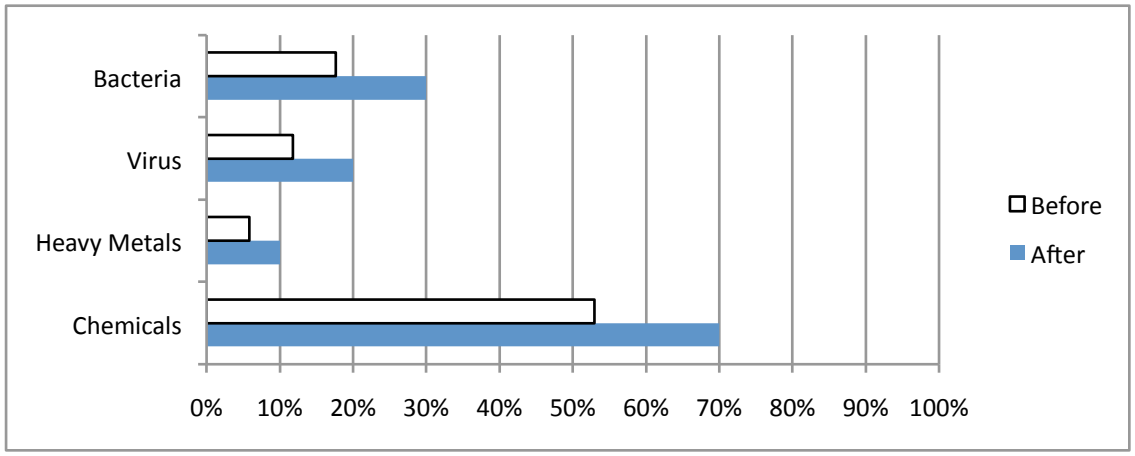

Figure 5.5: The Nature of Allergens

Although an improvement was noticed towards identifying allergens as chemicals yet even other elements has shown an increase in the results. This suggests that there are misconceptions about allergens and this makes it harder for food service staff to negotiate the management of something that they do not fully comprehend. It is difficult for staff to conceive that certain common foods are considered as food hazards and treat them as so.

5.3.4 Removing Allergens from Food

The subject of removal of allergens from food also indicated if participants had understood the concept of contamination and how to avoid these instances from occurring. When asked how allergens can be removed from food the pre training results showed that 6% (n=17) have thought that freezing could remove food allergens and 12% thought that washing

would render the food allergen free, while 82% reported that this can be achieved through eliminating the use of foods that are considered as allergens. For the purpose of this study this was termed elimination. The post training results show that 100% (n=10) of the participants claimed that the only way to remove allergens from food in the food service industry is by means of elimination (Figure 5.6). This illustrated that there was a good grasp of knowledge of cross contamination and that the participants understood that no process could remove allergens once these were part of a prepared food. It also reflected that the participants understood that once food had been in contact with food allergens, that food could not be reversed and re arranged to be served to food allergy sufferers who might be sensitive to that particular food.

Question: How can you remove allergens from food?

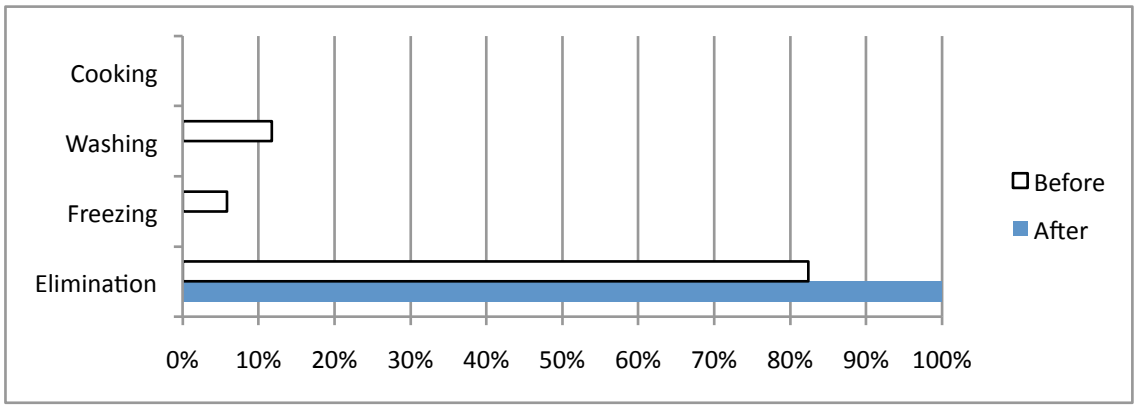

Figure 5.6: Removal of Food Allergens from Food

It seems that the concept of controlling allergens by elimination had left a positive effect as the post training results showed that all participants opted to respond that allergens can only be removed from food if eliminated. This result shows that if food service staff were knowledgeable of the composition of the products, they would have been able to eliminate certain products from their production to produce safe food for sensitive individuals.

5.3.5 Consequences of Food Allergens

The next question was to establish their knowledge of the consequences that allergens had on sensitive individuals. The results show that pre training the emphasis was on breathing restrictions (EUFIC, 2006) which is correct as one of the potential effects on allergic consumers, however only 59% thought that death could also be a consequence to sensitive individuals if food allergens were consumed (Figure 5.7).

Question: What could the effect of food allergens be on sensitive consumers?

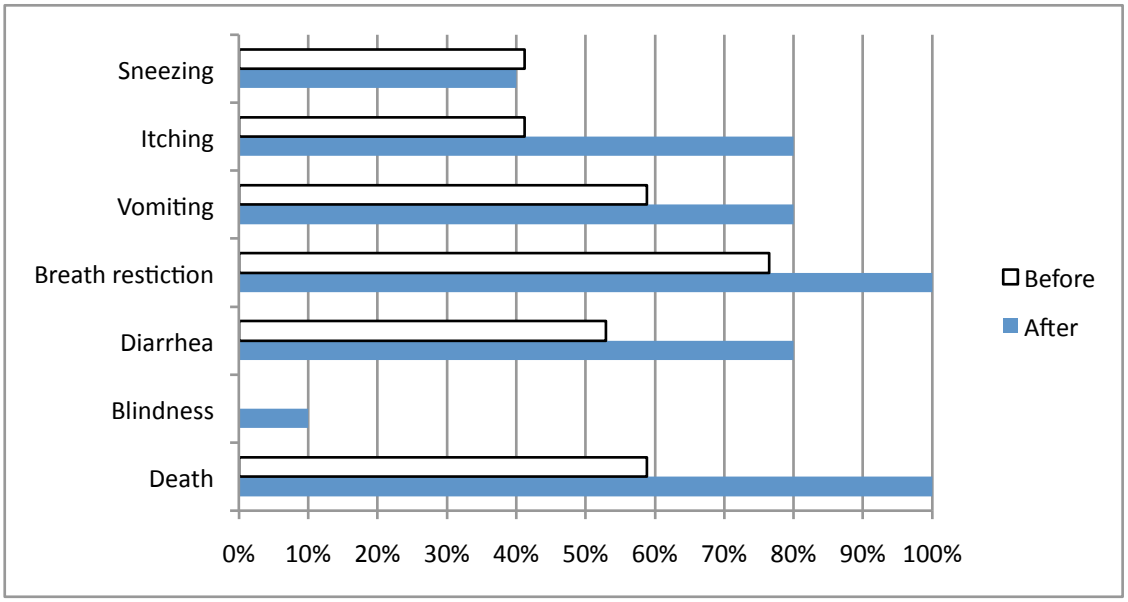

Figure 5.7: Consequence of Food Allergies

This result could be alarming knowing that over 40% of untrained food preparation staff did not realise the severity of the consequences that food allergens can have on sensitive individuals. The post training results show that there had been an improvement in the knowledge of the participants on the consequences food allergens have on allergy sufferers. The two elements which scored 100% were the breathing restrictions and death. This shows that the training had left betterment in two very crucial elements of the ones listed. It also shows that there was still some

misconceptions of the consequences of food allergens namely that blindness (10%) could be an effect of a food allergy. Although nasal congestion is linked to food allergies, sneezing is not likely to be a common symptom, therefore the result on this element, which did not show any difference pre and post training, indicates that the participants might have confused air particles allergies, such as hay fever, with oral food allergies as in the case of this research.

5.3.6 Confidence in Preparing Special Dietary Meals

Although all participants had claimed that they had received some kind of food safety training and 24% reported that they had received food allergy management training, 35% reported that they were not confident to prepare a meal with special requirements. What is notable is that 59% (n=17) answered that they were confident to prepare such meals. With the hind sight of the previous results in mind, the latter result presented serious doubt of their true ability to prepare a meal which would have been safe for allergy sufferers. Post training 50% (n=10) of the participants claimed to be confident in producing a meal for a sensitive individuals (Figure 5.8). There is a decrease of 9% in confidence which might indicate that after realising the true consequences caused by food allergens, the participants felt that their knowledge and working practices were not adequate enough to produce safe meals for allergy sufferers. The training session and the other components of the multi-faceted toolkit had impacted the participants with critical self-analysis on their ability to produce safe food for allergy sufferers. This signifies that the multi-faceted toolkit was successful in bringing about the true status of the competence of working staff.

Question: How confident are you to serve a meal to a client with special dietary requirements?

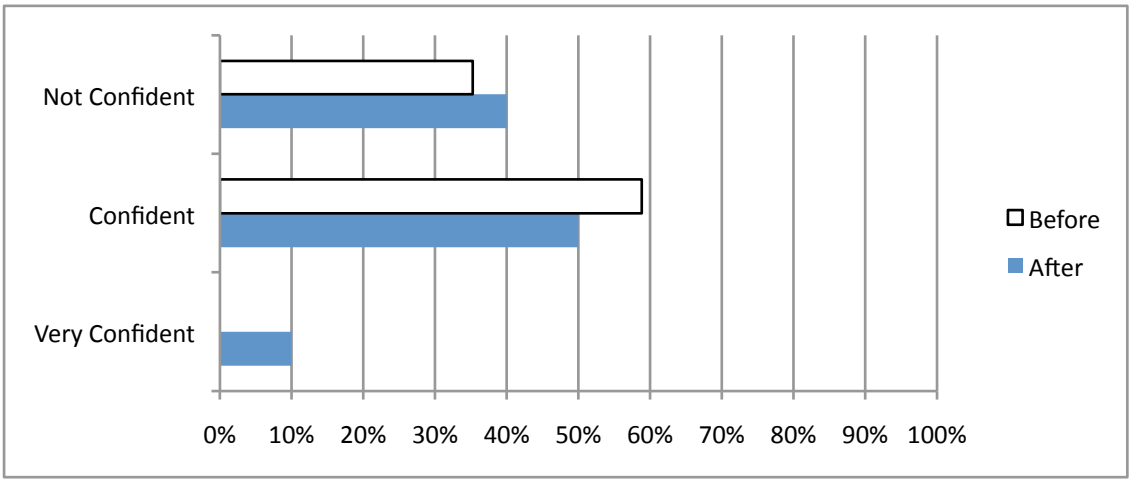

Figure 5.8: Confidence in preparing Special Meals

This also indicates that their broadened knowledge made them realise that further instructions were needed for them to be confident enough to produce safe food for clients with special dietary requirements. It is clear that chefs who felt that they were not directly responsible for the safety of the food took less interest to know the accurate composition of the ingredients of complex foods; therefore this uncertainty of accurate ingredient knowledge lead food preparation staff to be less confident to prepare food after being instructed in the true consequences food allergies have on sensitive individuals. It might also be the case that they did not want to assume any responsibility in preparing special meals.

5.3.7 Businesses Adequacy to Prepare Special Meals

Confidence in the preparation of food relies on other factors besides the ability of the food business staff. It is also built on the assurance that operating tools are in place to ensure the production of safe food for sensitive individuals. Pre training 71% (n=17) of participants felt that their businesses were adequate to cater for special dietary requirements however this dropped to 50% (n=10) post training. This drop reflects that

their increased knowledge of food allergens and their management had prompted them to re-evaluate their working practices and respond that their businesses might not be adequately designed and prepared to produce food for special dietary requirements (Figure 5.9). This result is a similar scenario to the previous one as noted in section 5.3.6. The post training knowledge had affected the participants' judgement on their overall position in producing safe food for allergy sufferers. This signifies that training was a catalyst in their critical self-assessment and that of what they could claim as a business.

Question: Does the food business cater for special dietary requirement such as food allergies?

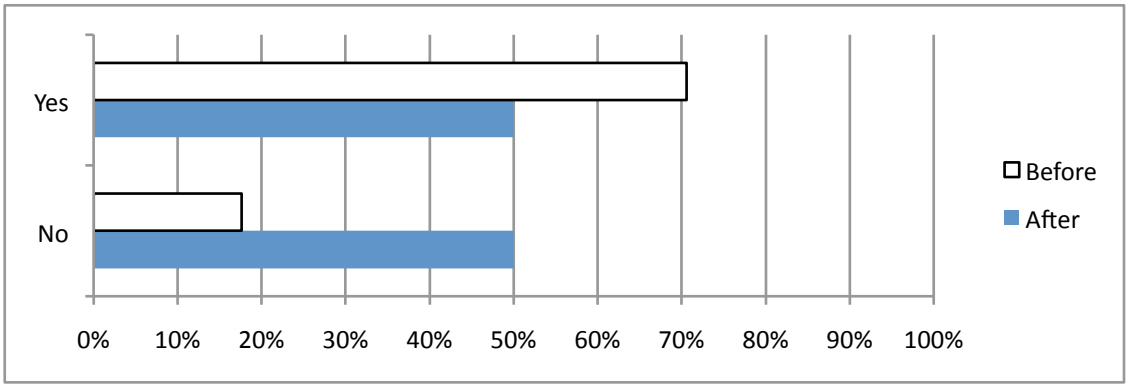

Figure 5.9: Catering for Special Diets

Participants also shifted who is responsible to answer consumers request from the chef 82% (n=17) pre training to a more balanced spread of 50% to the chef and 40% to the restaurant manager post training (n=10) (Figure 5.10). The change in perception to who is responsible to answer consumers request indicate that the participants thought that other staff are also responsible; however the level of responsibility attributed to the assistant chefs did not change much. This shows that a shift in responsibility is evident. In other words, most of the participants have indicated that the assistant chefs should not be responsible to answer

clients' requests. This result could be the reflection that most of the participants were themselves assistant chefs except for the chef patron.

Question: If yes , who will be responsible to reply to the clients request?

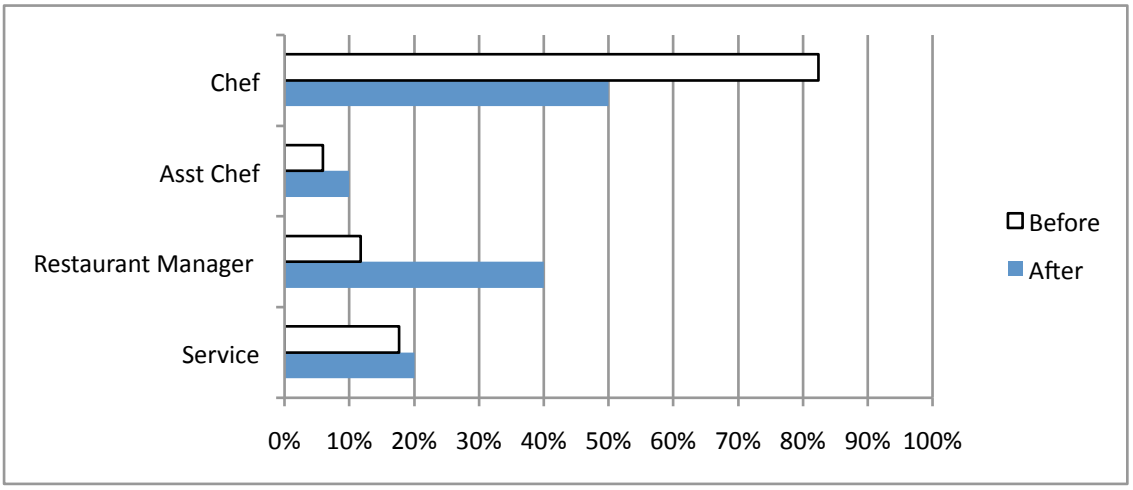

Figure 5.10: Responding to Clients' Requests

5.3.8 Threshold Tolerance to Food Allergens

The results indicate that pre and post training all participants knew that a small amount of a food allergen could cause harm. With this in mind, when reflecting back to their knowledge of which foods were considered as allergens and where these could be found, it seems that the participants knew of the seriousness food allergens posed to sensitive individuals yet failed to know the allergens and their derivatives which might have been ingredients in complex products. To fortify this line of thought, the participants were asked if ingredients in their possession were free from allergens. Both pre and post training results show that the majority (96% pre training and 100% post training) (Figure 5.11) recognised that the ingredients within their businesses are not free from allergens.

Question: Do you think that all your ingredients are free from allergens?

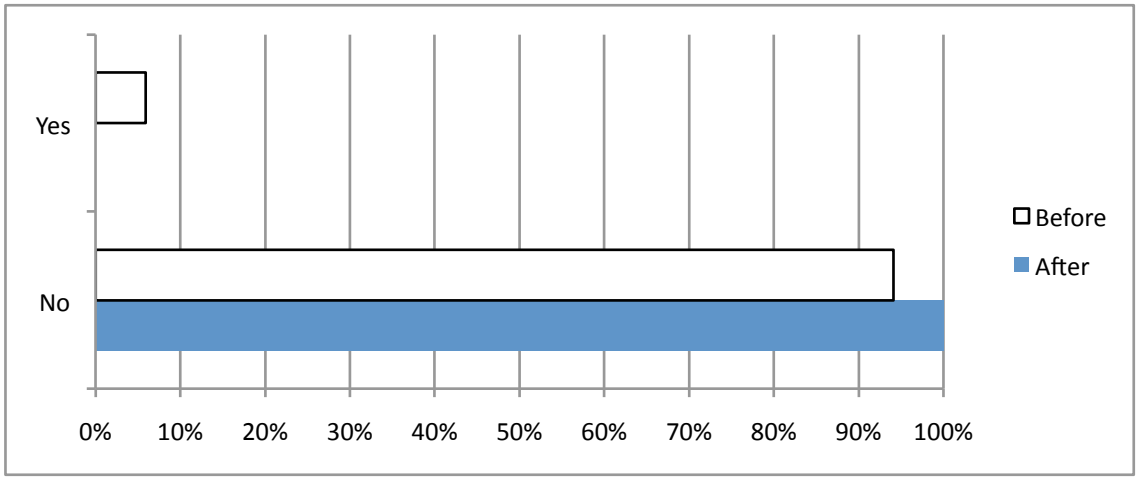

Figure 5.11: Knowledge of Allergens in Ingredients

Logically the confidence in preparing safe food for sensitive individuals would decrease, knowing that the food preparation staff questioned their own knowledge of the composition of complex ingredients. In other words, prior to the knowledge delivered in the training session, the participants were not aware of all the allergens listed in Annex II and not fully aware of the consequences food allergens have on sensitive individuals. Post training their confidence to prepare food for sensitive individuals decreased because they were now aware of the complex composition of ingredients knowing that certain ingredients, which until pre training were considered as safe, suddenly became a potential food safety hazard.

5.3.9 Physical Removal of Allergens from Ready Plated Food

Similarly the results show that the physical removal of allergic ingredients from ready plated food was considered to be inappropriate to produce safe food for sensitive individuals. However when comparing these results (94% pre training and 100% post training the participants said that allergens cannot be removed from ready plated food) (Figure 5.12) with the results of the question to establish if food allergens can be removed,

the focus is drawn to the 18% (n=17) who replied that freezing and washing could eliminate allergens from food (Figure 5.6). This contradiction indicates that if the allergen was a visible ingredient for example nuts, this could have been identified easier as an allergen, however when the allergen was part of a complex ingredient as for example celery in a bouillon, this was more difficult to identify and harder for the food preparation staff to eliminate.

Question: Can allergens be removed from a ready plated dish; example nuts?

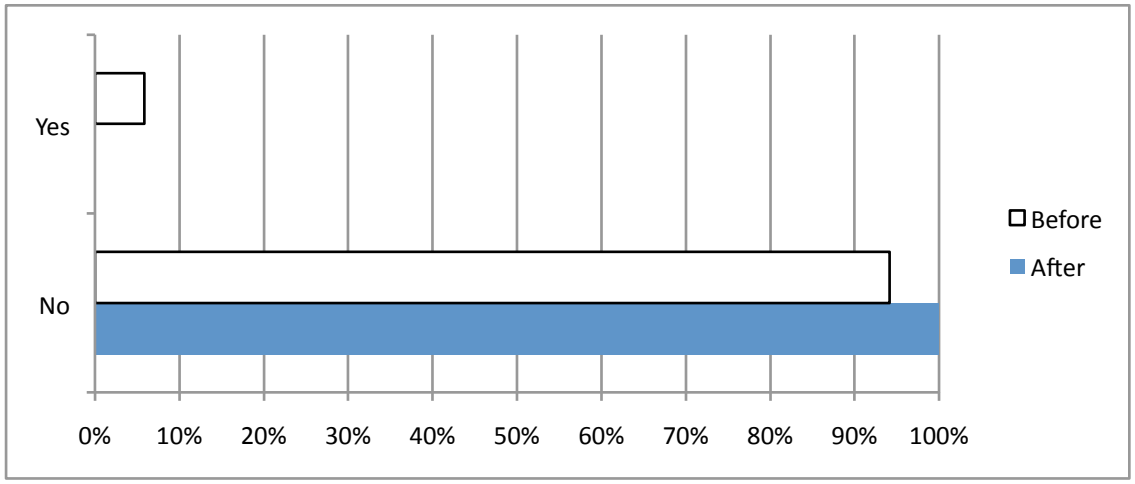

Figure 5.12: Removals of Allergens from RTE

All participants had responded that allergens cannot be removed from RTE foods post training meaning that they have understood the concept of cross contamination; however this only applies when allergens are visible. One can argue that it is more difficult to identify allergens or cross contamination especially when these are not evidently visible. From previous results it can also be noted that their knowledge of what constituted a food as an allergen was limited and therefore this limitation might have had an effect on the result. Put differently, the participants could only identify allergens if these were in their natural state and could

be physical seen cross contaminating other foods. For example if the consumer had asked for a salad without any fish, this allergen would have been eliminated; however it might be that in the accompanying dressing, fish could be one of the ingredients as in Worcestershire sauce or Caesar's dressing.

5.3.10 Cross Contamination

Cross contamination of products is a main concern in producing food which could be claimed to be free from specific food allergens. To achieve a level of certainty, raw stocks need to be assured as being free from any contamination. This assurance is obtained from reputable suppliers who themselves would know the risks involved if stocks are cross contaminated. Visits to audit the working practices should be carried out to verify best practices. However this is not always the case. Results from the questionnaire (Figure 5.13) show that pre training 94% (n=17) did not know if products they worked with could have been contaminated with potential food hazards, in this case food allergens. Post training the result show that 80% (n=10) still did not know if products within their possession could have been contaminated, yet as noted in section 5.3.6, 50% of the group questioned after training, claimed that they were confident to produce food suitable for sensitive individuals. This contradiction indicates a shortfall in the understanding of the management of hazard which also indicates that the working staff still did not comprehend that common foods could pose a serious threat to allergy sufferers. This result also confirms the lack of knowledge which was highlighted across the literature review. The importance of food safety is lacking from the formal and informal formation of staff working in this industry. As a result the consequences of this lack of knowledge could have serious consequences on the sensitive consumer. Training within the multi-faceted toolkit has

shown that an improvement could be achieved through information however this might be improved if the staff are also exposed to the practical phases of food safety management for example verification and validation of suppliers.

Question: When buying loose ingredients or products (e.g. vegetables, fish), do you know if these contain or if these could have been contaminated by allergens?

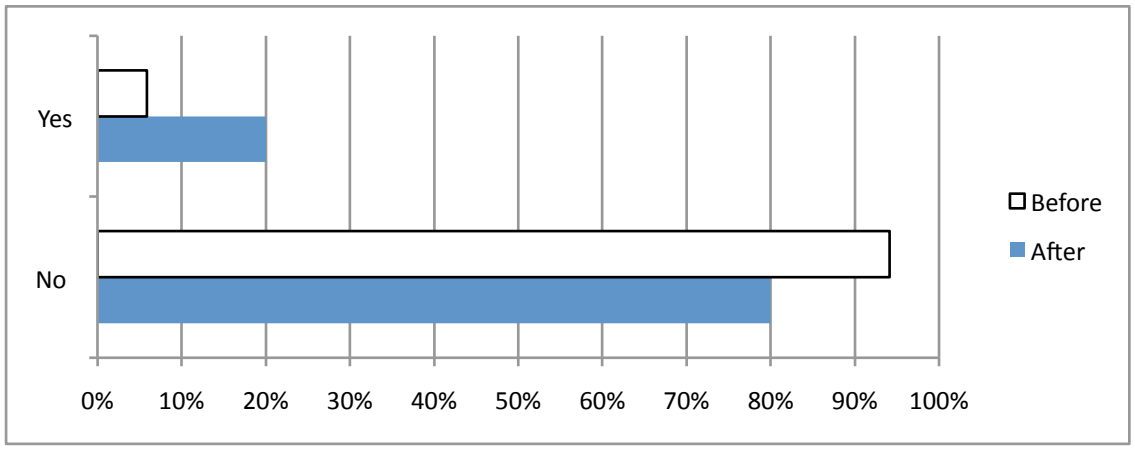

Figure 5.13: Knowledge of Cross Contamination of Raw Product with Allergens

Result show that there was an increase in their knowledge if the food was contaminated with food allergens. This marginal betterment does not reflect well on the fact that food which was prepared for sensitive individuals can still be contaminated at raw source. Although care could have been given in the preparation of these meals, there still seems to be a lack of knowledge of the food sources and transportation and the storage practices which could result in cross contamination of food. This crucial element of food safety management was not well practiced and therefore any subsequent practices will have little effect to render food safe if the sources of the ingredients are operating a similar procedure in managing food allergens.

