Transitioning to Independence: Late Adolescents Access to Food and Health Care and Self-Management of Food Allergies

by

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A thesis submitted in partial fulfilment for the requirements for the degree of Doctor of Philosophy, at the University of Central Lancashire

November 2024

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Table of Contents

Abstract

The period of transition from late adolescence to adulthood is a pivotal life stage characterised by increasing autonomy, risk-taking and many developmental changes. This can lead to poorer food choices, which will directly impact dietary intake. The presence of a food allergy will significantly impact both food choice and dietary intake due to the implementation of avoidance diets and the reduced access to safe, allergen-free food. The management of food allergies during the life stage of late adolescence necessitates adequate support. Despite this, access to sufficient support is a challenge for this group. At present, little research exists exploring the food choice, food access, dietary intake and healthcare access of late adolescents with food allergies. To understand the factors which influence food choice and therefore dietary intake and to understand the challenges and opportunities faced by late adolescents with food allergies when accessing food and healthcare is crucial. This can enable the development of tailored interventions which contribute to a more robust support system, consequently optimising the overall health and quality of life in this group. Therefore, the overall aim of this research was to investigate the current food choice, food access, healthcare access and dietary intake in late adolescents with food allergies in North West England.

This research consisted of five stages - the first three addressing the current food choice, food access and healthcare access of late adolescents with food allergies; the fourth stage explored their dietary intake while in the fifth stage, possible interventions were discussed and suggested with a diverse group of participants (food-allergic patients, parents/carers and healthcare professionals) to improve the current food and healthcare access of late adolescents with food allergies.

A mixed methods approach was used for this research. Through quantitative questionnaires, geographical mapping and qualitative focus groups, the current food choice, food access and healthcare access of late adolescents with food allergies was explored. In each case, a comparative analysis between late adolescents with and without food allergies was also conducted. Main results highlighted no differences between groups in relation to food choice. Challenges in accessing allergen-free foods were also identified. Similarly, late adolescents with food allergies struggled in accessing sufficient healthcare, in particular nutritional and psychological support were challenging. Through diet diaries the current dietary intake of late adolescents with food allergies was also explored. Dietary intake was found to be broadly similar in both late adolescents with and without food allergies. Diet quality was considered to be poor in all participants, with increased intakes of saturated fat, refined carbohydrates, sugar and salt and an inability to meet the recommended fibre intake. A novel approach of this

research was the collaboration between food-allergic patients, parents and healthcare professionals in recommending potential interventions based on the findings of each stage of this research.

The results of this PhD research have important implications for further research. Late adolescents with food allergies desire to be like their peers and balancing this with the realities of managing food allergies is a challenge. The need to create an environment that promotes inclusivity while at university and supports the needs of late adolescents with food allergies is crucial. Additionally, access to quality health care that considers the unique needs during the transition from adolescence to adulthood is an imperative aspect of management. Collaboration is key – educational institutions, healthcare providers, policymakers and food-allergic patients themselves must work together to ensure a holistic and supportive approach in the management of food allergies.

List of Figures

List of Tables

List of Abbreviations

AFF – Allergen Free Foods

BSACI – British Society for Allergy and Clinical Immunology

DRV – Dietary Reference Value

EAACI – European Academy for Allergy and Clinical Immunology

FA – Food Access

FAP – Food Allergic Patients

FC – Food Choice

GPsWER's – GPs with Extended Roles

HCA – Healthcare Access

HCP – Healthcare Professional

IMD - Index of Multiple Deprivation

LA – Late Adolescents

LSOA's – Lower-Layer Super Output Areas

NHS REC – National Health Service, Research Ethics Service

NICE – National Institute for Health and Care Excellence

NIHR – National Institute of Health Research

NW – North West of England

PAL – Precautionary Allergen Labelling

P/C – Parent/Carers

UCLan – University of Central Lancashire

Acknowledgements

I would like to take this opportunity to thank all those who made this Doctoral thesis possible.

First and foremost, I would like to thank my supervisory team Dr Jan Mei Soon-Sinclair, Professor Mick McKeown and Dr Timothy Smith for their invaluable guidance, support and expertise throughout this journey. In particular, I wish to extend my sincerest thanks to my primary supervisor Dr Jan Mei Soon-Sinclair, for your dedication, expertise, and continued feedback during every phase of this research. Your tireless efforts in reviewing my work and your insightful comments and suggestions have been instrumental in shaping this thesis. I feel extremely fortunate for your guidance and am deeply thankful to have had you as my mentor.

I would also like to acknowledge Dr Komali Kantaman, Dr Upaka Rathnayake and Dr Randika Makumbura for their continued guidance and support in the geographical mapping chapter and also to Dr Shingai Nyarugwe for your assistance with focus groups and thematic analysis.

I am also very grateful to the National Institute of Health Research, ARC North West Coast, (NIHR ARC NWC) for their funding, which played a crucial role in the successful completion of my research project.

A huge thanks to all of my public advisors – your valuable insights, experiences and feedback have certainly enriched the depth and quality of this thesis.

A special mention to all of my family, I am extremely fortunate for your continued support.

And lastly to my husband - thank you for your encouragement and understanding during the challenging phases of my research journey. I am profoundly grateful for your continued patience, support and belief in me.

Chapter 1

1.1. Introduction

The primary focus of this research was to explore the current food choice (FC), food access (FA), dietary intake and healthcare access (HCA) of 18-25year olds with food allergies in the North West of England. This research has been made possible through funding from the National Institute of Health Research, Applied Research Collaboration, North West Coast (NIHR ARC NWC). A Health Inequalities Assessment Toolkit (HIAT) was used to continuously inform this research ensuring equity at every stage.

The World Allergy Organisation (2017), has defined food allergy as a 'hypersensitivity reaction initiated by proven or strongly suspected immunologic mechanisms.' Food allergies are typically mediated by IgE antibodies, which are characterised by the rapid onset of symptoms following ingestion. This can include hives, swelling, vomiting, abdominal pain and in more severe instances, anaphylaxis. In some cases non-igE mediated mechanisms can also be involved. Effects of these types of reactions are generally delayed upon consumption of the offending food, causing milder reactions, with gastrointestinal symptoms and inflammation the most common of manifestations (Lopez et al., 2023). Over the last few decades, diagnostic rates of food allergy in the UK are ever increasing (Daniels et al., 2021). While self-reported food allergy in the UK has reached up to 20%, the number of clinically diagnosed food allergies is much lower affecting between 1 and 2% of the UK population (FSA, 2017; Allergy UK, 2024). Food allergy can develop at any age and are more common in children than adults. Approximately 6% of the adult UK population are affected by food allergy (FSA, 2024), while in children this is thought to be between 6 and 8% (BSACI, 2024). In individuals where sensitisation has occurred from previous exposure, any food protein can cause allergy. In the UK there are eight top allergens that trigger 90% of all food allergy reactions – milk, egg, soy, wheat, fish, shellfish, peanut and tree nuts (Allergy UK, 2021). A recent study conducted by the Foods Standards Agency (2024) highlighted how peanuts and tree nuts were most likely cause allergic reactions in UK adults. Allergies to fresh fruits (related to birch pollen) were also prevalent in this group, while milk, fish, shrimp and mussels were least likely to cause allergies. In comparison, milk, egg and peanuts are the most common causes of food allergy in UK children (BSACI, 2024).

From the age of 18, individuals will likely transition into further education or employment naturally shifting from a phase of heavy reliance on parental influence, to one of greater

autonomy (Zarrett and Eccles, 2006; Curtis, 2015; Bonnie and Backes, 2019). Much literature indicates that for this period of late adolescence to adulthood, 18-25years is perhaps the most inclusive range (Zarrett and Eccles, 2006; Beresford and Stuttard, 2014; Curtis, 2015; Jaworska and Macqueen, 2015; Steinberg, 2015; Sawyer et al., 2018; Roberts et al., 2020). **Therefore, this piece of research will use the age range of 18-25years to characterise this period of 'late adolescence.'** The life stage of late adolescence itself is both unique and complex. It is characterised by varying stages of biological growth, social transitions and psychological advances. These individuals will likely have an increased desire for independence and a belief of invincibility. The need to explore and experiment is heightened as social identity is pursued, often leading to much risk-taking in this group (Zarrett and Eccles, 2006; Curtis, 2015; Sawyer et al., 2018; Bonnie and Backes, 2019). Throughout this process of human development, the additional burden of managing a food allergy will prove challenging and thus, it is no surprise why LA with FA possess the highest risk of fatal reactions (Newman and Knibb, 2020). Optimal access to quality food and healthcare is therefore demanded in this group. Despite this, little support in this regard is currently available specifically for this group of individuals.

For LA with food allergies, the need for a quality diet encompassing all essential nutrients, without compromising safety is crucial – not only as means of enhancing academic performance, but also to maintain good overall health. The implementation of an avoidance diet (as is one of the main forms of treatment for food allergy) will prove difficult in LA. These individuals will be influenced by social pressures and peer pressures and the increased risk-taking can make it difficult to appropriately screen food products to ensure their suitability. Consequently, this will restrict FC while also increasing the risk of accidental exposure (Dilley et al., 2018; Tackett et al., 2019). Furthermore, while allergen-free foods offer a safe and diverse means of improving FC and consequently dietary intake, they are considerably more expensive, with their availability limited to large supermarkets. In addition to this, accessing sufficient healthcare for LA with food allergies is a challenge (Royal College of Physicians, 2003; Barker et al., 2021). This stems from multiple reasons. For instance a limited number of allergists, reduced confidence and training among health professionals and increased waiting times for diagnosis and treatment (Diwakar et al., 2017; Khaleva et al., 2020). Delayed and/or inadequate allergy care will lead to an increased risk of allergic reactions in patients, causing a host of issues; for example, heightened anxiety, social isolation, reduced dietary quality, and in more severe cases, hospitalisations and anaphylaxis. This in turn will dramatically reduce overall health and well-being (Groetch and Venter, 2020; Knibb et al., 2023). Two additional contributing factors to the reduced food and HCA in LA with FA, are geographical location and socioeconomic status (Warner et al., 2006; Bilaver et al., 2016).

Clearly, the inabilities of for LA with food allergies to access appropriate food and healthcare will not only prove detrimental to health, but will inevitably increase the existing burden on the healthcare systems. In the field of allergy, research in specifically LA between the ages of 18 and 25years is almost non-existent, with most studies focusing on either childhood or adulthood. While some literature has looked at the current food and HCA of those with food allergies, little research has explored this in the UK context. Similarly, few pieces of research have investigated the impact of food allergies on the food and HCA of specifically LA, despite this being a crucial life stage which will shape future behaviour. Hence, there is a need to further investigate food and HCA in this group of LA to identify existing disparities and challenges faced. This will lead to the development of effective interventions that will improve the overall health and well-being of these individuals. Therefore, in this PhD research the current food and HCA of LA with food allergies will be investigated.

1.1. Research Aims and Objectives

The overall aim of this research was to investigate the current FC, FA, HCA and dietary intake in LA with food allergies in North West (NW) England. The aim is supported by 5 specific objectives.

FC is a multifactorial and complex process. Biological (taste, smell, hunger), social (family, peers, culture), psychological (emotion, stress) and economic (cost, availability, income) factors are considered to be major determinants of FC. The period of transition from late adolescence to adulthood is a challenging developmental stage, due to factors such as increased peer pressure, risk-taking and heightened emotions, which can lead to poor FC. Additionally, the presence of a food allergy itself can further elicit negative FCs. Therefore, **the first objective was to understand these various factors impacting FC behaviour in LA with and without food allergies.** Additionally**,** physical access to food is an important factor in predicting FC behaviour and thus, the **second objective was to determine the access to healthy, nutritious food and allergen-free food in those with and without** food allergies**.** In addition to this, FC behaviour has a direct impact on dietary quality and therefore, **the third objective involved determining the dietary intake of individuals with and without** food allergies**.** To our knowledge, this is the first piece of research investigating FC, FA and dietary intake specifically in LA with food allergies. Results obtained from these studies will further our understanding of FC and FA during this critical period of transition and will help to identify the most influential determinants of FC. This information can therefore be utilised to empower young people in adopting healthier behaviours, which will consequently allow for nutritional needs to be met, inevitably improving future health status.

Throughout this period of transition, LA will have to assume personal responsibility while managing their chronic food allergies. During this time, individuals will require healthcare systems to provide the necessary support and guidance. Despite this, adequate support is currently not available that targets the specific needs of LA with food allergies, undergoing this critical period of transition. Individuals will have no choice but to continue to attend paediatric allergy clinics before transferring to adult allergy clinics at approximately 18 years. With little or no services to support this transition process, LA will often be left feeling lost in the system. They will feel as though they have outgrown the support they once relied on during their childhood years, while feeling too young to adopt the role of an adult. **Therefore, the fourth objective explored the current HCA for LA with** food allergies **from both the perspective of the food allergic patient, the parent and the HCP. Additionally, the barriers and facilitators experienced by HCP in providing care for this group were also determined.** Limited research is currently available investigating current healthcare for LA with food allergies. It is hoped that the findings from this study will help to identify the healthcare needs of food-allergic patients and any existing gaps in knowledge and training of HCP. This in turn will allow for the recommendation of necessary interventions, with the intention of informing and influencing services to maximise the quality of care distributed, ultimately allowing for the successful management of food allergies.

Socioeconomic status has a considerable influence on FA and HCA. Those with fewer resources who are from socio-economically disadvantaged groups, are more likely to make poorer choices in relation to food (Monterrosa et al., 2020). Likewise, the cost of medication and continued support (e.g. travelling long distances for healthcare) will further burden these individuals, limiting their access to appropriate food and healthcare (Minaker et al., 2014). The presence of a food allergy itself will automatically place these individuals at a further disadvantage, consequently increasing their risk of food and health insecurity. Therefore, data collection for each of the above aims was concentrated in the NW Region of England, as this area has a large number of neighbourhoods with high levels of socioeconomic deprivation. LA are the most understudied age population with respect to FC, FA, HCA and dietary intake, despite this being a crucial life stage where optimal dietary quality and healthcare is required. Even less data are available for LA with food allergies and as such, the target population for each of the above studies focused on those between the ages of 18 and 25years. A comparison for each of the above aims between those with and without food allergies was also conducted, as means of exploring any potential differences between the two groups.
The overall results from each study will further our understanding into the current FC, FA, HCA and dietary intake of LA with and without food allergies in the NW. **This will ultimately lead to the final objective to suggest preventive interventions with FAPs, parents of**

individuals with food allergies and healthcare practitioners who have had experience in providing care for LA with food allergy. Based on the findings of each phase, a collaborative effort in the form of potential interventions to improve the current FC and therefore dietary intake, FA and HCA in LA with food allergies will be suggested. Consequently, the proposed recommendations will provide an evidence based foundation that if implemented, will undoubtedly have potential to mitigate the negative impacts of food and health inequity in LA with food allergies.

1.2. Thesis Outline

An overview of the PhD study has been illustrated in Figure 1.1

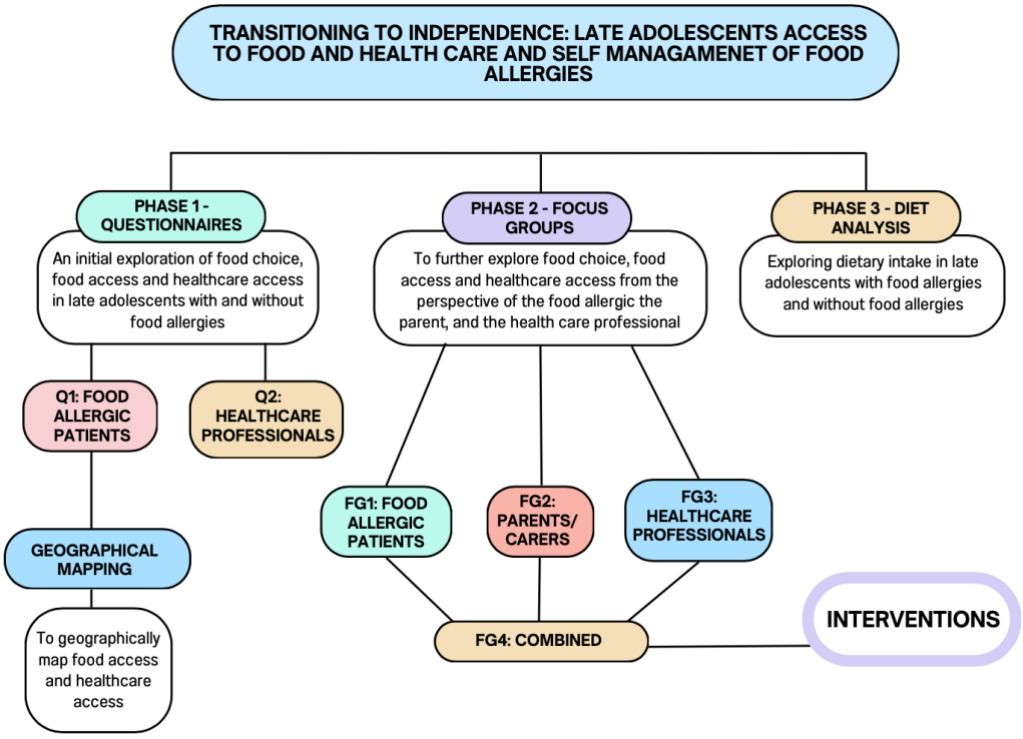


Figure 1.1. An overview of the PhD study

The current chapter (Chapter 1) provides a general overview of the research, research aims and thesis outline.

