

# A Matter of trust: A quantitative study to explore allergen awareness and compliance in takeaway food businesses in the Borough of Knowsley

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Sarah FOX<sup>1</sup>, Graeme MITCHELL<sup>2\*</sup>, Michael PASCUCILLA<sup>3</sup>

## ABSTRACT

With the number of people suffering from food allergies increasing globally and food allergies accounting for more hospital admissions than food borne diseases, food allergens pose a significant public health threat.

In December 2014, the European Union (EU) introduced legislation which aimed to ensure that customers with food allergies could make informed choices and safely consume food, without the risk of a potentially life-threatening reaction.

Using a questionnaire and allergen audit (designed to provide a consistent and standardised means of measuring food safety practices within food businesses), the aim of the research was to explore the awareness, understanding and practices of 21 randomly selected food business in the Borough of Knowsley, located in the North West of England.

The findings revealed a significant gap between the level of confidence expressed by food business owners and their practices and understanding. Whilst all (n=21) felt confident in providing a safe meal and 90% (n=18) were aware of the need display allergen information, none of the food businesses owners demonstrated a high level of allergen control in their premises and 43% (n=9) did not display any allergen information within their premises. In addition, the research established that there appeared to be no direct link between the levels of food hygiene found in a food business and the awareness and practice of the food business owner regarding food allergens.

This gap leaves customers exposed to a significant level of risk, as it appears that the confidence food business owners have in producing a safe meal is misplaced.

**Key words:** food allergens, food businesses, risk, allergen audit

<sup>1</sup> Place Directorate, Civic Centre, Chorley Road, Swinton, Salford, M27 5FJ, UK

<sup>2</sup> Public Health Institute, Faculty of Health, Education and Community  
Liverpool John Moores University  
3<sup>rd</sup> Floor Exchange Station, Tithebarn Street, Liverpool L2 2QP, UK

<sup>3</sup> East Shore District Health department  
688 East Main St. Branford, CT 06405, USA

\* *Corresponding author*

Graeme Mitchell MCIEH CEnvH  
Public Health Institute, Faculty of Health,  
Education and Community  
Liverpool John Moores University  
3<sup>rd</sup> Floor Exchange Station, Tithebarn  
Street, Liverpool L2 2QP, UK  
E-mail: g.k.mitchell@ljmu.ac.uk

The prevalence of food allergies is reported to be rising in many countries, with many studies estimating that food allergies affect 1-2% of adults and 5-8% of children.

The World Health Organisation (WHO) reports that there are more than 70 foods that have been reported as causing food allergen reactions.

## INTRODUCTION

Since December 2014, specific EU legislation has required food businesses (FB) to provide information to customers about food allergens, yet concerns still exist as to how effectively this legislation is being implemented.

The importance of ensuring customers are provided with accurate information about potentially life-threatening allergens that may be contained within food cannot be underestimated. A number of deaths in the United Kingdom (UK) have been linked to FBs providing allergen-contaminated food, sometimes despite requests from the customer concerning their allergen status. In one case, the wilful negligence shown by a food business operator (FBO) regarding allergens resulted in his prosecution and conviction for manslaughter after the death of a customer.

The prevalence of food allergies is reported to be rising in many countries [1], with many studies estimating that food allergies affect 1-2% of adults and 5-8% of children [2, 3, 4, 5]. Hospital admissions for children in the UK alone, due to food allergies, have increased by 700% since 1990 [6] and almost twice as many people are hospitalised per year due to allergic reactions to food than food borne diseases [7] although there appears to be no single reason for this.

According to Wang and Sampson [8] food allergies can be defined as adverse immune mediated reactions to specific food proteins that can have a rapid onset time and can sometimes be serious and lead to a life-threatening anaphylactic reactions. Table 1 identifies the area where the reaction could take place and the symptoms that may be experienced.

Food allergies are not the same as food intolerances, which may be caused by difficulties in digesting certain substances such as lactose. With a food intolerance, no allergic reaction occurs, and symptoms develop several hours after consuming the food. In general, it requires a larger amount of food to trigger food intolerances than for food allergies and whilst undoubtedly unpleasant, food intolerances are never life threatening, unlike food allergies.