5.3.11 Allergen Presence Recording Tools

Recording the presence of food allergens is an important task in the scrutiny of ingredients and products when developing a menu item. There are various means of recording this information. In this research three most common tools (recipes, SOP and record sheets) were listed for the participants to select which they used in recording the presence of allergens of purchasing products. The results show that 70% recorded this information on recipes, 50% on SOP and 40% on record sheet (Figure 5.14), yet 80%, as reported in the previous result, could not assure that their purchased products were free from contamination with allergens. It seems that the new acquired knowledge compelled them to answer that recipes were the preferred tool to record the presence of allergens within that specific food.

Question: How do you record the presence of allergens within the purchase products?

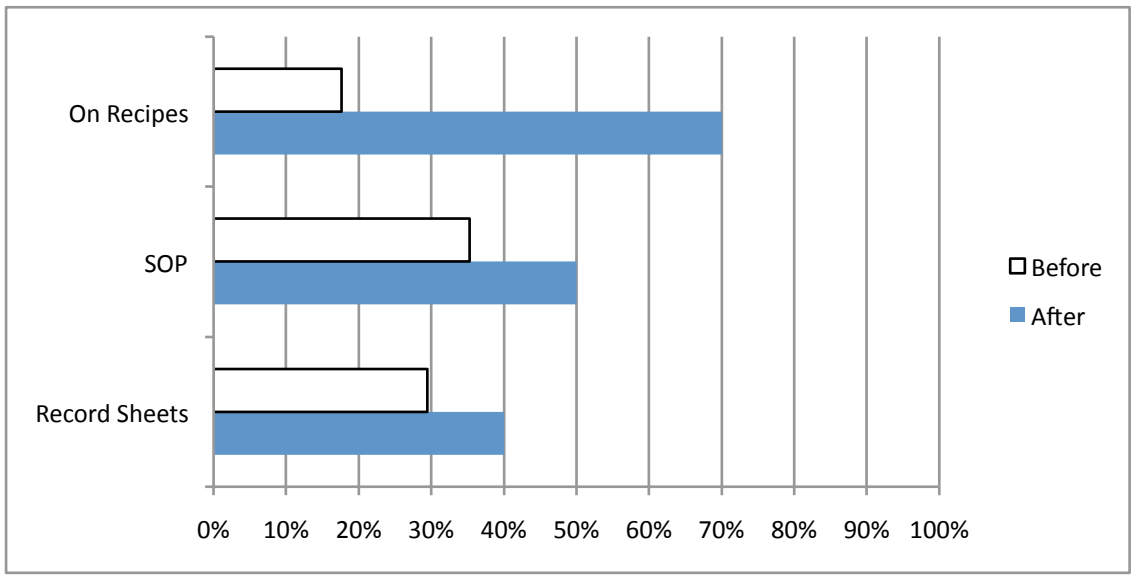

Figure 5.14: Record Keeping of Allergens

5.3.12 Communication Tools

Communicating the ingredient information to others is a vital pivot in the whole process of producing safe food for sensitive individuals. The accurate ingredient information needs to travel with the food as it passes through all preparation processes. Post training results show a noticeable change in the communication tools selected. Pre training the use of labels was recorded at 47% whilst post training this had increase to 80%. All other means have almost doubled from 12% in pre training to 20% in post training. Remarkably digital means were not selected either in pre or in post training questionnaires (Figure 5.15)

Question: How would you communicate the product information to other staff?

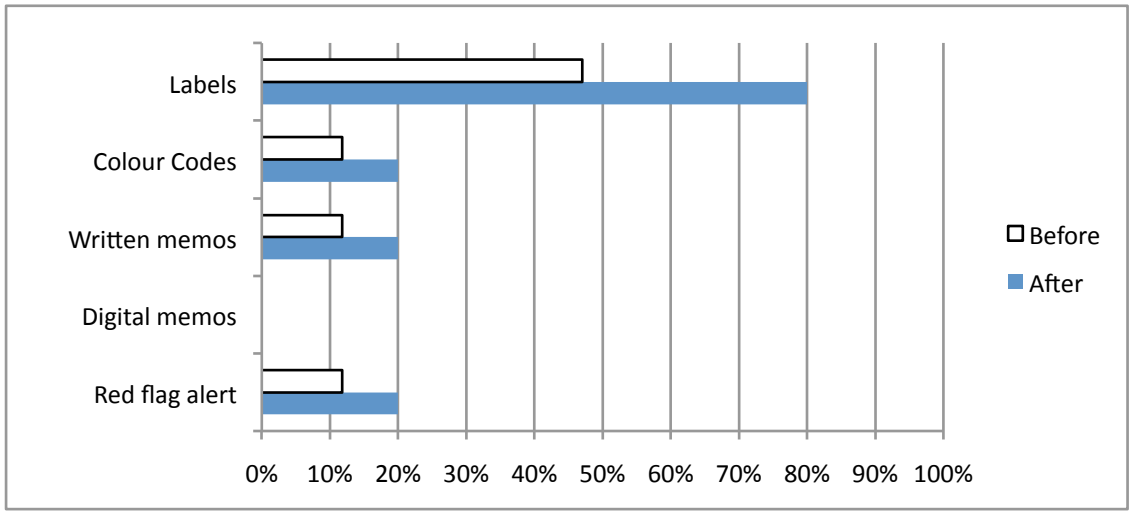

Figure 5.15: Internal Communications of Allergens

5.3.13 Risks Associated with Eating in Restaurants

Consumers have rights which are protected by legal regulations. These give a sense of order to everything which is expected to happen around us. Food information to consumers is also regulated and since December 2014 new laws determine what information needs to be communicated to the consumer. This also means that sensitive individuals now have the right

to know if any of the offending food is present in a menu item before they make their order. Pre training, 71% (n=17) of participants felt that sensitive individuals should risk eating in restaurants, 24% said that they should not risk and 5% did not answer. Post training the scene changes and 50% (n=10) reported that sensitive individuals should not risk eating in restaurants, 40% noted that they should take the risk while 10% did not respond (Figure 5.16). The results show that further knowledge has prompted the participants to report that the risks of food allergy sufferers falling ill after eating in restaurants is higher than prior to their training. It also indicates that there is a lack of assertive confidence in preparing safe food for allergy sufferers.

Question: Do you think that food allergy sufferer should risk eating in restaurants?

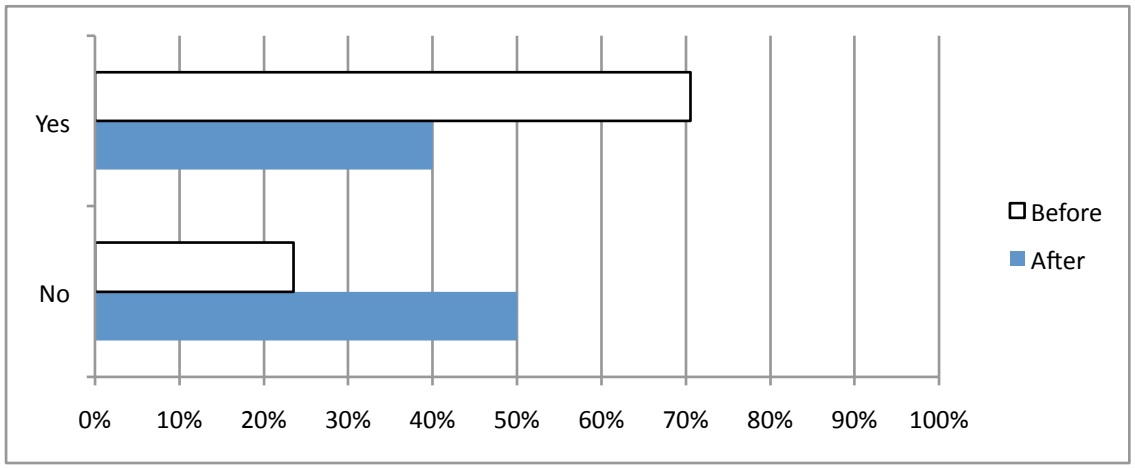

Figure 5.16: Risks of Allergy Sufferers Eating in Restaurants

5.3.14 Justification for Allergen Management

Both pre and post training results show that the majority of the participants felt that the number of food allergy sufferers justifies the implementation of a food allergy management system within their businesses (Figure 5.17).

Question: Does the number of allergy sufferers justify the implementation of a food allergy management system?

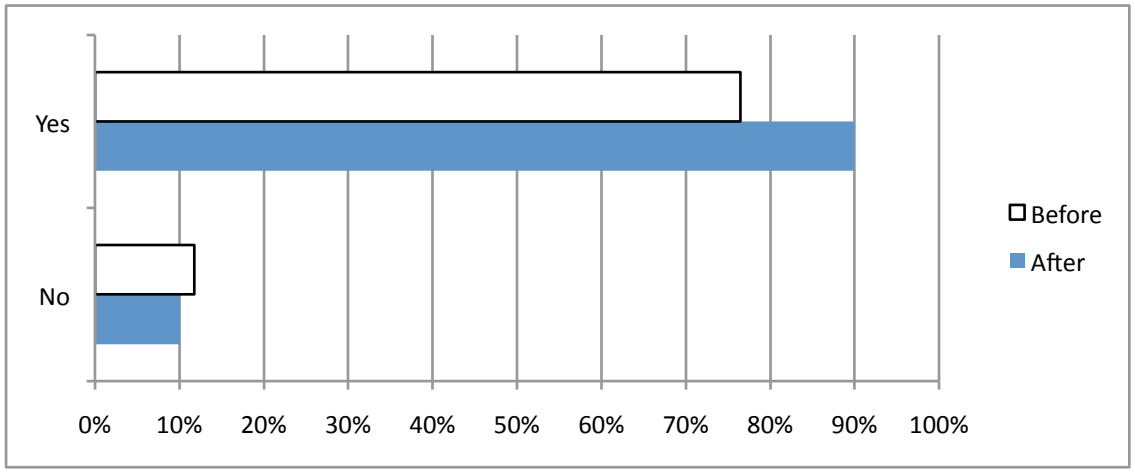

Figure 5.17: Justification for Allergen Management

In Chapter 3, where the focus group discussion was analysed, it was also noted that sensitive individuals would entertain the idea of eating more frequently outside their home if the food services industry demonstrates that safer practices are being implemented in their businesses. This would encourage both the industry and the sensitive individuals to understand the requirements and constraints of producing safe food for allergy sufferers.

5.3.15 Persons Responsible to Ensure Food Safety

Responsibility was already discussed in the previous chapters; however no real data was presented at that time to strengthen the claims made by sensitive individuals that all involved, including the client, should be responsible so that no incidents would occur within the food service businesses. The result of the questionnaire indicates that pre training, most of the responsibility was directed at the chef. Although the percentage did not change significantly in the post training results in respect to the chef, all the other elements listed in the question reported an increase. In other

words the participants reported that the responsibility to avoid food allergy incidents in the food service industry lie with the cooks (90%), service staff (80%), restaurant managers (90%) and store keepers (80%) whilst 40% felt that responsibility also lay with the client; however the allergy sufferers had noted that they are the sole keepers of their health (Figure 5.18). The producers and the consumers both acknowledged that the responsibility to avoid incidents is a shared undertaking.

Question: Who do you think is responsible to ensure that no food allergy incident could occur in your restaurant?

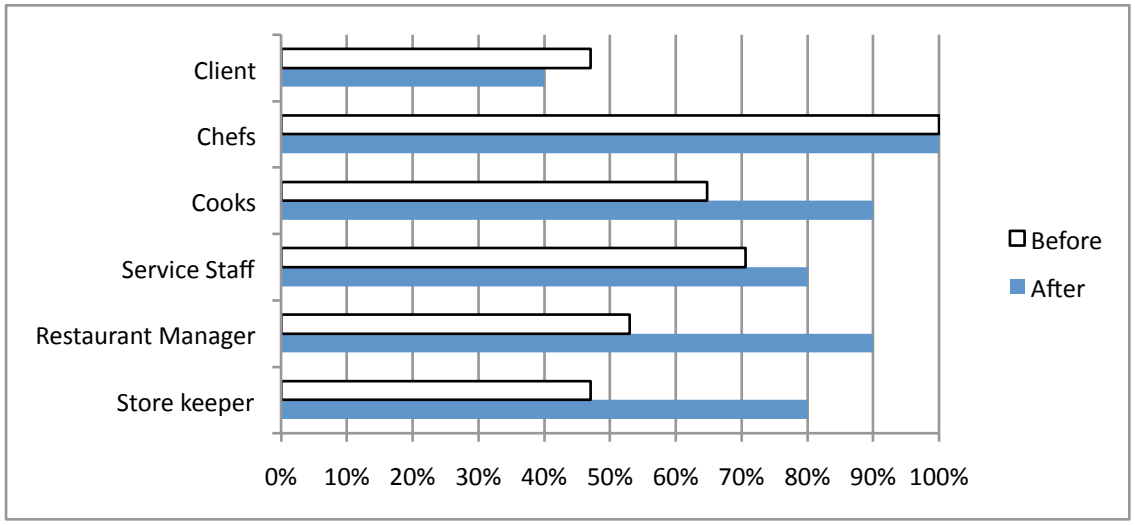

Figure 5.18: Persons Responsible for Food Allergy Safety

5.3.16 Food Allergy Management Policy

It is almost impossible to have a system which is 100% risk free. The elements and human factors, barriers and other limitations will result in incidents that would need to be dealt with promptly to safe guard the health of the ill-fated consumer in case of a food allergy incident. Not knowing the immediate necessary steps to take in the case of food allergy incidents within the food businesses could be detrimental to saving a life. Pre training results show that all participants reported that calling an

ambulance in case of a food allergy incident was the thing to do. In the pre training results 46% reported that assisting the ill-fated consumers with their medicine was important. Post training this result was at 70% which indicates that the participants had increased their knowledge that a medicinal remedy is available and that if assisted in time lives could be saved (Figure 5.19). The other remedies listed in the question did not show any noticeable changes pre and post training.

Question: If a sufferer gets an attack while in your restaurant, what should you do?

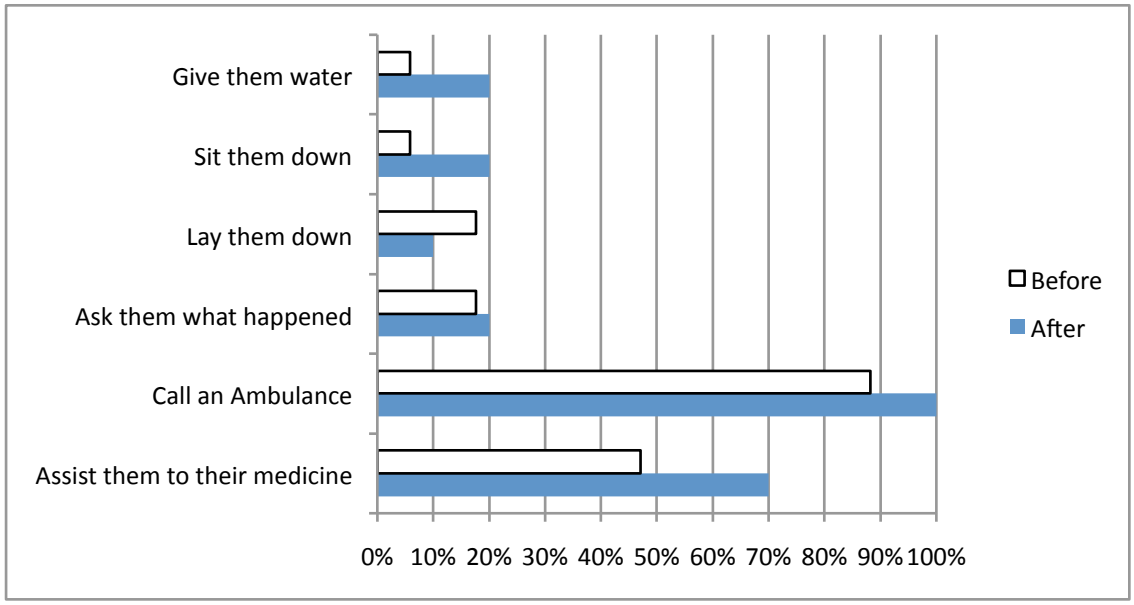

Figure 5.19: Action to Food Allergy Incidents

5.3.17 Food Allergen Tracking System

The need to understand what is in the food and where it came from can be reported in the results of the last question. Results show that pre training 88% (n=17) and 80% post training (n=10) the participant felt that they would trust a system which would assist them in tracing allergens within the food service businesses. This result shows that the food service staff

required tools that would assist them in identifying the food allergens and that they would be constantly aware of the presence of food allergens.

5.4 STRENGTHS AND LIMITATIONS

The questionnaire produced a large amount of data which gives this research quantitative results. The research through the questionnaire provided the participants with a better understanding of the questions as the researcher was available to clarify their queries. This ensured that the participants could, as much as possible, give a close account of their knowledge of food allergens and status of their practices in the food service businesses, although this can only be assumed as the participants could also report their own belief (Robson, 2002).

The commitment from the management of the businesses to implement the multi-facet toolkit proved to be an important step towards ensuring cooperation from the participating staff. The training session in food allergen management, as part of the multi-faceted toolkit, was offered free of charge to the participants. This was conducted during working hours.

The questionnaire sessions were also held during the working hours. Although the sessions were planned to take part in the less busy hours of the day, the length of the sessions could have urged the participants not to give their fullest attention to all questions. The language barrier was also seen as a problem to understand the questions, due to the fact that the question were in English and some of the participants were not full comprehensive of the language. The participants were facilitated by the researcher in understanding the questions in the Maltese language.

The participants were chosen by the business owners. This limitation is mainly due to the size of the businesses participating and the limited

human resources of each business. It is therefore noted that the results are limited to the types of businesses participating. The extent of the research has also proved to be a limiting factor in keeping the same number of participants in both questionnaires. Mobility is very common and high (Worsfold, 2005) in the catering industry and although every effort to retain as many as possible participants from the original cohort, this was reduced from 17 persons in the first questionnaire to 10 persons in the second session.

5.5 CHAPTER'S CONCLUSION

Throughout this study it was noted that an increase in participants' knowledge of food allergens and their management, within the food service industry, was brought about through the training sessions delivered between the two identical questionnaires. There are indicators which show that an overall improvement can be noted especially in knowledge of which food ingredients are the most common allergens listed in the EU. All participants had claimed that they had received food safety training previously yet the majority had not received any prior training in food allergy management. Food allergies are not new to food safety yet it seems that very little importance is given in basic training in how these common ingredients can be managed to avoid incidents within the food service industry.

Confidence has decreased in the preparation of special meals post training. There might be more than one reason why this has resulted; however the main reason is that with increased knowledge, participants must have understood that their businesses are not well prepared to produce such meals. It also shows that the food safety management practices within their businesses did not cater well enough for them to be

confident to prepare safe food for sensitive individuals. This also means that when comparing theoretical with practical knowledge, knowledge outweighed the practice. This could be due to constraints within the businesses or because the level of practical experiences they felt they possessed did not meet the requirements to produce safe allergen free food. This signifies that traditional classroom training needs to be accompanied by practical examples within the constraints of their own businesses. The results have shown that the progress in the cognitive knowledge of food service staff of food allergens does not equate to the same level of knowledge of managing the food allergens.

The acceptance that some common foods are hazards to sensitive individuals seems to be a barrier in practice more than it is in theory. The previous chapter has indicated that cross contamination still poses a serious concern to the production of allergen free food. This study has outlined the imbalance between what the food service staff know about food allergens, even after the dedicated training sessions, and how food is actually being prepared for food allergy sufferers. Further research is required to achieve an understanding of the how best the delivered knowledge would be reflected in the practical preparation of food for allergy sufferers. The behavioural changes required to bring about better practices in food safety are challenges that need to be understood even if the goal posts are always being moved due to the nature of the industry and the human element.

CHAPTER 6

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DISCUSSION

6.1 INTRODUCTION

In an inclusive society, where every effort possible should be undertaken to integrate every member of society in all aspects of life (Desa, 2009), people with eating disorders or diseases should be able to participate in social events without the notion of exclusion or fear and anxiety for their health when eating out.

Throughout this research, the main protagonists were the food allergy sufferers and the way this group of people can be socially included in society without them feeling that they are marginalised or that they are social pariahs who should not venture outside their homes to eat, this as a result of the lack of food allergy management and the lack of the production of safe allergen free food (Allergy UK, 2016). True food allergy sufferers and also food intolerant individuals seek to be understood by the food service industry. This seems to be a simple affair; however the food service industry is extremely complex and with many variants of size, nature, operation, knowledge and ownership just to name a few. Any of these variants has its own restrictions and burdens in the production of food and more challenging in managing food allergens. Living with food allergies is manageable when all the information about the food is available and accurate. The information needs to reflect not just the ingredients but also takes into consideration the processes involved in its production, transportation, storage and final preparation stages before consumption. For allergy sufferers, it is not the fact that they are afflicted by this disorder which affects their quality of life; it is the social isolation and the lack of awareness that the food service industry has of food allergies (Allergy UK, 2016). The food allergy sufferers are further disturbed when the industry is over confident, yet ignorant to serve food that clearly contains the offending food. This equates to lack of knowledge of the

consequences food allergens have on sensitive individuals, from a slight discomfort to potentially fatal predicament.

6.2 STAFF LACK OF FOOD ALLERGEN KNOWLEDGE

Although aware that food allergies cause some form of discomfort to sensitive individuals, the industry lacks the in-depth knowledge of the actual consequences, physical and psychological, allergens have on allergy sufferers. This lack of awareness and confusion of the real nature of food allergens was reported in the research. This correlates with Leitch, Blair and McDowell (2001) findings that although the industry recognised that food allergens pose a serious threat to the safety of sensitive individuals little efforts to address the risks are taken. The food service participants could not, even post training indicate the exact nature of food allergen (Chapter 5). Results have shown that training is needed to address this issue yet it is also noted that in the mind-set of the working staff, allergies are bundled together. In other words, there is still no clear distinction between food allergies and allergies caused through other mediums. The true nature of allergens is also confused with other elements such as bacteria, viruses and heavy metals as seen in Chapter 5; therefore the elimination or control of allergens is still abstract. Although results show that the working staff have identified that elimination is the means of controlling allergens, they still were not certain what needs to be controlled. It is difficult to control something that is not understood and worse not even knowing what one is actually trying to control or how. This was evidenced when the participants could not identify allergens solely as chemical hazards as mentioned above. This means that they were trying to individualise the nature of the allergens from memory and not because they had a true knowledge of the substance.

6.3 TRAINING IN FOOD ALLERGEN MANAGEMENT

Food working staff need to be trained not only in their practical catering and culinary skills, which is most obvious, but also in practices which are required to serve safe food. All other skills would lose their value if the clients feel weary of the food or of the kind of response they receive when enquiring about the ingredients within the dishes. Training, which is a pillar to acquire knowledge, needs to address aspects of the preparation of safe food. Sheward (2006) had indicated that training needs be planned in a manner that all food safety issues are addressed with the right tools, this means that appropriate training focused on specific food safety issues is delivered and the tools to manage the related hazards are explained in relation to the food business. The FDA (2005) also indicated that operational-specific training for food employees is required and that the management of food allergens should be included. Working staff tend to consider the food ingredients as simple components that are required in their industry to prepare saleable products. There is little reflection on the status of the ingredients prior to this being in their control and even when in their control, cross contamination was not considered as a means that could put allergy sufferers at risk. In Chapter 5 the majority of the staff had reported, even after training, that they had no knowledge if the food in their control was free from cross contamination with allergens. The allergy sufferers are aware that cross contamination is a serious concern within the food service industry. This was accentuated by the focus group participants that even when all ingredients would be accurately declared they still felt that contamination was possible (Chapter 3). Food allergy sufferers are cautious that the offending ingredients are not present in their food and ensure that they communicate their requirements to the service staff, yet they cannot feel at ease knowing that cross contamination could occur; this was evidenced in the literature review (Chapter 1) and also in the

focus group discussion (Chapter 3). Understanding the consequence of food allergies pose on sensitive individuals is essential to highlight the severity that is linked with this condition (Bailey et al, 2011). During training, the consequences need to be explained in a manner that the food service industry staff understands that food allergens, although common ingredients, are potentially harmful ingredients that could bring ill health or even death to their sensitive consumers. This means that staff need to understand that customers are putting their health in their hands (FDA, 2009). This might sound dramatic, yet it is very real, knowing that the industry prepares food that is meant to sustain the consumer and that their actions have a direct effect on the consumers' health. Although after training there was a significant increase in the knowledge of the common allergens listed within the EU (Chapter 5), there was still a considerable gap in the overall knowledge of the allergens and also that cross contamination by hand or any other medium, could cause ill health to sensitive individuals as seen in Chapter 4.