Chapter 2 reviews the existing literature in relation to FC, FA and HCA. It begins by reviewing the incidence and prevalence of allergy in a global context, later moving on to a more specific focus in the UK and the NW region. Health inequalities in allergy care are then mentioned, followed by a discussion of allergy at the primary care level and the importance of transition care. The beneficial role of a range of allied health professionals in allergy care are also discussed. This chapter then moves on to looking at FC behaviour in specifically LA before concluding with a section on food insecurity.

In Chapter 3, quantitative questionnaires were used to determine an initial insight into factors influencing FC as well as food and HCA of LA with and without food allergy. The food and HCA results from this chapter were then geographically represented using mapping software (ArcGIS), to highlight which specific areas within the NW had reduced access to food and healthcare. A comparison was also made between those with and without food allergies. This is described in Chapter 4. Chapter 5 specifically focuses on the current HCA available for LA with food allergies from the perspective of the HCPs themselves. This again was achieved through quantitative questionnaires. In Chapter 6, an in-depth analysis of FC, FA and HCA is determined through qualitative focus groups. Thematic analysis using NVivo was used to analyse the data. In this study, the perspective of the food-allergic patient, the parent and the HCP was considered. FC behaviour determines food consumption and Chapter 7 therefore, provides a comparative analysis of dietary intake in LA with and without food allergies. Data collection was achieved through 4-day diet diaries and analysed using the software Nutritics. Based on the findings of each of the above studies, Chapter 8 discusses interventions to improve the current FC and therefore dietary intake, FA and HCA of LA with food allergy in NW England. This was achieved through one qualitative focus group, whereby through collaborative effort, food-allergic patients, parents and HCP contributed to potential interventions. The final Chapter (Chapter 9) readdresses the principal aim and objectives of this research and provides an overview of the findings of the studies conducted throughout this project. Limitations are mentioned and recommendations for further research are also outlined in this chapter.

Chapter 2

Literature Review

2.1. Allergy – Incidence, Prevalence, Treatment and Direct Cost

The incidence and prevalence of allergy across the world has increased and is continuing to do so (Daniels et al., 2021). Approximately 20% of the global population is affected by allergic disease (Dierick et al., 2020). This is being seen in both developed and developing countries. Developing countries are most at risk, where the paucity of allergy care services alongside the sharp increase associated with urbanisation, will cause a significant burden (Asher, 2011; Hossny et al., 2019; Daniels et al., 2021). The UK has one of the highest rates of allergy, with approximately 18 million allergy sufferers (BSACI, 2023). It has been estimated that 44% of all UK adults and 50% of all UK children are experiencing some allergy-related conditions (Cruddas, 2023; Allergy UK, 2024). In particular, there has been an increased prevalence of food allergies. (Rachid and Keet, 2018; De Martinis et al., 2020). Currently, 2.4 million people in the UK are living with a food allergy (FSA, 2024). Therefore, this high prevalence of allergic disease warrants sufficient management.

One primary treatment of food allergies is the avoidance of the offending allergen. This in itself is a challenging task. One which requires knowledge of interpreting food labels, an increased vigilance to minimise the risks of cross contamination and an adequate communication of the food allergy to other's (Rachid and Keet, 2018). Recent developments in food allergy research are also exploring additional options, including oral immunotherapy (the practice of gradually increasing amounts of a food allergen to desensitise the immune system) and sublingual immunotherapy (placing food allergens beneath the tongue to desensitise the immune system). One example of oral immunotherapy for peanut allergy sufferers is the use of a drug called Palforzia – the first licensed treatment for peanut desensitisation. These alternative options offer potential treatments for those with food allergies and have shown great promise, thus raising hope for the many suffers of food allergic disease (Sicherer et al., 2020; Muraro et al., 2022; Pouessel and Lezmi, 2023).

The increased prevalence of allergy will place an increased burden on the health care systems (Tang and Mullins, 2017). Health care services will face considerable direct medical costs, owing to the diagnosis, management and prevention of allergic disease (Daniels et al., 2021).

In the UK, the cost to the National Health Service for all allergic diseases exceeds £1 Billion per annum (Allergy UK, 2024). A UK study on peanut allergies estimated the annual cost per patient to be between £253 and £333, with a national burden of £33 and £44 million in the year 2015 alone (Scott et al., 2019). Additionally, this substantial cost associated with the management of food allergies is further emphasised by Fong et al. (2022). They mention the significant economic burden of food allergies in the UK, highlighting the direct medical costs associated with hospital admissions and treatments and the indirect medical costs like lost productivity due to time off work. They further mention the high cost of allergen free foods, which further add to the financial strain of food allergic patients. A more recent study conducted by Allergy UK in 2023, further highlights the ongoing financial strain associated with managing food allergies. In this study, 63% of parents expressed their concerns about the financial burden associated with managing their child's food allergy (Allergy UK, 2024).

Clearly, the cost of allergic disease is high. With allergies expected to rise, the cost required for management will only continue to increase, further straining the burden that already exists on the health care systems (Fong et al., 2022). Effective allergy services can and will reduce the overall burden on both the patient and the health care systems, thereby reducing overall costs.

2.2. Allergy Service Provision

Allergy is a major public health problem. Despite a global increase in the incidence and prevalence of allergy, services remain inadequate and are struggling to meet current demands (Barker et al., 2021; Daniels et al., 2021). This challenge is not a new one with the Royal College of Physicians highlighting the insufficiency of allergy services as early as 2003 (Royal College of Physicians, 2003).

Access to and standards of allergists and allergy services greatly vary across countries. In 2006, Warner et al. conducted a study that showcased the global variation in allergy service provision in a number of countries. Their results highlighted an enormous variation between countries at this time (Table 2.1). For instance, Germany had approximately 5,000 certified allergists, clearly offering a much better allergist to population ratio when compared to many other countries. On the other hand, the UK had only 1 allergist per 1,083,333 people – one of the lowest ratios globally. There were also some countries, for example Bangladesh, where there were no certified allergists at all, illustrating the global inequity in allergy care (Warner et al., 2006).

Fast forward to the year 2019 and the situation for allergy care had not improved in many regions. Fyhrquist et al. (2019) conducted a study to update and expand on the findings from Warner et al. (2006), specifically focusing on both specialists and subspecialists in allergy care (Table 2.2). Their research indicated that countries such as the UK continued to remain behind, having the lowest ratio of specialists and sub-specialists in allergy per 100,000 inhabitants. It was specified how the UK had only 0.05 specialists and 0.15 subspecialists per 100,000 inhabitants, reflecting minimal progress over the 13 years. Conversely, countries like Germany had significantly higher numbers with 6.04 subspecialists per 100,000 inhabitants, illustrating a better allocation of resources towards allergy care in this country.

Interestingly, even highly developed regions such as Hong Kong, were found to have limited allergy service provision. Chan et al. (2015), highlighted how the ratio of allergy specialists to patients can reach a shocking 1:2.8 million in Hong Kong (Chan et al., 2015). Additionally, only four Immunology and Allergy specialists were listed in the Hong Kong Medical Council Specialist Register, with only two of them practicing allergy (The Medical Council of Hong Kong, 2017; Lee et al., 2019), further emphasising the limited resources in this country.

By 2021, the gap in allergy service provision remained a pressing issue, despite the growing recognition of the need for improved healthcare services to manage the increasing prevalence of allergies (Barker et al., 2021; Daniels et al., 2021). Although improvements have been made in addressing the shortage of allergy services globally, significant gaps remain. Chong et al. (2023) further emphasise the ongoing challenges in accessing allergy care, particularly in the context of the UK. Their research highlights the persistent shortage of allergists, the uneven distribution of resources and the high financial burden on allergy patients and the healthcare system. They argue that although some countries have made strides in improving the number of allergy specialists and improving service provision, the UK continues to struggle with inadequate resources and difficulties in accessibility. They conclude their research by emphasising the need for continued investment in allergy services and more equitable distribution of healthcare services to better manage the growing allergy epidemic. Despite the UK being a highly developed country, they still face considerable challenges in allergy service provision, as reflected in both historical and recent studies.

103 **Table 2.1.** Number of allergists per head of the population across different countries

Country	**Allergists per head of the population**	**Country**	**Allergists per head of the population**	**Country**	**Allergists per head of the population**
Argentina	1:46,353	*Honduras*	1:1,380,000	*Romania*	1:197,577
Belgium	1:900,000	*Hungary*	1:50,000	*Serbia/Montenegro*	1:500,000
Brazil	1:100,000	*Israel*	1:52,000	*South Africa*	1:1,666,666
Bulgaria	1:106,250	*Italy*	1:43,200	*Spain*	1:44,000
Chile	1:500,000	*Japan*	1:61,200	*Sweden*	1:42,857
Colombia	1:571,428	*Lebanon*	1:121,000	*Switzerland*	1:36,649
Czech Republic	1:17,543	*Malaysia*	1:25,000,000	*Thailand*	1:1,000,000
Denmark	1:135,000	*Mexico*	1:175,000	*Turkey*	1:1,076,923
Ecuador	1:2,400,000	*Mongolia*	1:2,250,001	*United Kingdom*	1:1,083,333
El Salvador	1:470,000	*Paraguay*	1:200,000	*Ukraine*	1:94,441
Finland	1:94,545	*Peru*	1:1,360,000	*Uruguay*	1:110,000
France	1:1,240,000	*Philippines*	1:66,115	*USA*	1:65,546
Germany	1:16,000	*Portugal*	1:63,334	*Venezuela*	1:109,090
Greece	1:183,333				

**Source: Warner et al., 2006*

104 **Table 2.2.** Number of allergy specialists and sub-specialists absolute and (per 100,000 inhabitants) across different countries

Country	Specialists	Sub-specialists	Country	Specialists	Sub-specialists
Albania	48 (1.64)	-	*Kosovo*	17 (0.95)	-
Austria	-	-	*Latvia*	-	25 (1.28)
Belgium	-	-	*Lithuania*	60 (2.08)	8 (0.28)
Bulgaria	74 (1.04)	-	*Luxemburg*	1 (0.17)	15 (2.57)
Croatia	29 (0.69)	60 (1.43)	*Netherlands*	4 (0.02)	37 (0.22)
Cyprus	2 (0.17)	-	*Norway*	-	-
Czech Republic	350 (3.30)	-	*Poland*	1200 (3.14)	-
Denmark	-	-	*Portugal*	250 (2.42)	-
Estonia	3 (0.23)	15 (1.15)	*Romania*	181 (0.81)	-
Finland	-	110 (1.99)	*Russia*	2000 (1.39)	-
France	520 (0.80)	1300 (2.00)	*Serbia*	-	31 (0.35)
Georgia	233 (5.96)	-	*Slovakia*	253 (4.65)	-
Germany		4962 (6.04)	*Slovenia*	-	-
Greece	148 (1.33)	-	*Spain*	1500 (3.24)	103 (1.04)
Hungary	-	500 (5.14)	*Sweden*	70 (0.71)	-
Iceland	-	12 (3.58)	*Switzerland*	150 (1.77)	-
Ireland	-	-	*Turkey*	-	316 (0.39)
Israel	-	90 (1.07)	*UK*	30 (0.05)	100 (0.15)
Italy	1630 (2.74)	-			

**Source: Fyhrquist et al., 2019*

- Indicates lack of specialist/sub-specialist

2.2.1. UK Allergy Care

Even developed countries such as the UK are delivering suboptimal allergy care, greatly reducing patient experience and health outcomes. The UK has an outstanding record of scientific allergy research, yet historically clinical services for allergy sufferers have been severely under resourced and under supplied, leading to poorer patient care (Warner et al., 2006; Finlay and Egner, 2010; Diwakar et al., 2017; Fyhrquist et al., 2019; Chong et al., 2023). In 2010, Finlay and Egner described the UK allergy care as 'basic' – a valid statement given that at that time, there were only six fully staffed major allergy clinics in the UK offering a full-time service and an additional nine allergy services offering a part-time service. Moreover, these specialist services were also hindered with untrained personnel and the high numbers of poor referral practices from primary care services led to long waiting times and so reduced patient care. The lack of specialists also meant that clinical training opportunities were limited (RCP, 2003; Finlay and Egner, 2010; RCP, 2010).

Since then however, the number of allergy clinics in the UK have considerably improved, with 115 allergy clinics now available according to the BSACI. While the North of the UK is home to 40 allergy clinics (17 adult allergy clinics and 23 pediatric allergy clinics), the South has a total of 75 allergy clinics (24 adult allergy clinics and 51 pediatric allergy clinics (BSACI, 2024). This stark contrast between the North and the South suggests that although access to allergy services have become more widespread, the distribution of services is uneven, indicating a continued struggle in in equitable access to allergy care.

2.2.1.1. Call for Improved Allergy Services in the UK

A number of reports spanning from the early 1990s to 2010 have extensively detailed the paucity of allergy specialists, the inadequate training among HCPs and the poor communication between stakeholders and health services in the UK.

The Royal College of Physicians (RCP) (a professional membership body for physicians) released two reports in the 90's – 'Allergy: conventional and alternative concepts' and 'Good allergy practice: standards of care for providers and purchasers of allergy services within the NHS.' Both reports highlighted the need of delivering a competent allergy service to the public. They drew attention to the importance of good clinical practices in allergy and the standards of care required. Additionally, the dangers of relying on practitioners of complementary and alternative medicines were also mentioned. Although both reports were well received and

detailed the efficacies of certain interventions, they did not necessarily impact the improvement of allergy services in the NHS (RCP 1992; RCP, 1994). The continued impact of allergies and the continued shortage of allergy services consequently led to the third report in 2003. This report further outlines the inadequacies of allergy services, the unmet needs of many patients suffering from allergy and as a result, the reduced quality of life they endure (RCP, 2003). The contents of this report was extremely critical that the Department of Health conducted a review in 2004, which led to a UK parliamentary report being issued and a document titled 'The provision of allergy services' was created. The report highlighted the serious problems that existed in the care of allergy patients, particularly in the primary care setting. Recommendations for the inclusion of allergy training in the curriculum for trainee doctors and specialist allergy clinics was made (House of Commons, 2004). In 2006, the Department of Health published a further report 'A review of services for allergy.' The report highlighted the 'serious problems' that existed in the quality of NHS allergy service provision. The need for a greater capacity of services in allergy along with clinical specialists was outlined (Department of Health, 2006). Similarly, the House of Lords Science and Technology Committee led an inquiry into allergy in 2007. A number of practical steps were recommended, including the development of expert centres, which would lead to an improvement in services (House of Lords, 2007). Unfortunately however, these many reports by the House of Commons, Department of Health and House of Commons did not lead to any change in health care policy concerning allergies. In fact, seven years on from its last report, the RCP released yet another titled, 'Allergy services: still not meeting the unmet need' which illustrated that despite the development of multiple intervening parliamentary reports, issues relating to allergy service provision had still not been adequately addressed, largely due to lack of funding being provided (RCP, 2010). All these reports which were published in the UK, showcase that even affluent developed areas can deliver sub-optimal care, leading to reduced patient outcomes and experiences. Additionally, they consistently highlight the ongoing challenges in allergy care, emphasising the persistent gaps in service provision over nearly two decades.