**Table 1.** Area of reaction and symptom [9]

Area	Symptom
Skin	Itching, swelling and redness
Gastrointestinal Tract	Pain, nausea, vomiting, diarrhoea, itching and swelling of the oral cavity
Respiratory Tract	Itching and swelling of the nose and throat, asthma
Eyes	Itching and swelling
Cardio-vascular system	Chest pain, abnormal heart rhythm, low blood pressure causing fainting and loss of consciousness

The World Health Organisation (WHO) reports that there are more than 70 foods that have been reported as causing food allergen reactions, however the EU has identified 14 major allergens, as detailed in box 1.

**Box 1:** List of EU food allergens [10]

Cereals containing gluten namely wheat (such as spelt and Khorasan wheat), rye, barley  
 Crustaceans and products thereof (for example prawns, lobster, crabs and crayfish)  
 Egg and products thereof  
 Fish and products thereof  
 Peanuts and products thereof  
 Soybeans and products thereof  
 Milk and products thereof (including lactose)  
 Nuts (namely almond, hazelnut, walnut, cashew, pecan nut, Brazil nut, pistachio nut and Macadamia nut (Queensland nut))  
 Celery and products thereof  
 Mustard and products thereof  
 Sesame seeds and products thereof  
 Sulphur dioxide and/ or sulphites at concentrations of more than 10mg/kg or 10mg/L (litre)  
 Lupin and products thereof  
 Molluscs and products thereof (for example mussels, clams, oysters, scallops, snails and squid)

The detriments to the quality of life for allergic consumers and their families has been well documented [11, 12, 13]. Although there are no boundaries on the groups of people food allergies effect, Gowland, [14] recognises that teenagers and people in their early twenties are particularly at risk, as they are beginning to make independent food choices and they are ill equipped in food preparation and have had little experience in dealing with the risk allergens pose. In addition, the vulnerability of this group is exacerbated by the struggle for social acceptance and that due to peer pressure; this group is more likely to engaging in risky behaviour particularly when they are out with friends [15].

From December 2014, all FBs have been required to provide information about allergenic ingredients used in foods sold or provided by them. This legal duties placed upon FBs are based on EU Food Information for Consumers Regulation (No.1167/2011) (EU FIC) and Commission Delegated Regulation (EU) No. 78/2014 amending Annex II of 1167/2011. This requirement states that food must be safe, authentic and properly labelled and the responsibility for this falls to the FBO; however, there is an expectation of some regulatory oversight. This is where the enforcement regarding allergens becomes complex and the issue is raised as to whether allergens are a food safety issue or a food standards matter. Allergen enforcement has taken two separate tracks, food safety, e.g. hygiene and contamination and food standards, e.g. labelling, authenticity and fraud [16].

For individuals who experience food allergies, avoidance is often the only solution as accidental allergen ingestion is potentially life threatening for many [17]. The conveying of information regarding allergens then becomes vitality important as eating away from the home has become more of a norm. This presents a particular problem for consumers with

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food allergies as the lack of information can lead to exposure of risk and/or unnecessary restrictions. In the UK Bailey et al, [18] reported that of 90 restaurant staff surveyed, 81% reported being confident in providing a safe meal for a food allergic customer yet 38% believed that consuming a small amount of an allergen was safe; Common et al, [19] found that out of 40 UK restaurant staff questioned, all respondents were comfortable and 65% were very comfortable in providing a safe meal, yet 25% believed that cooking food would prevent it causing an allergy – this would seem to justify the concerns that allergic consumers would have in eating away from the home.

Even after the introduction of the legislation, the UK's Royal Society for Public Health [20] established that takeaway food businesses were struggling to meet the new legal requirements: 66% of all takeaways failed to provide the legally required information on how customers can find the 14 allergens; over 50% were unable to state whether their food contained an allergen and 80% were not in possession of records stating whether allergens were present in ingredients.

The studies indicates there is a significant gap in the knowledge and practice of FBs around the provision of allergen safe food to customers. Therefore the aim of this research is to explore the understanding and practices of FBs in relation to food allergens.