6.4 KNOWLEDGE OF CROSS CONTAMINATION ISSUES

Serving food can become a routine in the industry and therefore certain aspects of food safety can slide to low levels of attention. The same can be noticed with food allergens. Although care was noticed to be given to eliminate the offending ingredients from prepared dishes, cross contamination by hand, equipment or other than by design could have rendered the food potentially harmful to sensitive individuals (Chapter 4). These incidents of cross contamination might not even be considered by the service staff as being worth evaluating yet cross contamination is not simply brought about through ingredients but also through unintentional contact with the offending food. This happens mainly during production and more noticeable in the constrained spaces where food is prepared also

under time restrictions. These two restrictions, which are synonymous to small business as explained in the literature review, have shown to be barriers in the production of safe food (Taylor, 2001; FoodDrinkEurope, 2013; CDC, 2015). Many barriers which hinder the working staff from producing safe food have been identified in this study. In this research, training which indicated the consequences of food allergens have on sensitive individuals, proved to affect positively the knowledge of the working staff in the preparation of food for sensitive individuals (Chapter 5). This could change their behaviour if practices are modified to reflect that allergens are identified and controlled throughout the production. Bailey et al (2011) concluded that the knowledge level of food production staff needs to improve through training, which in turn would also address the inappropriate confidence in food safety. This is supported by the findings in this research. As they become more knowledgeable, they revaluated themselves and became more realistic in how they portrayed their confidence in preparing food for sensitive individuals.

6.5 FOOD RESIDUE AFTER DISH WASHING

Although many studies focused on the bacterial cross contamination of food, which is a serious issue, this research has taken a different view to cross contamination. Traces of food residue on utensils, which do not cause harm to the majority of consumers, might pose serious health issues to food allergy sufferers. During the focus group discussions, the participants were anxious of the fact that in large kitchens, cross contamination through common used utensils, might leave residues of the offending food. These concerns were found to be legitimate with some allergens and a limited range of utensil tested (Chapter 3). The anxiety of sensitive individuals, over cross contamination from pans, needs to be addressed in good hygiene practices and training. The results indicated

(Chapter 3) that residue was detected even after industrial dish washing or quick hand washing of the utensils; this should be highlighted in training. This is also valid for working surfaces. Understanding that removing the visible debris is not enough should be part of every hygiene training course.

6.6 IMPROVING FOOD ALLERGEN MANAGEMENT THROUGH BEHAVIOURAL CHANGE

The study has indicated that further training about food allergens increased the knowledge of the working staff. It also highlighted that the staff were more cautious to deal with food allergens post training; however when reflecting on what was observed from the post training videos (Chapter 4), the behavioural change was noticed not to reflect the results of the questionnaire (Chapter 5). Similar results were recorded by Roberts et al (2008). Their study found that behavioural compliance did not improve after food safety training. The behavioural change theory describes the five stages which address this issue in a gradual progression of a mix of thoughts and actions. This indicates that in the real world, training on its own falls short of achieving the desired behaviour.

Figure 6.1: The Stages of Behavioural Change (Grimley 1997 and Prochaska 1992)

Taylor (2003) defines behavioural change stages (Figure 6.1) by stating that the pre contemplation stage is when the participants are unaware of a problem which they face. In this research this was when the participants were unaware that certain food products were allergens and they were unaware of the consequences these allergens have on sensitive individuals (Chapter 5). At contemplation stage they were aware of the problem yet did not commit to take any action to change. This was when they realised that food allergens were a problem to certain people, however they failed to take any actions to ease this problem, for example when they knew about the allergens yet failed to be confident enough to prepare safe

allergy free food (Chapter 5). The next stage is preparation. This stage was when they intended to change however they delayed their actions until they could get enough knowledge and skills to commit themselves to the change needed. The action stage was when the food service staff had committed to change the behavioural practice and overcome the problem of identifying the allergens and work in a disciplined manner to avoid cross contamination. This stage requires time and energy to make the real difference in behavioural practices. It might also need the external drive of experts in the field. Maintenance stage is where a commitment to uphold the change is fortified by the continuous support of the management through training which would encourage the best practices in food allergen management. As already reported and discussed in Chapter 5 traditional classroom training will bring about better knowledge however it fails to provide enough instructions which would change behaviour. This also confirms the report by Jenkins-Mclean, Skillton and Sellers (2004) that traditional classroom training alone might not be enough to achieve behavioural change.

6.6.1 Achieving Behavioural Change

Although change in their practice was noticed as minimal yet it was also noticed that their knowledge of food allergens had increased. If the barriers described would be isolated and addressed in a team effort with the support of a knowledgeable allergen manager, it is likely that behavioural change could be achieved. The framework for behaviour change needs to be identified to address the causes of how individuals act and think in respect to issues of handling food properly (Jenkins-Mclean, Skillton & Sellers, 2004) and safe enough for allergy sufferers not to experience ill health episodes when dining out of their homes.

6.6.2 Effective Training to Achieve Behavioural Change

Effective specific training leads to acquiring knowledge, which can be defined in various terms. Ormrod (2004) defines learning in two concepts; cognitivism and behaviourism. Cognitive theories deal with the mental ability to learn through the thought processes, which in many cases this would be a classroom exercise as shown in this research. Behaviourism defines learning as the relatively permanent change in behaviour as a result of experience. This could be explained as the learning of tangible observable responses (Ormrod, 2004). Results from this research have shown that the classroom training had altered the cognitive knowledge of the participants. The fact that the participants could name better the list of allergens after the training signifies that the learning outcomes led to a relatively permanent change in mental ability to recall the allergen list. It is not known whether the results would be the same had the second questionnaire been performed a year later; however it is also known that continuous training in food allergen management should be repeated on regular basis (FoodDrinkEurope, 2013). Nonetheless, after training, some of the participants still claimed that allergens could be bacteria, viruses or heavy metals. It was observed, that after training, cross contamination by hand had increased. This indicates that although their cognitive knowledge had increased yet their behaviour change was limited.

Training sessions in this research lacked the practical element which would have enhanced the experience of the working staff in managing allergens in their kitchens. Heffner (2001) argues that behavioural change is brought about with the intervention of knowledge, which is stimulated with the drive of experts in the field. Progression through stages is spiral and not linear (Kritsonis, 2005); therefore applying Grimley (1997) and Prochaska (1992) behavioural change model in a spiral achieves the right momentum

in the learning spiral to attain motion or movement (Ormrod, 2004). This means that behavioural change will result in the need for further training as an outcome of the influence of external experts, who additionally fortify the knowledge of the working staff in the management of allergens.

The management of allergens was explained through a serious of examples and case studies in the training sessions to the participants who represented the food service staff from kitchen to service that is, from chefs to waiting staff; however the actual production floor management was not part of the training programme. Kolb, Boyatzis and Mainemelis (2011) also argue that knowledge can be achieved through the combination of grasping and transforming experiences. Taking into account Heffner's (2001) and Kolb et al (2011) arguments and the results from the research, a model starts to emerge which represents the forces required to achieve the behavioural change in the preparation of food free from allergens, after the staff had been trained in traditional classroom programmes (Figure 6.2). The model based on the literature reviews and the results, indicate that training will bring about higher cognitive knowledge and with the practical experience, knowledge would be achieved and in turn this will bring about behavioural change. The spiral represents a similar approach to spiral curricula designs which is attributed to Bruner (1960), yet in the case of this research each new level represents new industry related subjects which will assist the individual to progress in the new level of knowledge and will enhance the performance of the food preparation staff (Figure 6.2).

Figure 6.2: The Learning Spiral to Attain Knowledge, Skills and Higher Competance

Figure 6.3: Learning Cycle to Achieve Behavioural Change Showing External Drives Inputs

Ormrod (2004) states that learning occurs only when it is reflected in the person's behaviour; in this regard this research had shown that limited behavioural change was brought about as few improved results in the participants' behaviour were recorded. Heffner (2001) stated that Operant Conditioning, a form of learning which is reinforced or discouraged by its consequences (Moore & Tschannen-Moran, 2010), would likely bring about

positive change; however operant conditioning needs the external technical expert intervention (Figure 6.3) which instructs the operant that the action performed would be getting better if certain procedures would be followed. The research has shown that no positive change was observed in certain practices as the external expert had no practical intervention in the participants' daily work.

The external drivers (Figure 6.3) will mobilise the learning cycle and influence the outcomes. In the development of the external drivers, attention was given to which force would influence the drive of the individual through the spiral. In the training phase new EU regulations required that new programmes would deliver the required information which would enhance the cognitive knowledge of the participants. The support of the external drivers would transform the cognitive knowledge into practical use which would mobilise this new acquired knowledge to achieve behavioural change. Skinner stated that behaviour that is reinforced will reoccur (Chen, 2011); that further confirms the spiral model adopted in this section of the research. Positive reinforcement from the consumers, the owners and the authorities are the drivers that will bring the behavioural change desired. This can be in forms of praise or appreciation when the staff would have performed their duties to the standards that would have been developed and implemented within the food services industry.

6.7 HACCP TOOL COMMUNICATION

Food allergen management could be part of a HACCP plan and discussed as part of hazard analysis (FoodDrinkEurope, 2011; Wallace, 2014). The implementation of HACCP needs the participation of a multidisciplinary team (Wallace, Sperber & Mortimore, 2011). This could achieve holistic

food safety management. During the research, results indicated that some working staff were not sure which food safety system was employed within their businesses (Chapter 5). This indicates that no proper HACCP meetings were held or that if these were held no top to bottom information was being seeped to the participants. Whichever is the case, food allergens could not have been discussed or at least no effect of any HACCP plan to manage food allergens was evident. This indicates that HACCP was poorly understood and managed.

Wallace, Sperber and Mortimore (2011) argue that the lack of technical expertise within a team, and therefore the broader understanding of the management of food safety, hinder the effective use of HACCP. Management should involve the working force in all aspects of the food safety system employed within the business so that they feel that they are included in the decision making, feel that they own the system and also are made aware of the barriers to food safety and the solutions which will render the food safe.

6.8 STANDARIZATION AS A SAFETY TOOL

Standardization could be considered as a necessary tool to provide both staff and consumers an atmosphere of certainty (FAO/WHO, 2002). Although seen by the food preparation staff as creativity restrictor, standardization or SOPs could be pivotal in the delivery of accurate ingredient information to the consumer. In other words, if the recipe changes without the ingredient information updated, this action could result in the consumer ingesting a food which in previous occasions did not cause any ill health with the consequence of a serious food allergy incident, as in the case of Ethan Thomas, an 11 year old boy who died after eating a meal that he had ordered many times before from the same

restaurant (Allergy Aware, 2012); all this because the preparation of the food would have been altered. Creativity is important at recipe development and once this is established, an SOP should be written and followed (USEPA, 2007). Having discussed that food allergen management is best incorporated within a HACCP plan, the use of SOPs which include critical limits, should be included (FDA, 2001). The information about the dish is made available to all concerned in its production, service and to the consumer. Deviating from the SOP would increase the risk of introducing food allergens immeasurably which the consumer has no knowledge of when making the food choice. This would be difficult for the consumer to control and to address this possibility the new Food Information Regulations were introduced. However regulations need the adequate tools to be effective. The innovative multi-faceted toolkit introduced in this research has demonstrated that the information retrieved by the participants had eased their anxiety and they felt that this could be helpful in making their food choice. The scanning facility provides both the standardisation and ingredient information to all parties involved in the production and consumption of food.

6.9 FOOD INFORMATION TO CONSUMERS

Regulation EU 1169/2011 gave each country the opportunity to adopt means through which the information regarding the food is made available to the consumer (EU 1169/2011). This regulation limits its scope of the delivering food information to the fourteen allergens most common within the EU. It is documented that other foods could also be considered as allergens and pose the same serious threat to sensitive individuals, as report in Chapter 3 by one of the participants who was allergic to garlic. Although it is understandable that the exceptions are in the extreme minority, however if all the ingredients of a prepared meal would be listed

this would include all the possible food sensitivities. The system developed for this research lists all the ingredients which are then retrieved through the QR codes surpassing the minimum legal requirement. The focus should be on the delivery of accurate ingredient information to the consumer through a system that can be verified and accessed by all those involved in the preparation and service of food and also the consumer.

Food safety encompasses a broad number of factors which determine the effect food would bear on the consumers. This research has focused on the management of food allergens and how it is most suited to improve their management in small food service businesses. The results have shown that with minimal financial investment, a system can be operated to inform the consumer accurately of the ingredients within the food. It is important to note that human error will always be a concern; however if all steps are followed correctly as devise in the allergen management policy and there will be no spontaneous changes in the ingredients or processes, then the information to the consumer should reflect the true nature of the food prepared.

6.10 RISK MANAGEMENT

Sensitive individuals, like the focus group participants in this research, fear for their health and in extreme case for their lives when eating out (Chapter 1). Food businesses should be able to reduce the risks of causing incidents through food allergen management within their business. The results have shown (Chapter 5) that there was no clear understanding which food safety system was being used within some of the businesses; this indicates that risk assessments were not well understood. This conclusion is also drawn from the results which show that the food preparation staff did not know if their purchased products were free from

cross contamination (Chapter 5). Therefore it is assumed if one is ignorant of the status of the ingredients, one cannot produce safe food for sensitive individuals. Mortimore and Wallace (2001) reported that risk management is based on knowledge, experience and information available. The results of the research showed that these elements were clearly absent from the response of the participants (Chapter 5). More emphasis needs to be given to the accreditation of the safety and the status of the ingredients. Although many assume that the ingredients received are safe; this is far from the truth. The effort to produce safe food for sensitive individuals needs to be a concerted effort from farm to fork. This can be achieved through the principles of HACCP.

HACCP has proved to be a globally accepted tool that can be used with success in the management of food hazards. When considering allergens as chemical hazards, then these can be controlled through the same principles of other chemical hazards.

With the knowledge of what needs to be controlled and how to control the hazard identified, it would establish a sense of security that sensitive individuals seek from the food service industry (Chapter 3). The industry needs to demonstrate that a continuous improvement can be felt in the grounded knowledge of the staff working within the food business. This knowledge however needs to be in-depth with a conscious demeanour to prepare food which will not cause harm or ill health to the allergy sufferers. Bailey et al (2011) concluded that the knowledge base of employees about food allergens should improve otherwise allergy sufferers would continue to risk their health when eating out. On the other hand food allergy sufferers still need to be vigilant for all signs which would indicate a loss of control over the contamination of their food.

The onus of serving safe food to allergic consumers lies with the food industry (FDA, 2009). It is a priority that the food service industry improves its current level of knowledge regarding food allergens. This needs to be done in a way that the behaviour of the staff is addressed and change can be achieved in an efficient and effective manner. The findings of this research have shown that risk is still very evident for allergy sufferers to dine out.

6.11 STRENGTHS AND LIMITATIONS

This study involved both the food producers and also the food allergic consumer. Each party was researched and discussed in separate chapters with the aims of identify the expectations of the consumers and the actual manufacturing processes in the food service industry of food that is suitable for allergenic consumers. Whilst it was established that each food business needs to have a food safety management system based on the HACCP principles in place, this was not determined.

The study highlighted the opinions of four food allergic consumers who mentioned peanuts, nuts, gluten, milk and garlic as food sensitivities in the focus group, each mentioning one or more of these foods as a food which caused them ill health. Although their opinions were reflected to be significant and proved that there are gaps in the knowledge of the food service staff, the variance in their sensitivities proved to have an effect on their response. This might have been different had the participants been all of the same sensitivity, that being severe or mild. It is also recognised that not all food allergies were discussed however it is assumed that the perception of the consumers is very similar if not the same.

From this study a number of findings have emerged which although cannot be generalised for the whole food service industry, yet it is noticed

that similarities exist in the procedures of food production which need attention in producing allergen free food. Therefore these similarities can be indicators that the findings could be common to most food service business.

Within Chapters 3, 4 and 5, strengths and limitations regarding each methodology were discussed. The main limitations being the accurate translation of the focus group transcripts, the number of participants, the variance in the number of participants in the questionnaire, the angle of the cameras and the duration of observation. Also considered as a main limitation is that although restaurants had the option to participate or not, the working staff chosen to participate did not have this option; however workers in the food service industry are accustomed to attend upskilling programmes as a continuous professional development and it is also recommended by law. The strength of this research was that both the consumer and the producer of food were studied, providing a rich source of qualitative and quantitative data which gave the research a clear understanding of the gaps in food allergen management in small food service businesses.

6.12 BRINGING ABOUT CHANGE IN FOOD ALLERGY MANAGEMENT

The importance of behavioural change required in the food preparation for food allergy sufferers (Chapter 5) triangulates with the focus group discussions (Chapter 3) which accentuated the requirement that the food service staff need to be conscious of the consequences food allergens have of the sensitive individuals. The focus group participants had claimed that the food service staff were not knowledgeable of the handling of allergens. This was triangulated with the data gathered through observation (Chapter 4) which confirmed that food allergen handling could have caused cross

contamination of food. Literature review (Chapter 1) had indicated that further specialised training was required to obtain the desired change in the working practices. This was further collaborated with the focus group data (Chapter 3) and also with the results of the questionnaire (Chapter 5) pre and post training which indicated that training had an effect on the knowledge of the working staff. Although training has shown that knowledge could be enhanced, literature review (Chapter 1) had further indicated that knowledge alone will not better practice. This was triangulated with the data through observation (Chapter 4) after the participants had received training in food allergen management. The practices observed did not correlate with the data of their post training knowledge (Chapter 5). This disparity between knowledge and practice was identified in the literature review (Chapter 1), discussed and noted in the focus group discussions (Chapter 3) within the themes and also observed when data from the questionnaire (Chapter 5) was analysed against the participants' performance (Chapter 4).

6.13 FURTHER RESEARCH

There are areas within this study that would benefit from further research namely;

- Further study into the development of a training programme that would bring behavioural change in the practices of the preparation of food for allergy sufferers.
- Further work on the application of the QR codes.
- Study the perception of the consumers when using the QR codes in restaurants as a source to retrieve ingredient information.
- Apply the multi-facet toolkit in other food service businesses.

This research has confirmed results from other studies, delivered new ones and raised questions in the area of allergen management in small food businesses serving loose food. The ground work in this research would enable further studies to improve on what has been identified as multi-facet tools to improve food allergen management.

6.14 CONCLUSIONS

This research has portrayed the perceptions of the food allergy sufferers of the food service industry and identified the gaps that exist in the provision of safe allergen free food by this industry. The concerns of eating out of their homes have been discussed and their conclusion was always that they have no or limited trust in other people preparing their food. This was a result of the lack of knowledge of food allergens demonstrated by the food services industry and the ignorance of consequence these common foods have on allergy sufferers. The lack of training was attributed to this shortcoming. Training people in the food service industry needs to be specific to the work performed in the specific work place. The training programme needs to have practical elements instructed by external experts. The food preparation practices within the small food service businesses need to concentrate on the ingredients and their status before deciding on the type of menu that they would be engineering considering the space and the time available to prepare and produce food fit for allergy sufferers. The complexity of food preparation is in itself a difficult limitation in producing allergy free food. This could be improved if at recipe development stages natural ingredients are used and recorded instead of complex compounds which require scrutinising. Even when this is performed, a change in product or in the complex ingredient composition requires that the ingredient information is analysed for any

new allergens. This is not automatic and requires the full attention of the food preparation staff.

Consumers need to communicate their requirements every time they dine out of their home even if they would dine at the same restaurant as it has been reported in this research. This communication is the beginning of the process which will alert the kitchen that an allergy sufferer is dining in the business. Then the following processes which would have been put in place as part of the allergen management policy, would come into action with each step careful followed as planned. The multi-facet toolkit has shown to be effective in the delivery of better management of food allergens whilst it is still in the development stages of becoming a tool that could alleviate most of the barriers identified in this research. Through this research it has been argued that the management of food allergens is complex and depends on many factors that are prior to the actual food preparation; however with complete control through HACCP, managing food allergens could be achieved. It is believed that the good use of the tool would bring about an improvement in the management of food allergens in small food service businesses serving loose food.

REFERENCES

ACTSO, Association of Chief Trading Standards Officers (2014). Regulation (EU) No 1169/2011 of the European Parliament and the Council of the 25 October 2011 on the provision of food information to consumers. No 3/14. Available at; http://bfff.co.uk/wp-content/uploads/2014/07/FIC_Transition_ACTSO_Approved_0614_11.pdf (Accessed on 20th July 2016).

Adesokan, H.K., Akinseye, V.O., and Aesokan, G.A. (2015). Food Safety Training is Associated with Improved Knowledge and Behaviours among Foodservice Establishments' Workers. *International Journal of Food Science*, Vol.2015 (2015) Article ID 328761, 8 pages. Available at; www.hindawi.com/journals/ijfs/2015/328761/ Accessed on 14th February 2017.

Ajala, A.R., Cruz, A.G., Faria, J.A.F., Walter, E.H.M., Granato, D. and Sant' Ana, A. S. (2010). Food allergens: Knowledge and practices of food handlers in restaurants. *Food Control,* 21 (2010) pp.1318–1321.

Allen, K.J., Turner, P.J., Pawankar, R., Taylor, S., Sicherer, S., Lack, G., Rosario, N., Ebisawa, M., Wong, G., Mills, E.N.1, Beyer, K.1, Fiocchi, A. and Sampson, H.A. (2014). Precautionary labelling of foods for allergen content: are we ready for a global framework? *The World Allergy Organization Journal*.2014; 7(1): 10.

AllergyUK.org (2016). Allergy UK Launches New Food Accreditation Scheme. Available at; http://www.allergyuk.org/news/latest-news/post/235-allergy-uk-launches-new-food-accreditation-scheme (Accessed on the 4th April 2016).

AllergyUK.org (2015a). Living in FEAR…. . A report by Allergy UK into anaphylaxis and severe allergy. Available at; http://www.allergyuk.net/LivingInFear/files/assets/common/downloads/Living%20In%20Fear.pdf (Accessed on the 15th September 2015).

AllergyUK.org (2015b). Why is Allergy Increasing? Available at; http://www.allergyuk.org/why-is-allergy-increasing/ why-is-allergy-increasing (Accessed on 15th December 2015).

Allergy Aware (2012*).* 11 year old boy dies from allergic reaction. Available at; http://www.allergyaware.org/news/11_year_old_boy_dies_from_allergic_reaction.html (Accessed on 8th June 2016).

Anaphylaxis.org.uk (2015). Anaphylaxis Campaign ,Onion and Garlic Allergy. Available at; http://www.anaphylaxis.org.uk/knowledgebase/onion-and-garlic-allergy/ (Accessed on 30th September 2015).

Anderson, J.B., Shuster, T.A., Hansen, K.E., Levy, A.S. and Volk, A. (2004*).* A camera's view of consumer food- handling behaviours. *The American Dietetic Association,* (2004) pp. 186-191.

Australian Food and Grocery Council, (AFGC), (2007). Food Industry Guide to Allergen Management and Labelling. Available at; http://www.allergenbureau.net/downloads/allergen-guide/Allergen_Guide_2007.pdf (Accessed on the 22nd December, 2012).

Bailey, S., Albardiaz, R., Frew, A.J. and Smith, H. (2011). Restaurant staff's knowledge of anaphylaxis and dietary care of people with allergies. *Clinical & Experimental Allergy,* Vol.41, pp. 713-717.

Bailey, S., Kindratt, T.B., Smith, H. and Reading, D. (2014). Food allergy training event for restaurant staff; a pilot evaluation, *Clinical and Translational Allergy*, 2014; 4; 26.

Bakker, E. (2014). Food Allergy or Food Intolerance? Available at; http://ericbakker.com/food-allergy-food-intolerance/#sthash.vSHU8HJJ.dpbs (Accessed on 14th December 2016).

Barron, F. and Haley-Zitlin, V. (2002). *Food safety, Allergy and HACCP, a primer for food processors.* Clemson University, South Caroline, USA.

Boye, J.I. and Godefroy, S.B. (2010). *Allergen Management in the Food Industry*, Wiley, New Jersey, Canada.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology,* 3 (2). Pp.77-101 ISSN 1478-0887.

British Broadcasting Corporation (BBC) (2005). Teens' allergy fears 'mistaken'. Available at; http://news.bbc.co.uk/2/hi/health/4318740.stm (Accessed on 8th June 2016).

British Broadcasting Corporation (BBC) (2016). Peanut curry death: Restaurant owner Mohammed Zaman jailed. Available at; http://www.bbc.com/news/uk-england-36360111 (Accessed on 4th June 2016).

Bruner, J.S. (1960). *The process of Education.* Cambridge, MA, Harvard University Press 1960.

BT Foodnet (2006). Making Food supply Chains Visible for Live Business Control. Available at; http://www2.bt.com/static/i/media/pdf/campaigns/consumer_goods/foodnet_broch.pdf (Accessed on 19th December 2016).

Buttigieg, N. and Schembri, P. (2015). Towards further democratization of food consumption: Keeping the consumer informed. *Journal of Research for Consumers*. Issue: 28, 2015.

CBI Market Intelligence (2010). HACCP- Hazard Analysis Critical Control Point. Ministry of Foreign Affairs of the Netherlands. Available at; http://www.cbi.eu/marketintel/HACCP-Hazard-Analysis-Critical-Control-Point-/159957 (Accessed on the 22nd December, 2012).

CDC, Centers for Disease Control and Prevention (2011). Food workers handwashing and restaurant factors, EHS-Net study and recommendations. Available at; http://www.cdc.gov/nceh/ehs/ehsnet/plain_language/food-worker-handwashing-restaurant-factors.htm (Accessed on the 22nd April 2016).