In recent times, there has been a greater focus on addressing these issues. Many national and international organisations have developed various clinical guidelines which incorporate published evidence to improve and standardise care in the UK. For example, the UK National Institute for Health Care and Excellence (NICE) have produced guidance on multiple allergy topics including eczema, anaphylaxis, food allergy and drug allergy (NICE, 2020). Equally, the British Society for Allergy and Clinical Immunology (BSACI) and the BSACI Standards of Care Committee (SOCC) have developed guidelines for conditions such as allergen immunotherapy including allergic rhinitis, drug allergies, anaphylaxis, chronic urticaria/angio-oedema and additionally, specific guidance on food allergies such as milk, nut, peanut and

egg allergy (BSACI, 2006; BSACI SOCC 2021). More recently, the BSACI have released a new initiative to enhance UK allergy services by empowering GPs with specialised training in allergy care – GPs with Extended Roles (GPwER's). The work focuses on increasing the number of GPs who can effectively manage allergy cases within primary care, reducing the strin on specialist services and thus improving patient outcomes. This initiative represents a significant step towards addressing the gaps in allergy service provision in the UK (BSACI, 2023).

Similarly, the lack of allergy services in Europe were also recognised and advances in research and care in this field were prompted. The European Academy of Allergy and Clinical Immunology (EAACI) released multiple guidelines over time which detail evidence-based recommendations for use in clinical practice (EACCI, 2023). From amongst these multiple guidelines, majority address the clinical aspects of care with only few focusing on supporting patient self-management and education and even fewer involving patients and caregivers, who play a key role in the management of allergy itself. Most recently, EAACI have developed a practical toolbox specifically for the effective transition of adolescents and young adults with asthma and allergies. Their research considers a multidisciplinary approach and includes a careful selection of valuable resources, tailored for HCPs, patients, parents, the workplace and the wider community (Vazquez-Ortiz et al., 2023). Thus, to date this EACCI toolkit is the most comprehensive guideline available for the management of allergies.

2.2.1.2. Summary

There is a renewed momentum to improve allergy care and significant strides have been made to address the shortcomings in UK allergy services. At present however, little real-life application and implementation of these guidelines have been seen. The primary reason for this would be the lack of priority and investment into allergy service provision, as well as the lack of political will (Sinnott and Dudley-Southern., 2011; Jutel et al., 2013; Vance et al., 2021; Chong et al., 2023). As more research is conducted, further advancements in allergy are anticipated and this will likely lead to more effective and widespread implementation of guidelines and strategies to better manage allergies, improve patient outcomes and reduce the burden of allergies in the UK.

2.2.2. Accessing Allergy Care in the North West

Access to quality allergy care is necessary for all those suffering from allergies. Communication, understanding and trust are essential components that must be established to provide effective care. This requires both the patient and the HCP to be both physically and mentally present during a consultation (Angier and Jay, 2019). Services closer to the home of patients will therefore support their ability to attend. However, there is a marked geographical inequality in allergy service provision in the UK. Most specialists are based in London and the South East. Specifically, those living in the NW face challenges in accessing health care for their allergy, due to limited availability of allergy services in this region (BSACI, 2024). One main reason for this, is due to the high levels of deprivation that exist in the North West (NW).

2.2.2.1. Indices of Multiple Deprivation

Deprivation refers to the unmet needs caused by a lack of a broad range of resources and opportunities (Noble et al., 2019). Deprivation can lead to health inequalities which can lead to an increased incidence of disease, a greater number of mental health issues, reduced quality of life and high mortality rates. Therefore, increased deprivation levels will consequently lead to an increased burden on the health care systems (Charlton et al., 2013).

The English Indices of Deprivation is an important tool that attempts to measure this broad concept of multiple deprivation across England. The Indices of Deprivation is based on a weighted combination of seven distinct domains *(1. Income Deprivation, 2. Employment Deprivation, 3. Education, Skills and Training Deprivation, 4. Health Deprivation and Disability, 5. Crime, 6. Barriers to Housing and Services, 7. Living Environment Deprivation)* (see Figure 2.1). This allows for an overall relative measure of deprivation to be produced, known as the Index of Multiple Deprivation (IMD), which consequently highlights the most deprived areas in England.

In 2019, the latest Indices of Deprivation report was released highlighting those areas within England that are the most deprived (Noble et al., 2019). Noble et al. (2019), highlights how 45% of districts ranked in the most deprived areas of England, are in the NW region. The report further emphasises these high levels of deprivation through highlighting patterns of deprivation across large areas known as Local Authority Districts. Across England, 317 local authority districts exist, with 1 being the most deprived and 317, the least deprived. Additionally, the report highlights deprivation across smaller neighbourhoods of relatively even size containing approximately 1,500 people known as Lower-layer Super Output Areas

(LSOA's). Overall, the NW contains high levels of deprivation, with 45% of local authority districts ranked in the most deprived decile. This high deprivation is further emphasised in Table 2.3, which shows the 20 Local Authority Districts within England ranked as the most deprived, based on a series of different measures. This data further reinforces the increased overall deprivation that exists in the NW region. Based on the average rank, there is a concentration of Local Authorities in the most deprived decile in areas in London, the Midlands, the North East and in particular the NW, of which 9 of the 20 Local Authorities from this region were ranked as some of the most deprived. Areas in the most deprived decile based on the average score measure included large cities in the Midlands and the North. Particularly cities/towns within Merseyside, Greater Manchester and Lancashire were amongst the most deprived. Amongst the Local Authority Districts that were considered the most deprived 10 per cent nationally, a higher concentration existed in the NW, with 10 of the 20 districts from this area. The local concentration of deprivation, which includes those LSOA's that are extremely deprived, showed particularly high concentrations primarily in the NW. For both income and employment measures, deprivation was greatly concentrated in London boroughs and the Midlands. Certain areas in the NW did feature in the most deprived decile in the income and employment measures. Specifically, Manchester and Liverpool were amongst two areas from the NW that were most deprived in both measures (Table 2.3).

The pattern of deprivation across Local Authority Districts and LSOA's helps in identifying the overall intensity of deprivation across England. Clearly, high levels of deprivation were evident across the NW region in comparison to other areas in England, based on the 2019 indices.

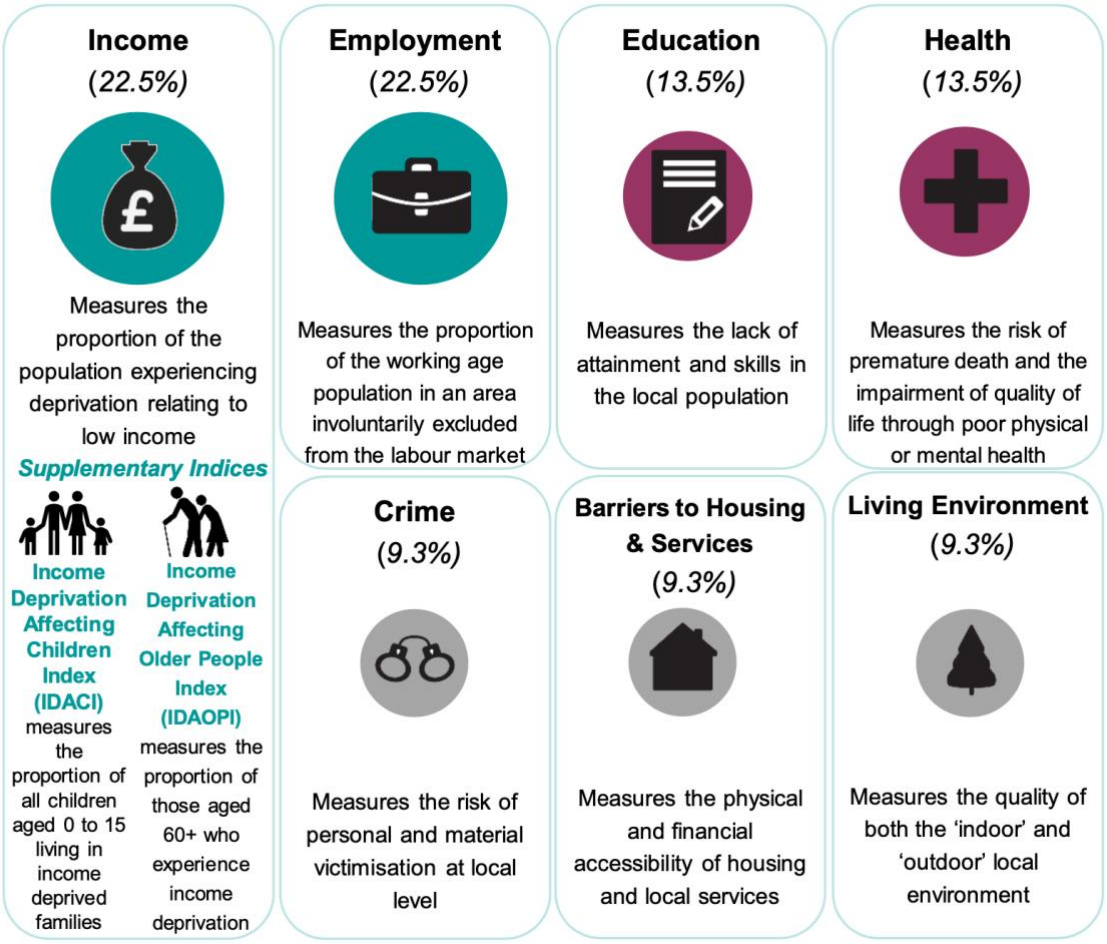


Figure 2.1. A description of the seven domains and their weights, which are combined to form the overall Index of Multiple Deprivation

272 **Table 2.3.** The top 20 Local Authority Districts ranked as most deprived, based on a series of
273 summary measures of the Index of Multiple Deprivation, 2019

Rank	Average Rank[1]	Average Score[2]	Most deprived 10 per cent [3]	Local Concentration[4]	Income Scale[5]	Employment Scale[6]
1	Blackpool	Blackpool	Middlesbrough	Blackpool	Birmingham	Birmingham
2	Manchester	Knowsley	Liverpool	Knowsley	Manchester	Liverpool
3	Knowsley	Liverpool	Knowsley	Middlesbrough	Liverpool	Leeds
4	Liverpool	Hull	Hull	North East Lincolnshire	Leeds	Manchester
5	Barking and Dagenham	Middlesbrough	Manchester	Liverpool	Bradford	County Durham
6	Birmingham	Manchester	Blackpool	Burnley	Sheffield	Bradford
7	Hackney	Birmingham	Birmingham	Hull	County Durham	Sheffield
8	Sandwell	Burnley	Burnley	Wirral	Cornwall	Cornwall
9	Hull	Blackburn with Darwen	Blackburn with Darwen	Barrow in Furness	Sandwell	Bristol
10	Nottingham	Hartlepool	Hartlepool	Hartlepool	Leicester	Nottingham
11	Burnley	Nottingham	Bradford	Redcar and Cleveland	Nottingham	Kirklees
12	Newham	Sandwell	Stoke on Trent	Newcastle	Bristol	Sandwell
13	Hastings	Bradford	Halton	Manchester	Kirklees	Wirral
14	Blackburn with Darwen	Stoke on Trent	Pendle	Great Yarmouth	Hull	Hull
15	Stoke on Trent	Rochdale	Nottingham	Thanet	Newham	Sunderland
16	Middlesbrough	Hyndburn	Oldham	Hastings	Tower Hamlets	Leicester
17	Rochdale	Hastings	Hastings and North East Lincolnshire	Bradford	Enfield	Wakefield
18	Hyndburn	Salford	-	Blackburn with Darwen	Wirral	Wigan
19	Wolverhampton	Oldham	Salford	Sefton	Walsall	Newcastle
20	Salford	Great Yarmouth	Rochdale	Salford	Wolverhampton	Doncaster

**Source: Indices of Deprivation, Department for Communities and Local Government, 2015 & 2019*

**Red Font indicates Local Authority Districts based in the NW*

[1] Average level of deprivation across the higher level area, based on the *ranks* of all Lower-layer Super Output Areas

[2] Average level of deprivation across the higher level area, based on the *scores* of all Lower-layer Super Output Area

[3] The proportion of the Lower-layer Super Output Areas in the higher level area that are classified as the most deprived 10 per cent in the country

[4] Identifies the higher level areas with extreme levels of deprivation, by comparing the most deprived Lower-layer Super Output Areas in the higher level area, against those in other areas across the country

[5] Volume of deprivation in the larger area according to the number of people who are income deprived

[6] Volume of deprivation in the larger area according to the number of people who are employment deprived

2.2.2.2. Allergy Services in the North West

In early 2003, concerns were raised regarding the limited allergy service provision in NW, England. This was prior to the development of the RCP 2003 report (RCP, 2003). Owing to the lack of full-time allergy specialists in the NW and the small number of clinicians working in this field, a strategy to improve allergy services in this region was developed. This led to the development of a document titled, 'A framework for an adult allergy network in the NW: the NW integrated clinical allergy service.' Though the strategy outlined stimulated much discussion nationally and was in principle agreed with NW primary care trusts, it was not implemented in the NW. In 2006, more work into this area was carried out to emphasise the need for allergy service provision in the NW to be addressed. In response to this, The House of Lords 2007 report (House of Lords, 2007) recommended setting up allergy centres in each Strategic Health Authority (SHA). The government came to the conclusion that any future development and provision of services in allergy would require a much clearer understanding of the skills and competencies needed within the health care setting, to ensure the delivery of high quality, cost-effective care at each stage of the patients journey. However, they did consider the possibility of establishing a lead SHA for allergy who would communicate with interested parties and Specialised Commissioning Groups (SCG's). The Department of Health therefore wrote to all SHA Chief Executives to determine expression of interest. Following this, the NW SHA was appointed in August 2008 and a pilot allergy service in the NW to improve services was commissioned. The project received non-recurrent funding from the Department of Health and was undertaken by the NW Specialised commissioning Group (NWSCG) and 24 primary care trusts in the NW region. The duration of the project spanned from February 2009 until January 2011 (Sinnott and Dudley-Southern, 2011).

It was realised that large tertiary centres would not be practical and cost-effective in large cities in close proximity to one another. Rather, having access to specialist centres in secondary care centres would be better received. Therefore, the primary aim was to add new services to already existing ones. Specialist-led services existed in the cities of Liverpool, Manchester and Preston and thus, these served as 'hubs' to create a network of inner-city allergy centres. Specifically, specialist allergists, immunologists and clinicians with a particular expertise in allergies were linked to the networked centre. Additionally, a multi-disciplinary approach was taken and thus, specially trained nurses and GPwER's also formed part of the service. Figure 2.2 outlines the development of the allergy service across the NW (Sinnott and Dudley-Southern, 2011).

Source: Sinnott and Dudley-Southern., 2011

Figure 2.2. Development of allergy services for children and adults in North West, England

A number of lessons emerged during the course of the project. With improved diagnosis and treatment at the primary and secondary level, majority of patients can be treated at earlier stages. This will lead to the rapid identification of allergies and allow them to be treated appropriately, while also limiting unnecessary referrals to tertiary centres. Additionally, it was found that primary care physicians lacked confidence in diagnosing and treating more complex allergies and an increased level of training and education in this group will prove beneficial. The pilot study further demonstrated that there is a need for allergy specialists to dedicate

time into the training and mentoring of primary and secondary care practitioners. Moreover, a costing exercise revealed that there is a significant variation in the provision of resources across clinical practice and allergy service providers. To combat this, the authors suggested introducing a mandatory national tariff to cover the costs of the services including training and education provisions. Furthermore, the project demonstrated that there is a substantial need for the delivery of competent, adequately resourced, integrated patient pathways, which currently does not exist in many parts of the UK including the NW. However, this will require different commissioners to work closely together, which itself is not simple to accomplish (Sinnott and Dudley-Southern, 2011).

There is no doubt that the NW Allergy project raised awareness for the need of better allergy service provision in this region. Despite this, many commissioners failed to appreciate the burden of allergic disease and were reluctant to engage in initiatives to address these issues. In their report, Sinnott and Dudley-Southern. (2011), point out that the NHS financial constraints meant that current allergy services are unlikely to be prioritised leaving services vulnerable and thus, inequity of care for many patients with allergies will continue to persist. At present, in the NW of England 40 allergy clinics exist, of which 17 provide adult allergy services and 23 focus on pediatric allergy. While this shows an improvement in the number of available services, this region still falls behind. In comparison the South of England, which currently is home to 75 allergy clinics, offers an increased number of allergy services (BSACI, 2024). This gap emphasises that despite years of effort, the same challenges continue to persist - that is the ongoing difficulties of ensuring equitable access to allergy care across different regions.

2.2.3. Inequity in Care

Equal access to sufficient health care services is a basic requirement for all individuals. Despite this, much inequity is present. Health inequalities exist in those suffering from allergies and differences in healthcare access (HCA) are frequently seen in this group, leading to adverse patient outcomes. These disparities are inherently linked to socioeconomic disadvantages (Tepler et al., 2022).