The research was undertaken in the Borough of Knowsley which is located in the North West of England. The Borough is typical of a mid-sized urban district in the UK, although it is ranked 2nd in terms of deprivation in the UK. The Environmental Health team for the Borough of Knowsley are responsible for the enforcement of 750 takeaway FBs, which provide a range of cuisines to the local residents and visitors.

## METHODS

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### Research Design

The research itself consisted of two different research elements. The first element of the research aimed to assess the knowledge and attitudes of FBOs surrounding allergens utilising questionnaires. The second element of the research was designed to explore the practises in place within the business and an allergen audit was undertaken.

### Sampling

Using pragmatic sampling, from the list of 750 FBs every 25<sup>th</sup> FB was selected in order to achieve a sample size of 30 businesses. However, given the time and resources limitation for the survey only 21 FBs took part in both the questionnaire and audit elements of the research.

### Questionnaires

The questionnaire was specifically developed by the authors for the purpose of this research considering the Food Standards Agency's guidance on food allergens. The questionnaire was designed to assess the

knowledge and attitudes of FBOs and took on the style of a descriptive survey, which employed both closed questions and those based on a Likert scale. The questionnaire probed the FBOs level of knowledge regarding the requirements of the legislation and how clear/easy to understand these legislative requirements were. To gain insight into the knowledge FBO's have in being able to identify allergens they were provided with a grid of ingredients and asked to identify any that they believed should be highlighted as an allergen. The grid contained a list of 28 ingredients, of which 17 were classed as allergens. This included all 14 specified allergens plus three other commonly used items that contained one or more allergens (these items were: mixed nut powder; pasta and almond powder). Finally, the questionnaire explored how confident FBOs were in providing a safe meal and the factors that could cause issues for allergen sufferers.

### Audit

The audit focused on three main areas:

- The display of information
- Allergen control in storage, kitchen, production and service areas
- Confidence in management (how well the guidance was understood by the FBOs)

In order to allow for a standard and consistent measure for these three areas, an allergen descriptor matrix was developed by the authors for this specific research study. (see box 2). The combined scores for each area of the audit then generated an overall allergen score for each premises. As each area has a highest score of four, the maximum overall score a FB could achieve would be 12. This approach was based around the current food hygiene intervention-rating scheme, which is a risk assessment to determine the frequency of interventions for FBs, and can be found in Annex 5 of the UK's Food Law Code of Practice. Although not its primary purpose, the audit also verifies the answers given in the questionnaire.

#### Box 2: Allergen Descriptor Matrix

Display of information	
score	Guidance on scoring criteria
4	High standard of compliance – clear and informative information displayed on the premises and on the takeaway menu providing the customer with all the necessary information
3	Information is displayed regarding allergens in some areas of the food business but not necessarily both on the premises and on the takeaway menu
2	The need for allergen information is recognised with 'please ask for more information' type signage.
1	Total non -compliance with statutory obligations – no, or very little information displayed on the premises and/or on the menu

**Allergen control in storage, kitchen, production and service areas**

score	Guidance on scoring criteria
4	High standard of control – allergen ingredients are clearly labelled and separated avoiding the risk of cross contamination. There is documented control with regards to the purchasing of allergen ingredients
3	There is good evidence of labelling and separation to prevent cross contamination
2	The business makes some attempt to control allergens by basic separation and some labelling
1	There is total non-compliance with the Food Standards Agency guidance. Labelling is poor and cross contamination of allergens is evident

**Confidence in management**

Score	Guidance on scoring criteria
4	FBO is knowledgeable and has an excellent understanding of allergens and legal requirements. They can confidently discuss processes in place to ensure compliance
3	FBO has good knowledge surrounding allergen requirements and the impact this has on the business
2	The FBO has some understanding, however there are obvious gaps in knowledge and understanding
1	There is no, or very little knowledge or understanding by the FBO of allergens, the requirements around them or the impact this has on the business

**Data Collection**

As this research was undertaken as part of the BSc (Hons) Environmental Health degree programme, prior to collection of any data, ethical approval was obtained from Liverpool John Moores University. The questionnaires were administered face to face with the FBOs and the audits undertaken at the same time. Visits to the food premises were carried out during weekdays and evenings in January/February 2018. The FBOs were aware that the research was taking place, as they had previously been contacted directly by the Environmental Health team. However, none of the visits were pre-arranged and the researcher arrived unannounced at each of the premises.