CDC, Centers for Disease Control and Prevention (2015). Factors affecting safe food preparation by food workers and managers. Available at; https://www.cdc.gov/nceh/ehs/ehsnet/plain_language/factors-affecting-safe-food-prep-by-food-workers-mgrs.htm (Accessed on the 19th July 2016).

CDC, Centers for Disease Control and Prevention (2016). Infographics. Available at; http://www.cdc.gov/socialmedia/tools/infographics.html (Accessed on 1st June 2016).

Chapman, B. (2011). Food safety for food handlers. *Food Safety Magazine,* Dec 2010/Jan 2011. Available at; http://www.foodsafetymagazine.com/magazine-archive1/december-2010january-2011/food-safety-for-food-handlers/ (Accessed on 10th October 2015).

Chapman, B.J., MacLaurin, T. and Powell, D.A. (2013*).* Video observation and Data coding method to assess food handling practices at food service. *Food Protection Trends*, Vol. 33, No. 3, pp. 146-156.

Chen, I. (2011). *Behaviourism and Developments in Instructional Design and Technology.* Available at; https://books.google.com.mt/books?id=Q3SBsfOGqE8C&pg=PP2&lpg=PP2&dq=instructional+design:+concepts,+methodologies,+tools+and+applications+kristin+klinger&source=bl&ots=jydbQEWCDk&sig=rpz3kRcIZC89IM3z15eh1IWfKyI&hl=en&sa=X&ved=0ahUKEwinmID4sazNAhUJPxQKHfJrBeEQ6AEIHzAA#v=onepage&q=will%20reoccur%20&f=false (Accessed on 12th June 2016).

Clarke, V. and Braun, V. (2013). Methods: Teaching Thematic Analysis. The British Psychological Society. *The Psychologist,* February 2013, Vol 26, pp 120-123. Available at; https://thepsychologist.bps.org.uk/volume-26/edition-2/methods-teaching-thematic-analysis (Accessed on 3rd January 2017).

Clayton, D.A. and Griffith, C.J. (2004). *Observation of food safety practices in catering using notational analysis. British Food Journal,* Vol. 106 Iss 3 pp. 211-227.

Clayton, D.A., Griffith, C.J., Price, P. and Peters, A.C. (2002). Food handlers' beliefs and self-reporting practices. *International Journal of Environmental Health Research,* 12:1 pp. 25-39.

Courtney, R.C. (2016). Evaluation of Qualitative Food Allergen Detection Methods and Cleaning Validation Approaches. *Dissertations & Theses in Food Science and Technology*. Paper 68.

Coutts, J. and Fielder, R. (2009). Management of Food Allergens. Wiley-Blackwell, Chichester, UK.

Cruwys, T., Bevelander, K.E. and Hermans, R.C.J. (2014). Social modelling of eating: A review of when and why social influence affects food intake and choice. *Appetite*, 86 (2015) 3-18.

Cummings, A.J., Knibb, R.C., King, R.M. and Lucas, J.S. (2010). The psychosocial impact of food allergy and food hypersensitivity in children, adolescents and their family: a review. *Allergy*, 65 (2010) pp.933-945.

de Blok, B.M.J., Vlieg-Boerstra, B.J., Oude Elberink, J.N.G., Duivermann, E.J., DunnGalvin, A., Hourihane, J.O'B., Cornelisse-Vermaat, J.R., Frewer, L., Mills, C. and Dubios, A.E.J. (2007*).* A framework for measuring the social impact of food allergy cross Europe: a EuroPrevall state of the art paper. *Allergy,* 2007: 62: pp. 733-737.

DEFRA Department of Environment Food & Rural Affairs (2014). Food statistics pocketbook 2014. Available at; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/423616/foodpocketbook-2014report-23apr15.pdf (Accessed on 4th April 2016).

Department of State Health Services (DSHS) (2012). Guidelines for the Care of Students with Food Allergies At-Risk for Anaphylaxis to Implement Senate Bill 27 (82nd Legislative Session), Texas, USA. Available at; http://www.dshs.state.tx.us/WorkArea/DownloadAsset.aspx?id=8589966589 (Accessed on 21st February 2013).

DESA (2009). Creating an Inclusive Society: Practical Strategies to Promote Social Integration. Available at; http://www.un.org/esa/socdev/egms/docs/2009/Ghana/inclusive-society.pdf (Accessed on 28th December 2016).

Drossman, A., Creed, F.H., Olden, K.W., Toner, B.B. and Whitehead, W.E. (1999). Psychosocial aspect of the functional gastrointestinal disorders. *Gut,* 45:1125-1130.

DunnGalvin, A., Hourihane, J. O'B., Frewer, L., Knibb, R.C., Oude Elberink, J.N.G. and Klinge, I. (2006). Incorporating a gender dimension in food allergy research: A review. *Allergy,* 2006: 61: 1336-1343.

EC (2002). European Commission (EC) Regulation No. 178/2002 of the European Parliament and of the Council of 28 January 2002 laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety. Available at; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:031:0001:0024:EN:PDF (Accessed on 6th January, 2013).

EC (2004). European Commission (EC) Regulation No. 852/2004 of the European Parliament and of the Council of 29 April 2004 on hygiene of foodstuffs. Available at; http://www.eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:139:0001:0054:EN:pdf (Accessed on 6th January, 2013).

EC (2004). European Commission (EC) Regulation No. 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin. Available at; http://www.fsai.ie/uploadedFiles/Reg853_2004(1).pdf (Accessed on 6th January, 2013).

EC (2004). European Commission (EC) Regulation No. 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food the organization of official controls on products of animal origin intended for human consumption. Available at; http://www.food.gov.uk/multimedia/pdfs/h3ojregulation.pdf (Accessed on 6th January, 2013).

Eden- Jones, J. (2006). *Record keeping and food safety program in small hospitality businesses in Victoria: Influences of workplace culture and training.* Available at; https://avetra.org.au/ABSTRACTS2006/PA%200034.pd (Accessed on 4th April 2016).

Egan, M.B., Raats, M.M., Grubb, S.M., Eves, A., Lumbers, M.L., Dean, M.S. and Adams, M.R. (2007). A review of food safety and food hygiene training studies in the commercial sector. *Food Control,* 18 (2007) 1180-1190.

Elucidare (2011). Food Allergies Worldwide ; A population review. Available at; http://www.elucidare.co.uk/assignments/Project_Allergy/Global%20food%20allergies%20statistics.pdf (Accessed on 10th January, 2013).

Ernest and Young (2013). *An assessment of the economic contribution of the hospitality sector across 31 countries.* The Hospitality Sector in Europe, September 2013.

ESCO European Commission (2010). Contribute to the development of a European multilingual classification of jobs and skills. Available at; http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=852 (Accessed on 5th January, 2013).

European Commission (2003). Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises. Available at; http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003H0361&from=EN (Accessed on 21st April 2016).

EU 1169/2011(2011). European Commission (EU) Regulation No. 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers, amending Regulations (EC) No 1924/2006 and (EC) No 1925/2006 of the European Parliament and of the Council, and repealing Commission Directive 87/250/EEC, Council Directive 90/496/EEC, Commission Directive 1999/10/EC, Directive 2000/13/EC of the European Parliament and of the Council, Commission Directives 2002/67/EC and 2008/5/EC and Commission Regulation (EC) No 608/2004. Available at; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:304:0018:0063:EN:PDF (Accessed on 5th November, 2012).

EU (2013). European Commission, (2013) European Commission upholds free movement of people, Memo/13/1041. Available at; http://europa.eu/rapid/press-release_MEMO-13-1041_en.htm (Accessed on the 25th September 2015).

EU (2014). European Commission (EU) Regulation No. 828/2014 of 30 July 2014 on the requirements for the provision of information to consumers on the absence or reduced presence of gluten in food. Available at; http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0828&from=EN (Accessed on 15th April 2016).

EUFIC, European Food Information Council (2006). Food Allergies and Intolerances. Available at; http://www.eufic.org/article/en/expid/basics-food-allergy-intolerance/ (Accessed on 15th December 2016).

Eurofound (2012). *Employment and industrial relations in the hotels and restaurants sector*. Available at; http://www.eurofound.europa.eu/eiro/studies/tn1109011s/tn1109011s_5.htm (Accessed on 28th February 2013).

European Commission (2015). User Guide to SME Definition. Available at; http://www.smedefinitionguide_en%20(1).pdf (Accessed on 2nd June 2016).

Eurostat European Commission (2009). *Hotel, restaurant and catering services statistics - NACE Rev. 1.1*. Available at; http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Hotel,_restaurant_and_catering_services_statistics_-_NACE_Rev._1.1 (Accessed on the 21nd December, 2012).

FAO (1997). Questionnaire Design. *Marketing Research and Information Systems.* Available at; http://www.fao.org/docrep/w3241e/w3241e05.htm (Accessed on 3rd January 2017).

FAO/WHO (1997). *Hazard Analysis Critical Control Point (HACCP) systems and guidelines for its application.* Available at; http://www.fao.org/docrep/005/y1579e/y1579e03.htm (Accessed on 19th December, 2016).

Food Allergy & Anaphylaxis Network (FAAN) (2010). *Welcoming Guests with Food Allergies.* Available at; http://www.foodallergy.org/document.doc?id=143 (Accessed on the 5th April, 2013).

Food and Agriculture Organization (FAO) (1998). *Guidelines for Quality Management in Soil and Plant Laboratories.* Available at; http://www.fao.org/docrep/W7295E/w7295e04.htm (Accessed on the 22nd December, 2012).

Food and Agriculture Organization/World Health Organization (FAO/WHO) (2008). *FAO/WHO, Assuring Food Safety and Quality: GUIDELINES FOR STRENGTHENING NATIONAL FOOD CONTROL SYSTEMS*. Available at; http://www.who.int/foodsafety/publications/capacity/en/Englsih_Guidelines_Food_control.pdf (Accessed on 8th April 2013).

Food and Agriculture Organization/World Health Organization (FAO/WHO) (2002). *Report of the Evaluation of the Codex Alimentarius and other FAO and WHO food standards work.* Available at; http://www.fao.org/docrep/meeting/005/y7871e/y7871e00.htm (Accessed on 5th June 2016).

Food and Agriculture Organization/World Health Organization (FAO/WHO) (2006). *FAO/WHO Guidance To Governments On The Application Of HACCP In Small And/Or Less-Developed Food Businesses.* Available at; http://www.who.int/foodsafety/publications/fs_management/haccp_sldbs/en/index.html (Accessed on the 22nd December, 2012).

Food and Drug Administration (FDA) (2001). *Food Code Annex 5: HACCP Guidelines.* Available at; http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm089302.htm (Accessed on 8th June 2016).

Food and Drug Administration (FDA) (2005). *Food CGMP Modernization – A Focus on food safety.* Available at; http://www.fda.gov/Food/GuidanceRegulation/CMP/ucm207458.htm (Accessed on the 24th July 2015).

Food and Drug Administration (FDA) (2006). *Managing Food Safety: A Regulator's Manual For Applying HACCP Principles to Risk based Retail and Food Service Inspections and Evaluating Voluntary Food Safety Management Systems.* Available at; http://www.fda.gov/downloads/Food/FoodSafety/RetailFoodProtection/ManagingFoodSafetyHACCPPrinciples/Regulators/UCM078159.pdf (Accessed on 27th February 2013).

Food and Drug Administration (FDA) (2009). *FDA Food Code 2009: Chapters 1- Purpose and Definitions.* Available at; http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm186464.htm (Accessed on 15th April 2016).

Food and Drug Administration (FDA) (2009). *FDA Food Code 2009: Annex 3 – Public Health reasons/ administrative guidelines- Chapter 2, Management and Personnel*. Available at; http://www.fda.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm189171.htm (Accessed on 4th June 2016).

Food and Drug Administration (FDA) (2009). *FDA Food Code 2009: Annex 4 - Management of Food Safety Practices – Achieving Active Managerial Control of Foodborne Illness Risk Factors.* Available at; http://www.fsa.gov/Food/GuidanceRegulation/RetailFoodProtection/FoodCode/ucm188363.htm (Accessed on 31st May 2013).

Food and Drug Administration (FDA) (2016). *Food Allergies: What you need to know.* Available at; http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm079311.htm (Accessed on 1st June 2016).

FoodDrinkEurope (2013). *Guidance on Food Allergen Management for Food Manufacturers.* Available at; http://fooddrinkeurope.eu/uploads/press-releases_documents/temp_file_FINAL_Allergen_A4_web1.pdf (Accessed on 20th February 2013).

FoodDrinkEurope (2015). *Small and Medium- Sized Enterprises (SMEs*). Available at; http://www.fooddrinkeurope.eu/our-actions/topic/small-and-medium-sized-enterprises-smes/figures/ (Accessed on 20th January 2015).

Food Standards Agency (FSA) (2014). *Allergen information for loose food*s. Food Standards Agency, June 2014. Available at; http://www.food.gov.uk/sites/default/files/multimedia/pdfs/publication/loosefoodsleaflet.pdf (Accessed on 10th February 2015).

Food Standards Agency (FSA) (2015). *Allergen information for loose foods.* Food Standards Agency, March 2015. Available at; http://www.food.gov.uk/sites/default/files/multimedia/pdfs/publication/loosefoodsleaflet.pdf (Accessed on 24th March 2016).

Food Standards Agency (FSA) (2015). *Food Hygiene for Businesses.* Available at; https://www.food.gov.uk/business-industry/food-hygiene (Accessed on the 30th August 2015).

Food Standards Agency (FSA) (2009). *Buying Food when you have a food allergy or food intolerance.* Available at; http://www.food.gov.uk/multimedia/pdfs/publication/buyingfoodallergy1109.pdf (Accessed on 5th April 2013).

Food Standards Agency (FSA) (2006). *Guidance on Allergen Management and Consumer Information*. Available at; http://www.food.gov.uk/multimedia/pdfs/maycontainguide.pdf (Accessed on the 20th December, 2012).

Food Safety Authority of Ireland (2012). *Audit Report, Control and Labelling of Food Allergens in Catering Establishments*. Available at; http://www.fsai.ie/news_centre/press_releases/catering_allergen_audit_22.10.12.html (Accessed on the 22nd May, 2013).

Gendel, S.M., Zhu, J., Nolan, N. and Gombas, K. (2014). Learning from FDA Food Allergen Recalls and Reportable Foods. *Food Safety Magazine*. Available at; http://www.foodsafetymagazine.com/magazine-archive1/aprilmay-2014/learning-from-fda-food-allergen-recalls-and-reportable-foods/ (Accessed on 5th June 2016).

Gibbs, A. (1997). *Focus Groups. Social Research Update*, University of Surrey. Available at; http://sru.soc.surrey.ac.uk/SRU19.html (Accessed on 3rd April 2016).

Goodman, L.A. (1961). "Snowball sampling". *Annals of Mathematical Statistics*, 32 (1): 148–170. Available at; http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.aoms/1177705148, (Accessed on the 24th May, 2013).

Gavura, S. (2013). Food Allergies: Facts, Myths, and Pseudoscience, *Science-Based Medicine,* September 2013. Available at; https://sciencebasedmedicine.org/food-allergies-facts-myths-and-pseudoscience/ (Accessed on 15th February 2017).

Gowland, H. (2002). Food Allergy Risk Management- A Matter of Life or Death? In, Emerton, V., *Food Allergy and Intolerance, Current Issues and Concerns* (pp. 80-92). Leatherhead Publishing, Surrey, UK.

Green, L.R. (2008). Behavioural science and food safety. *Journal of Environmental Health*, September 2008.

Griffith,C. and Redmond, E. (2014). Food Safety Training and Health Education. In,Motarjemi, Y.,Moy, G. and Todd, E. (2014). *Encyclopedia of Food Safety*, Academic Press, Elsevier, UK.

Grimley,D.M., Prochaska, G.E. and Prochaska, J.O. (1997). Condom use adoption and continuation: a transtheoretical approach. *HEALTH EDUCATION RESEARCH*, Vol.12 no.1 1997 Pages 61-75.

Gupta, R.S., Kim, J.S., Barnathan, J.A., Amsden, L.B., Tummala, L.S., and Holl, J.L. (2008). Food Allergy knowledge, attitudes and briefs: Focus groups of parents, physicians and the general public. *BMC Pediatrics* 2008. Available at; http://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-8-36 (Accessed on 16th February 2017).

Hadley, C. (2006). Food allergies on the rise? Determining the prevalence of food allergies, and how quickly it is increasing, is the first step in tackling the problem. *Embo Report*s, 2006 Nov; 7(11): 1080-1083.

Hall, J. (2004). *Determination of the views of consumers with food allergies & an assessment of the awareness of food allergies in Small-Medium Enterprises: Practical Implications & Control*. Scientific Short Paper. University of Central Lancashire, Preston UK. Available at; http://www.rochdale.gov.uk/PDF/2007-07-24-food-allergy-scientific-paper.pdf (Accessed on the 22nd December, 2012).

Heffner, C.L. (2001). Chapter 4: Learning and Behavioural Psychology. *Psychology 101*. Available at; http://allpsych.com/psychology101/ (Accessed on 30th March 2016).

Hertzman, J. and Barrash, D. (2007). An assessment of food safety knowledge and practices of catering employees. *British Food Journal*, Vol. 109 Iss. 7 pp. 562- 576.

Hjalager, A. and Andersen, S. (2001). Tourism employment: contingent work or professional career? *Employee Relations*, Vol. 23 Iss. 2, pp. 115 – 129.

Hodge, C. (2007). *Managing Food Allergens*, Advanced Food Safety Limited.

Hoorigan J.B. (2008). *Mobile Access to Data and Information*. Pew Research Center. Available at; http://www.pewinternet.org/2008/03/05/mobile-access-to-data-and-information-3/ (Accessed on 14th March 2016).

House of Lords (2007). Parliamentary business, Publications and Records, Available at; http://www.publications.parliament.uk/pa/ld200607/ldselect/ldsctech/166/16613.htm (Accessed on the 20th February 2013).

Hospitality and Management Training, (2016). *The Business of Food*. Available at; http://study.com/academy/lesson/food-service-industry-definition-history.html (Accessed on 30th December 2016).

Hughes, M.D. and Franks, I.M. (2004). *Notational Analysis of Sport, better systems for improving coaching and performance.* 2nd Edition – Routledge, UK.

Hunter, J. and Huntley, K. (2009). The management of Multiple Food Intolerances. *Food Matters.* Available at; http://www.foodsmatter.com/allergy_intolerance/food_intolerance/articles/hunter_huntley_food_intol.html (Accessed on the 3rd June 2016).

IFST (2015) Institute of Food Science and Technology. *Food Allergy*. Available at; http://www.ifst.org/knowledge-centre/information-statements/food-allergy (Accessed on 21st December 2016).

Institute of Agriculture and Natural Resources, (2016). Food Allergens Japan. *University of Nebraska.* Available at; http://farrp.unl.edu/reg-sit-japan (Accessed on 16th December 2016).

Jenkins-McLean, T., Skilton, C. and Sellers, C. (2004). Engaging food service workers in behavioural-change partnerships. *Journal of Environmental Health*, pp15-19.

Karajeh, M.A., Hurlstone, D.P., Patel, T.M. and Sanders, D.S., (2004). Chefs' knowledge of coeliac disease (compared to the public): a questionnaire survey from the United Kingdom. *Clinical Nutrition Journal*, Vol. 24, Iss 2, pp. 206-210. Available at; http://www.clinicalnutritionjournal.com/article/S0261-5614(04)00141-4/fulltext (Accessed on the 25th April 2013).

Kelly, C. and Gangur, V. (2009). Sex disparity in food allergy: Evidence from the PubMed database. *Journal of Allergy*, Vol. 2009, Article ID 159845.

Kendall, P.A., Elsbernd, A., Sinclair, K., Schroeder, M., Chen, G., Bergmann, V., Hillers, V.N. and Medeiros, L.C., (2004). Observation versus self-report: Validation of a consumer food behaviour questionnaire. *Journal of Food Protection*, Vol.67, No.11 Pgs. 2578- 2586.

Kerbach, S., Alldrick, A. J., Crevel, R.W.R., Domotor, L., DunnGalvin, A., Clare Mills, E.N., Pfaff, S., Poms, R.E., Popping, B. and Tomoskozi, S. (2008). Managing food allergens in the food supply chain – viewed from different stakeholder perspectives. *Quality Assurance and Safety of Crops & Foods*, Vol 1 Issue 1.

Kerzner, A. (2003). Project Management; A System Approach to Planning, Scheduling and Controlling. Wiley, Hoboken, New Jersey, USA.

Koikkalainen, S. (2011). Free Movement in Europe: Past and Present. *University of Lapland.* Available at; http://www.migrationinformation.org/Feature/display.cfm?ID=836 (Accessed on the 5th April 2013).

Kolb, D.A., Boyatzis, R.E. and Mainemelis, C. (2011*). Experimental Learning Theory: Previous Research and New Directions.* Available at; https://books.google.com.mt/books?hl=en&lr=&id=rBuQAgAAQBAJ&oi=fnd&pg=PA227&dq=experiential+learning+theory+previous+research+and+new+directions&ots=RwYPEezhwv&sig=Tfzz94A8W_lHaqklmuL4yy7VLo&redir_esc=y#v=onepage&q=experiential%20learning%20theory%20previous%20research%20and%20new%20directions&f=false (Accessed on 11th June 2016).

Knight, A.J., Worosz, M.R. and Todd, E.C.D. (2007). Serving food safety: Consumer perceptions of food safety at restaurants. *International Journal of Contemporary Hospitality Management,* Vol.19 No. 6, 2007.

Kritsonis, A. (2005). Comparison of Change Theories. *International Journal of Scholarly Academic Intellectual Diversity*, Vol. 8 No. 1 2004-2005.

Lee, J.A. and Hathaway,S.C. (1998). *The Challenge of Designing Valid HACCP Plans for the Raw Food Commodities,* Food Control, Elsevier, Oxford.

Lee, Y.M. and Kwon, J. (2011). Exploration of attitudes and behaviors of consumers with food allergies about dining out: A focus group study. *K Rex, Kansas State University, USA*. Available at; http://krex.k-state.edu/dspace/handle/2097/9791 (Accessed on the 18th December, 2012).

Leitch, I., Blair, I.S. and McDowell, D.A. (2001). The role of environmental health officers in the protection of allergic consumers. *International Journal of Environmental Health Research,* 11 , 51-61.

Leitch, I.S., Walker, M. J. and Davey, R. (2005). Food allergy: Gambling your life on a take away food. *International Journal of Environmental Health Research*, 15(2), 79-87.

Leitch, I.S. and McIntosh, J. (2014). The Importance of Food Allergy Training for Environmental Health Service Professionals. In, C.B. Madsen, R.W.R. Crevel, C. Mills and S.T. Taylor, *Risk Management for Food Allergy* (pp. 207-214), Elsevier, Oxford.

Lombardo, T. (2014). Food Plant SOP: The Backbone of our Food Safety System. *Food Safety Magazine*. Available at; http://www.foodsafetymagazine.com/magazine-archive1/december-2013january-2014/food-plant-sops-the-backbone-of-your-food-safety-system/ (Accessed on 27th December 2016).

Losito, P., Visciano, P., Genualdo, M. and Cardone, G. (2011). Food supplier qualifications by an Italian large-scale-distributor: Auditing system and non-conformances. *Food Control,* 22 (2011), 2047-2051.

Lupo, L. (2011). Tracking and Traceability. [online] *QA Quality Assurance and Food Safety*. Available at; http://www.qualityassurancemag.com/qa0811-tracking-traceability-supply-chain.aspx (Accessed on 18th January, 2013).

Lyons, A.C. and Forde, E.M. (2004). Food allergy in young adults: perceptions and psychological effects. *Journal of Health Psychology,* 2004 July; 9(4): 497-504. Available at; http://www.ncbi.nlm.nih.gov/pubmed/15231052 (Accessed on 21st December 2012).

Madsen, C.B., Crevel, R., Chan, C-H., Dubois, A.E.J., DunnGalvin, A., Flokstra-de Blok, B.M.J., Gowland, M.H., Hattersley, S., O'B Hourihane, J., Nørhede, P., Pfaff, S., Rowe, G., Schnadt, S. and Vlieg-Boerstra, B.J. (2010). Food allergy: Stakeholder perspectives on acceptable risk. *Regulatory Toxicology and Pharmacology*, Vol. 57, No. 2-3, pp. 256-265.

Madsen, C.B., Hattersley, S., Allen, K.J., Beyer, K., Chan, C.H., Godefroy, S.B., Hodgson, R., Mills, E.N., Muñoz-Furlong, A., Schnadt, S., Ward, R., Wickman, M. and Crevel, R. (2012). Can we define a tolerable level of risk in food allergy? *Clinical and Experimental Allergy,* 2012 Jan; 42(1):30-7.

Malta Independent (2007). Tourism in the shoulder months. Available at; http://www.independent.com.mt/articles/2007-05-07/leader/tourism-in-the-shoulder-months-173025/ (Accessed on 30th December 2016).

Mayes,T. and Mortimore, S. (2001). *Making the most of HACCP. Learning from others´ experience.* Cambridge: Woodhead Publishing Limited.

Mayo Clinic (2016). Disease and Conditions, Crohn's Disease. Available at; http://www.mayoclinic.org/diseases-conditions/crohns-disease/basics/definition/con-20032061 (Accessed on 20th April 2016).