Those from low income families experiencing deprivation struggle in accessing health care for their allergy. It has been well established that allergy service provision across the UK is poor. There are a limited number of specialist centres and few allergy specialists available. As such, patients will have no choice but to travel long distances to obtain necessary support and/or

treatment. Many individuals with allergies experiencing socioeconomic deprivation will also have little or no means to attend clinics and will often rely on public transport, which itself can prove costly. Additionally, the increased travel will incur further costs in terms of money and time. There will be added expenses of food and parking and travelling long distances will repeatedly disrupt education and/or work (Minaker et al., 2014; Angier and Jay, 2021; Daniels et al., 2021). This will often lead to irregular attendance by those in low-income families causing patients to be discharged, inevitably losing their support. This lack of engagement with medical services will firstly impact the quality of care and reduce patients' compliance of medication, increasing the risk of accidental ingestions and anaphylaxis. (Filippidou et al., 2014). Secondly, patients will be forced to seek alternative forms of care. For instance, many individuals will practice self-care and particularly, there has been a predominant increase in the use of the internet to diagnose and treat allergic conditions. Though this may be more easily accessible, it is often unregulated and inaccurate. Consequently, this will prove more detrimental to health and thus, increase the already high burden on primary care and specialist allergy services (Halls et al., 2018; Morris, 2019; King et al., 2020). Moreover, the cost of specific medication (adrenaline auto-injectors) in those with allergies will present a financial burden. Prescription rates of adrenaline auto-injectors have significantly increased in the UK and with it the cost (Minaker et al., 2014; Diwakar, 2017). On average, the cost of an adrenaline auto-injector in the UK via prescription is £9.65 (NHS, 2021) and this is considerably more when bought at a pharmacy or online (Diwakar, 2017). This necessary medication which is life-saving also has a limited shelf-life and thus, will need to be renewed regularly further increasing costs (Minaker et al., 2014; Diwakar, 2017; Fong et al., 2022).

Particularly for those with food allergies, there are additional financial burdens. At the core of management is the avoidance of offending allergenic foods and the inclusion of safe, nutritionally sound alternatives. However, while allergen free foods (AFF) are tailored to suit the needs of those with food allergies, they are more expensive with availability limited to large supermarkets and health shops (North and Brown, 2017; Polk and Diwakar, 2017; Tepler et al., 2022). AFF are between 2 to 4 times more expensive than non-AFF and hence, those from lower socioeconomic backgrounds greatly struggle to access them (Polk and Dinakar, 2017; Coleman-Jensen et al., 2022; Tepler et al., 2022). Racial disparities were also seen in accessing AFF, with Johns and Savage (2014), highlighting how Black caregivers reported a lower likelihood of accessing such foods in comparison to White caregivers (Coleman-Jensen et al., 2022). Moreover, research conducted by Bilaver et al. (2016), found that in those with food allergies whereby individuals were facing a high economic burden, it was especially challenging to access specialised care, due to the added costs of increased hospital visits, emergency care visits, the costliness of avoidance diets and the inclusion of AFF.

Furthermore, research also indicates that there is a lack of culturally sensitive health education among HCP, which can lead to the delivery of unequal care in patients. (Ryan et al., 2005). Studies have shown that there is a high burden of food allergy in ethnic minority groups, yet these individuals struggle to access quality health care (Krishna et al., 2020; Davis et al., 2021; Jones et al., 2022). Mahdavinia et al. (2017), further emphasises this showing how inequity in food allergy care exists between children of different racial backgrounds. The results of their research highlighted how Black and Hispanic children were found to have shorter follow up appointments with an allergy specialist, when compared with White children with the same food allergy. Similarly, Kanaley et al. (2020) also highlighted how Asian, Black and Hispanic children were less likely to receive food allergy diagnostic testing and be seen by an allergist than White children with allergies.

Health inequalities are clearly apparent in those seeking health care for their allergy. This inequity can impact all stages of an individual's care from diagnosis, prevention and management. Firstly, reduced access to specialist care and poor delivery of allergy care by HCP will lead to suboptimal management in patients. Secondly, those from a lower socioeconomic background and those from a Black and Minority Ethnic group will face additional barriers in accessing care for their allergy. As such, these individuals will have an increased risk of adverse reactions, inadequate nutrition and poorer health outcomes. HCP, allergy charity bodies and food companies must therefore recognise these additional burdens presented to those with allergies and provide necessary support where possible. These disparities in HCA further emphasise the need for more focused research on how these factors affect LA with food allergies. Without proactive measures to address equity in food access and healthcare services, health outcomes will continue to decline further, leading to an increased burden on the healthcare systems. Specifically, this thesis will explore food access and HCA in LA with food allergies in the NW region, with an aim of suggesting evidence-based interventions to address these critical issues.

2.2.4. Allergy at the Primary Care Level

In the UK, a considerable amount of pressure is placed on the primary care physician or GP who provide the first point of medical contact for patients, as well as the gatekeeper to higher levels of care (Finlay and Egner, 2010; Agache et al., 2013; Diwakar et al., 2017; Chong et al., 2023). Allergy accounts for approximately 8% of GP consultations in the UK (Diwakar et al., 2017). As a basic obligation, GPs should know what their patients require and when needed they should be able to direct patients to timely appropriate care (Finlay and Egner,

2010). Despite this significant responsibility placed upon primary care physicians, GPs possess little specialised training in allergy and are not equipped to competently deal with patients (RCP, 2003; Levy et al., 2004; Daniels et al., 2021). In fact, in 2002 one survey completed by 500 GPs in the UK showcased how allergy care was considered to be poor, with many GPs treating patients without any basic training (Levy et al., 2004). A follow-up study in 2009 was conducted by Hazeldine et al. (2010), to determine if GP perceptions on allergy care throughout the UK had changed. Their results revealed no notable improvements in GP perceptions of UK allergy services between the period of 2002 and 2009 and further highlighted that problems still persisted in allergy care throughout the NHS. These findings were further mirrored by a similar survey conducted between 2010 and 2011, which looked into the allergy training provision of GPs in the UK (Ellis et al., 2013). The persistence of these issues can potentially explain why morbidity rates remain unacceptably high and additionally why the costs associated with allergic diseases at the primary care level are substantial.

Much research indicates how GPs struggle in providing care for allergic patients as there are few services and facilities in place to assist them. Specifically in the primary care setting, there is a lack of availability of diagnostic testing and there is an increased difficulty in accessing specialists. As such, the ability to adequately attend to the needs of those with potentially life-threatening allergic diseases becomes a struggle (Levy et al., 2004; Levy et al., 2009; Hazeldine et al., 2010; Lowe et al., 2010; Diwakar et al., 2017). Many studies further emphasise this, showing how the current allergy knowledge and training available to GPs was inadequate, how only few GPs were familiar with guidelines to managing allergic disease and how the continuing medical education programs for GPs were unsatisfactory (RCP, 2003; Hazeldine et al., 2010; Agache et al., 2013; Diwakar et al., 2017; Ryan et al., 2017). In particular, GPs lacked knowledge and education in recognising allergic disease and had difficulty in conducting diagnostic work-ups and referrals (Ryan et al., 2005; Agache et al., 2013; Diwakar et al., 2017; Ryan et al., 2017). Managing areas such as food allergy proved more difficult for GPs, with previous research highlighting how only less than 30% of primary care practitioners were able to comfortably interpret food allergy tests (Gupta et al., 2010).

Furthermore, GPs in primary care should be capable of recognising and treating milder cases of allergy, with only more severe and complex cases referred to consultants. This approach could prove more effective and reduce the overall burden on secondary and tertiary health care services, through reducing hospital admissions and treatment costs. However, the lack of support, knowledge and training provided for primary care physicians, will dramatically reduce their confidence and ability in diagnosing and managing allergic disease. As such, GPs will also commonly refer patients with mild to moderate allergies, resulting in delays in patient

management and therefore poor patient outcomes. This will additionally lead to a waste of health care resources (Levy et al., 2004; Agache et al., 2013; Diwakar et al., 2017). Research from both the UK and Ireland further emphasises how lack of knowledge and training amongst GPs will lead to incorrect referrals, which are often counterproductive. Their research revealed how only between 9% and 23% of referrals to allergy clinics made by primary care physicians, were in fact diagnosed as patients with allergy (Jones et al., 2010; Conlon et al., 2015). Additional research reinforces this, mentioning how allergies are under-diagnosed and incorrectly treated at the primary care level (Jutel et al., 2013). Similarly, research by Ryan et al. (2017) further supports this, showing how greater than 75% of GPs had inadequate knowledge of allergen immunotherapy and felt they had little confidence in referring patients to specialist care. Much research has also highlighted how GPs lack the knowledge to appropriately prescribe and administer adrenaline auto-injectors, which is the only effective treatment for anaphylaxis (Clark et al., 2004; Russell et al., 2010; Saleh-Langenberg et al., 2015; Chooniedass et al., 2017; Robinson et al., 2017; Cimen and Sayili, 2022). In fact, approximately half of patients presenting to the emergency department, report having never received adrenaline (Russell et al., 2010; Gelincik et al., 2013; Banerji et al., 2014; Alvarez-Perea et al., 2015; Sidhu et al., 2016). This can prove quite costly, with many studies reporting how delayed and under-prescribed adrenaline are significant risk factors for the cause of fatal anaphylaxis (Pumphrey 2000; Lieberman, 2005; Chooniedass et al., 2017; Turner et al., 2017).

Therefore, it is clear that this inappropriate management of allergies across primary care is prevalent. First, it places an increased burden on secondary and tertiary health services, causing a considerable financial burden (Jones et al., 2010; de Magalhaes et al., 2017; Sullivan et al., 2017). Secondly, a negative impact on the quality of life of many allergy patients will likely be seen (Diwakar et al., 2017). Lack of knowledge and training and confusion among GPs can dramatically reduce the quality of care for patients with allergies and is one of the primary causes of distress among patients (House of Commons, 2004). Barker et al. (2021) suggest that one way of combating the knowledge and training of primary care providers, is to include allergy content in the undergraduate curriculum for medical students and to additionally provide ongoing postgraduate training courses. The World Allergy Organisation (WAO) have previously outlined a comprehensive list of components to be included in the undergraduate curricula (Potter et al., 2009). Despite this, in the UK implementation of these recommendations have not been uniformly incorporated for medical undergraduates. This gap in medical education contributes to the ongoing challenges in providing effective allergy care by primary care physicians (Shehata et al., 2006; Shehata et al., 2007; Busse et al., 2012; Reid et al., 2019).

2.2.4.1. GPs with Extended Roles

In 2010, the RCP reported a greater need of improved allergy services and the need for more allergy specialists, supported by an increasing training of GPs (RCP, 2010). One outcome suggested by the RCP and the House of Commons was the use of GP's with special interests in allergy (GPwSIs) – now referred to as GPwERs. GPwERs are GPs with special experience or training which allows them to take referrals and provide care for patients normally seen by specialists (Roland, 2005). This concept of extended roles for GPs within the community who have additional knowledge and expertise pertaining to the field of allergy, has been suggested before (Ryan et al., 2005). In fact, in the year 2000 the NHS introduced their 10 year plan of reform, in which a key part included the idea of specialist GPs taking referrals from fellow GPs in certain specific areas of disease. This concept aimed to improve patients access to specialist care. As a result it was hoped that waiting list times and referral costs would be reduced (NHS, 2000). A similar concept to this was implemented in the late 90's, whereby specialists would travel to specialist outreach clinics established in primary care settings, in order to provide specific care for patients. This provided a positive impact and led to reduced waiting times and high patient satisfaction. However, the cost to the NHS of implementing such a strategy was high (Roland et al., 1998). These findings mirror that of further studies, who also detail the impact of utilising GPwERs. For instance, a randomised controlled trial and an economic evaluation were undertaken by Salisbury et al. (2005) and Coast et al. (2005) respectively. Their results did highlight that in the field of dermatology, GPwERs were effective. Not only was the service more accessible, patients were seen more quickly, they were more satisfied with the care received and were also found to have similar outcomes when compared with patients seen in a specialist clinic. Despite this positive outcome, the NHS cost of referring patients to GPwERs was 75% more than sending patients directly to specialist clinics. This was primarily due to the fact that patients receiving care in specialist clinics, alongside being seen by specialist consultants, would also be seen by junior hospital staff who received lower salaries. It therefore seems that the idea of specialist GPs incurs a greater cost to health services. What is clear however, is that the role of GPwERs is effective for the patient and does seem to work and if this is underpinned with funding and investment, then it will undoubtedly prove an efficient way of increasing specialist capacity.

Though much literature has vouched for the inclusion of GPwERs, this concept has seldom been adopted in the field of allergy itself. In fact, to our knowledge there have only been two reports in the UK of the use of GPwERs in allergy, both based in London (Levy et al., 2009; El-Shanaway et al., 2019). The aims of these locally enhanced allergy led clinics, were to ultimately bridge the gap between primary care and secondary and tertiary care. It was hoped

that through establishing an integrated multidisciplinary pediatric allergy service, the availability of allergy care would be more accessible and there would exist a greater consistency in the allergy care being provided, thus improving overall patient satisfaction. The inclusion of GPweERs, alongside nurses and dietitians who were able to provide specific tailored care for patients with allergy, provided a unique and beneficial addition. The outcomes of both clinics were positive. Overall, a significant reduction was seen in the number of allergy related attendances at the hospital. Patients were seen much quicker with one clinic reporting a reduction in waiting times of at least three weeks, while the second clinic reported an average wait time of only 18 days. In both clinics, fewer referrals were made to secondary and tertiary care, which consequently resulted in overall financial savings and overall patient satisfaction. Therefore, both Levy et al. (2009) and El-Shanaway et al. (2019) clearly demonstrated that it is possible to deliver a primary care-based specialist service for those with allergies, while maintaining patient satisfaction and ensuring a beneficial economic outcome.

Despite the promising results of both these studies, it is important to note the limitations. Both clinics were based in London where healthcare resources are perhaps better than other parts of the UK, e.g. the NW of England. Therefore, this limits the generalisability of these findings to more deprived areas where healthcare services may be more constrained. Additionally both clinics focused on pediatric patients, with little emphasis on LA or young adults. LA is a demographic facing considerable unique challenges in the management of their food allergies. LA often have greater autonomy over their food choices and may encounter different barriers in accessing healthcare such as financial constraints, lack of knowledge about allergen labelling and dietary needs and inadequate healthcare support to meet their individual needs. Thus, it is unclear whether the successes observed by Levy et al. (2009) and El-Shanaway et al. (2019) can be replicated in older populations where circumstances may differ. Moreover, one of the two clinics (Levy et al., 2009) was terminated due to competing financial priorities and constraints, suggesting the importance of financial support in sustaining such clinics, which unfortunately may not be feasible in all healthcare settings. This further highlights the need to consider financial barriers that may impact the implementation of similar models in regions such as the NW, where resources are likely constrained.

Quite recently, the continued poor care of allergic disease in the UK has led to the development of a GPwER framework, to create a network of specialist GPs who are trained in the field of allergy. This framework has been facilitated by the BSACI and endorsed by the Royal College of General Practitioners and is based on prior and current frameworks in the fields of respiratory and dermatology respectively. The framework itself has been reviewed by

primary care professionals and specialist BSACI members and includes essential components to assist GPs working in allergy. Currently, many GPs will practice and provide advice and treatment to allergy patients without any national guidance for allergy extended roles. Therefore, this new framework will aim to standardise the training for GPs to support the delivery of allergy care and improve the quality of services at the primary care level. This will be achieved through ensuring GPs have better access to training and allowing them to understand and develop the required knowledge and skills beyond their role as a generalist. Consequently, this will enable them to become more suitably qualified in demonstrating competence when delivering allergy care. This scheme is set to be trialled and piloted in December 2023 by two GP members. Following the pilot phase of this framework, it is hoped that a UK map of GPwERs in the field of allergy will be created and linked to existing pediatric and adult allergy networks (BSACI, 2023).

2.2.4.2. Improving the Knowledge and Training of GPs

GP's are central to care and will continue to shoulder one of the greatest burdens of allergy, if the current care is not improved. The standard of allergy care delivered in the primary care setting can significantly influence the management and prevention of allergies and hence, patient satisfaction and patient quality of life (Agache et al., 2013). The patient need is clear – accurate diagnosis, state of the art management, continuity of care and expert clinicians who can clearly distinguish between what is and what is not allergy. Quite simply, patients should be seen at the right time, in the right place by individuals with the right expertise.