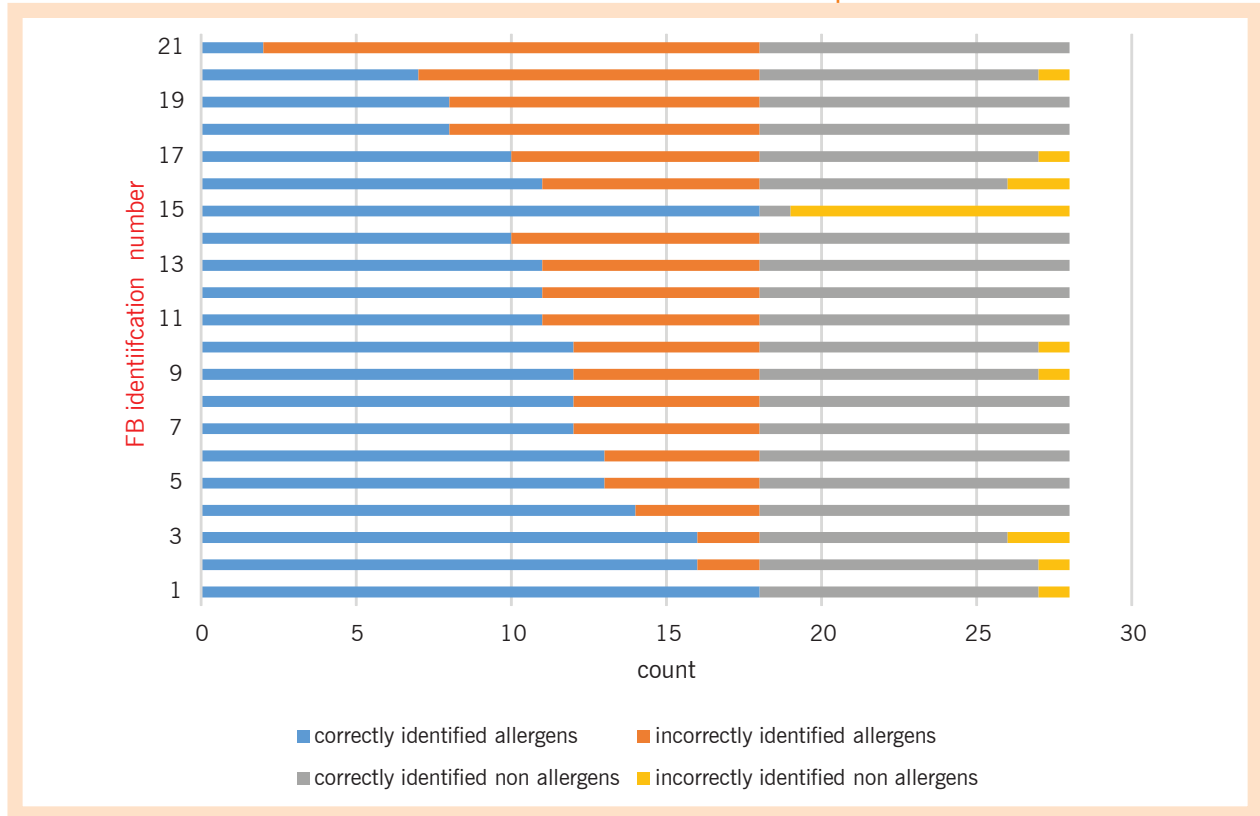
**Data Analysis**

Data from the questionnaires and audits were analysed using Microsoft Excel. The descriptive statistics are used, as well as Pearson's correlation coefficient.

**RESULTS AND DISCUSSION****Results****Questionnaire Findings**

There is a legal requirement under the legislation for FBOs to display information regarding allergens in their businesses. When asked, 90% (n=18) of FBOs were aware of this requirement, with only 10% (n=2) of all FBOs providing the answer as no (total n=20).