Mayo Clinic (2016). Disease and Conditions, Irritable Bowel Syndrome. Available at; http://www.mayoclinic.org/diseases-conditions/irritable-bowel-syndrome/basics/definition/con-20024578 (Accessed on 21st April 2016).

McDonalds.com.mt, (2017). *McDonalds Official Website* (Online). Available at; http://mcdonalds.com.mt/ (Accessed on 14th February 2017).

MenuCal, (2017). *Food Safety Authority of Ireland*. (Online).
Available at;
https://menucal.fsai.ie/Account/LogOn?ReturnUrl=%2f# (Accesed on 12th February 2017).

Mills, E.N.C., Mackie, A.R., Burney, P., Beyer, K., Frewer, L., Madsen, C., Botjes, E., Crevel, R.W.R. and van Ree, R. (2007). The prevalence, cost and basis of food allergy across Europe. *Allergy* 2007: 62:717-722.

Mills, E.N.C., Valovirta, E., Madsen, C., Taylor, S.L., Vieths, S., Anklam, E., Baumgartner, S., Koch, P., Crevel, R.W.R. and Frewer, L. (2004). Information provision for allergic consumers- where are we going with food allergen labelling? Blackwell Munksgaard *Allergy,* 2004: 59: 1262-1268.

Ministry for the Economy, Investment and Small Business (2016). *Trade License Directory.* Available at;
http://licences.gov.mt/licencelist.aspx (Accessed on 21st December 2016).

Mirosa, M., Bremer, P., Peniamina, R., and Conner, T. (2012). Food Allergies: Understanding the Issues From a Consumer Perspective, in AP - *Asia-Pacific Advances in Consumer Research,* Volume 10, eds. , Duluth, MN : Association for Consumer Research, Pages: 69-70.

Moore, M. and Tschannen-Moran, B. (2010). *Coaching Psychology Manual*, Lippincott Williams and Wilkins, Philadelphia, USA.

Morris, A. (2015).*Common Food Allergies*. Available at; http://www.allergy-clinic.co.uk/food-allergy/food-and-allergy/ (Accessed on 8th June 2016).

Morrison, P., Caffin, N. and Wallace, R. (1998). Small food service establishments still on amber light for adopting Australian HACCP-based food safety code. *British Food Journal,* Vol. 100 Iss. 8 pp. 364-370.

Mortimore, S. and Wallace, C.A. (2001). *The HACCP Training Resource Pack, Trainer's Manual.* Aspen Publications. Gaithersburg, Maryland, USA.

MTA (2016) Malta Tourism Authority. Licenses. Available at; http://www.mta.com.mt/licences (Accessed on 21st December 2016).

Nash, M. (2014). The Changing Face of Food Safety Management. Available at; http://www.checkit.net/wp-content/uploads/2015/11/The_changing_face_food_safety_management_newlogo_wp.pdf (Accessed on 27th December 2016).

National Institute of Health (2012). Food Allergy, An overview. *National Institute of Allergy and Infectious Disease.* Available at; https://www.niaid.nih.gov/topics/foodallergy/documents/foodallergy.pdf (Accessed on 6th June 2016).

National Institute of Mental Health (2016). *Anxiety Disorder.* Available at; http://www.nimh.nih.gov/health/topics/anxiety-disorders/index.shtml (Accessed on 2nd June 2016).

Neogen Corporation (2010). *Reveal 3D Tests. Egg Test.* Available at; http://peramed.com/peramed/docs/R-3D_Egg_0410.pdf (Accessed on 21st December 2016).

Neogen Corporation (2010). *Reveal 3D Tests. Gluten Test.* Available at; http://peramed.com/peramed/docs/R-3D_Gluten_0410.pdf (Accessed on 21st December 2016).

Nerb, G., Hitzelsberger, F., Woidich, A., Pommer, S., Hemmer, S. and Heczko, P. (2009). Scientific Report on the Mobility of Cross-Border Workers within the EU-27/EEA/EFTA Countries. *MKW Wirtschaftsforschung GmbH,* Munich, Germany. Available at; http://ec.europa.eu/social/BlobServlet?docId=3459&langId=en (Accessed on 4th April 2013).

Newman, I. and Benz, C.R. (1998). *Qualitative-quantitative Research Methodology: Exploring the Interactive Continuum,* SIU Press, Southern Illinois University, USA.

Newman, J. (2008). Allergies—Misery for All Seasons. *National Geographic Magazine*, May, 2008. Available at; http://science.nationalgeographic.com/science/health-and-human-body/human-body/allergy-misery-article.html (Accessed on 21st February 2013).

NHS, (2016). Food Intolerance. Available at; http://www.nhs.uk/conditions/food-intolerance/pages/introduction.aspx#similar-symptoms (Accessed on 28th December 2016).

Noone, S.A., Muzon-Furlong, A. and Sicherer, S.H. (2003). Parent and adolescent perceptions on Food allergy. *The Journal of Allergy and Clinical Immunology,* V ol. 111, Iss. 2, Supplement 1, pp S133.

Noone, S.A., Sicherer, S.H. and TePas, E. (2016). Food allergy: Impact on health-related quality of life. *UpToDate.* Available at; http://www.uptodate.com/contents/food-allergy-impact-on-health-related-quality-of-life (Accessed on 18th July 2016).

Occupational Health and Safety Malta (2013). The Hotel and Catering Sector. Malta: Parliamentary Secretary for Small businesses and self-employed. Available at; http://ohsa.org.mt/Home/Sectors/GeneralandAccidentInvestigation/Thehotelandcatering sector.aspx (Accessed on 28th February 2013).

Ormrod, J.E. (2004). *Human Learning*. Pearson Merrill Prentice Hall , New Jersey, Columbus, Ohio, USA.

Oxford Research/Eurofound (2008). Comprehensive sectoral analysis of emerging competencies and economic activities in the European Union. Available at; http://ec.europa.eu/social/BlobServlet?docId=3019 (Accessed on 5th April 2013).

PewResearchCenter (2017). Questionnaire Design, *PewResearchCenter* Official Website (Online). Available at; http://www.pewresearch.org/methodology/u-s-survey-research/questionnaire-design/ (Accessed on 16th February 2017).

Philips, J.J., and Philips, P.P. (2016). *Handbook of Training Evaluation and Measurement Metho*ds. Routledge, London, UK.

Postnote (2009). Food Hygiene Standards. UK: Parliamentary Office of Science and Technology, February 2009, No. 326. Available at; http://www.parliament.uk/documents/post/postpn326.pdf (Accessed on 7th December, 2012).

Pratten, J. and Towers, N. (2004). Food allergies and the UK catering Industry. A study of the training needs for the industry to serve those with food allergies. *Journal of European Industrial Training*, Vol. 28, No. 6, 2004.

Pratten, J.D. and Towers, N. (2003). Food allergies: a problem for the catering industry, British food Journal, Vol.105 Iss: 4 pp 279-287.

Prediktor Solutions, Tracking and Traceability (2012). *Prediktor Solutions.* Available at; http://www.prediktor.no/en/solutions/productionmanagement/Pages/Tracking-and-Traceability.aspx (Accessed on 8th December, 2012).

Prochaska, J.O., DiClemente C.C. and Norcross, J.C. (1992). In Search of How People Change, Applications to Addictive Behaviors. *American Psychologist*, Vol. 47 No.9 pp.1102-1114.

Radke, T.J., Brown, L.G., Hoover, E.R., Faw, B.V., Reimann, D., Wong, M.R., Nocholas, D., Barkley, J. and Ripley, D. (2016). Food Allergy Knowledge and Attitudes of Restaurant Managers and Staff: An EHS-Net Study. *Journal of Food Protection,* Vol. 79, No. 9, 2016, Pages 1588–1598.

Rheinlander, T., Olsen, M., Bakang, J.A., Tayki, H., Konradsen, F. and Samuelsen, H. (2008). Keeping up appearance: Perception of street food safety in urban Kumasi, Ghana. *Journal of Urban Health,* Vol.85 No. 6 pp952-964.

Roberts, K.R., Barrett, B.B., Howells, A.D., Shanklin, C.W., Pilling, V.K. and Brannon, L.A. (2008). Food safety training and foodservice employees' knowledge and behaviour. *Food Protection Trends,* Vol. 28 No. 4, pp252-260.

Robson, C. (2002). *Real World Research,* Blackwell, Oxford, UK.

Robson, L. S., Shannon, H. S., Goldenhar, L. M. and Hale, A. R. (2001). Guide to Evaluating the Effectiveness of Strategies for Preventing Work Injuries: How to Show Whether a Safety Intervention Really Works. *National Institute for Occupational Safety and Heal*th Cincinnati, OH, USA.

Röder, M., Vieths, S. and Holzhauser, T. (2009). Commercial lateral flow devices for rapid detection of peanut (*Arachis hypogaea)* and hazelnut (*Corylus avellana)* cross-contamination in the industrial production of cookies. *Analytical and Bioanalytical Chemistry*, September 2009, Volume 395, Issue 1, pp 103–109. Available at; http://link.springer.com/article/10.1007/s00216-009-2716-x (Accessed on 27th December 2016).

Reifsnyder, C.M. (2007). *Allergies and Hormones.* Available at; http://www.cherylreif.com/wp-content/uploads/2011/Science%20Writing/Allergies%20and%20Hormones.pdf (Accessed on 30th December 2016).

Safefood (2008). *Safefood works with environmental health officers and the catering industry to address food allergy hazard* (NI release). Available at; http://www.safefood.eu/News/2008/safefood-works-with-environmental-health-officers-en.aspx (Accessed on 20th February 2013).

Sampson, M. A., Munoz-Furlong, A. and Sicherer, S. H. (2006). Risk-taking and coping strategies of adolescents and young adults with food allergy*. Journal of Allergy and Clinical Immunology,* 117, 1440-1445.

Sanagavarapu, P. (2011*). Psychosocial effects of food allergy: What do they mean for educators' practice in early childhood settings?* 21st Century Learning. University of Western Sydney. Available at; http://learning21c.wordpress.com/2011/12/11/psychosocial-affects-of-food-allergy-what-do-they-mean-for-educators-practice-in-early-childhood-settings/ (Accessed on 14th December, 2012).

Seltman, H. (2015). *Experimental Design and Analysis.* Available at; http://www.stat.cmu.edu/~hseltman/309/Book/Book.pdf (Accessed on 28th December 2016).

Shaffer, L.S. (2010). *Beyond Berger and Luckmann's Concept of "Recipe Knowledge:" Simple versus Standardized Recipes.* West Chester University. Available at; https://www.questia.com/library/journal/1P3-2053949141/beyond-berger-and-luckmann-s-concept-of-recipe-knowledge (Accessed on the 5th January, 2013).

Sharma, H. (2013). Is it possible to be allergic to garlic? *Allergic Living*. Available at; http://allergicliving.com/2013/12/11/is-it-possible-to-be-allergic-to-garlic/ (Accessed on 23rd December 2016).

Shepherd, R. and Raats, M. (2006). *The Psychology of Food Choice*, CABI , Wallingford, Oxfordshire, UK.

Sheward, E. (2006). *Aviation Food Safety*, Blackwell, Oxford, UK.

Shravani, S. (2012). Food allergens and food safety: A global perspective with respect to Codex Alimentarius. *Journal of Food Science and Engineering*, 2 (2012) 411-426.

Simon, M. (2011). *Assumptions, Limitations and Delimitations.* Dissertation and scholarly research: Recipes for success. Seattle, WA, Dissertation Success, LLC. Available at; http://dissertationrecipes.com/wp-content/uploads/2011/04/Assumptionslimitations delimitationsX.pdf (Accessed on the 24th April, 2013).

Sommer, I., MacKenzie, H., Venter, C. and Dean, T. (2012). Factors influencing food choices of food-allergic consumers: findings from focus groups. *Allergy,* 67: 1319-1322.

Steward, D.W. and Shamdasani, P.N. (1990). *Focus Groups, The theory and Practices.* Sage Publications. London, UK.

Stier, R.F.(2007). Ensuring the safety and quality of fried foods. *Food Safety Magazine*. Available at; http://www.foodsafetymagazine.com/magazine-archive1/junejuly-2007/ensuring-the-safety-and-quality-of-fried-foods/ (Accessed on 21st December 2016).

Surak, J.G., Cawley, J.L., and Gavoor, M. (2007). *Protect the food supply chain* [online]. Food Quality and Safety. Available at; http://www.foodqualityandsafety.com/article/protect-the-food-supply-chain/ (Accessed on the 20th October 2015).

Taylor, E. (2001). HACCP in small companies: benefit or burden? *Journal of Food Safety*, 15, 217–222.

Taylor, S.E. (2003). *Health Psychology,* McGraw-Hill Companies, New York, USA.

Taylor, S.L. (2011*). A global perspective on food allergens.* Food Allergy Research & Resource Program, University of Nebraska. Available at; https://www.ifst.org/documents/misc/s_taylor_ifst_0411pt1.pdf (Accessed on the 28th May, 2013).

Taylor, S.L. and Hefle, S. (2001). Food allergies and other food sensitivities. *Food Technology,* September 2001, Vol. 55 No. 9.

Taylor, E. and Kane, K. (2004). Reducing the burden of HACCP on SMEs. *Food Control*, 16(2005) 833-839).

Teufel, M., Biedermann, T., Rapps, N., Hausteiner, C., Henningsen, P., Enck, P. and Zipfel, S. (2007). Psychological burden of food allergy. *World Journal of Gastroenterology,* 2007 Jul 7;13(25):3456-65. Available at; http://www.ncbi.nlm.nih.gov/pubmed/17659692 (Accessed on the 5th January, 2013).

Todd, E.C.D., Micheals, B.S., Greig,J.D., Smith, D. and Bartleson, C.A. (2010).Outbreaks where food workers have been implicated in the spread of foodborne disease. Part 8. Gloves as a barrier to prevent contamination of food by workers. *Journal for Food Protection,* 9 (2010) pp 1596-1773, pp 1762- 1773 (12).

Turner, P.J., Gowland, M.H., Vibha Sharma, BA., Ierodiakonou, D., Harper, N., Garcez, T., Pumphrey, R. and Boyle, R.J. (2015). Increase in anaphylaxis-related hospitalizations but no increase in fatalities: An analysis of the United Kingdom national anaphylaxis data, 1992-2012. *The Journal of Allergen and Clinical Immunology,* Volume 135, Issue 4, pp 956-963.

Uguz, A., Lack, G., Pumphery, R., Ewans, J., Warner, J., Dick, J., Briggs, D., Clarke, S., Reading, D. and Hourihane, J. (2005). Allergic reactions in the community; a questionnaire survey of members of the anaphylaxis campaign*. Clinical and Experimental Allergy,* 35: 746=750.

UK Health Centre (2016). *Lactose Intolerance and Gastroenteritis.* Available at; http://www.healthcentre.org.uk/allergies/food-intolerance-lactose-intolerance-gastroenteritis.html (Accessed on 2nd June 2016).

United States Environmental Protection Agency (USEPA). *Guidance for Preparing Standard Operating Procedures (SOPs).* Available at; https://www.epa.gov/sites/production/files/2015-06/documents/g6-final.pdf (Accessed on 10th June 2016).

USDA United States Department of Agriculture (2014). *Food Service Industry.* Available at; http://www.ers.usda.gov/topics/food-markets-prices/food-service-industry.aspx (Accessed on 6th April 2016).

van Hengel, A.J., Capelletti, C.,Brohee, M., Anklam, E. and Baumgartner M.C.S. (2006).Validation of Two Commercial Lateral Flow Devices for the Detection of Peanut Proteins in Cookies: Interlaboratory Study. *Journal of AOAC International,* Volume 89, Number 2, March 2006, pp. 462-468(7). Available at; http://www.ingentaconnect.com/content/aoac/jaoac/2006/00000089/00000002/art00017 (Accessed on 27th December 2016).

Verhoeckx, K.C.M., Vissers, Y.M., Baumert, J.L., Faludi R., Feys, M., Flanagan, S., Herouet-Guicheney, C., Holzhauser, T., Shimojo, R., van der Bolt, N., Wichers, H. and Kimber, I. (2015). Food Processing and Allergenicity. Elsevier, *Food and Chemical Toxicology* Volume 80, June 2015, Pages 223–240.

Violaris, Y., Bridges, B. and Bridges, J. (2007). Small businesses- Big Risk; Current Status and future direction of HACCP in Cyprus*. Food Control,* 19 (2008) 439-448.

Wallace, C. (2001). Effective HACCP training. In T. Mayes & S. Mortimore, *Making the most of HACCP. Learning from others´ experience* (pp. 213-230). Cambridge: Woodhead Publishing Limited.

Wallace, C.A. (2014). *Intermediate HACCP.* Highfield.co.uk.limited, Doncaster, UK.

Wallace, C.A., Sperber, W.H. and Mortimore, S.A. (2011). *Food Safety for the 21st Century.* Wiley-Blackwell, Chichester, UK.

Ward, R., Crevel, R., Bell, I., Khandke, N., Ramsay, C. and Paine, S. (2010). A vision for allergen management best practice in the food industry, *Trends in Food Science & Technology*, 21 (2010) 619-625.

WebMD (2016). Somatoform Disorders. *Mental Health Center*. Available at; http:/www.webmd.com/mental-health/somatoform-disorders-symptoms-types-treatment (Accesses on 21st April 2016).

Will, M. and Guenther, D. (2007). Food Quality and Safety Standards as required by the EU Law and the Private Industry with special reference to MEDA countries' exports of fresh and processes fruit and vegetables, herbs and spices. *Germany: Deutsche Gesellschaft fur Internationale Zusammenarbeit GmbH.* Available at; http://www2.gtz.de/dokumente/bib/07-0800.pdf (Accessed on 15th January, 2013).

Wilson,B. (2008). *Swindled, The dark history of food fraud, from poisoned candy to counterfeit coffee.* Princeton University Press. Princeton and Oxford.

Worsfold, D. (2005). A survey of food safety training in small food manufacturers. *International Journal of Environmental Health Research*, August 2005; 15(4): 281-288.

Worsfold, D. and Griffith, C.J. (2003). A survey of food hygiene and safety training in the retail and catering industry. *Nutrition & Food Science*, Vol. 33 Iss2 pp. 68-79.

Yapp, C. and Fairman, R. (2004). Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies. *Food Control*, 17 (2006) 42–51. Available at; http://www.gewponoi.com/trofima/ygieini/Literature/Enotita_7-Theoria/FOOD_CON_17,42-51.pdf (Accessed on 15th January, 2013).

Yun J. and Katelaris, C.H.(2009). Food Allergies in Adolescents and Adult. *Internal Medicine Journal.* Volume 39, Issue 7, July 2009, Pages 475–478. Available at; http://onlinelibrary.wiley.com/doi/10.1111/j.1445-5994.2009.01967.x/full (Accessed on 30th December 2016).

APPENDICES

APPENDIX 1

PEER REVIEW PAPER: BUTTIGIEG, N. AND SCHEMBRI, P. (2015). JOURNAL OF RESEARCH FOR CONSUMERS. ISSUE: 28, 2015

Towards further democratization of food consumption: Keeping the consumer informed.

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Abstract

The purpose of this study is to explore the rational driving recent EU legislative developments in providing obligatory food information to the consumer. One dimension of this study tries to understand how this legislation reflects a contemporary awareness of human relations to food. This legislation tries to emphasize the democratization of food socialization, irrespective of dietary requirements or otherwise. This brings us to another dimension of this study, emphasizing the nourishing component of the legislation. This is the result of the complex relationship between food producer and the consumer. The majority of food businesses, being small and medium sized, encounter difficulties in understanding and managing food allergies. In an attempt to avert this multifaceted challenge, the EU promulgated a legislative measure emphasizing a shared responsibility between the consumer and the food business. Amid such proactive position, current evidence indicates how patients suffering from food allergies are constantly met with significant difficulties.

KEY WORDS:

Food allergies, food democracy, legislation, food culture

People by nature require eating several times during the course of the day. Some plan their dietary requirements; others just go along and satisfy their needs at restaurants or eateries. Consumers also resort to street food, which in the last few years has become more popular and somewhat more sophisticated and varied. In all these situations, the consumer expects wholesome food amid the limited information food businesses provide in a menu.

Recent regulatory measures instruct food businesses to provide the consumer with accurate information about the ingredients employed at all stages of production. The physiological and psychological importance of wholesome food motivated official authorities to ensure the safety of food. Considered as a basic moral obligation, governments never relaxed their intention of ensuring sufficient food quantity and quality. Amid such convictions, the whole concept of trust is constantly being challenged as science continues to inform the consumer about possibilities of ingesting harmful foods. The fear of consuming offensive food remains to be a constant hidden concern. This understanding emanates from the growing physical distance between the consumer and the producer. The lack of direct control over the 'production of consumption' triggers a myriad of complex anxieties, including the fear of ingesting life threatening foods.

Put differently, trust marks an important bond between the consumer and the food businesses. Throughout the whole food chain, communication is of vital importance to ensure the safety of food. To generate further ease of mind, food service providers are expected to inform the consumer using accurate and effective means of communication.

Food business operators are legally bound to devise systems to ensure the safety of food. This also means that any allergy related information is accurate and clearly communicated. Effective communication about ingredients and methods of food production between fellow operators and between the business operators and the consumer is now a must. What once seemed to be a gesture of cordiality is today a legal obligation.

The purpose of this study is to explore the rational driving recent EU legislative developments in providing obligatory food information to the consumer. One dimension of this study tries to understand how this legislation reflects a contemporary awareness of human relations to food. Effective communication and accurate information is seen as another modicum to continue to support individuals and their culture, as well as how these interact with each other and with their environment. Evidence indicates how the consumer continues to grow increasingly wary of trusting the food producer, especially when suffering of any food allergies. If food has a constant tendency to transform itself into situations, then it is also true that particular situations can go unnoticed when the general understanding holds that social cohesion is often created by exclusion rather than inclusion. This legislation tries to emphasize the democratization of food socialization, irrespective of dietary requirements or otherwise. This brings us to another dimension of this study, emphasizing the nourishing component of the legislation. This is the result of the complex relationship between food producer and the consumer. The majority of food businesses, being small and medium sized, encounter difficulties in understanding and managing food allergies. Some claim awareness of such challenges but then exhibit stark ignorance on the matter. Others opt to ignore such requirements, holding the consumer responsible for their decision. In an attempt to avert this multifaceted challenge, the EU promulgated a legislative measure emphasizing a shared responsibility between the consumer and the food business. While the consumer is expected to inform of any allergies, the food service provider is required to present accurate ingredient information. The consumer and the food business are communicating further than just a gesture of cordiality, thus ensuring that both parties are fulfilling their responsibilities.

The Context

Food is more than a body fuel. In the words of Roland Barthes, 'An entire "world" is present in and signified in food...[it] transforms itself into situations and performs a social

function, it's not just physical nourishment' (Counihan & van Esterik, 1997). Food is an important marker of our sense of individual and collective identity. Food is an important channel that permits an attempt at self-understanding; it is a revealing means of understanding our behaviours and our social interactions with other humans. Against this understanding, social scientists are constantly trying to decode the complex human relationship to food. The EU legislative measure, similarly, tries to bring together the two important dimensions of this relationship. The first consideration probes on the connection between physiology and culture, the nutritional function and the symbolic function. The second consideration focuses on the confluence between the individual and the collective, the psychological and the social.

This multi-dimensional character is mainly driven by two basic aspects of human relationship to food: first, humans are omnivores, and in the words of Michael Pollan, the associated implications generated an 'omnivore's dilemma'; secondly, humans constantly seek ways of how to use food as a 'voice', a means of how food relates the self to the collective, a dialogue between the 'outside' and the 'inside' of the human body (Pollan, 2006; Rozin & Fallon, 1981).

The omnivore's experience is primarily driven by the basic understanding that humans are autonomous, free and adaptable. But this sense of liberation generates equally contradictory challenges. The omnivore's dilemma is sandwiched between the human need of a variety of foods to ensure effective sustenance and the sense of conservatism when it comes to internalise 'new' foods as the unknown could present a potential danger. The omnivore's dilemma for Pollan (2006) is represented by the constant tension between the need for change and variety, as well as the fear of the unknown. The latter represents an element of anxiety, caused by the human endeavour of what Brillant Savarin (2009) encapsulated in the famous 'you are what you eat'. This endeavour depends on the human ability to control food as the fuel that conditions the body, the mind and therefore one's

identity. The internalisation of food, to use Mary Douglas' term, entails a series of risk taking decisions as the consumer's life and health are at stake. Today, anxiety is not necessarily generated as a result of the human interested of exploring 'new' foods. Humans are increasingly feeling unsafe even with the food they are familiar with. As the production of consumption becomes more the prerogative of the food business, the consumer is faced by the dilemma of not exerting enough control over food.

There are some 150 million people worldwide (Elucidare, 2011) who suffer from one or more food allergies. An obvious marker of such discomfort originates from tendency to attribute the problem with past consumption experiences. As self-proclaimed doctors, some precipitate in assuming that they could be allergic to a particular food. In several population studies, 20-45% of adults believe they suffer from adverse reactions to food (Teufel et al., 2007). These symptoms vary from true food allergy reactions which is about 2-4% in adult population, food intolerance or irritable bowel syndrome, to somatoform or other mental disorders (Teufel et al., 2007).