Integrated care is one of the best ways of achieving this and thus, will allow individuals to be empowered and take effective control of their allergic disease (Finlay and Egner, 2010). Levy et al. (2009) not only suggest the importance of improving training for GPs at both the undergraduate and postgraduate level, but also the importance of increasing the number of specialised primary care health providers. They further suggest structured allergy training whereby GPs receive standardised allergy education, which has previously been proven to improve the health outcomes of patients while also improving the confidence and competency of HCPs in managing allergic disease (Sheikh et al., 2007). Finlay and Egner (2010), suggest appointing a lead consultant allergist within each NHS trust to oversee the delivery of allergy care. Strong leadership from allergy clinicians is essential to develop education and training. This will help to improve cost-effective service provision and enhance quality of care. It is also imperative that models of care which prove successful should be shared and emulated across NHS trusts and nationally. Additionally, in order to improve clinical effectiveness, Roland

(2005), highlight the need of GPs having ongoing training and education, through close relationships with local specialists. Similarly, El-Shanaway et al. (2019) also point out the need for ongoing educational support for GPs and suggest that going forward this is of vital importance to improve and maintain allergy care, as currently there is a lack of allergy training available. Likewise, Demoly et al. (2019) illustrate the importance of adequate training for GPs along with improved access to quality medical advice from specialists. They suggest the use of online tools such as, webinars, on-demand videos and decision making tools. Such tools will prove particularly valuable for GPs, taking into account their restricted time due to high workload. Additionally, the online resources proposed by Demoly et al (2019) encompass key information which are easily accessible to GPs and are especially designed with clear guidance and signposting. This will allow GPs to reduce unnecessary referrals and ensure where possible, that patients are seen sooner and closer to home. Moreover, Daniels et al. (2021), suggest providing postgraduate training opportunities to GP's, which will boost their confidence in diagnosing, managing and referring patients appropriately. They also propose a 'level of competence approach' which considers the core, additional and specialist competences, needed to equip physicians with the necessary skills to deliver a high standard of care for patients with allergies (Figure 2.3). Furthermore, an allergy management support system to empower GPs to better manage allergy patients, has also been developed for use in the primary care setting in Netherlands (Flokstra-de Blok et al., 2017). Such a strategy has proven successful and similar initiatives could therefore prove valuable if adopted in the UK (de Blok et al., 2018). Consequently, each of these strategies could potentially improve the delivery of high quality healthcare in the primary setting, improving patient experience while simultaneously reducing unnecessary costs.

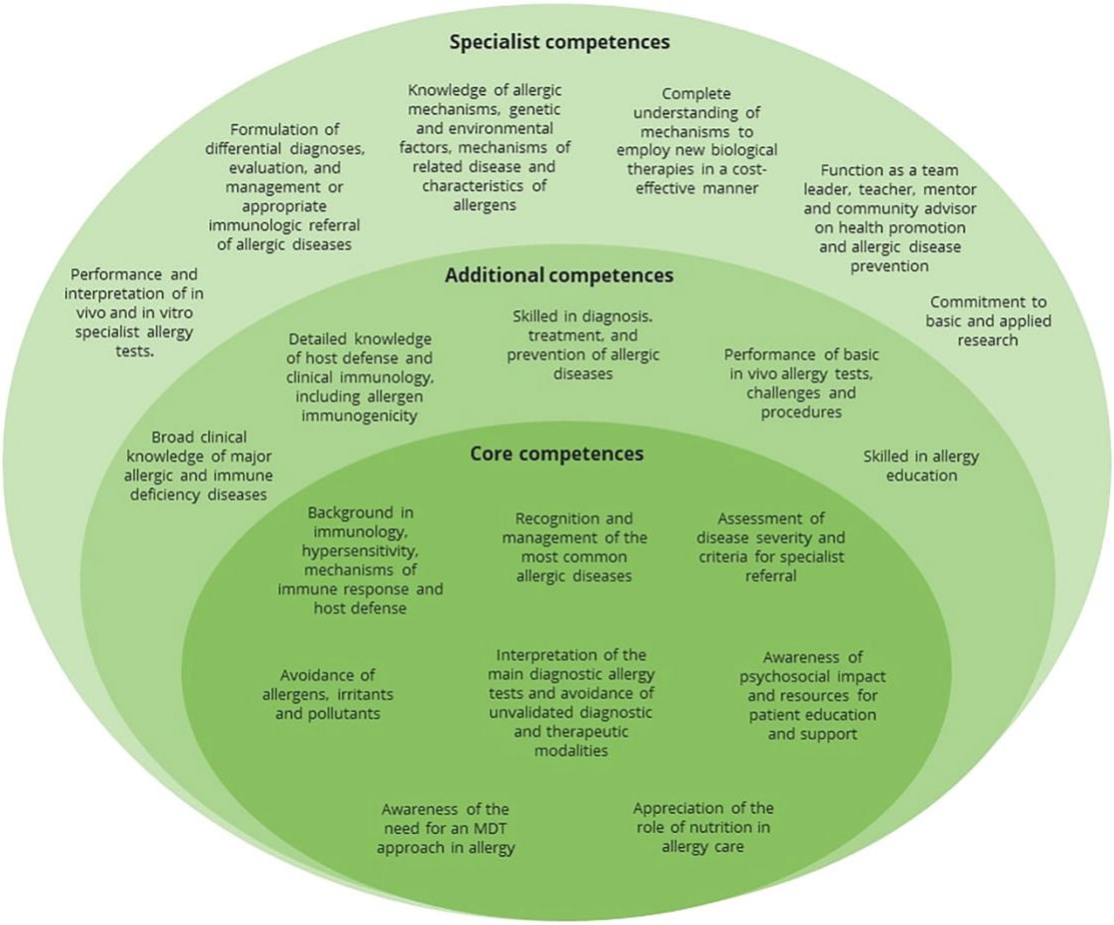


Figure 2.3. Proposed recommendations for the competency of primary care physicians in allergy, organised into 'core', 'additional' and 'specialist' competences (Daniels et al., 2021)

2.2.4.3. Summary

While efforts have clearly been made to improve allergy services, still, there is an unmet need. It seems as though the allergy epidemic has taken the health care systems by surprise and currently, there is a failure on the part of government and funders to acknowledge this rapid increase. The ever-increasing prevalence and complexity of allergies will continue to strain the health care systems and unless further improvements are made to provide adequate allergy services, patients will continue to suffer. Effective management of allergies will save both time and money and allergy care delivered by GPs who possess sufficient training and knowledge will be instrumental in achieving this. In fact, research by Conlon et al. (2015) and

Smith et al. (2015) highlighted how up to half of allergy referrals in the UK can easily be managed in the primary care setting, if GPs were appropriately trained. If steps are not taken and good quality care cannot be facilitated, then the lives of patients will continue to be at risk from fatal anaphylaxis, from malnutrition due to the implementation of inappropriate diets and from a range of mental health issues stemming from inappropriate and unnecessary anxiety (Finlay and Egner, 2010).

2.2.5. Transition Care

Allergic disease can manifest at any age and hence, the standard and quality of allergy care must be sufficient in every life stage (Daniels et al., 2021). Particularly, during the critical period of late adolescence individuals with allergies require greater support. Late adolescents (LA) between 18-25years, with their innate qualities of risk-taking and perception of invincibility, are perhaps the most vulnerable group (Warren et al., 2017). These individuals between 18-25years will be in a state of transition from late adolescence to adulthood (Jaworska and Macqueen, 2015; Sawyer et al., 2018; Roberts et al., 2020). This period is a time of physical, cognitive, psychological and social development (Monks et al., 2010; Roberts et al., 2020). This coupled with responsibility of self-management of their allergy, makes it an extremely stressful and significant period in their lives (Warren et al., 2017).

To enhance management, access to adequate healthcare is a basic requirement that must be available to all those suffering from food allergies (Stallings and Oria, 2016). It is imperative that LA with food allergies who will be undergoing a crucial developmental period, have the means to obtain sufficient knowledge, skills and confidence, allowing them to gain independence and enhance individual self-management abilities. This will prove beneficial in supporting them throughout their adult life, consequently leading to improved health (Roberts et al, 2020). Despite this, allergy service provision across the UK is severely lacking, with a shortage of allergy clinics and specialists available, who can provide the necessary advice and treatment relating to this period of transition. This will prove problematic given that in the UK the incidence of allergies, in particular food allergies, will firstly continue to rise (Cruddas, 2023), secondly, this increasing number of allergic disease is associated with higher health care usage and an increased burden on the NHS (Cruddas, 2023) and finally, LA with food allergies possess the highest risk of fatal reactions (Newman and Knibb, 2020). Therefore, sufficient transition support and provision of health services is a necessity in this group - to ensure good mental and physical health and to allow for successful transition care, therefore

optimising overall health (Kalinyak et al., 2016; Knibb and Gore, 2020; Vazquez-Ortiz et al., 2023).

Research has defined transition care as ‘an active and evolving process that addresses the medical, psychosocial and educational needs of young people as they prepare to move from child to adult centred health care (Blum et al., 1993; Sawyer et al., 1997; Rosen et al., 2003; Ladores, 2015). A key focus of the transition process is preparation. However, to this day transition is not given much priority with adolescents receiving limited or in some cases no education and preparation relating to key aspects of health care transition (Lotstein et al., 2005; 2009). For instance, previous research has highlighted how only 42% of LA with special health care needs, had an opportunity to discuss transition care with their HCP (Lotstein et al., 2009). Similarly, research has shown that amongst those services who possessed transition resources, approximately only 50% performed an assessment of ‘readiness’ to determine the suitability of the patient in transferring to adult services. This was primarily due to the lack of a validated patient-centred tool/guideline, that could assist in the evaluation of such a process (McLaughlin et al., 2008; Schwartz et al., 2011). Likewise, in a study by Lotstein et al. (2005) of children with special health care needs, only 50% of parents reported discussing transition care with the paediatrician. The UK primarily sees paediatric care providers transfer patients to adult services at the age of 16. In some cases patients will be incorrectly discharged altogether. This will come at an extremely inopportune time with individuals undergoing major physical and developmental changes. Consequently, this along with educational/workplace pressures, will result in severe consequences (Knibb and Gore, 2020).

Limited research exists looking at the current transition care of LA with allergies. Khaleva et al. (2020) conducted a Europe-wide study assessing the challenges of HCPs in working with adolescents and young adults and their current transition processes. The study involved 41 countries and registered over 1000 responses. Their research further outlines key limitations experienced by HCPs, with regard to their current transition services. It was found that 77% of HCPs had no specific resources to strengthen care for adolescents with allergies; 76% of HCPs, although recognising the significance of the transition process, had received no specific training in the care of late adolescence. These statistics are somewhat worrying, given that the role of HCPs is key, in allowing for successful self-management and smooth transition into adulthood (Protudjer et al., 2019). The study carried out by Khaleva et al. (2020) prompted the development of guidelines by EAACI for the effective transition of adolescents and young adults with allergic conditions, with a multidisciplinary approach at its core. Following this research study, an EAACI taskforce developed a toolkit to provide a range of practical

resources to assist in the development of transition services for LA (Vazquez-Ortiz et al., 2023). It is hoped that the resources outlined in the toolkit will serve as a guideline for HCPs globally to improve and support current transition practices across allergy services. There is of course a need to monitor the effectiveness of these guidelines through regular monitoring and audits, to ensure evidence-based standards are met.

While the study by Khaleva et al. (2020) did include UK participants, no other UK research has explored challenges experienced by HCPs when providing care for LA with food allergies. Their study also relies on an online cross-sectional survey which could present methodological limitations. This approach may not capture the full complexity of issues in relation to HCA and practices of HCPs, as it lacks the depth that qualitative research could provide. Therefore, the results from this study may not fully address the nuanced challenges which LA face, particularly in the UK context. This highlights a crucial gap in the literature and consequently emphasises the need for more detailed qualitative research to provide a richer understanding of HCA and transition care in this group.

It is often assumed that when reaching a certain age, individuals should, without adequate support, automatically demonstrate the necessary skills and know-how to navigate the world, whilst assuming responsibility for a chronic health condition (Kalinyak et al., 2016). In fact, research dictates that this period of transition from adolescence to adulthood is complex and achieving successful transition is challenging (Protudjer et al, 2019). A successful transition process should provide adolescents with education, guidance, preparation and skills to empower them into becoming independent young adults, who have the ability to effectively and competently manage their chronic condition and make good informed decisions about their future health (Vajro et al., 2018; Knibb and Gore, 2020). Therefore, understanding the many challenges that LA face, providing optimal health care and ensuring that a strong support system is in place, is vital. Without this, how can it truly be possible to nurture these individuals and allow them to thrive and be successful – not only in the self-management of their food allergy, but in all aspects of their lives (Kalinyak et al., 2016; Roberts et al., 2020).

2.2.6. Multidisciplinary Care

The growing severity and complexity of allergic disease means that allergy specialists and trained GPs alone will not be sufficient to deliver quality care (Flokstra-de Blok et al., 2017; Skypala et al., 2018). In fact, previous research illustrates how allied health professionals themselves feel that they are only moderately proficient to treat patients with allergies and that

they are in need of increased training (Groetch et al., 2010; Maslin et al., 2014). The burden of allergic disease for the patient is extensive. Hence, a multidisciplinary approach with trained practitioners (i.e. nurses, dietitians, psychologists, pharmacists etc.) offers a means to ensure the delivery of high quality holistic care for patients with allergies. There is much evidence which indicates the beneficial and effective role of various HCP in the care of allergy.

2.2.6.1. Nurses

Nurses can be of particular benefit to patients with allergy. If appropriately trained, they can teach patients how to competently use adrenaline auto-injectors and administer diagnostic tests and treatments to patients (Wooler, 2001; Saleh-Langenberg et al., 2017; Skypala et al., 2018; Daniels et al., 2021). Nurses will also have the unique opportunity to enhance their individual learning and skills through working closely with GPs and allergy specialists (Skypala et al., 2018; Kelman et al., 2019; Daniels et al., 2021). Moreover, they often have more time with the patient than the physician and thus, are likely to establish a relationship. As such, they will become more approachable and can provide relevant advice, resources and education to both patients and parents (Ibrahim et al., 2022; Muraro et al., 2022). This is especially important when patients receive large amounts of information following a session with the GP or allergy specialist, which may prove difficult to understand and retain (van Os-Medendorp, et al. 2020). Providing reassurance, emotional support and counselling to patients with allergy, is also a key role that nurses can partake in (van Os-Medendorp, et al. 2020; Muraro et al., 2022).

Recent research from the UK has proven how the role of qualified nurses can prove instrumental in the quality of care received by FAP. Hammersley et al. (2022) demonstrated how a nurse led allergy clinic in primary care was extremely effective for patients with food allergy. Nurses who possessed postgraduate allergy qualifications and extensive secondary care experience were able to effectively diagnose, manage and provide relevant education to patients with allergies through face-to-face and remote consultations. Thus lessening the burden on the primary care physicians. Despite these findings, research by Hammersley et al. (2022) did have limitations. This included low sample size and additionally, there was incomplete follow up data for some participants resulting in bias, as those who did not complete the post-assessment intervention assessments may have benefited less from the intervention. Further UK studies are needed to evaluate the effectiveness of nurse-led interventions and to additionally explore strategies for standardising training across different healthcare settings. Despite the beneficial role of nurses, in the UK there are insufficient

numbers of trained nurses working in the field of allergy (RCP, 2003; National Allergy Strategy Group and All Party Parliamentary Group, 2021).

2.2.6.2. Dietitians

In patients suffering from food allergies, avoidance of the offending allergen is the cornerstone of management. If guidance by a trained professional is not available, patients will be at risk of an imbalanced diet as well as chronic and acute reactions. Challenges created by the ubiquitous nature of food along with the changes in nutritional requirements with age, make it especially important for those with food allergies to receive sufficient quality of care (Daniels et al., 2021; Muraro et al., 2022). The period of late adolescence is an important life stage whereby many developmental changes will take place. These individuals will have an increased need of nutrients including calcium, phosphorus, magnesium, protein, zinc and iron in females. Muscle mass and bone mass must be maintained and so, healthy eating becomes paramount (Das et al., 2017). Often, unmonitored diets of those suffering from food allergies will lead to the implementation of unnecessary restrictive diets which will pose nutritional consequences and will negatively impact health (Steinman et al., 2010; Groetch and Venter, 2020). For instance, Meyer et al. (2014), highlight how exclusion diets which were of poor nutritional quality resulted in obesity in those with food allergies. Dietitians therefore play a crucial role for patients with food allergies.