The FBOs were then asked if the legislation relating to allergens was clear and easy to understand. 85% (n= 17) agreed or strongly agreed



**Figure 1.** Allergens and non-allergens correctly and incorrectly identified

that the requirements under the legislation are clear and easy to understand, with 15% (n=3) disagreeing (total n= 20).

Figure 1 shows the number of correctly identified allergens; incorrectly identified allergens; correctly identified non-allergens and incorrectly identified non-allergens. Of particular note is the one FBO who identified all 18 allergens correctly, but-also identified nine incorrectly.

When asked how confident they were in preparing a safe meal 67% (n=14) of FBOs stated they were very confident and 33% (n=7) said they were confident. None of the FBOs stated they were unconfident or very unconfident. (total n=21)

The FBOs were then asked a series of questions relating to the management of allergens and their impact.

Table 2 demonstrates that 23% (n=5) of FBOs thought that when eaten in small amounts, food allergens would be safe for allergen sufferers to eat, whereas 77% (n=16) of FBOs did not (total n=21).

**Table 2.** FBO perceptions towards specific aspects of allergen safety management

	Strongly disagree		Disagree		Agree		Strongly agree		Total	
	No. FBs	% FBs	No. FBs	% FBs	No. FBs	% FBs	No. FBs	% FBs	No. FBs	% FBs
Safe to eat small amount of allergens	10	48%	6	29%	3	14%	2	9%	21	100%
Allergens destroyed by cooking	13	62%	6	29%	2	9%	0	0%	21	100%
Importance of cross contamination	0	0%	1	5%	10	48%	10	48%	21	100%

In addition Table 2 demonstrates that 9% (n=2) of FBOs thought that cooking would destroy food allergens, whereas 81% (n=19) of FBOs did not (total n=21).

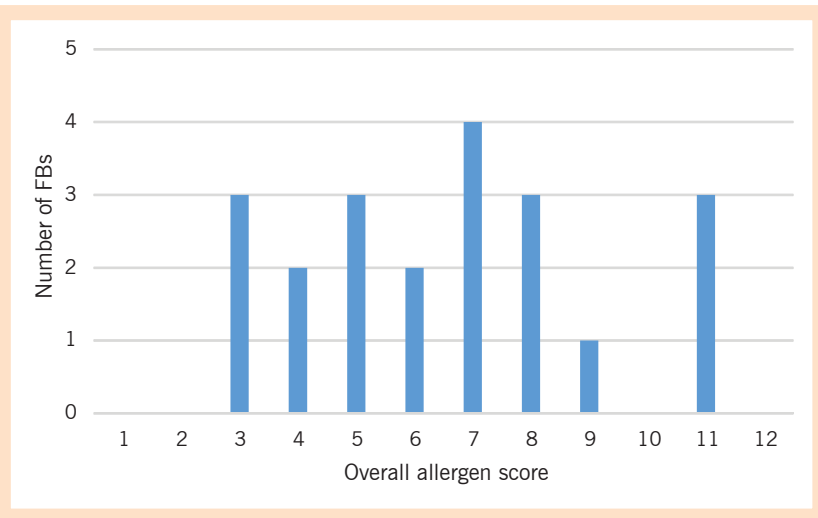
Finally, Table 2 highlights that FBOs understand the importance of cross contamination, with 95% (n=20) agreeing that it can be a contributing factor to a dish becoming contaminated with an allergen and only 5% (n=1) disagreeing (total n=21)