The people who have to deal with possible potential life threatening situation might have less confidence than others to consume food prepared by the loose food industry (Coutts & Fielder, 2009). In a study by Pratten and Towers, it is reported that 60% of consumers find restaurants' menus misleading or lacking in information. Although this indicates a serious gap in communication, it is also reported that the consumers fail to ask for further information in fear of appearing ‘fussy’ (Pratten & Towers, 2003).

At a glance, the person at risk of any food allergy only needs to be protected from the offending food that could cause harm. However, ensuring that the information provided is accurate and communicated effectively to the consumer is far from simple. Recent studies have shown that food allergic individuals are at risk of negative emotional and social outcomes, including anxiety avoidance and risky behaviour (Boye & Godefroy, 2010).

Apart from modern scientific knowledge and the constant questioning of the reliability of qualitative methods of research, there are several advocates to raise awareness about the impact of food allergies. It is safe enough to state that there is a well established collective identity in support of this understanding. In fact, the hallmarks of a social movement in this respect are quite evident. Supermarket shelves are lined with food catering for those consumers with particular dietary requirements, while restaurateurs have marked their marketing strategy, even if totally misinformed about the complexity of food allergens. Amid such developments, several food service providers are still hesitant to align themselves to these respective demands. This is not necessarily the result of ill-will, but rather of the complexity of the situation within which food service providers could exist.

The food service industry employs vast numbers of people, with restaurants being the largest employer in the industry (Pratten & Towers, 2003). This industry requires additional seasonal workers, it is therefore understood that due to globalization and somewhat free mobility of people (Koikkalainen, 2011), language (Nerb et al., 2011) and different cultural backgrounds could present complex challenges to ensure food safety (FAO/WHO, 2006) and compliance to a set standard or regulations within a food production unit. These complex situations bring into the discussion the competences of the people employed or otherwise, who prepare food for the consumer who opt to resort to these eateries to satisfy their nutritional requirement. The majority of food businesses being small and medium size employ about 70.9% of the workforce (EU NACE Rev1.1). The same statistics indicate that within this specific industry the workforce tends to be younger than other activities with no less than 35% having an age of 15-29 years, a clear characteristic linked to the relatively low skill and low paid nature of many of the jobs within the industry (EU NACE Rev1.1). This situation is further compounded by the low retention rate in employment which might also discourage the employer to invest in training the staff which will affect the food safety. As much as the food industry is aware of these challenges, the food allergy patient fears these shortcomings. The rising phenomenon among those

consumers interested in the services of restaurateurs propelled other awareness campaigns emphasizing the concepts of fair, equal and good.

The anxiety generated by the collective obsession of contaminated food among western consumers in recent decades gave rise to numerous pressure groups suggesting alternative food policies to policymakers and public health officials. This movement shifted to the 'front burner' the concept of food democracy. Food democracy was discussed by Via Campesina, an international peasants' organisation, during the 1996 World Food Summit. Thereafter, the term took different shapes and meanings as the concept is far-ranging and tackles various aspects of the food system. One recent development focuses on the right of information and effective means of communication necessary to facilitate adequate food choices for consumers interested in the qualities of their consumption particularly those suffering from food-related allergies.

As a process, the European Union (EU) had embarked on a project intended to promulgate legislative measures to ensure food information as part of a process to alleviate unnecessary anxieties and fears experienced by patients when seeking the services of the food business industry. Since then, sustained research continued to inform governments, as well as legislators, who identified more measures to continue to improve the quality of life of the consumer. This conviction has recently been encapsulated in another legislative measure that specifically earmarks the importance of food democratisation towards making the right food choices. Therefore, in what ways has increased knowledge about food allergies shaped individual coping strategies, if at all? What is the relationship between food, the body and sociality for people with food allergies?

Food Control

The twentieth century could be marked as a revolutionary period towards the democratisation of food. Especially in the developed world, fear starts to shift from the prospect of having no food, to having too much to choose from. Long-standing markers of social class distinction would gradually experience interesting transformations. As the food industry expanded its horizons, a plethora of exquisite and highly tasty foods turned the exception into the norm. Consumers are gradually becoming increasingly knowledgeable about particular dietary regimes and the effect on the body. Against this background, democratisation became the main proponent in reaction to fear and anxiety. A cursory look at repeated cases immediately communicates the complexity of those situations experienced by consumers suffering from food allergies.

Different risk behaviours taken by food allergy sufferers can be linked to situation, age, knowledge or lack of it, peer pressure, dare and frequency of allergy reaction occurrence by the effected persons. With children (6-15 years) and young adults (13-21 years) the situation is very complex as this group of people believe that dangers and consequences can be controlled, which in turn generates an illusionary perception of control (Madsen et al., 2010). Responsibility of care shifts from parents to children (off springs) as these grow older and with this also anxiety appears particularly strong as the lives of the consumer becomes more peer and less parent based (Madsen et al, 2010). The age of the sufferer influences the management of food safety risks which could be controlled through wider acceptance of the conditions by peers and boarder knowledge by all those who are involved in food production and preparation. Ultimately the consumers have to be in control of what could put their health at risk. For this very reason, some food consumers prefer to enjoy the short lived positive moments of conviviality over the after affects of the food on the body. If some try to ignore dietary instructions, others have overreacted to it. Irrespective of human behaviour, as the modern food life is also

increasingly haunted by perceived and real fear of food as a poison, the food industry is expected to redress this challenge as part of this ongoing revolution towards food democratisation.

The recent EU Regulation (EU) 1169/2011 addresses the provision of food information to the consumer with the scope of providing a basis for the assurance of a high level of protection of the consumer's information needs, including non-pre-packed food also known a loose food. Article 44 of the same regulation states that the provision entrenched in Article 9(1) refers to, "*any ingredient or processing aid listed in Annex II or derived from a substance or product listed in Annex II causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product, even if in an altered form;*" needs to be made known to the consumer in order to provide an assurance of a high level of protection in relation to the food information (Regulation (EU) 1169/2011). (Annex II)

Food business operators are legally bound to devise systems to ensure that the food they supply would be safe (Regulation (EC) 178/2002). The same regulation also goes on to state that it aims to protect the interest of the consumer and that it would provide basis for the consumer to make informed choices about the food to be consumed. Article 14(4)c states that food should not be placed for sale if this could be injurious to particular health sensitivities of a specific category of consumers where the food prepared is intended for that category of consumer. This suggests that when food is prepared for allergic or intolerant consumers, it should not in any way put their health in any risk of injury. The information provided should help consumers determine if the consumption of a particular food or a category of foods could have an adverse health effect (Regulation (EC) 178/2002). This clearly puts a moral responsibility on the food producer to offer only food that will not put the health of the consumer, including sensitive individuals, at risk. It is noted however that the front of house staff do not always refer food queries made by the allergic consumer

back to the kitchen and try to be convincingly knowledgeable but wrong as to the status of the meal (Leitch, Walker & Davey, 2005). The same study shows that commercial catering caused 76% of food-related reactions where, neither the serving staff nor the caterers were aware of the presence of the offending ingredients. This worrying situation clearly indicates that there is lack of knowledge of ingredients within food, that most of front of house staff did not check the allergen status of the meals and that there is a need for further training in the subject of food allergen control (Leitch, Walker & Davey, 2005; Bailey et al., 2011) within the food operations. This demonstrates a shortfall in capability to meet the legal requirements stated above. It is precisely these shortcomings that require attention, issues that need to be rectified so as to give back, unconditionally, the joy of eating to the food allergy consumer.

The sense of democratisation, as uniform as it might seem, carries different meanings that could vary with gender, age and social status. The meaning is also influenced by the severity of the food allergies and the level of allergenicity. Studies also indicate how reactions to food allergies occur mainly outside of the home setting. Dining in restaurants, or whilst at school or nursery, work or a friend's house are considered as high risk locations that could trigger food-allergy reactions. This generates psychological distress and impacts the quality of life. In the absence of adequate information and effective communication, customers suffering from food allergies either opt out from participating in such acts of conviviality or else resort only to those restaurants that are usually known to cater for these specific needs. Without any doubt, fear and anxiety remains especially since reactions could simply be the result of cross-contamination or an unexpected substituted ingredient. Against this background, social isolation could be the hardest part of living with a food allergy (Sampsom et al., 2006).

What seems to be a rather simple and basic right, led to a myriad of mixed reactions. The lack of understanding by the general public, and the rather stark unwillingness to accommodate such needs impact the quality of life of patients. Evidence also indicates similar reactions from school personnel and extended family. These often fail to understand the high degree of food safety such patients and their family seeks when sharing food with others. This means that patients are constantly on the receiving end. Psychological distress, including anxiety and depression, are caused as soon as food starts to act as an anti-social agent. Not to appear overtly demanding, some might decide to participate in the act of conviviality even when aware that they would eventually suffer physical discomfort due to their food allergy. Others choose to either opt out or else take their own food as part of their diet management programme.

Studies investigating the quality of life in food allergic children and adolescents clearly epitomise the different reactions. Akeson et al. (2007) indicate how parents, and especially the mother of a food allergic child, suffer from anxiety related problems due to their fear of not being able to supervise the food consumption of their children. In fact, Akeson reports that most adolescents imploded their sever reactions to food allergies. Marklund et al. (2004) continues to support such views claiming how Swedish adolescents strive to avoid feeling different from the 'normal' adolescent amid their level of concern. The research of Avery et al. (2003) conducted in England highlights the fear and anxiety experienced by allergic children. This understanding is further corroborated by the investigation of Cummings et al. (2010) which identifies high rates of school absenteeism from the food allergic group studied in the Netherlands. Apart from poorer health outcomes, children are also subjected to one of the worst challenges in the educational experience of a child - bullying. While children may unintentionally consume allergens, exposure could also result from peer pressure (Klinnert & Robinson, 2008; Ravid et al., 2012). Lieberman et al. (2010) identifies the children with food allergen challenges with an 'inherent imbalance of power'. The feeling of embarrassment, isolation, belittling and even

depression take over the life of the child who believes that the parents are the only sense of protection. These energies feed on each other as parents become sceptical about the school and the level of protection offered. Apart from the need to avoid problem foods, additional stress and anxiety comes from non-food allergen families, the lack of awareness in school management and the relationship between the students.

The difficulty of not being able to understand the risk had a remarkable effect on members of the family. The study of Bollinger et al. (2006) indicated how daily family life was effected even during situations which exclusively controlled by family members such as meal preparation. The family's social activities are thwarted when such control transfers into the hands of the food producer. The studies of Cummings et al. (2010) and King et al. (2009) have reported that the highest levels of 'living with fear' are associated with children and especially mothers and wives. Counihan (1999) surmises this interesting cultural construct by emphasising its important psychological and emotional influences. There is a cultural universal that recognises the predominant role of women in feeding. Food is an important marker of female identity and a means through which wives and mothers connect and influence any immediate dependants.

Clearly, what we eat not only marks our identity but also exhibits our need to feel control and mastery over what appears to be a chaotic and uncertain world. The study of King et al. (2009) emphasis the higher emotional troubles experienced by mothers in relation to their husbands. The ability to control our food also means establishing order in our lives by avoiding unnecessary anxieties. The new EU legislative measures are meant to reduce such anxieties by bringing a sense of food safety. The persistent fear of cross-contamination, unlabelled products, the nature of ingredients and the difficulty of understanding product labels are considered as among the main challenges towards the democratization of food. In this case, the challenge impacts not only the consumer's body, but also the person's identity. Mothers and wives could experience a better quality of life

when their food-related decisions have a positive impact on family members. More informed choices allows for parents to feel more comfortable involving themselves and their children during social activities. The female connection to and influence over their close of kin continues to support those cultural constructs that define female gender roles in society.

Conclusion

Although great caution and care must always be exercised, living with food allergies does not have to mean a life of constant fear. The EU legislative measure is intended to ameliorate the life of people suffering from food allergies. The ability to establish effective communication helps the patient to deal with those overwhelming emotions as well allows space to embrace the new lifestyle. Accurate labelling and informed food service providers allow individuals not be defined by their food allergy. As soon as consumers start to make the right choices, consumers regain control over their food-related excitement, security, and self-assurance. In order to produce loose food that would be suitable for allergy sufferers, accurate ingredient information, complete knowledge of any previous preparation, knowledge of transportation and storage facilities and the accurate preparation of the recipe according to established standard operational procedures is of utmost importance. All this information need to be available and ready to be communicated to the consumer first and to the enforcer on demand. The new legislation allows the use of new technological means to communicate accurate information at different stages of food production.

Food law including the latest addition reinforces legal obligations for businesses to be compliant with the food tractability requirements by stating that it is mandatory to have information on the identity and composition, properties or other characteristics of food. Whatever the means of communications it is important that the information provided from end-to-end of the supply chain is transferred without errors. The key here is accurate transmission of food information from source to source without transforming a pleasant

dining experience into a clinical environment, yet enabling each consumer to make educated food choices based on solid accurate information.

References

Akeson, Neil, Allison Worth and Aziz Sheikh (2007), "The psychosocial impact of anaphylaxis on young people and their parents," *Clinical & Experimental Allergy*, 37, 1213-20.

Bailey, Samuel, Richard Albardiaz, Anthony J Frew and Helen Smith (2011), "Restaurant staff's knowledge of anaphylaxis and dietary care of people with allergies," *Clinical & Experimental Allergy*, 41,713-717.

Boye, Joyce I. and Samuel B Godefroy (2010), *Allergen Management in the Food Industry*, Canada: Wiley-Blackwell.

Counihan, Caroline M. (1999), *The Anthropology of Food and Body. Gender, Meaning, and Power*, London: Routledge.

Counihan, Caroline M. and Penny van Esterik (1997), *Food and Culture: A reader.* London: Routledge.

Coutts, Jacqueline and Richard Fielder (2009), *Management of Food Allergens*, Chichester: Wiley-Blackwell.

Cummings, Amanda J., Rebecca C.Knibb and Michel Erlewyn-Lajeunesse (2010), "Management of nut allergy influences quality of life and anxiety in children and their mothers." *Pediatr Allergy Immunol*, 21, 586-94.

EC (2002) European Commission (EC) Regulation No. 178/2002 of the European Parliament and of the Council of 28 January 2002.http://eur-lex.europa.eu

EU (2011) European Commission (EU) Regulation No. 1169/2011 of the European Parliament and of the Council of 25 October 2011 on the provision of food information to consumers. http://eur-lex.europa.eu/LexUriServ/

Eurostat European Commission (2009), "Hotel, restaurant and catering services statistics - NACE Rev. 1.1," http://epp.eurostat.ec.europa.eu/

Elucidare (2011), "Food Allergies Worldwide. A population review," http://www.elucidare.co.uk/

Food & Agriculture Organization/World Health Organization (FAO/WHO)(2006), FAO/WHO "Guidance To Governments On The Application Of HACCP In Small And/Or Less-Developed Food Businesses," http://www.who.int/foodsafety/publications/fs_management/haccp_sldbs/en/index.html

King, Rosemary M., Rebecca C.Knibb and Jonathan O. Hourihane (2009),"Impact of peanut allergy on quality of life, stress and anxiety in the family." *Allergy.* 64, 461-468.

Klinnert, Mary D., and Jane L.Robinson (2008), "Addressing the psychological needs of families of food-allergic children." *Curr Allergy Asthma,* 8, 195-200.

Koikkalainen, Saara (2011), "Free Movement in Europe: Past and Present," http://www.migrationinformation.org/

Leitch, Ian S., Michael J. Walker and Rachel Davey (2005), "Food allergy: Gambling your life on a take away food." *International Journal of Environmental Health Research*. 15, 78-87.

Lieberman, Jay A., Christopher Weiss and Terence J.Furlong (2010), "Bullying among paediatric patients with food allergy." *Ann Allergy Asthma Immunol,* 105, 282-6.

Madsen, Charlotte B., René Crevel, Chun-Han Chan, Anthony E.J. Dubois, Audrey Dunn Galvin, Bertine M.J. Flokstra-de Blok, Hazel M. Gowland, Sue Hattersley, Jonathan O'B Hourihane, Pia Nørhede, Pfaff, S, Rowe, G, Schnadt, S & Vlieg-Boerstra, BJ (2010), "Food allergy: Stakeholder perspectives on acceptable risk." *Regulatory Toxicology and Pharmacology*, 57, 256-265.

Marklund, Brigitta, Staffan Ahlstedt and Gun Nordstrom (2004), "Health-related quality of life among adolescents with allergy-like conditions - with emphasis on food hypersensitivity," *Health Quality Life Outcomes,* 2:65-69

Nerb, Gernot, Franz Hitzelsberger, Andreas Woidich, Stefan Pommer, Sebastian Hemmer, and Petr Heczko (2009), "Scientific Report on the Mobility of Cross-Border Workers within the EU-27/EEA/EFTA Countries," http://ec.europa.eu/

Pollan, Michael (2006), *The Omnivore's Dilemma*. New York: Penguin.

Pratten, John D. and Neil Towers (2003), "Food allergies: a problem for the catering industry", *British Food Journal*, 105 (4), 279-287.

Ravid, Noga L., Rachel A. Annunziato and Michael A. Ambrose (2012), "Mental health and quality-of-life concerns related to the burden of food allergy," *Immunol Allergy Clin,* 32, 83-95.

Rozin, Paul and April E. Fallon (1981), "The acquisition of likes and dislikes for foods," *What is America Eating?*, 35-48.

Sampson, Margaret A., Anne Muno-Furlong and Scott H Sicherer (2006), "Risk-taking and coping strategies of adolescents and young adults with food allergy," *Journal of Allergy and Clinical Immunology,* 117, 1440-1445.

Teufel, Martin, Tilo Biedermann , Nora Rapps , Constanze Hausteiner , Peter Henningsen , Paul Enck and Stephan Zipfel (2007), "Psychological burden of food allergy," *World Journal of Gastroenterology,* 13(25), 3456-65.

APPENDIX 2

ETHICS COMMITTEE APPROVAL LETTER TO HOLD FOCUS GROUP DISCUSSIONS

12th February 2014

Carol Wallace and Paulino Schembri
School of Sports Tourism & the Outdoors
University of Central Lancashire

Dear Carol & Paulino

Re: BuSH Ethics Committee Application
Unique Reference Number: **BuSH 220**

The BuSH ethics committee has granted approval of your proposal application 'Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food'.

Please note that approval is granted up to the end of project date or for 5 years, whichever is the longer. This is on the assumption that the project does not significantly change, in which case, you should check whether further ethical clearance is required

We shall e-mail you a copy of the end-of-project report form to complete within a month of the anticipated date of project completion you specified on your application form. This should be completed, within 3 months, to complete the ethics governance procedures or, alternatively, an amended end-of-project date forwarded to roffice@uclan.ac.uk quoting your unique reference number.

Yours sincerely

Gill Thomson
Vice Chair
BuSH Ethics Committee

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals as a result of gained.

APPENDIX 3

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ETHICS COMMITTEE APPROVAL LETTER COVERING REST OF RESEARCH

18th June 2014

Carol Wallace and Paulino Schembri
School of Health
University of Central Lancashire

Dear Carol & Paulino

Re: BuSH Ethics Committee Application
Unique Reference Number: **BuSH 220 Phase 2**

The BuSH ethics committee has granted approval of your proposal application 'Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food'.

Please note that approval is granted up to the end of project date or for 5 years, whichever is the longer. This is on the assumption that the project does not significantly change, in which case, you should check whether further ethical clearance is required

We shall e-mail you a copy of the end-of-project report form to complete within a month of the anticipated date of project completion you specified on your application form. This should be completed, within 3 months, to complete the ethics governance procedures or, alternatively, an amended end-of-project date forwarded to roffice@uclan.ac.uk quoting your unique reference number.

Yours sincerely

Paola Dey
Deputy Vice Chair
STEMH Ethics Committee

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals from any Maltese ethical or governance approvals as appropriate as a result of gained.

APPENDIX 4

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FOCUS GROUP INFORMATION SHEET

Research Study title

Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Invitation

You are being invited to take part in a focus group discussion as part of a research study. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

This study will investigate the situation pre and post the application of the innovative multi-facet toolkit which intends to address critical elements in the management of food allergies in the small and medium size loose food operations with the aim to transfer accurate ingredient and allergen information throughout all the steps required for food preparation, up to service.

The focus group, which will be made up of 6 to 8 people, was selected through a self-selection process after replying to an advert which was posted on social media.

It is up to you to decide whether or not to take part. If you are still willing to participate in the study, email/contact Paulino Schembri within 2 weeks for a convenient date to be organised. *If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form at the start of the focus group. If you decide to take part you are still free to withdraw at any time and without giving a reason.*

As a participant in the focus group you have the right not to answer any question and can leave the focus group at any time. If one withdraws from the focus group, the data collected up till then will still be kept and analysed due to the group based nature of the discussion.

As a participant you will be asked to come to our office for about one and a half hour for a focus group discussion where a facilitator will assist the discussion which is set around pre-set topics. The discussion would be audio recorded by an IT specialist.

Please be aware that if you do not wish to be recorded then you would not be able to participate in this research.

During the discussion, you will be asked to use an innovative system to retrieve accurate ingredient information from a menu which should assist in educated

decision making about food choices when eating out. You will be asked for your perception of the system which should improve allergen management practice and provide tools for accurate allergen data handling and transfer.

As a participant, you are not asked to consume any food; therefore there is no risk of ill health what so ever in taking in the part in the focus group discussion.

The collected data will be kept strictly confidential. Privacy and anonymity will be ensured in the collection, storage and publication of research material. Electronic data will be stored on password protected/encrypted computer files, and hard copies will be stored in a locked fire retardant data safe. Anonymity will be ensured by an irreversible process whereby identifiers are removed from data and replaced by a code. It is then impossible to identify the individual to whom the data or information relates. Data generated by the study must be retained in accordance with the University's policy on Academic Integrity in paper or electronic form for 5 years from the end of the project following which all data will be destroyed.

If you would like to participate please fill in the UCLan approved consent form and you will be asked to attend the focus group at an appointed time.

The results of the study will be presented in anonymous form in a thesis and also in a peer review journal available to the general public.

I am conducting the research as a Professional Doctorate student of the School of Sport , Tourism and the Outdoors at the University of Central Lancashire (UCLan) UK. This research is self-funded.

The project has received ethics approval through the Built Environment, Sports & Health ethics sub-committee at the University of Central Lancashire.

Contact for Further Information

Main Researcher;
Paulino Schembri MSc.
Email; lino@alfservicesgroup.com

Should you have any concerns about the way in which the study has been conducted, you could also contact;

Dr. C. A. Wallace,
Director of Studies,
SSTO UCLan, Preston, UK.
Email; CAWallace@uclan.ac.uk

Thank you for your time taken to read this information sheet.

January 2014

APPENDIX 5

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FOCUS GROUP CONSENT FORM

CONSENT FORM – Focus Group

Full title of Project:
Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Name, position and contact address of Researcher:
Paulino Lino Schembri MSc.
'Jamalfi'
Triq L- Imhallef P.Debono
Msida
Malta

Please read the following statements and initial the boxes to indicate your agreement

	Please initial box
1. I confirm that I have read and understand the information sheet, dated January 2014 for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason.	☐
3. If I decide to withdraw from the focus group, I understand that the data collected up till then will still be kept and analysed due to the group based nature of the discussion.	☐
4. I agree to the use of anonymised quotes within the thesis, publications and any presentations generated from this study.	☐
5. I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research.	☐
6. I agree to the focus group being audio recorded	☐
7. I agree to the use of anonymised quotes in publications	☐
8. I agree to take part in the above study.	☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

APPENDIX 6

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FOOD SERVICE OWNER INFORMATION SHEET

Research Study title

Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Invitation

Restaurant owners

Your restaurant operation is being invited to take part in a research study. As owner/operator of the restaurant you are personally invited to participate and members of your restaurant staff will also be invited. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

This study will investigate the situation pre and post the application of the innovative multi-facet toolkit which intends to address critical elements in the management of food allergies in the small and medium size loose food operations with the aim to transfer accurate ingredient information throughout all the steps required for food preparation, up to service.

Application of the toolkit will involve:

- Setting up Food Allergen Management policy
- Lectures delivered to staff of the selected businesses
- Poster of the Allergens within the EU with visual aids
- Simplified recipe building for tracing allergens
- Ingredient matrix to formulate recipe and identify allergens easily
- Tool to transfer recipe allergen information to consumers via smart phone app

To assess whether the multi-faceted toolkit is working, 2 questionnaires will be administered to restaurant staff – 1 before multi-faceted toolkit application and 1 afterwards. The researcher will also observe practices following training using video recording.

The duration of the application of the multi-faceted toolkit will be around 2 to 3 months in total; however the entire contact hours will be restricted to approximately 12 hours which will include the application of the questionnaires and training.

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep. Once having read/considered the information, a consent form will need to be signed. This will

be collected before the research commences and will indicate your agreement to take part in the study. *If you decide to take part you are still free to withdraw at any time and without giving a reason.* If you decide to withdraw your restaurant from the study, the data collected up till then will still be kept and analysed up until that point.

The collected data will be kept strictly confidential. Privacy and anonymity will be ensured in the collection, storage and publication of research material. Electronic data will be stored on password protected/encrypted computer files, and hard copies will be stored separately in a locked fire retardant data safe. Anonymity will be ensured by a reversible process whereby identifiers are removed from data and replaced by a code. It is then impossible to identify the business or individual staff to whom the data or information relates without the code key and this will be stored in an encrypted file, accessible only to the researcher. Data generated by the study must be retained in accordance with the University's policy on Academic Integrity in secure paper or electronic form for 5 years from the end of the project following which all data will be destroyed.