Research has highlighted how dietary counselling has a significant impact on the nutritional status of those with food allergies (Canani et al., 2014). Dietitians themselves have the ability to provide personalised diet plans that suit the needs of the patient and reflect an adequate and balanced diet (Groetch and Venter, 2020; Leone et al., 2023). Additionally, they can monitor the health effects of food elimination diets and can advise appropriate food alternatives, while maintaining diet diversity (Hubbard, 2003; Groetch et al and Venter, 2020; Mazzocchi et al., 2017; Daniels et al., 2021). Moreover, they can advise patients and families on how to read and interpret labels and can recommend the use of appropriate supplements where needed (Leone et al., 2023). Research further indicates that based on their knowledge and expertise, dietitians will have the ability to conduct allergy focused diet histories and food challenges and can therefore aid diagnosis and treatment (Skypala et al., 2015; Bird et al., 2020). Parents have also reported that dietitians have proven extremely useful in providing emotional support to patients and families (MacKenzie et al., 2015). A recent study conducted by Collinson et al. (2023), further highlighted the beneficial role of dietitians in pediatric food allergy. Their research illustrated how dietetic-led clinics reduced primary and secondary care

appointments, diagnosed FAP quicker, therefore resolving symptoms more rapidly and reduced the time taken to access dietetic care.

It is clear that proper dietary intervention is necessary for patients with food allergies and to ensure nutritional adequacy, supervision from a trained dietitian and/or nutritionist should be an integral part of allergy consultation. This becomes even more essential for those with multiple and complex food allergies (Venter et al., 2012). In the UK, many community dietitians who are experts in their field do exist, however they have not been specifically trained in allergy and thus, may not be able to provide competent care for patients suffering from allergic disease (National Allergy Strategy Group and All Party Parliamentary Group, 2021). More research in this regard is therefore needed to explore the practical challenges dietitians face and how their training can be improved to provide effective allergy care. This can help to develop strategies to ensure dietitians are better equipped in providing effective, comprehensive care for patients with food allergy.

2.2.6.3. Psychologists

The entire process of having, managing and treating allergies can cause significant long term psychological issues and severely impact quality of life. There is a constant fear of experiencing an allergic reaction by sufferers and this will make living a normal life extremely challenging. A survey of 6000 allergy sufferers by Allergy UK revealed how over 62% of patients felt that their allergy 'significantly affected all aspects of their lives.' (Allergy UK, 2015). A further report in 2015 revealed how 44% of allergy sufferers are living in fear of potentially fatal reactions, which has led to high levels of anxiety over the most basic everyday activities, including eating and leaving the home (National Allergy Strategy Group and All Party Parliamentary Group, 2021).

Many studies have highlighted this significant impact of allergies on the mental health and quality of life of patients. A study conducted by Stadler et al. (2022) showed how allergies (insect venom, food/food additives, drug) and urticaria led to increased rates of depression and thus, reduced quality of life amongst patients in a tertiary allergy centre. Research has also suggested that an episode of anaphylaxis, is considered a traumatic event which may lead to Post Traumatic Stress Disorder (PTSD) in patients with severe allergies (Avery et al., 2003; Weiss and Marsac, 2016). Knibb et al. (2023) further reinforces this, highlighting how in adults the impact of anaphylaxis is greatly related to stress, anxiety and depression, which will significantly impact quality of life. Likewise, Budu-Aggrey (2021) found strong evidence to

indicate that allergies are associated with depression, anxiety, bipolar disorder and neuroticism. Furthermore, the diagnosis and treatment of allergy itself can cause considerable psychological impacts on the patient (Daniels et al., 2021; BSACI, 2023). For example, the application of adrenaline is a known cause of anxiety amongst patients with allergies (Daniels et al., 2021).

Food is ubiquitous and for those suffering from food allergies there is a greater risk of an allergic reaction which will constantly be present (Daniels et al., 2021; Fiocchi et al., 2021). Avoidance of the allergenic food is challenging and requires constant vigilance, which places an increased stress on patients (Knibb et al., 2023). In extreme cases, the avoidance of foods will lead to social isolation and continuous anxiety (Feng and Kim, 2019). Also, the constant effort in needing to regularly read and interpret food labels can be laboursome and time-consuming for most. A report conducted by the Foods Standards Agency (2001) revealed how the simple act of shopping will take 39% longer for FAP, which will negatively impact their quality of life. Additionally, the widespread use of Precautionary Allergen Labelling (PAL) which encompasses an increasingly high number of unregulated statements, will further leave sufferers in a state of constant uncertainty, fear and therefore, anxiety (Fiocchi et al., 2021).

Furthermore, the transition from adolescence to adulthood is a challenging developmental stage. This group of individuals will often engage in risky behaviour as they attempt to establish their identity. Research from the United States shows how only 40% of food-allergic college students were found to adhere to their dietary restrictions (Greenhawt et al., 2009) and how many adolescents will knowingly ingest ‘may contain’ foods placing them at an increased risk of anaphylaxis (Sampson et al., 2006; Monks et al., 2010; Greenhawt et al., 2016). When in a social situation adolescents will often fail to inform peers about their allergy and will often refuse to carry their adrenaline auto-injector, further emphasising this risk taking behaviour in LA (Warren et al., 2017; Sicherer et al., 2020). One study revealed how only 6.6% of US students with food allergies carried their adrenaline auto-injector (Greenhawt et al., 2009). Likewise, Robinson et al. (2019) found that carriage of the adrenaline auto-injector was suboptimal in US adolescent students, especially where these individuals were independent of parental supervision. In comparison, little UK research details risk taking behaviour in LA. One UK study however did reveal similar concerns, mentioning low rates of carrying adrenaline auto-injectors in adolescents. They further mentioned barriers of this, including failure to recognise anaphylaxis, lack of knowledge regarding technique and when to administer the adrenaline auto-injector and fear of using the adrenaline auto-injector (Gallagher et al., 2012). In LA, the pressure to conform to certain situations dominates self-preservation and as such, leads to increased risk taking behaviours which is one of the leading

causes of food induced anaphylaxis in this group (Monks et al., 2010; Warren et al., 2017; Sicherer et al., 2020).

Additionally, mental health and quality of life is dramatically reduced in LA. Increased levels of anxiety, including general anxiety and separation anxiety are particularly seen, alongside anorexia and bulimia nervosa (Shanahan et al., 2014). In a study among UK adolescents, lack of knowledge and fear of using an adrenaline auto-injector contributed greatly to high levels of anxiety (Gallagher et al., 2012). One US study highlighted social isolation, depression and performance anxiety in food allergic adolescents (Antolin-Amerigo et al., 2016), while another US study revealed how a staggering 43% of food allergic individuals in early and late adolescence were subject to some form of bullying (Warren et al., 2017). Furthermore, eating out and socialising is made more difficult - particularly in those with food allergies. LA often avoid social venues due to fear of being exposed to a food allergen, consequently leading to social vulnerabilities (Stjerna, 2015; Newman and Knibb, 2020; Herbert and DunnGalvin, 2021). The myriad of mental illnesses that adolescents are likely to be burdened with, coupled with the management of allergies and the challenging developmental period they will undertake, can have devastating effects.

Furthermore, the management of food allergies will additionally lead to psychological distress and poor quality of life in parents and carers. Much research has demonstrated how the unpredictable and potentially life-threatening nature of food allergies has resulted in poorer mental health and reduced quality of life in parents and caregivers of young children (Avery et al., 2003; King et al., 2009; Lau et al., 2014; Morou et al., 2014; Birdi et al., 2016). The psychological impact of allergy is commonly known to compromise school attendance, family relationships and social life (Daniels et al., 2021; Herbert and DunnGalvin, 2021). In most cases, family members will be significantly impacted by restrictions put in place due to their child's food allergy (Mandell et al., 2005). For instance, family members would also adhere to the allergy restricted diet of their children placing unnecessary restrictions on their own diet, resulting in nutritional imbalance (Munoz-Furlong, 2003). Also, family activities and social events will be restricted with many families avoiding such activities altogether, in order to minimise risk and anxiety (Bollinger et al., 2006; Stjerna et al., 2014). Particularly, parents of adolescents with allergies reported increased levels of anxiety when handing over the primary responsibility of management to their children (Akeson et al., 2007; Lange, 2014). Therefore, it is necessary that parents and families of patients suffering from allergies also receive psychological support from trained professionals.

Clearly the role of the psychologist deserves an essential place within the field of allergy. At present, the UK has established successful psychological services for many chronic conditions e.g. diabetes, cystic fibrosis and oncology. Yet this provision is rarely offered to patients with allergies (Mercer et al., 2015). A survey conducted by Young and Minshall (2016) in the UK, revealed that although health professionals in pediatric allergy recognised the need for psychological support, access to this support for patients and families was limited. Currently, the UK has two allergy clinics who receive dedicated funding for psychological services - Southampton General Hospital and Evelina London Children's Hospital, which were established in 2014 and 2016 respectively. Both services offer a range of psychological services, including interventions and parent workshops and additionally offer consultations to support the multi-disciplinary team. Since their inception, a high number of patients have been seen and treated in both clinics demonstrating the necessity of such a service. While some psychological support is offered in tertiary centres in the UK, not much exists in the NW region. This means patients would often have to travel long distances to receive support, which due to financial status may not always be possible. Thus, resulting in many patients and many families having no services at all (Minaker et al., 2014; Knibb et al., 2015). Research indicates that the current limited access and inadequacy of psychological support is primarily due to lack of funding (Knibb et al., 2019; Daniels et al., 2021). However, if psychological needs are not met, greater costs on the health care system will be incurred.

In a typical consultation, there is often little time to adequately address the psychological needs of patients and their families (Feng and Kim, 2018; Knibb et al., 2019). In instances where patients were fortunate enough to receive some psychological care from their GP or allergy specialist, the support was found to be inadequate (Akeson et al., 2007). Broome-Stone (2012) reinforce this, indicating that due to a lack of knowledge, HCP and services are not fully equipped to address the needs of parents who have children with severe food allergies and this in turn can lead to a reduced quality of life. Similarly, through their study Mandell et al. (2005) found that lack of knowledge given to parents of children with peanut allergy at the time of diagnosis, increased uncertainty and anxiety in management of the allergy. Knibb and Semper (2013) further emphasise the inadequacies in allergy services. Their research highlights how no significant differences existed in levels of anxiety and depression before and after visiting an allergy clinic in parents of children with suspected food allergy.

To ensure effective long-term management of allergies, access to specialist psychological support alongside medical care is necessary (Birdi et al., 2016; Daniels et al., 2021; Muraro et al., 2022). Increasing the number of dedicated psychological services across the UK will

have a positive impact. This could lead to a decrease in anxiety and depression in patients and their families, which in turn could improve their quality of life. Additionally, ensuring psychological support is more accessible may also improve patient adherence to medical advice, which can assist in reducing the frequency of allergic reactions and hospital admissions. In particular, increasing this accessibility in areas such as the NW region, which currently has few hospitals with dedicated psychological support (Knibb et al., 2019) can also help to mitigate the existing disparities in healthcare provision. Consequently, this can lead to fewer emergency visits by patients resulting in long-term cost savings for the NHS.

Psychologists have the ability to provide in depth psychological care. They can implement coping strategies and targeted interventions which can support patients with allergies and their families (Daniels et al., 2021). Skypala et al. (2018), mention that psychologists have a unique ability in providing individuals with a sense of empowerment and that this is achieved through the delivery of coping strategies that support their day-to-day management of allergies. Consequently, this improves the overall emotional wellbeing of patients. While little published research exists on interventions to improve the quality of life in those with food allergies, there is evidence to show the positive impact of cognitive behavioural therapy (CBT). CBT is a proven psychological intervention and has been shown to reduce food allergy related anxiety in parents. One UK study showcased how in mothers of children with food allergy, CBT was effective in reducing the psychological impact of food allergy. Namely there was a significant reduction in anxiety, depression and worry and an overall improvement in mental health status and therefore, quality of life (Knibb, 2015). Similarly, Boyle et al. (2017) conducted a randomised controlled trial where UK mothers of children with food allergy were provided with a brief intervention of CBT. While there was no significant changes in anxiety level at 6 weeks, there was a reduction in a group of mothers who had moderate to high levels of anxiety at one year, suggesting positive long-term effects on maternal psychological well-being. However, the short term impact remains unclear and further research is warranted to assess the clinical significance of such interventions. CBT has demonstrated positive effects, although the existing research, particularly in the context of food allergies, remains limited. Further research is needed to fully establish its clinical significance and long-term benefits. Expanding psychological services within allergy clinics could improve patient care by addressing the emotional and psychological needs of patients and their families. More research needs to be undertaken, particularly in regions such as the NW of England, where there exists little specialised psychological support for patients with food allergy. This can consequently lead to the implementation of comprehensive psychological support programs across undeserved regions, addressing gaps in care and improving the mental well-being and management of food allergies.

All health care staff, including nurses, dietitians, GPs and social workers have a role to play in delivering psychological support to patients with allergy (Mandell et al., 2005; Mercer et al., 2015). Mercer et al. (2015) further suggest that in order for psychological provision to be effective, good regular communication between professionals is paramount. Knibb et al. (2019) additionally recommend the need for health care providers, family members and the wider public to learn necessary skills from psychologists. This in turn can prompt the recognition of psychological behaviours and therefore, can lead to the implantation of early interventions which will prove beneficial. Furthermore, Barker et al. (2021) recommend including psychosocial aspects of allergy in the undergraduate medical curriculum, in the hopes of facilitating psychosocial care as a core competency in allergy practice at the primary care level. This will ensure more accessible psychological care for allergic patients.

2.2.6.4. Pharmacists

Alongside nurses, dietitians and psychologists, the important role of pharmacists in allergy care have also been emphasised in research. Pharmacists can provide medication advice and ensure appropriate medication is being used by patients for effective management (Skypala et al., 2018). They can also educate patients on the correct technique of administering adrenaline auto-injectors (Saleh-Langenberg et al., 2017; Daniels et al., 2021). Research also indicates that pharmacists can recognise the signs of an allergic reaction and will be able to support the diagnosis of new patients with food allergy (Barnett, 2003).

2.2.6.5. Summary

Research clearly illustrates how the roles of different HCP in the care of patients with allergy is valued and of vital importance. The GP or physician will rarely have time to devote themselves to the additional aspects of care needed to successfully manage allergies. A multi-disciplinary team of allied health professionals will certainly benefit. It will ensure timely, accessible, holistic care, which is of high quality and thus, allow for optimal allergy management in the patient. Consequently, reducing the overall burden on the primary care physicians and existing allergy specialists (Mercer et al., 2015; Skypala et al., 2018, Knibb et al, 2019; Barker et al., 2021; Daniels et al., 2021; Muraro et al., 2022; Knibb et al., 2023). Without such tailored support from trained professionals, food allergic patients and their families may face challenges in the management of their food allergies, increasing the risk of poor health outcomes and reducing their quality of life (Daniels et al., 2021).

2.3. Food Choice in Late Adolescents

Food Choice is a dynamic and complex phenomenon that is constantly evolving. Many factors influence the foods we choose to eat; biological, psychological, economic, social, cultural, physical and political factors are all significant predictors of FC (Monterrosa et al., 2020). During the challenging period of late adolescence, individuals will attempt to establish their identity. This profoundly impacts eating behaviours in this group. The transition to university life is associated with an increased autonomy over FCs and smaller food budgets. This coupled with the increased exposure to new social groups and food cultures will further define food intake (Sprake et al., 2018). Research indicates that while majority of LA contemplate healthy eating, they often struggle to make this a priority. Although some LA are able to lead a healthy lifestyle, many have no interest or motivation in altering their current eating habits (Brennan et al., 2020). In fact, LA between the ages of 18-25years are amongst the largest consumers of fast food and sugar sweetened beverages and have predominantly lower fruit and vegetable intake and thus, have an extremely poor diet (Pelletier et al., 2014; Rounsefall, et al., 2020).

2.3.1. The Social Aspect

The social context is a powerful influencer of food intake. Though eating is largely regulated by hunger and satiety, the presence of other people has a significant impact on eating behaviour (Robinson and Higgs, 2013; Pelletier et al., 2014; Robinson et al., 2014; Cruwys et al., 2015; Higgs, 2015; Higgs and Thomas, 2016; Herman, 2017; Suwalska and Bogdanski, 2021). The social model of eating involves adjusting the amount of food eaten to the intake of the accompanying person (Liu and Higgs, 2019). This model includes two theories and can further explain eating behaviour. Situations where people are in a group or in the presence of acquaintances will lead them to eating more, as described by the ***social facilitation*** theory. In contrast, the theory of ***self-presentation*** suggests that when people believe others are watching them eat or judging their intake, food consumption will decrease (Higgs and Thomas, 2016; Suwalska and Bogdanski, 2021).