### Audit findings

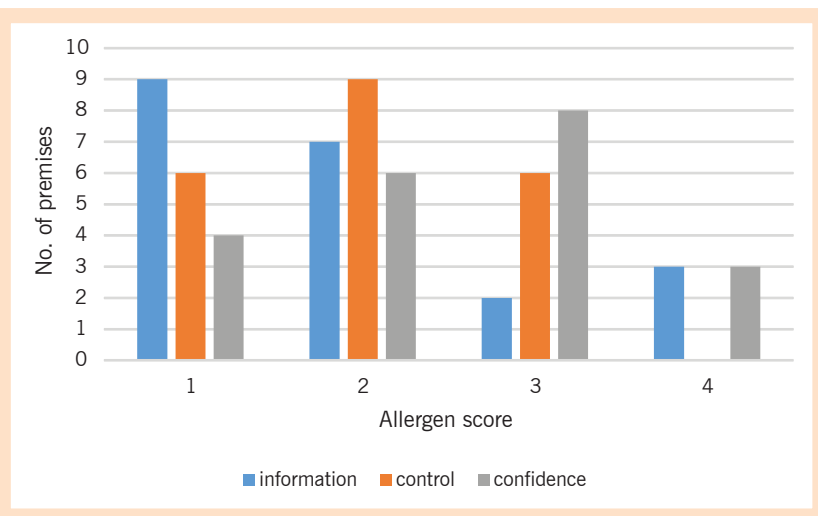
The second element of the research was the audit of the premises and this part of the research was designed to explore the actual practises of the business. The highest overall score that each FB could obtain was 12 and Figure 2 shows the range of scores achieved by the FBs.

This data was then broken down further to determine the score achieved in each area of the audit. This is detailed in Figure 3.

**Figure 2.**  
Overall allergen scores achieved



**Figure 3.**  
Allergen scoring for all areas of the Allergen Audit



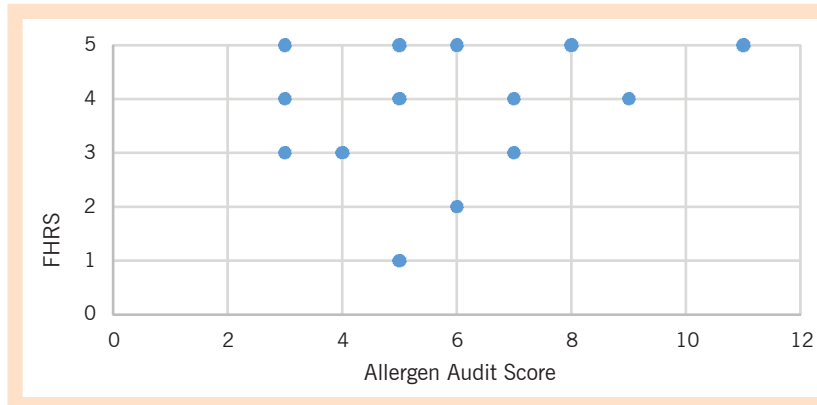


The score ranges from 1 (total non-compliance with guidance/ cross contamination is inevitable/ no or very little knowledge by the FBO surrounding allergens and the impact of them) to 4 (where a high standard of compliance was observed/allergens are clearly labelled to avoid cross contamination and there are documented controls with regards to purchasing/excellent knowledge and the FBO can confidently discuss processes in place to ensure compliance).

As Figure 3 shows, none of the premises visited receive the highest score available for allergen control and only 25% of FBs received the highest scores for display of information and confidence in management.

All the FBs involved in the research were registered with the local authority and as such, all (except one, which was a new business and was awaiting inspection) had a current Food Hygiene Rating System (FHRS) score. The FHRS generates a score based upon three elements: current level of compliance (hygiene); current level of compliance (structural) and confidence in management/control procedures. The FHRS score ranges from 0 (urgent improvement necessary) to 5 (very good).

To explore any relationship between the FHRS score and the allergen matrix score generated by this research, the FHRS score for each premises was identified. This was then plotted against the allergen matrix score for the premises, as shown in Figure 4.



**Figure 4.**

Scatterplot of Food Hygiene Rating Scores against allergen audit scores

As shown in Figure 4 there does not appear to be a direct relationship between the allergen score and the FHRS score. Whilst the FBs with the highest scoring allergen matrix score did achieve the highest FHRS, so did a FB with one of the lowest allergen matrix scores. Indeed, the three lowest allergen matrix scores were found to be in FBs that were deemed acceptable, according to their FHRS scores.

The Pearson correlation co-efficient ( $r$ ) for the above scatter plot is moderately positive (+0.40) and has a  $p$  value of 0.069, which indicates the relationship is not statistically significant.