The results of the study will be presented in anonymous form in a thesis and also in a peer review journal available to the general public.

I am conducting the research as a Professional Doctorate student of the School of Sport, Tourism and the Outdoors at the University of Central Lancashire (UCLan) UK. This research is self-funded.

The project has received ethics approval through the STEMH ethics committee of the University of Central Lancashire

Contact for Further Information

Main Researcher;
Paulino Schembri MSc.
Email; lino@alfservicesgroup.com

Supervisor;
Dr Carol A Wallace, PhD, CSci, PGCE, FRSPH, FIFST, FHEA
Principal Lecturer, Food Safety Management
Tel: +44 (0)1772 893657

Should you have any concerns about the way in which the study has been conducted, you could also contact;

Dr. John Minten
Dean of the School of Sport, Tourism & the Outdoors
UCLan, Preston, UK.
Email; jhminten@uclan.ac.uk

Thank you for your time taken to read this information sheet.

June 2014

APPENDIX 7

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FOOD SERVICE OWNER CONSENT FORM

CONSENT FORM - Restaurant owners

Full title of Project:
Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Name, position and contact address of Researcher:
Paulino Lino Schembri MSc.
'Jamalfi'
Triq L- Imhallef P.Debono
Msida
Malta

Please read the following statements and initial the boxes to indicate your agreement

Please initial box

1. I confirm that I have read and understand the information sheet, dated …….. for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw the business at any time, without giving a reason. ☐
3. I confirm that the staff will be informed of the research and the procedures involved and that their consent will be sought individually. ☐
4. I understand that I will not receive any information regarding potential allergen handling transgressions by specific employees. ☐
5. I understand that the data collected is for the sole purpose of the research ☐
6. I agree that data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research. ☐
7. I understand that it will not be possible to withdraw data from the study after final analysis has been undertaken ☐
8. I agree to the observation being video recorded ☐
9. I agree to my restaurant taking part in the above study. ☐

Name of Restaurant Proprietor	Date	Signature
Name of Researcher	Date	Signature

APPENDIX 8

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FOOD SERVICE STAFF INFORMATION SHEET

Research Study title

Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Invitation;

Restaurant Staff

You are being invited to take part in a research study at your place of work. Before you decide whether or not to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully.

What is the purpose of the study?

This study will investigate the situation pre and post the application of the innovative multi-facet toolkit which intends to address critical elements in the management of food allergies in the small and medium size loose food operations with the aim to transfer accurate ingredient information throughout all the steps required for food preparation, up to service.

Application of the multi-faceted toolkit will involve:

- Setting up Food Allergen Management policy
- Lectures delivered to staff of the selected businesses
- Poster of the Allergens within the EU with visual aids
- Simplified recipe building for tracing allergens
- Ingredient matrix to formulate recipe and identify allergens easily
- Tool to transfer recipe allergen information to consumers via smart phone app

To assess whether the multi-faceted toolkit is working, 2 questionnaires will be administered to restaurant staff – 1 before multi-faceted toolkit application and 1 afterwards. The researcher will also observe practices following training using video recording. You would be requested to attend the training sessions which will improve your understanding of food allergy management at your work place.

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep. Once having read/considered the information, a consent form will need to be signed during the first meeting which will indicate your agreement to take part in the study. *If you decide to take part you are still free to withdraw at any time and without*

giving a reason. If you decide to withdraw from the study, the data collected up till then will still be kept and analysed up until that point.

The collected data will be kept strictly confidential. Privacy and anonymity will be ensured in the collection, storage and publication of research material. Electronic data will be stored on password protected/encrypted computer files, and hard copies will be stored in a locked fire retardant data safe. Anonymity will be ensured by a reversible process whereby identifiers are removed from data and replaced by a code. It is then impossible to identify the business or individual staff to whom the data or information relates without the code key and this will be stored in an encrypted file, accessible only to the researcher. Data generated by the study must be retained in accordance with the University's policy on Academic Integrity in secure paper or electronic form for 5 years from the end of the project following which all data will be destroyed.

The results of the study will be presented in anonymous form in a thesis and also in a peer review journal available to the general public.

I am conducting the research as a Professional Doctorate student of the School of Sport , Tourism and the Outdoors at the University of Central Lancashire (UCLan) UK. This research is self-funded.

The project has received ethics approval through the STEMH ethics committee of the University of Central Lancashire

Contact for Further Information

Main Researcher;
Paulino Schembri MSc.
Email; lino@alfservicesgroup.com

Supervisor;
Dr Carol A Wallace, PhD, CSci, PGCE, FRSPH, FIFST, FHEA
Principal Lecturer, Food Safety Management
Tel: +44 (0)1772 893657

Should you have any concerns about the way in which the study has been conducted, you could also contact;

Dr. John Minten

Dean of the School of Sport, Tourism & the Outdoors

UCLan, Preston, UK.

Email; jhminten@uclan.ac.uk

Thank you for your time taken to read this information sheet.

June 2014

APPENDIX 9

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FOOD SERVICE STAFF CONSENT SHEET

University of Central Lancashire

CONSENT FORM - Staff

Full title of Project:
Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Name, position and contact address of Researcher:
Paulino Lino Schembri MSc.
'Jamalfi'
Triq L- Imhallef P.Debono
Msida
Malta

Please read the following statements and initial the boxes to indicate your agreement

Please initial box

1. I confirm that I have read and understand the information sheet, dated …….. for the above study and have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason. ☐
3. I agree that my data gathered in this study may be stored (after it has been anonymised) in a specialist data centre and may be used for future research. ☐
4. I understand that it will not be possible to withdraw my data from the study after final analysis has been undertaken ☐
5. I understand that the data collected is for the sole purpose of the research ☐
6. I agree to the observation being video recorded ☐
7. I agree to take part in the above study. ☐

Name of Participant	Date	Signature
Name of Researcher	Date	Signature

APPENDIX 10

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FOOD ALLERGY TRAINING COURSE FOR STAFF IN RESTAURANT AND KITCHENS

University of Central Lancashire

Food allergy training course for staff in restaurant and kitchens.

Course objectives

The Food allergy training course is tailor made to suit individuals so that all facets of food production, processing, storage, transportation and delivery, catering and service to clients are covered. Successful completion of this course would enable the candidates to;

1. Identify the allergens listed in Annex II of EU 1169/2014
2. Understand the consequence of food allergens to sensitive individuals
3. Manage the food allergens in the kitchen space
4. Improve sanitation procedures to address food allergens contamination
5. Formulate recipes with reworked ingredients
6. Use a simple matrix to compose recipes and internal labelling
7. Identify unintended cross contamination
8. Acknowledge the presence of allegers in purchases products
9. Knowledgeable of delivering accurate ingredient information to consumers

The training time to cover this syllabus is at least 8 hours.

- The course will be delivered with the aid of Power point presentations
- It takes a 2X 3 hour sessions with a break in between
- Only staff employed at the restaurant are allowed to participate

All resource material will be distributed to attending participants.

Food allergy training course for staff in restaurant and kitchens.

There are some 150 million people worldwide who suffer from one or more food allergies. These people, who have to deal with this potential life-threatening situation, might have less confidence than others to consume food prepared by the loose food industry. Malta and Gozo has about 8000 people who are allergic however with 1.6 million tourists spending 13 million bed nights which averages at a constant addition of 35,616 persons which equates at an additional 712 potential food allergy sufferers. With this in mind if a restaurant serves 100 clients a day then the possibility is that 2 of them would be food allergic and therefore continuous training of how to prepare food and manage food allergens which will not cause harm to sensitive individuals becomes a major priority in food handling.

Consequence to consumption

Besides knowing which foods present a risk to food allergy sufferers, food handlers should also know the characteristics of ingredients that can be used in the food production. Glazed bread products is a clear example of this where the staff needs to be knowledgeable about the type of product used for glazing to be able to determine if this would be suitable for instance for an egg allergy sufferer.

Many other examples of this situation can be noticed when generic terms like 'nuts' are used to blanket the variety of different **nuts** or **tree nuts** e.g. peanuts or hazelnuts. This wide over use or blanket use of precautionary labeling would erode the message.

This leads to consumers and food handlers ignoring the message and thereby exposing the consumer to potential risks.

The storage of foods should also be taken into consideration with special attention to aerosol products such as flour or lupin. It is important to segregate food that could contaminate other foods. A good example would be the fish display in many restaurants where fish mollusks (eg Mussels, Octopus) and Crustaceans (eg Shrimps, lobsters) are placed together touching each other with a high risk of contamination.

THE TIMES

timesofmalta.com

Monday, September 17, 2012, 05:18 by

Kim Dalli

Most restaurants 'do not know about food allergies'

Eating out had always been a form of relaxation and enjoyment for Mario Aquilina and his wife, but everything changed when their son was diagnosed with a food allergy last year.

'It's difficult to find restaurants that make us feel safe'

After several medical tests and many tense months of waiting, two-year-old Elias was diagnosed as being allergic to fish. He must avoid it at all times, along with any foods that may have been contaminated during preparation

http://www.timesofmalta.com/articles/view/20120917/local/Most-restaurants-do-not-know-about-food-allergies-.437209

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With the knowledge of the fourteen most common allergies within the EU, it is to appropriate understand how to store the elements segregated at all times. This exercise will encompass all the activities within the operation from receiving to service. Special attention would need to be given to cross contamination due to contact as this might not be considered as a risk by the operatives.

Alternative ingredients could also be discussed in order to widen the possibility of operating a food business without the need of introducing allergens into the food preparation area, Eg substituting butter for vegetable Margarine without lactose, Milk with soy milk.`

Segregation;

- Good Kitchen design
- Adequate physical barriers to separate allergens
- Adequate spatial separation to separate allergens
- Scheduling to minimize opportunities for carryover
- Allow sufficient time for cleaning
- Separation in stores (cold and dry) in-house and at suppliers
- Separation in preparation areas
- Separation of Work-In- Progress (WIP) or rework
- Separation & movement control of staff
- Airflow control
- Procedures to prevent the introduction of allergens by staff into the food preparation area Eg Peanut snacks in Kitchens
- Handover between staff shifts
- Risk management upon introduction of new allergens into kitchens (New recipes)

Sanitation

As part of a Good Hygiene Practice (GHP), sanitation should already be implemented within the food business to operate food safety system; however it would be important within this training unit to explain sanitation techniques that would minimize the risk of the heterogeneously distribution of allergenic material and indicate effective cleaning method that may be assessed to comply with the set standards (FoodDrinkEurope, 2013).

Cleaning;

- Identify what should be cleaned
- Define effective cleaning standards to be achieved (wet or dry)
- Document procedures for effective cleaning
- Validate procedures (check that the system works in practice)
- Identify responsible staff for the identified tasks
- Sign off for completion of cleaning
- Supervision to verify compliance
- Where possible dedicate tools and equipment (if not available greater care should be given to ensure that the set standard is achieved)
- Sufficient cleaning equipment
- Clean working wear
- Effective waste/cleaning removal procedures

Rapid lateral flow test devices (strip test/ dipstick) are used primarily for sanitation assessment, but can be used for food product testing. These tests are the most suited to detect the presence (or absence) of the targeted allergens (eg. peanuts).

Other detection methods such as General Protein Tests, ATP/Bioluminescence Tests, Polymerase Chain Reaction (PCR) require laboratory analysis which in the case of a kitchen are not effective or efficient due to the nature of the business.

Rework

Réchauffé, as it is known in the French kitchen, is the rework of older material into new dishes. For the staff to understand that the new dish still contain all of the properties of the older dish one has to understand that the information needs to be carried forward and then transmitted to all the staff, including service staff, where these would be able to advise their clients about any health hazards that such food might present.

Ideally the principle should be 'identical into identical' however this might not be practical in a restaurant in order to have a rotational menu. Therefore it would be important to identify the ingredients in the original product and the same procedure for the original allergen should be managed and documented. In order to track ingredients within rework, the same procedure as in the beginning of a recipe, SOPs have to be followed and any changes need to be recorded for the next operative to be aware of the ingredients within the dish/product.

A good example would be cheese cake; although cheese cake normally does not contain eggs the biscuit base might have egg as an ingredient. Chocolate containing tree nuts might be another example if this is reworked into any other product this must be indicated as containing tree nuts.

Rework;

- Identify product
- Identify ingredients
- Store with label and date
- Re use as original product with the same procedure

Internal Labeling (bar coding)

Once dishes are prepared, especially where a cook-chill-reheat system is operated, deviation from the SOP would need to be recorded. If this would not be the case then reference is made to the original recipe where all the accurate information would be recorded. For the operatives to retrieve this information it is suggested that label/barcode would be available to scan which will provide all the necessary information including allergen alerts.

Food matrices have a huge influence on allergen detection. Once a product is purchased, the person responsible would analyse the product and determine if it contains any allergens. The ingredient matrix would start to be generated and would hold the most important information (i.e. name of supplier, bar code, name of product, allergen status) for future reference (Fig. 1). This matrix will be

used whenever a recipe is to be built (engineered) and the presence of an allergen would be recorded in the recipe's SOP. The recipe would also be written on a matrix, which would clearly indicate the allergen presence (Fig.2) (Fig.3). Once this is done, a bar code would be generated which would encode all the data necessary to deliver accurate information to the clients (Fig.4). This bar code would be printed next to the item on the menu where clients can scan, using their smart phone and retrieve the data from the cloud without the need of the third party (Fig.5).

Cross Contamination

Contamination of safe food is probably the main reason for sensitive people to ingest hidden allergens. This could occur in the food preparation areas where other customers' food is prepared and thus contaminated worktops and other utensils can contribute to food cross contamination eg. Frying French fries in the same oil as fish sticks would for instance be an example of contaminating food without intention and if staffs are not knowledgeable enough, this could occur regularly.

Identify the areas where potential cross contamination may occur;

- Shared storage, handling, mixing and transportation.
- Cross-over/ spillage points.
- Shared cleaning equipment
- Share food production areas and equipment (slicing machines, chopping boards)
- Airborne cross contamination (flour, lupin, celery pollen)

Cross-contact of products with allergenic materials may occur due to poor personal hygiene within a food preparation facility. The application of existing GMP rules should be sufficient to minimize the risk of such cross-contamination.

The risk arising from the likelihood of cross-contact happening with people being the vector of the contamination needs to be assessed. For instance, allergens present as dry products powders) are much more likely transferred by people than non-volatile liquids containing allergens.

Provisions of dedicated work wear for use in areas handling specific allergens or where a high risk of cross-contact through clothing exists. Such work wear should be restricted to working areas (i.e. not in canteen area, etc.).

Employees should not be permitted to bring food or drink into areas where products, ingredients or primary packaging is exposed.

The design and use of facility and equipment

This exercise would focus around the appropriate use of equipment to perform the task at hand without contaminating the food which will come into contact with the same equipment. Ideally, wherever possible, equipment should be dedicated to specific allergen profile; however in a small business this would be impractical if not impossible, therefore solutions and correct use of the equipment together with a GMP would form the basis to minimize the risk of cross contamination.

The correct use of small and large equipment will reduce or eliminate the cross contamination of food;

- Colour coded small utensil (scoops, ladles, tongs)
- Scheduling production to avoid cross contamination
- Validated cleaning programme should be in place.
- Use of designated areas (zones) for specific allergens
- Facility design to minimize the movement of products and personal
- Create a negative air pressure to reduce the airflow that could potentially transport allergens

Purchasing

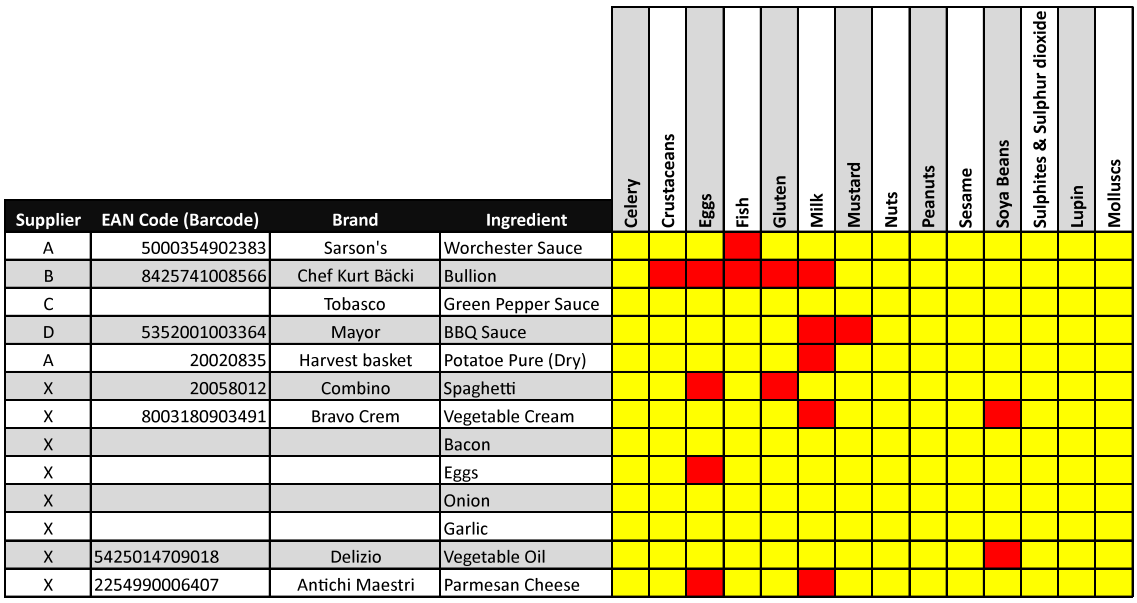
As part of the HACCP plan, purchasing from reputable suppliers would already have been implemented as one of the PRPs; however in addition to other requirements an appropriate and proportionate policy to assess the allergen status of ingredients used by suppliers should be established. This will form part of further education to those already knowledgeable of HACCP and should be well explained for those who are new to the subject.

- Auditing suppliers
- Require admission of allergen management policy from third party
- Segregation of allergens in storage and transportation as part of hazard analysis
- GMP on transportation with special attention to spillage which should be analogous to glass breakage procedures.

Communication

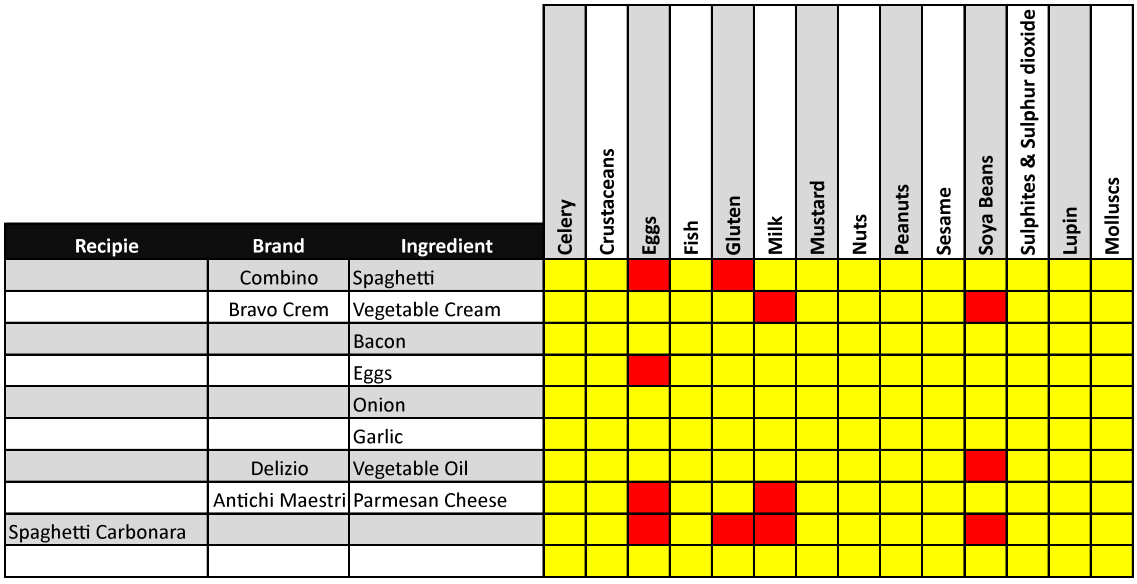
The importance of communicating with fellow operatives regarding the ingredients and methodology used to produce meals would need to be highlighted. New tools of communications could be explained which will ensure that all the staff would be able to retrieve the accurate information about the food on sale. It would be also appropriate to indicate that ego and secrecy about recipes or meals would not help deliver a safe meal to an allergy sensitive individual.

- Use of labels
- Use of barcodes
- Use of written SOP
- No deviation from recipe unless agrees and all staff notified
- Ensure that recipes, preparation, holding and consumer information is produced with a high awareness of allergen risks.
- Communicate all the information to all the staff involved in the operation including the services staff.
- Provide consumers with allergen information



Supplier	EAN Code (Barcode)	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
A	5000354902383	Sarson's	Worchester Sauce				■										
B	8425741008566	Chef Kurt Bäcki	Bullion		■	■	■	■	■								
C		Tobasco	Green Pepper Sauce														
D	5352001003364	Mayor	BBQ Sauce						■	■							
A	20020835	Harvest basket	Potatoe Pure (Dry)						■								
X	20058012	Combino	Spaghetti			■		■									
X	8003180903491	Bravo Crem	Vegetable Cream						■					■			
X			Bacon														
X			Eggs			■											
X			Onion														
X			Garlic														
X	5425014709018	Delizio	Vegetable Oil											■			
X	2254990006407	Antichi Maestri	Parmesan Cheese			■			■								

Figure 1 - List of Common Ingredients Matrix



Recipie	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
	Combino	Spaghetti			■		■									
	Bravo Crem	Vegetable Cream						■					■			
		Bacon														
		Eggs			■											
		Onion														
		Garlic														
	Delizio	Vegetable Oil											■			
	Antichi Maestri	Parmesan Cheese			■			■								
Spaghetti Carbonara					■		■	■					■			

Figure 2 - Recipe Matrix Expanded

Recipie	Brand	Ingredient	Celery	Crustaceans	Eggs	Fish	Gluten	Milk	Mustard	Nuts	Peanuts	Sesame	Soya Beans	Sulphites & Sulphur dioxide	Lupin	Molluscs
Spaghetti Carbonara																

Figure 3 – Recipe Matrix Collapsed

Figure 4 – Barcode with encoded data to be printed next to menu item

Figure 5 – Decoded data retrieved onto smartphone

APPENDIX 11

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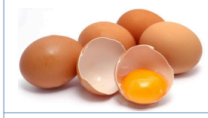
FOOD ALLERGENS INFOGRAPHIC

Food Allergens

Examples of Allergenic food and ingredients

Pictorial Reference of allergens	Ingredients Annex II, EU 1169/2011	Typical Ingredient Sources	Examples of derived products and compound ingredients containing allergens
	**Cereals** containing Gluten Cereali li jkun fihom Glutina Cereali contenenti glutine Glutenhaltiges Getreide	Wheat, Rye, Oats, Spelt, Kamut and Hybridised strains	Malt, Cous cous, Bouillon Powders, Seasoning Mixes Baking powder,
	**Crustaceans** Krustaċji Crostacei Krustentiere	Shrimp, Crab, Lobster, Crayfish	Bouillons, Concentrated Stocks, Soups Mixes, Sandwich Pastes
	**Egg** Bajd Uovo Ei	Egg powder, Egg Glaze, Egg Albumin, Egg whites	Mayonnaise, Pasta , Gran Padana, Cake Mixes,
	**Fish** Ħut Pesce Fisch	All species	Cured, smoked pickled and canned fish, caviar, Worcestershire sauce, Steak sauce, Stuffed olives
	**Peanuts** Karawett Arachidi Erdnüsse		Peanut Butter, Satay Sauce, Bouillons, Pastry fillings, Confectioners Substitute, Chocolate, Marinades
	**Soya** Soja Soia Soja	Soybeans, Edamame Beans	Lecithin, Vegetable oils, Sausage, Seasoning Mixes, Cocoa
	**Milk** including Lactose Ħalib inkluži Lattosju Latte compreso il lattosio Milch einschließlich Laktose		Butter, Sausage, All cheeses, Chocolate, Nougat, Bread
	**Tree Nuts** Lewż Frutta a Guscio Baumnüsse	Almonds, Hazelnuts, Walnuts, Cashew, Pecan, Brazil, Pistachio, Macadamia, Queensland	Pesto, marzipan, Chocolate, Muesli,
	**Celery and Celeriac** Karfus u Celeriac Sedano e sedano rapa Sellerie und Knollensellerie	All parts of the plant including roots and leaves	Seasoning Mixes, Stocks, Bouillons
	**Mustard** Mustarda Senape Senf	mustard seeds(white, yellow, black) Mustard leaves	Mayonnaise, Dressings, Marinades, Pickles, Dressings Mustard
	**Sesame** Gulġlien Sesamo Sesam	sesame seeds	Tahini, Sesame Oils, Sesame Paste, Muesli, Oriental Sauces
	**Lupin** Lupin Lupin Lupin	Lupin seeds and flowers	Gluten free Bread and Bakes, ice cream, mayonnaise and dressings
	**Mollusks** Mulluski Molluschi Weichtiere	Mussels, Clams, Snails, Octopus, Scallops, Oysters	Worcestershire sauce, Seafood flavouring , Imitation seafood products, Fish stock, fish sauce, soy sauce, salad dressings, surimi
	**Sulphur Dioxide & Sulphites** Dijossidu tal-kubrit u sulfati Anidride solforosa e solfiti Schwefeldioxid und Sulfite		Wine, Dried Fruits, Pickling Mixes, Vinegar, Preservatives E220, E221, E222, E223, E224, E226, E227, E228