For individuals with food allergies, these social dynamics can negatively impact eating behaviour and dietary adherence. The desire to fit in can lead food allergic individuals to make risky FCs to avoid feeling excluded or judged, such as consuming allergenic foods (Greenhawt et al., 2016). The social facilitation theory indicates that in social settings there will be an increased food intake, which for those with food allergies can prove dangerous if safe food options are limited or allergies are not clearly communicated. On the other hand, the social

presentation theory may cause food allergic individuals to restrict their food intake or avoid eating in social situations, to prevent potential exposure to allergens or draw attention to their food allergy (Graham and Ciciurkaite, 2023; Hanna et al., 2023).

Social cues can determine what is deemed appropriate with regard to food intake (Nisbett and Storms, 1974; Roth et al., 2001; Herman, 2017; Dix et al., 2022). In particular, peer influence is crucial in shaping the eating behaviours of LA. Food preferences are especially informed by peers as it is often seen as a positive emotional experience (Higgs and Thomas, 2016). Additionally, eating in groups is indicative of improved health and wellbeing (Dunbar, 2017). What was initially construed as a special occasion, has now increasingly become a common occurrence. In fact, eating with peers is especially prevalent amongst LA, as they embark on a journey of self-discovery and identity formation. This can be challenging for those with food allergies, as it often creates social pressures to conform to group norms and could lead to unsafe food practices (Jeong and Khandokar, 2024). When eating together, overindulgence of energy dense foods is accepted and even encouraged (Herman, 2017). Hence, it is no surprise why a substantial increase in weight gain has notably been documented in first year university students (Cockman et al., 2013; Deliens et al., 2014; Hebden et al., 2015; Sprake et al., 2018).

Stok et al. (2016), conducted a systematic review to assess the role of peer social norms on adolescents (10-25years) food intake. Of the 33 studies included in their review, 32 revealed a significant association between peer social norms and food intake. A common finding among all studies, was the increased consumption of unhealthy snacks, fast foods and sugar sweetened beverages, but also the increased consumption of fruits and vegetables. The eating practices did not differ between those in early adolescence (10-17years) and late adolescence (18-25years), suggesting the significant nature of social norms throughout this entire period of adolescence. Similar effects of social norms were also observed irrespective if the norm referent group consisted of socially close or socially distant peers. Thus indicating that so long as individuals can identify with their peers in any way, they will mimic behaviour. It is important to note here that the studies included in this review focused on the general population and not specifically in those with food allergies. This group face unique challenges and social norms and peer influences could potentially exacerbate risky eating behaviour as they attempt to navigate group dynamics while manging their food allergy (Jeong and Khandokar, 2024). Future studies should therefore investigate FCs in those with food allergies and how peer social norms may influence FC and dietary intake.

LA have a greater connection to social media and thus, this can further influence and establish eating behaviours in this group (Brennan et al., 2020). A Sensis social media report revealed how social media platforms were used by 89% of LA at least once per day (Sensis, 2017). This connection with a global audience will consequently lead to an increase in the exposure of advertising, which also plays a major role in eating habits of this group (Buchanan et al., 2017; Klassen et al., 2018; Friedman et al., 2022). However, research indicates that health promotion organisations have a lesser presence and following on social media and often miss the mark when it comes to specific sub-groups (Klassen et al., 2018; Barklamb et al., 2020; Dix et al., 2022). Therefore, they are not as successful in delivering their message, which further explains the poor eating habits of LA. Often, individuals identify with the eating behaviour of an important or popular social group and eating behaviours are further established when individuals receive positive social feedback from their peers regarding that food (Robinson and Higgs, 2012; Stok et al., 2014). Social media provides a constant stream of social input to LA whereby they are able to engage with idealised versions of both their peers and strangers (Friedman et al., 2022). A common occurrence amongst LA is to post their eating habits across social media platforms, which often consists of unhealthy foods (Filippone et al., 2022). Additionally, the food industry have commercialised social media, inundating individuals with advertisements of unhealthy foods high in energy and low in nutrients (Qutteina et al., 2019; Friedman et al., 2022). Equally, social media influencers who share their lives on social media and develop emotional connections with their audiences, have emerged as popular and persuasive individuals that can negatively impact eating behaviour (Freburg et al., 2011; Uzunoglu et al., 2014). However, many health focused influencers don't possess professional accreditation and often provide misleading information which lacks evidence, particularly with regard to diet and nutrition (Easton et al., 2018). Similarly, social media is commonly used for support and information following a food allergy diagnosis. However, those with food allergies often encounter challenges in sourcing reliable and accurate content. This can negatively impact their ability to manage their allergies effectively and make informed decisions about FCs and diet (Hamshaw et al., 2019).

2.3.2. The University Environment

During the years of late adolescence eating behaviour is largely influenced by unhealthy foods (Pelletier et al., 2014; Stok et al., 2014; Sprake et al., 2018). Students will often be living away from home and will no longer be under strict food supervision. Possibly for the first time in their lives, LA will choose where, when and what to eat (Li et al., 2022; Racine et al., 2022; Hafiz et al., 2023). This is quite different in comparison to childhood where parents select the foods

of the family diet and children often model parents eating behaviours. Thus, food intake is somewhat better at home (Poobalan et al., 2014; Scaglioni et al., 2018). As these individuals enter into university, the food environment they are exposed to offers a large proportion of unhealthy foods (Sprake et al., 2018). There is much existing literature which illustrates that the university food environment is poor. Table 2.4 provides a collection of previous studies from various countries, including the UK, US Australia, Brazil, Netherlands, New Zealand, Norway and Ghana. The studies included in the review focus on FCs of university students, while some also measure the food environment and dietary quality of participants. Overall, the studies consistently demonstrate that the university food environment is poor, mainly offering unhealthy food options and negatively impacting food FC and dietary intake among students. Additionally, factors such as taste and cost significantly predicted FC and this led to the consumption of foods lower in nutritional quality. To our knowledge, limited studies have explored the FCs of LA with food allergies in the university environment. In fact, only one previous research has investigated FC in specifically LA with food allergies (Laheri et al., 2022). The details of this study are additionally included in the subsequent review.

1190 **Table 2.4.** Previous literature highlighting the impact of the university environment on FC and dietary intake.

Reference	Year of Study	Country	Aim	Methodology	Findings
Kremmyda et al	2008	UK	To identify the eating habits of Greek students living in Glasgow and to see if these habits were the result of living away from home for the first time.	A self-administered questionnaire was used to assess the diets before and after commencing university in Greek students living in the family home (n=43) or away from home either in Greece (n=37) or Glasgow (n=55).	Those students who lived at home whilst at university were able to maintain dietary patterns. However, significant changes were observed in students who were living away from home, with these individuals consuming fewer fresh fruits, meats and cheeses and increasing their intake of snack foods, which were readily available on campus.
Pelletier and Laska	2013	US	To firstly quantify the prevalence of purchasing campus foods, fast foods and bringing food from home. Secondly, they examined the dietary intake and meal patterns of these students.	An online survey was completed by students from one community college and one university.	Approximately 45% of students purchased foods and/or beverages from at least one campus area venue greater than 3 times per week. Foods purchased in and around campus was associated with higher fat and sugar intake, while food prepared at home was healthier.
Roy et al	2016	Australia	The availability, accessibility and promotion of foods and beverages was assessed across seven institutions (three universities and four technical and further education campuses).	A scoring instrument called the food environment-quality index was developed and used to conduct a food environmental audit survey of 252 food and beverage outlets.	Two thirds of foods were sugar-sweetened beverages, chocolates, high energy foods, chips or confectionary. Healthy foods were less available and promoted less in comparison to unhealthy foods.

1191 **Table 2.4.** Continued

Reference	Year of Study	Country	Aim	Methodology	Findings
Kourouniotis et al	2016	Australia	To assess the importance of taste on dietary choice and to determine the dietary behaviour and dietary quality of university students.	A questionnaire was completed by 1306 Australian students.	Taste was an extremely important factor of FC and those who rated taste highly, had a poorer diet. Participants were consuming fruits and vegetables but were significantly more likely to consume foods high in fat, sugar and salt including cakes and puddings, biscuits, pizza, potato chips, takeaway meals and confectionary, as these were more readily available on campus and were cheaper to purchase.
Pulz et al	2016	Brazil	To evaluate the food environment at one Brazilian university including 6 restaurants and 13 snack bars.	The Nutrition Environment Measures Survey-Restaurants (NEMS-R) was adapted for Brazil to evaluate and qualitatively classify the nutritional quality and characteristics of the food.	Most food and beverages purchased from snack bars were made with processed ingredients and possessed a lower nutritional quality than similar products made on campus. Only 16% of the food outlets provided food ingredients or nutritional information of products.
Roy et al	2017	Australia	To assess the association between foods and beverages consumed from the university environment and diet quality in young adults.	A purposely designed validated smartphone application was used to collect 5 day dietary data from 103 university students. Diet quality was assessed using the 2013 dietary guidelines for food groups and nutrients and the validated Healthy Eating Index for Australians (HEIFA-2013.	A statistically significant difference was observed between the number of university foods and beverages consumed in 5 days and the HEIFA-2013. Frequent on campus food purchasing resulted in poor diet quality.

1192

1193 **Table 2.4.** Continued

Reference	Year of Study	Country	Aim	Methodology	Findings
Van den Bogerd et al	2019	Netherlands	Firstly, to investigate the fruit and vegetable intake of university students and associated demographics and lifestyle characteristics. Secondly, to investigate students perceptions of fruit and vegetable availability and fruit and vegetable intervention strategies in the university environment.	Cross-sectional questionnaire data was collected using a food frequency tool to investigate the fruit and vegetable intake of Dutch university students.	Fruit and vegetable intake was found to be lower in male students living independently. Students indicated that the university environment provided sufficient fruits and vegetables, however, they would be more willing to purchase them if they were more affordable.
Roy et al	2019	New Zealand	To investigate the purchasing preferences, behaviours and opinions of the food environment amongst students and staff at one large university.	A quantitative survey was used. The study audited 57 food outlets and 29 vending machines across 6 campuses at one large university.	79% of participants were found to consume on campus foods. Healthier food and beverage items were less available and accessible across campus, in comparison to their non-healthy counterparts. Additionally, unhealthy foods were promoted more and cost less than healthier items. Students were found to consume a greater quantity of unhealthy foods than staff.
Martinez-Perez et al	2021	Norway	To assess the nutritional profile of products offered at one Norwegian university, as means of determining the quality of the university food environment.	An anonymous online survey was completed by 1089 students	Most students were found to consume on campus foods, particularly for lunch and as a snack. Results revealed 39.8% of products were ‘unhealthy’ and 85.9% were ‘ultra-processed’. Taste was also found to be the most important determinant of FC followed by price.

1194 **Table 2.4** Continued.

Reference	Year of Study	Country	Aim	Methodology	Findings
Mensah et al	2022	Ghana	To map and characterise the food outlets within a Ghanaian university campus and to assess the healthiness of the food outlets.	A Geographical Information System (GIS) was used to characterise the food environment at the University of Ghana campus. A classification system was developed to assess the healthiness of food outlets within the university foodscape.	138 food outlets were identified, most of which were situated near student residences. Food outlets were categorised as either NCD-healthy, NCD-intermediate or NCD-unhealthy. More than half of the food outlets qualified as NCD-unhealthy food outlets, highlighting the poor food environment. (NCD = Non-Communicable Disease).
Hutchesson et al	2022	Australia	To describe on-campus food purchasing behaviours; satisfaction with the cost and availability of foods and beverages on-campus; and preferences for the on-campus food environment in Australian university students.	An online cross-sectional survey of 409 students between 2017 and 2018 took place.	Majority of students (94%) purchased foods and beverages on campus. Students were not satisfied with the availability of healthy food options and thought prices of existing healthy foods were high, which discouraged purchase of these foods.
Coyle et al	2023	Australia	To assess the food environment at one large university in Sydney, Australia.	Data was collected between March and July 2022 across 27 food outlets and 24 vending machines. The healthiness of the food environment was evaluated by comparing items against the *Healthy Food and Drink in New South Wales Health Facilities for Staff and Visitors Framework.*	Majority of products were found to be unhealthy. A large number of food and beverages exceeded portion recommendations, in particular sugary drinks. Packaged foods which were readily available on campus were unhealthy. Both students and staff struggled to identify healthier options due to many products failing to include the health star rating (a voluntary front of pack labelling system used in Australia, that provides an overall nutritional profile of packaged food).

1195

1196 **Table 2.4.** Continued.

Reference	Year of Study	Country	Aim	Methodology	Findings
Laheri et al	2022	UK	To explore factors influencing food selection behaviour in LA with food allergies and celiac disease.	A food selection survey was distributed to participants with food allergies and celiac disease in order to determine the influence of five factor - cost, taste, convenience, health and labelling.	Taste and cost were the most influential determinants of food selection in both groups of participants. Labelling was found to be the least influential factor, despite this ensuring safety in this group of participants.

2.3.3. Additional Factors Impacting Food Choice

Multiple factors in addition to social aspects and the poor university food environment can negatively impact FC and dietary intake in university students. For food allergic individuals, these factors are exacerbated by the need to independently manage their condition for the first time. To the best of our knowledge, only two pieces of research have investigated the FC of food allergic participants – one in early adolescence (Sommer et al., 2014) and one in late adolescence (Laheri et al., 2022). Both studies were conducted in the UK and determined that those with and without food allergies are influenced by similar determinants of FC and the primary reason for this, is that those with food allergies strive to live a similar life to that of their peers. Beyond this, very little UK research has explored the food access, eating behaviours and dietary intake of this group. Given this gap in the literature, it can only be assumed that the various factors which influence FC in the general LA population will also impact those with food allergies. However, without sufficient research, it is difficult to draw definitive conclusions about the unique experiences and challenges faced by this group. This lack of evidence warrants further investigation into the food access, FCs, eating behaviours and dietary intake of LA with food allergies.

During the period of transition from late adolescence to adulthood, there is an increased level of stress. The need to build new social relationships, achieve high results, peer competition and lack of time management are all difficulties encountered by LA, which contribute to this increased stress. Consequently, this will lead to negative changes in food preferences and consumption (Hafiz et al., 2023). In general, it has been found that during times of stress individuals were more likely to consume high fat foods and snack foods e.g. sweets which required little preparation (Grunberg and Straub., 1992; Oliver and Wardle, 1999; Wansink et al., 2003; Zellner et al., 2006). Individuals with food allergies are likely to experience heightened stress levels owing to the difficulty in carefully navigating their dietary restrictions in unfamiliar environments where the availability of safe food options is limited (Larson et al., 2020) potentially leading to an even greater reliance on unhealthy foods. Also, the need for social acceptance and autonomy from parents is one of the driving forces behind unhealthy eating behaviour (Poobalan et al, 2014; Stok et al., 2014). For those with food allergies, there may be a reluctance to stand out by adhering to dietary restrictions and this could lead to riskier FCs. Previous research from the US has noted the increased consumption of ‘may contain’ foods in LA (Sampson et al., 2006; Monks et al., 2010; Greenhawt et al., 2016), which raises serious concerns about their willingness to compromise safety for social conformity, regardless of the consequences.

Moreover, reduced time to prepare food due to university related stress and low cooking confidence, will inevitably lead to an increased reliance and preference for packaged and convenience foods, which are of a poorer dietary quality (Stok et al., 2016). This challenge is particularly pronounced for food allergic students, who may find it difficult to identify and source safe food options while at university. Further studies from Australia have also shown that 18-25year olds perceive healthy eating as both time consuming and expensive and hence, value social, financial and spiritual ideals a great deal more (Dix et al., 2022; Friedman et al., 2022). The added burden of allergen avoidance in those with food allergies may impact their perception of healthy eating, making it seem more difficult and less appealing. In addition to this, lack of nutrition knowledge and a lack of awareness of the importance of a balanced diet, is a common obstacle leading to poor dietary choices in this group (Husain et al., 2021). Belogianni et al. (2022) further reinforces this. They investigated nutrition knowledge among UK university students using the general nutrition knowledge questionnaire. Although participants had good knowledge of which meals, desserts and drinks were considered the healthier options, gaps were found in students nutrition knowledge. Half of students were not aware of dietary recommendations e.g. increasing wholegrain intake and reducing salt and fat intake. Fewer than half of participants were unable to identify that breakfast cereals and bread contained hidden sources of salt. Additionally, students had reduced knowledge on practices of weight management. This lack of nutritional knowledge may be especially problematic in LA with food allergies who not only need to understand general nutrition principles, but also are in need of specific knowledge regarding safe allergen free options and alternatives. In addition to this, Sogari et al. (2018) discuss barriers to healthy eating in US university students aged 18-25years. Through qualitative focus groups, their research identified time constraints, university related stress, an increased convenience of high calorie foods, easy access to junk foods and high prices of healthy foods, as the most common reasons why students struggled to eat healthily. They equally mentioned several facilitators of healthy eating including improving food knowledge and education, meal planning, getting involved in food preparation and being physically active. While similar studies have not been conducted in students with food allergies, for this group meal planning and preparation involves additional considerations, including allergen avoidance and risks related to cross-contact, potentially complicating their ability to eat healthily.