## DISCUSSION

All FBOs that participated in the study felt they were either confident or very confident in providing takeaway meals that were safe to eat for customers with stated food allergies. Yet the results of this study suggest that such a level of confidence may be misplaced, in line with the findings of Bailey et al. [21], Common et al [22] and the Royal Society for Public Health [23].

The vast majority of FBOs claimed to be aware of the legislative requirements to display food allergen information and that in general these requirements are clear and understandable. The allergen audit though, revealed that 33% (n=7) of premises provided only the most basic information and that a further 43% (n=9) had no or very little information on display. This apparent contradiction means that customers who would rely on the information provided by the FBO are being potentially misled and misinformed as to the presence of allergens in the food provided.

Even if a customer advises an FBO that they suffer from a food allergy, there is still the potential that they are putting themselves at risk. As previously stated, all the FBOs that participated felt they were either confident or very confident in providing takeaway meals that were safe to eat for customers with stated food allergies. The questionnaires and audits would challenge this: 23% (n= 5) believed that it is safe for an allergen sufferer to consume a meal, if only a small amount of the allergen is present; 9% (n=2) assumed that food allergens could be destroyed through the cooking process.

The risk is that FBOs who hold these beliefs and make these assumptions are endangering the health of their customers; customers who think that by consuming food from establishments display allergen information and informing the FBO of their food allergy, that they have taken appropriate steps to protect themselves from harm.

Overall the FBOs demonstrated a good knowledge of the food allergens themselves and 95% (n=20) were aware that cross contamination was a contributing factor for a dish to contain a food allergen. This knowledge and awareness was not perfect, with none of the FBOs being able to correctly identify all the allergens and non-allergens presented to them, indeed one FBO appeared to simply tick every box. Perhaps of greater concern is that whilst cross contamination was identified as an important factor none of the FBOs achieved the highest mark in the audit for allergen control, with 43% (n=9) just making a minimum effort and 29% (n=6) showing no level of control at all. This is perhaps the key finding for the research. It highlights that regardless of the information provided to the customer and then awareness of the FBOs, if cross contamination is not effectively controlled in the kitchen then customers are exposed to a significant level of risk. The gap between the confidence expressed by FBOs in their ability to provide safe meals and their actual practice poses a clear health risk to customers with food allergies.

In addition, the research found that the level of food hygiene in the FBs was not directly related to their practice and awareness around aller-

If cross contamination is not effectively controlled in the kitchen then customers are exposed to a significant level of risk.

gens – although it must be noted that the relatively small sample size could have influenced this value. This could lead to further risk for customers, who may assume that because a FB has a good FHRS score that the FB is able to adequately provide food that is allergen free. It creates a situation where hygienic food is not necessarily safe food – justifying the question as to whether allergens are a food safety issue or a food standards matter.

### Limitations

The research utilised small sample of FBs (n=21). It must also be acknowledged that this reported level of confidence may have been generated as a result of the Hawthorne Effect – were participants provide answers they believe that the research is seeking. This is perhaps especially relevant, since the FBOs may have felt a “wrong” answer could have led to formal action against them. However, in order to limit this, it was made clear to the FBOs that the research was part of a University research project and that the researcher was not part of the Environmental Health team.

## CONCLUSION

The introduction of legislation seems to have made little difference to the level of compliance found within FBs. It can be suggested that the introduction of it has had little effect on FBs, other than perhaps the cosmetic change of the putting up of a sign, stating that food produced on the premises may contain allergens. This alone does not make the FBO compliant and possibly instils a dangerous sense of false security for customers with food allergies.

Those cases that are reported and brought to the attention of enforcement staff, and then afterwards the public, are often the ones that have resulted in fatalities. Yet how many “near misses” occur that are never notified? For any legislation to be effective and to result in behaviour change, it must be adequately enforced and resourced. In the UK, enforcement officers were encouraged to adopt an advisory approach when the legislation commenced, switching to a more formal approach after 12 months. However, the lack of any tools (such as the audit tool developed for this research) to gauge the level of compliance within a FB; the lack of any incident reporting mechanism and the confusion as to whether this is a food safety or food standards issue, leaves customers vulnerable and exposes them to an unacceptable level of risk.

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