Adapted from C.Hodge (2007). Managing Food Allergens, Advanced Food Safety Limited

APPENDIX 12

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DATA EXTRACT FORM FOCUS GROUP TRANSCRIPTS

Data Extract	Coded for
• Question; Does your condition limit your social activities when food is present e.g. receptions or eating out?	
• when I am at a wedding reception I do not eat anything even if the chef comes and tells me that these items do not contain nut • I will not eat but I will take drinks but I will not take any chances • but yes eating out is always a problem, • Like a reception could not exist for me , I mean, I will go where I must go, for instance weddings , I will go but I either take food with me, it makes me laugh, this is limiting but I am now living in a world on my own in this , I have adapted to this life as I will for sure not touch food that will make me sick as later I will have huge problems • I will not eat anything except from Matildas and Ciappetti in Mdina, which means I do not trust anywhere else, it needs to be a time for me to try again, food from friend, I will be shocked when we are invited as I will know that I will experience a tammy ache and head ache to explain to them and to be extremely safe I will take food with me • I feel that I am cooking all the time, you need to be extremely organised, holidays always self-accommodation, I don't stay in hotels, if we real need to say one night we make a lot of research to find that place which caters for me for breakfast, I always carry my own food I carry big boxes of food with us. • I am a very social person but my life has changed. • wedding reception and the like, yes you are a bit limited but not as drastic as two others prior to me as it is an intolerance and not an allergy, not so drastic, going abroad maybe a bit more of a problem because if you're going to have a snack it is going to be a sandwich maybe something sweet just pastry, but otherwise I can't say it say affected me drastically • I never eat anything because I do not trust them because I am afraid of food poisoning • I am not allergic to lactose although it is not the first time that I had a fever to be honest but it never killed me, the best is to have a toilet close by and then it is alright so I cannot say it affected me. • Where restaurants are involved I will find restaurants that I can trust, she named some, I know of others which I trust 100% which I know that are quite safe and I take my brother with me who suffers of certain other intolerances	1. Eating at social gathering 2. Isolation 3. Quality of life 4. Trust 5. Behaviour 6. Attitudes 7. Selecting restaurants

• if my friends do not except my needs I will find other friend • yes you need to find people, I believe that if you cannot understand each other, which is technically small thing, because it should not make a difference if you go to restaurant A or B as such at the end of the day if they are not ready to give up this, what do you need them for.	1. Support
• We buy food and run around with fruit in our bags so as if we are caught out for lunch and we are hungry we eat an orange or apple or a banana, I will not go in to restaurants, very rarely do I go in to restaurants as when I go in I need to know that they can speak English, if I am not in England, that they would be capable of cooking for me a grill steak with nothing on, without any herds or anything, if they can do that, then I can trust them.	1. Quality of life 2. Trust 3. Behaviour 4. Language barrier
• Question; Have you experienced an ill health episode when eating out?	
• I went into the kitchen to speak to him and told him about my allergies. I spoke to the three waiters in the restaurants and to the chef I told him that I don't mind if I eat fish or meat as long as it is peanut and nut free and he told me to put my mind at rest and he got me beef steak and it was marinated in peanut oil, it was going to kill me • I my case it does not affect me instantaneous, the last time I had it was after two hours and the problem I think was the lactose and not the gluten because it was a one off attach, yes it happen but not on the premises. • no on premise never but when I went home yes I got an attach after eating out, yes after eating out it happen once I had a simple take away, I order a chicken fillet in a bun and I made clear that I don't want anything made from milk and he made me butter and as I bit into it I started to taste something, but it did not pass my mind that he would put on butter, I ate another piece and then I noticed and I went back and told him' you made me butter' . He told me 'yes I put in some butter for taste' he continued ' But you told me not to put any milk' . Today I make it clear, so I give a list, no butter, no milk ect.	1. Trust 2. Behaviour 3. Fear 4. Allergy attacks 5. Lack of knowledge

• Question; If yes, what was your personal immediate reaction and that of the restaurant staff? If yes, what was your personal immediate reaction and that of the restaurant staff?	
• I have to admit that I did not contact the restaurant afterwards to tell them what happened and that they must have done something wrong and that the food made me ill. • he was honest , if fact he was so concerned that he told me that the next meal is on the house, • And when I was sick my partner wanted to speak to the staff to indicate which door t the ambulance should come to and they replied 'can't you see we are busy'. • they offered me a membership of the gym after the ordeal, after I was almost dead and resurrected, I don't even want to see the hotel let alone the membership • within 5minute of eating it I lost consciousness and when I told them that I was getting an allergy attach they laughed and said that I am paranoid.	1. Claims 2. Compensation 3. Perception of allergy consequence 4. Knowledge 5. Fussiness
Question; After the ill health episode did it affect your decision to eat outside?	
• yes your self-confidence falls to zero especially, after the fact that you would have notified them and told them that you are allergic to certain products and then it is in your food and your self-confidence will diminish, you are afraid to eat out side • Exactly, you start to feel very insecure to trust • I am not a person who gets easily dishearten even if I had an episode I will not go to the same place but the experience will not hold me from going to another place to try out, simply I would have added to the list what I would have to do more to be cautious therefore	1. Confidence in food service businesses 2. List of precautions

Question; When eating out are staff helpful and accurately knowledgeable of the food ingredients.	
• In Malta very seldom almost none, a few restaurants that you can count on one hand which come and tell you and the chef comes out to explain and reassures you that he will cook especially for you • in England they have the fine print on the menu that if you allergic to anything talk to the staff and as soon as you tell them that you are allergic to peanut, they will tell you 'I am sorry in the kitchen we have peanut please leave', in America they are helpful, they will tell you that they have the epipen in case of emergency, 'We have the epipen in the kitchen', that is alright but if you have an allergic reaction the first thing the ambulance wants to see is your credit card as they will not take you and in Europe there is the language problem as some people understand you but other would have problems. • And that was the place that I felt the safest, on a cruise as you can eat whatever you please. • 'Choose what you want on the menu including the desserts', which normally have peanuts,' whatever you choose we will do it especially for you • a big selection of restaurants that you can feel secure than in others. • I only trust two restaurants, I cannot afford that they think that they are serving you something and something else will happen as the last time that I had a severe attack when I was in America and it took me three months to recoup, imagine that you would have gastric flu every day I come down to just 45 kilos which for my height is bad • and that is why I absolutely will not trust anyone • In restaurants there is a lot a misinformation about gluten, they think that as long as we avoid pasta ,and use gluten free pasta but then boil it the same water as other pasta • but when it came to the potatoes it was the same chips as all others had, and I asked him if the potatoes was good for me as it seemed frozen pack potatoes not fresh and I asked where it had been fried and there was other foods, as this was a restaurants which specialise in battered food, like prawns in batter and my heart missed a beat, and he said sorry but yes • meaning that there is a lot of misinformation, as much as you want. • the same not very well inform at all • I have not found no place in the world that I can say that I could rest assured that I did not have to explain, • I think it is in general that there is a huge problem. honestly I cannot say that I would go to a restaurant and I feel assure 100%,	1. Accurate ingredient knowledge 2. Trust 3. Language barrier 4. Secure 5. Misconception

• I think you would have to explain where ever you are, at least the first time.	1. Informing the food service business of your dietary problem.
• it is not just lack of knowledge and training it is ignorance in it's totally • it is lack of awareness • attitude • yes but one thing is having your own restaurant and being there and it is another having people working in your restaurant or hotel and all or most of them could not care less,	1. Ignorance 2. Lack of awareness 3. Attitude 4. Care less
Question; What is your feeling when you take your children to eat out if they are food allergenic?	
• coeliac so he is well aware of what it is, however in Italy I found it much better as a country • My son is the same as me, he is 14 years old, for instance he had the opportunity to go to Turin, now with the school on an exchange trip and I had to refuse him from going because although I have just said that in Italy they are more conscience and what not he is still so skinny, my son and we had so many problems, that I cannot entrust that he goes for two weeks and ends up not eating anything, yes there is fear and anxiety maybe I am over protective • he will not go out and buy a piece of chocolate when he knows that it make him ill, he will not do it, absolutely, he will not do it, but it keeps him back from doing certain things I can say. • a bit of a fear almost, if we are going out to eat; My god where are we going to eat for my sake I am not so much bothered but for the daughter I am more aware. • I have no children but if I had I would fear more than for myself, as for myself I would be able to cope after an attack;	1. Anxiety 2. Fear 3. Equality 4. Concern of children's wellbeing
• I want to teach him coping skills as this is not the end of the world, this is not a fatal disease or anything similar absolutely not.	1. Coping with the disease

Question; Did you all start with these conditions at a mature age or when you were children. Do you feel that your fear when you were young is greater than today	
• the allergies that I have, came out some 3-4 years ago • myself after the pregnancy, that was official diagnosed but with hind sight because afterward I realised what it was, when I was young I had incident but these were few and far between and no one associated these with the coeliac • mine as well by elimination and I have been with it for about a year and half • I was 12 and I was at the Vatican and I remember that we had to take loads of milk and when I came back I was still taking milk but it was hurting me but from there it seems that it started. • as no one used to believe me, not even my mother she thought that I just did not want the milk and then she took me to the doctor and he told her that 'Yes it could be that I was lactose intolerant', so she said that I was not make it up, when I was young, I am today 38, in those days it was almost unheard of this things	1. Diagnoses 2. Lack of knowledge by the parents
Question; What is your perception on who is responsible for your food (chef, staff, yourself)	
• if I tell the chef what my allergies are then it is up to him to execute, so it would be co- sharing • when I go to a restaurant and I order food the waiter will come, the first thing I will do is ask if I can speak to the chef. I will not talk to the waiter to tell the chef that I am allergic to peanuts and that I don't want nut or contamination or peanut oil or peanut butter etc etc. No I want to speak to the chef. I will not trust the third party as he might write it down and the message will not be delivered. I will speak with the chef. • I think on one side the greatest responsibility is of the one preparing the food and on the other hand everyone has the same responsibility as, if these are in any way related to food catering from the smallest one to the highest one, all of them need to deliver a consistent message and assist us, if one in the chain makes a mistake we will suffer the same, therefore for me all of them need to well informed.	1. Responsibility 2. Assume self-responsibility 3. Severity of allergy

• I my case ,me, as I am not as severe as the others ,I don't have to tell the chef, so I choose from the menu and it is up to me to read well what is on the menu. Only once have I been out and found nothing that was gluten free and they made me a platter and it came with nice Maltese bread, so you know, and then in that case it is as A is saying it is shared in my case I take it on myself • It is a chain, it is shared, it has to be every one, I don't accept to go to a restaurant and the waiter will not write correctly or something like that, I will not accept that. Basically the last time I went to famous place and I explained to the waitress clearly what are the ingredients that absolutely should not be featured in my plate, and when the plate came it was evident that one component had lactose, I told her that I had explained that it should not have lactose, and she replied that she will remove it , but I insisted that the whole plate should be changed and if you do not do accordingly I will hold you and the restaurant responsible and I recorded her name so that I would be clear with whom I had spoken. I do not accept that I am different from others who make an order, why should I disturb the chef, why should I take full responsibility. • maybe my allergy is slightly different to yours. Mine is life threatening • The waiter can in that case make a worst mistake then the chef, even they are responsible. • even you are responsible as you need to explain but once you have explained, I cannot accept it, unfortunately it happens, it is not the first time I would have to stand up and go to speak to the chef directly, but to me it is not acceptable in any way, it is something that irks me. • I say that everybody is absolutely responsible, even a kitchen hand who is cleaning in the kitchen as, if gluten is left in the pots and the chef did not notice this due to rushed practice….	
• if you tell them that you hold them responsible, if you get an attack in a restaurant it would be hard to take legal action against them, if you do not have evidence, a plate sample; you need to take it to the dietician. This happened to me and I tried to take legal action against this restaurant which almost killed me.	1. Vulnerability 2. Litigation

• so we have skewed up laws • yes it is impossible • in theory I will not accept that it is as if you are in a situation that you are like singled out.	1. Felling let down by the authority 2. Isolation
Question; Is it expected that food businesses would have more than one slicer?	
• I go one step further, in my opinion they should have special pots for celiac; I don't think that washing removes the allergen. • it very hard, almost impossible, however as J is say there are some restaurants and I go to one of them who knows that I cannot eat garlic, he does not have nuts as he cooks rabbits, but he has special utensil for me so that there will be no cross contamination to garlic. • what I am saying is that celiac and nut allergies should have a segregate pot and pans, lactose in reality if you would wash the pan the allergen will go away , nut and starch might stick to the pans as these are things that are more common and dangerous ,	1. Segregation 2. Expectation of kitchen practices 3. Perception of kitchen practices
Question; What is your perception of a system where no staff or any other person would be involved in transmitting accurate ingredient information?	
• transmitting accurate ingredient information • probably I would feel a bit safer • if on the menu there is sirloin steak and the ingredients will be listed, all named , I would feel a little bit safer, not 100% again but a bit more safer • I don't think that I would be fully satisfied because I would still want interaction with the staff in the restaurant • I would be fine with that • I think something like this should be a standard	1. Felling secure 2. Sceptic

Question; Do you think that the size of the business has any effect of the food safety especially with food allergens?	
• in my opinion I feel safer when the restaurant is family run or when the chef is the chef patron, there I will feel safer as here the chef will be more cautious • I feel safer in a family run restaurant or a chef patron. • that if it is a small restaurant he would be sooner prepared to listen to you, he would have a better control of the kitchen not so many hands • in a small restaurant that the staff understands the practices is crucial , from my experience this is where I felt safest. • I am afraid, I say to myself that in the confusing of many foods and people I will not trust them • I prefer a small business. • I won't think you can generalise. I think it comes from training and we go back to the points we mentioned before, I don't think you can say 'yes definitely you can trust this one more or that one more' • I would have tended to think like them had this not happened to me. • you cannot just say big or small, it depends, it is too general	1. Feeling safer in small restaurants 2. Small restaurants and restricted area 3. Trust in large operations 4. Training
Question; After being introduced of the multi-faceted toolkit would you feel more secure eating at restaurants offering this system knowing that the information here is accurate?	
• I would feel a lot safer, much safer, that is very good • it is very simple • It is really good, I would feel much safer, I would eat out every day • it is a wow, it is a great achievement • I hope that you can introduce it. Well done.	1. Assisted by the barcode
• here you have the ingredient, but what about contamination	1. Contamination concerns
• If the training is adequate	1. Training

• With this system I think in my position I would always be wary even when I cook for myself, when the food is on the plate I am always wary, if I am for example coming to eat at your place even if you tell me that the dish does not contain nuts, I will still be wary, and after I eat I clock the time and leave half an hour, but I think it would reduce the anxiety. Yes it reduces anxiety and if you try it and nothing happens and repeat it and still nothing happens then your confidence will start to increase. • It helps definitely, but it a part of the whole process, what I would not like to happen is that a kitchen will waive responsibility because they would have the system. • if the programme would rectify the process then it is good • But how you explained the system and it will keep on working the confidence will rise.	1. Reduction of anxiety 2. Increase in confidence 3. Part of a process
• we are humans and still makes mistakes, the programme could be extremely good but if it wrongly applied. • In our situations one starts to think if we are being fussy when asking what the ingredients are although I have all the right to know the ingredients but if the system would be there I think it should help. • for me I said all along that I bank a lot on what is written in a menu as I am not so much bother with the relationship with the waiter ,I my case this is perfect	1. Human error 2. Reliability 3. My right to know
Question; What is their perception if the service staff assists you in using the system.	
• if they would assist me I will not fell uncomfortable, at least I would feel that I am using the system right, if they would instruct us the first time as you have shown us, if I come the second time I will do it on my own. • I would be thankful • the same thing • it is so simple you can see what there is.	1. Assistance in the use of the multi-faceted toolkit

APPENDIX 13

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CERTIFICATION OF ANALYSIS FOR REVEAL 3-D TESTS

NEOGEN CORPORATION

CERTIFICATE OF ANALYSIS

Reveal 3-D Gluten Test

Product No.: 901031P

Lot No.: 217712

Expiration Date: May 30, 2016

Performance

Component	Lot Number	Expiry
Reveal 3-D Gluten device	217712	05-30-2016
Extraction buffer 4	213826	09-23-2016
Extraction buffer 5	213827	08-09-2016

Parameter	Result	Specification
Lower detectable level*	**1.0 ppm**	**Test and Overload line present. Control line always present.**
Upper detectable level*	**1000 ppm**	**Overload line less than or equal to test line. Control line always present.**
Extraction buffer	**Negative**	**Test line absent. Overload line Present. Control line always present.**
Kit control	**Detected**	**Test and Overload line present. Control line always present.**

*Spiked material into extraction buffer

Variances in data may occur. External factors such as stress from shipping, storage conditions, handling or contamination of components may influence results. Neogen Corporation certifies that this lot has met all internal quality control specifications for this product.

Ryan Viator, MS, PhD

Immunodiagnostics Quality Control Manager

Date: Tuesday, June 09, 2015

620 Lesher Place • Lansing, MI 48912 • **800/234-5333** (USA/Canada) • 517/372-9200
foodsafety@neogen.com • www.neogen.com

Certificate of Analysis provided with Reveal 3-D Gluten test

NEOGEN CORPORATION

CERTIFICATE OF ANALYSIS

Reveal 3-D Egg Test

Product No.: 902082Q

Lot No.: 214044

Expiration Date: Feb 19, 2016

Performance

Component	Lot Number	Expiry
Reveal 3-D Egg device	214044	02-19-2016
Reveal extraction buffer	208986	03-24-2016

Parameter	Result	Specification
Lower detection limit*	**0.5 ppm**	**Test and Overload line present. Control line always present.**
Upper detection limit*	**500 ppm**	**Overload line less than or equal to test line. Control line always present.**
Extraction buffer	**Negative**	**Test line absent. Overload line Present. Control line always present.**

*Spiked material into extraction buffer

Variances in data may occur. External factors such as stress from shipping, storage conditions, handling or contamination of components may influence results. Neogen Corporation certifies that this lot has met all internal quality control specifications for this product.

Ryan Viator, MS, PhD

Immunodiagnostics Quality Control Manager

Date: Thursday, February 26, 2015

620 Lesher Place • Lansing, MI 48912 • **800/234-5333** (USA/Canada) • 517/372-9200
foodsafety@neogen.com • www.neogen.com

Certificate of Analysis provided with Reveal 3-D Egg test

APPENDIX 14

CODED ACTIONS FROM OBSERVATIONS

Chef Patron

CAM NUMBER/DATE/TIME	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K
CAM1/1.7/12.32.51	*		*	*															
CAM1/1.7/13.11.20	*		*	*															
CAM1/2.7/12.06.30	*		*	*															
CAM1/2.7/12.55.31	*		*	*															
CAM2/3.7/12.40.00	*		*	*															
CAM2/3.7/13.03.51	*		*	*															
CAM1/4.7/12.28.10									*		*	*			*	*		*	
CAM1/14.7/13.46.46	*		*	*															
CAM1/15.7/13.17.57	*		*	*															
CAM1/16.7/12.18.00	*		*	*															
CAM1/16.7/13.50.38	*		*	*															
CAM1/4.8/11.54.39	*		*	*															
CAM1/4.8/12.36.00	*		*	*															
CAM2/5.8/10.51.56	*		*	*															
	13	0	13	13	0	0	0	0	1	0	1	1	0	0	1	1	0	1	0
	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K

Possible cross contamination by;

Equipment	Cleaned before use Yes	Cleaned before use No	Was Prior Food an allergen Yes	Was Prior Food an allergen No	Other	By Design Yes	By Design No	Hand	Proper hand washing observed Yes	Proper hand washing observed No	Touched equipment or food Yes	Touched equipment or food No	What was touched Food	What was touched Equipment	Was touched food an allergen Yes	Was touched food an allergen No	Were any other foods touched Yes	Were any other foods touched No

Restaurant

CAM NUMBER/DATE/TIME	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K
CAM 1/8.10/17.33.07									*		*	*			*	*		*	
CAM1/8.10/17.29.44	*		*	*															
CAM1/9.10/18.32.13	*		*	*															
CAM1/9.10/19.09.05	*		*	*															
CAM1/9.10/CONTINUOUS	*		*	*															
CAM2/10.10/19.08.30	*		*	*															
CAM2/10.10.19.32.02						*		*											
CAM1/11.10/17.39.22									*		*	*			*	*		*	
CAM1/11.10/18.36.20	*		*	*															
CAM1/11.10/19.42.32	*		*	*															
CAM1/11.10/19.44.32	*		*	*															
CAM1/12.10/18.48.16	*		*	*															
CAM1/15.10/19.30.14									*		*	*			*	*		*	
CAM1/16.10/19.13.06									*		*	*			*	*		*	
CAM2/1.7/18.17.12	*		*	*															
	10	0	10	10	0	1	0	1	4	0	4	4	0	0	4	4	0	4	0
	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K

Possible cross contamination by;

Equipment	Cleaned before use Yes	Cleaned before use No	Was Prior Food an allergen Yes	Was Prior Food an allergen No	Other	By Design Yes	By Design No	Hand	Proper hand washing observed Yes	Proper hand washing observed No	Touched equipment or food Yes	Touched equipment or food No	What was touched Food	What was touched Equipment	Was touched food an allergen Yes	Was touched food an allergen No	Were any other foods touched Yes	Were any other foods touched No

CPU

CAM NUMBER/DATE/TIME	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K
CAM1/23.7/10.35.25						*		*											
CAM2/28.7/12.40.05	*		*	*															
CAM2/31.7/10.32.31	*		*	*															
CAM1/23.6/10.43.59									*		*	*			*	*		*	
CAM1/23.6/11.04.30									*		*	*			*	*		*	
CAM1/23.6/11.05.42	*		*	*															
CAM1/24.6/10.31.20									*		*	*			*	*		*	
CAM1/24.6/10.48.21	*		*	*															
CAM1/24.6/11.38.22	*		*	*															
	5	0	5	5	0	1	0	1	3	0	3	3	0	0	3	3	0	3	0
	1	1A	1B	1C	1D	2	2A	2B	3	3A	3B	3C	3D	3E	3F	3G	3H	3J	3K

Possible cross contamination by;

Equipment	Cleaned before use	Cleaned before use	Was Prior Food an allergen	Was Prior Food an allergen	Other	By Design	By Design	Hand	Proper hand washing observed	Proper hand washing observed	Touched equipment or food	Touched equipment or food	What was touched Food	What was touched Equipment	Was touched food an allergen	Was touched food an allergen	Were any other foods touched	Were any other foods touched
	Yes	No	Yes	No		Yes	No		Yes	No	Yes	No			Yes	No	Yes	No

APPENDIX 15

_____

FOOD SERVICE STAFF QUESTIONNAIRE

Title of Project:

Improving Food Allergen Management in Small and Medium sized food service businesses serving loose food.

Restaurant staff Questionnaire.

This questionnaire is part of the university research to improve food allergy management.

1. Does your food business operate a HACCP or PRPs food safety system?

   HACCP ☐ PRP ☐

   If Yes have you received any food safety training?

   Yes ☐ No ☐

   If Yes have you received training in food allergen management?

   Yes ☐ No ☐

   If Yes was it part of a training course or was a specific food allergen training

   Part of a course ☐ Specific Food allergen training ☐

2. Does your food safety system include food allergy management procedures? (Food allergy management procedures are steps need to control food allergens within the food business.) If yes please state what procedures are employed in your business.

   ……
   ……
   ……
   ……
   ……
   ……

3. What allergens do your food safety system considers as food safety hazards?
   Please list them below

   ……
   ……
   ……
   ……
   ……

4. Can you name all the allergens listed within the EU? Please list them.

   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……
   ……

5. What do you think food allergens are?
   Bacteria ☐
   Virus ☐
   Heavy metals ☐
   Chemicals ☐

6. How can you remove allergens from food?

   By cooking ☐
   By washing ☐
   By freezing ☐
   By eliminating ☐

7. What could the effect of food allergens be on sensitive consumers?

   Sneezing ☐
   Itching ☐
   Vomiting ☐
   Breathing restrictions ☐
   Diarrhoea ☐
   Blindness ☐
   Death ☐

8. Does the food business cater for special dietary requirement such as food allergies?

   Yes ☐ No ☐

9. Do you think that a small amount of any food allergen could harm a sufferer?

   Yes ☐ No ☐

10. Do you think that all your ingredients are free from allergens?

    Yes ☐ No ☐

11. Can allergens be removed from a ready plated dish; example nuts?

    Yes ☐ No ☐

12. When buying loose ingredients or products (e.g. vegetables, fish), do you know if these contain or if these could have been contaminated by allergens?

    Yes ☐ No ☐

13. How do you record the presence of allergens within the purchased products?
    Tick where appropriate

    On recipes ☐
    SOP ☐
    Record sheets ☐

18. If a sufferer gets an attack while in your restaurant, what should you do?
    Tick where appropriate

    Give them water ☐
    Sit them down ☐
    Lay them down ☐
    Ask them what happened ☐
    Call an ambulance ☐
    Assist them to their medicine ☐

19. Would you trust a system that would assist you in tracing and tracking allergens in your operation?
    Yes ☐ No ☐

    If Yes what do you think it should include?
    ……
    ……
    ……
    ……