Furthermore, the poor access of healthy foods, particularly in and around campus, were also found to be obstacles to healthy eating amongst LA (McGowan et al., 2017; Munt et al., 2017; Sexton-Dhamu et al., 2021). Vending machines present everyday temptations to university students that are easily accessible. They more often than not include snacks and beverages of low nutritional value that are high in salt, sugar and fat, with limited healthy options available

(Byrd-Bredbenner et al., 2012; Grech et al., 2015; Lasala et al., 2022). The availability of these unhealthy options will consequently encourage the purchase and consumption of such foods (Grech et al., 2017; Shi et al., 2018; Whatnall et al., 2020). Previous research indicates that more than half of students (53.3%) use vending machines more than once per week and greater than 80% use them to snack between meals (Park and Papadika, 2016). Park and Papadika (2016), examined the nutritional value of goods sold in vending machines in a UK university. Their results revealed that most vending machine snacks were high in sugar, fat and saturated fat and beverages were high in sugar. Likewise, Grech et al. (2017) following an audit of the nutritional composition of vending machine foods in one university in Australia, found that 95% of snacks and 49% of beverages were considered unhealthy. For food allergic individuals, the campus food environment including vending machines, rarely offer allergen free options, forcing them to risk consuming potentially unsafe items which are nutritionally inadequate or simply go without.

Several interventions have proven successful in increasing the sale of healthy snacks and beverages in the university setting from vending machines. In a US study Brown et al. (2014), demonstrated the effectiveness of using colour coded stickers (red = less healthy, yellow = moderately healthy, green = more healthy). The use of this nutrition information intervention led to the increased purchase of healthier snack items (green stickered items) and a reduced purchase of red and yellow stickered foods and beverages. Additionally, Grech et al. (2015), conducted a systematic review to assess nutrition intervention studies in vending machines. Of the twelve studies included in their review, five were from a university setting. They found that reducing prices of healthier foods and increasing their availability in vending machines encouraged their purchase. Furthermore, Whatnall et al. (2020), evaluated the effectiveness of nutrition interventions in the university setting, through means of a systematic review. Of the thirteen studies included, their results revealed that eight reported positive findings. Promoting and increasing the availability of healthier foods and reducing their prices were the predominant strategies implemented that proved effective. Lasala et al. (2022), reinforced the need of including healthier foods in vending machines, suggesting foods such as, fruit, natural/roasted nuts without added salt, whole-grain sandwiches, breadsticks and cereals low in sugar and salt. A greater proportion of alternatives to sugar-sweetened beverages such as, water, natural fruit and vegetable juices, milk, natural yoghurts, and sugar-free soft drinks were also suggested to be included in vending machines by Lasala et al. (2022). Despite these efforts to improve the nutritional quality of vending machine foods, no research has investigated the inclusion of allergen free foods in university campus vending machines, suggesting a gap in accommodating to the needs of students with food allergies. There is a growing number of students with food allergies and this emphasises the need for more

inclusive and safe food options on the university campus. Additionally, there is a need for more research in this area to prompt the availability of safer food options for food allergic students.

In addition to this, the management of food allergies at university presents a uniquely challenging situation. LA with food allergies will be living independently and will likely for the first time, be responsible for their individual diet and health. During this time, LA will also be reliant on the university to prevent and aid the incidence of any food allergic reactions. To our knowledge, no research has looked at the management of food allergies in UK universities. However, some US studies exploring this topic do exist. They highlight how universities themselves, despite the growing number of food-allergic students, are not equipped to provide the necessary support and guidance for this group (Greenhawt et al., 2009; Choi and Rajagopal, 2013; Dyer et al., 2018; Bajaj et al., 2023; Wu and Wang. 2023). Specifically, staff at higher education institutes possess little knowledge and training regarding food allergies and lack the confidence in providing support to students in the event of an allergic reaction (Choi and Rajagopal., 2013). Moreover, the campus food environment offer little in the way of AFF and on campus dining facilities cannot completely guarantee an allergen free food environment (Greenhawt et al., 2009; Wu and Wang., 2023). To date, no previous research has mentioned the inclusion of AFF in campus vending machines, despite their increased use by LA. Thus, further highlighting the limited availability of safe food options on campus. Hence, it is no surprise why many accounts of fatal food anaphylaxis have been reported in students at university (Bock et al., 2007; Vuchnich et al., 2015; Mondello, 2023). To ensure inclusivity universities have a responsibility to support students in managing their food allergies. This lies in the development of policies and procedures which increase the access of AFF, facilitate allergy awareness training for staff and encourage self-responsibility and communication in food allergic students (Choi and Rajagopal, 2013; Dyer et al., 2018; Hassan et al., 2020; Bajaj et al., 2023; Wu and Wang. 2023).

2.3.4. Summary

The transition to university is characterised by dramatic changes in lifestyle. During this time, LA will perhaps for the first time in their lives be responsible for individual FC. Throughout this period, many factors will contribute to the FC behaviour of LA. As detailed in the literature, factors influencing FC in LA include social pressures, academic stress and limited time, which in turn can impact dietary habits. Despite any good intentions to adopt a healthy diet, the desire for independence and the pressures of social influence and academic life will lead these individuals to increase in their risk taking and in their indulgence of unhealthy foods. Equally, healthy eating will be hindered due to the tempting obesogenic environment and the constant

availability of pre-packed and convenience foods. For LA with food allergies, the added complexity of navigating allergen free options in a campus environment which often lacks adequate options can further influence FCs. Existing research indicates that while LA with and without food allergies are influenced by similar determinants of FC, the unique demands of managing food allergies may exacerbate the difficulties with maintaining a healthy diet. Additionally, the limited availability of AFF across campus will reduce FCs in this group and further increase risk-taking. It is clear that the university has an obligation to promote a more conducive food environment – one which can safely accommodate for all students, including those with food allergies. Literature dictates that eating behaviours established during the period of late adolescence will persist into adulthood (Vilaro et al., 2018). Therefore, in order to improve and maintain future health outcomes, there is a great need to ensure better dietary behaviours in this group of individuals.

2.4. Food Insecurity

2.4.1. Prevalence

Access to adequate food is a basic right, yet food insecurity is a global public health problem (BMC Medicine, 2023). Food insecurity has been defined as the inability to acquire sufficient food to meet nutritional requirements, due to financial or resource constraints (FAO, 2023). Food insecurity can be divided into three types. 'Marginal or 'mild' food insecurity (the uncertain access and anxiety in obtaining adequate food), 'moderate' food insecurity (the inability to afford a balanced diet – this can lead to compromising the quality and variety of food, reducing quantities of food and skipping meals) and 'severe' food insecurity (the inability to afford enough food – experiencing hunger) (Sosenko et al., 2022).

Despite the UK being an affluent country, food insecurity is prevalent and has been further exacerbated by the COVID-19 pandemic (McPherson, 2020). In April 2022, an estimated 7.3 million adults and more than 2.6 million children experienced food insecurity across the UK (Cretch, 2022). A further report highlights how in June 2023 alone, 9 million adults in the UK (17% of households) experienced 'moderate' or 'severe' food insecurity because they were unable to afford or access food. In this same time frame, 16% of adults reported having smaller portions or skipping meals altogether, 11% reported feeling hungry but not eating and 6% (equal to 3 million adults) reported not eating for a whole day (The Food Foundation, 2023). The NW of England is one area where there exists high levels of food insecurity and this can

be attributed to the high levels of deprivation which are present in this region (Mitchell, 2022; Smith et al., 2022). A UK food security report (2021) revealed extremely low food security in the NW, with 90% of households in this district experiencing some level of food insecurity. Further research identified that individuals at university in the NW of England were the most at risk, with 60% of food insecurity found among students (Armstrong et al., 2023).

2.4.2. The Consequences of Food Insecurity

Food insecurity has negative consequences on health. Many of those who experience food insecurity will have an increased reliance on processed foods high in fat, salt and sugar due to their inexpensive nature (Contento, 2011; Hall, 2018; Liem and Russell, 2019; Monterrosa et al., 2020; Molenaar et al., 2021; Li et al., 2022; Johnstone and Lonnie, 2023). This will massively impact diet quality with both malnutrition and obesity common occurrences (Carvajal-Aldaz et al., 2022; Johnstone and Lonnie, 2023). Additionally, individuals with food insecurity will either develop new physical health conditions or existing conditions will worsen. For example, levels of food insecurity are associated with vitamin deficiencies, elevated blood pressure, diabetes, heart disease, iron deficiency anemia, chronic pain and rheumatological conditions. (Gunderson and Ziliak, 2015; Dush et al., 2020; Larson et al., 2020; Yau et al., 2020; BMC Medicine 2023).

Moreover, poor quality of life is an inevitable outcome for those suffering from food insecurity. The difficulty in accessing food, particularly in those with dietary restrictions (e.g. food allergies), will impact social interactions and dining out experiences. Consequently, this will contribute to feelings of isolation and frustration, reducing overall quality of life (Graham and Ciciurkaite, 2023; Hanna et al., 2023). Additionally, the development of mental health conditions is prevalent (Dilley et al., 2018). A UK report on food insecurity found that in LA, 9 in 10 (91%) will worry that their food will run out before they are able to financially buy more, with more than half (57%) reporting that this is a frequent occurrence (Cretch, 2022). This insufficient food as well as the subsistence on nutritionally inadequate diets will lead to many individuals experiencing stress, anxiety and depression (Larson et al., 2020; McPherson et al., 2020; Pourmotabbed et al., 2020; Wolfson et al., 2021; Cretch et al., 2022). This will most certainly prove detrimental, with suicidal ideation and mental disorders merely a few of the negative impacts that will arise (Dush, 2020). Furthermore, research from Canada and the UK found that food insecurity (due to insufficient nutrients obtained from foods, namely Iron and Zinc) is linked to poorer cognitive ability making it harder for individuals to concentrate, thus directly impairing academic performance (Ke and Ford-Jones, 2015; McPherson, 2020). Similarly, securing nutritious food is challenging for food insecure individuals and can influence

immediate and future social development. This will further reduce educational and academic performance and hence economic attainment (Ke and Ford-Jones, 2015; Beyene, 2023).

The negative health impacts of food insecurity are clear. A direct result of this will be the increased burden on health and social care services. According to a UK study reported in BMC Medicine (2023), those experiencing food insecurity have an increased likelihood of being admitted for acute care, staying in hospital and being readmitted, in comparison to those who are food secure. In fact, food insecure individuals are also more likely to die prematurely and in cases of severe food insecurity, the life span is reduced by an average of nine years.

2.4.3. Food Banks

In recent times, the rising levels of food insecurity has caused an overwhelming increase in the number of food banks being used in the UK (McPherson, 2020; Sosenko, et al., 2022). Currently, food banks are overstretched and unable to accommodate for the rising demands. In 2022/23, approximately 2.99 million people used a food bank across the UK – an increase from the previous year (Clark, 2023). Particularly, food bank usage in the NW has been notable (Oldman, 2021). In 2021, the Trussell Trust reported providing food to people in the NW more than any other region. In addition to this, recent data from the Department of Work and Pensions highlighted the NW as having one of the highest household food bank usages compared to other areas in the UK (Department for Work and Pensions, 2023). Food banks do offer a critical role in providing relief to many individuals and families who struggle to access food (Minaker et al., 2014; Ke and Ford-Jones, 2015; Bazerghi et al., 2016; May et al., 2018; Loopstra et al., 2019). However, reliance on food banks is not a sustainable safety net and offer only a temporary solution (Ke and Ford-Jones, 2015; May et al., 2018; BMC Medicine, 2023). In fact, access to foods via food banks may not be readily available ‘as and when’ needed and this will result in periods of food deficiency. Those with food allergies experiencing food insecurity will be placed at an increased risk of food deficiency, as food banks rarely accommodate for this group, offering limited to no AFF (Fong et al., 2022; Scurlock et al., 2022). In addition to this, many will not be able to access food banks due to geographical location and the cost of transport (Tam et al., 2014; May et al., 2018). Also, the concept of food banks relies exclusively on donations, resulting in a limited food supply (Ke and Ford-Jones, 2015; Loopstra et al., 2019; Sosenko, et al., 2022). Moreover, much of the food provided at food banks lacks nutritional quality. Previous research has revealed that such foods exceed energy requirements, are extremely high in salt, sugar and carbohydrate and have inadequate vitamin A and D levels (Bazerghi et al., 2016; Hughes and Prayogo, 2018; Fallaize et al., 2020; Oldroyd et al., 2022). Thus making it difficult for individuals to achieve

and maintain a balanced diet. Additionally, fresh produce is scarce at food banks and while there are many long-life food options, these are often nutritionally unsuitable (Campbell et al., 2011; Ke and Ford-Jones, 2015).

2.4.4. Late Adolescents – An 'At Risk' Population

Food insecurity has the potential to affect people of all ages. However, over the past few years, there has been a notable increase in food insecurity in those experiencing late adolescence. Research conducted in the US highlights that food insecurity is present in nearly one in four individuals between the ages of 18 and 26years (Larson et al., 2020). These individuals will be in a state of transition from late adolescence to adulthood and have an increased risk of poverty and food insecurity making them amongst the most vulnerable (Defeyter et al., 2020; McPherson, 2020; Cretch et al., 2022). Research from both the UK and US further highlight how over one third of all students at university will be suffering from food insecurity at some level and since the COVID-19 pandemic, this number is increasing (Defeyter et al., 2020).

Economic constraints are one of the most commonly reported factors influencing food insecurity and as such, is a constant factor in the lives of many low-income families (Loopstra et al., 2019). The rising cost of living is one of the most significant contributors to this (Ke and Ford-Jones, 2015; Loopstra et al., 2019; Cretch, 2022). While seeking autonomy from their parents and embarking on a journey of self-discovery and identification, LA will often live independently. This can often leave them in financial difficulty (Defeyter et al., 2020). This is particularly prevalent in students at university. According to a UK specific study, these individuals are three times more likely to experience food insecurity than any other population group (Yau et al., 2020). Likewise, one UK study highlighted how food bank usage by university students was common, with 1 in 10 using a food bank during the 2021/22 academic year (Brown, 2022). This is unsurprising given that tuition fees, food, utilities, transport and accommodation are just some of the many expenditures for students (Ahmad et al., 2021; Ravel et al., 2023). Often students will supplement their income through part-time, temporary jobs, which can be difficult to balance while studying. Many will be unable to cope with this stressful situation and as such, will be in a state of constant worry and anxiety (Defeyter et al., 2020). Additionally, to afford a nutritious diet of good quality becomes difficult for this group due to financial restrictions. Previous UK research has illustrated how 54% of LA struggled to buy food in the year 2022, with this being commonly attributed to the high cost of living (e.g. rent and energy prices). In vulnerable LA this is worse, with the same research highlighting how 68% of these individuals will regularly go an entire day without food, due to lack of money.

Similarly, 78% of LA report they cannot afford to eat a balanced meal with almost half (45%) saying this is an often occurrence (Cretch, 2022).

In addition to this, the financial difficulty experienced by LA will present difficult choices. This group will be attempting to gain control over their individual FCs, while adapting to a life of independency and thus, will increasingly exercise poor judgement and select suboptimal foods (Bauer et al., 2016; Larson et al., 2020). For example, Larson et al. (2020), found that LA experiencing food insecurity in the US were more likely to consume fast food and sugar sweetened beverages, with a reduced intake of fruits, vegetables and fibre, placing them at an increased risk of nutritional deficiencies. Physical access to food is necessary in order to be food secure (UK Food Security Report, 2021). Therefore, one reason for LA being more inclined to purchase unhealthy foods, is because they are more affordable and easily accessible (Ke and Ford-Jones, 2015; Loopstra et al., 2019). One UK survey mentions how 62% of LA believed they did not have access to enough safe, nutritious food to develop and maintain growth and development (Cretch, 2022). This is often the case in the university campus environment and surrounding areas which have commonly been labelled as 'obesogenic.' (Poobalan et al., 2014; Tanton et al., 2015; Munt et al., 2017; Brennan et al., 2020) This will prove problematic given that firstly, the period from adolescence to adulthood is one which necessitates heightened nutritional requirements, in order to optimise academic performance (Maslin et al., 2018; Ravel et al., 2023). Secondly, insufficient nutrient intake can compromise health status and can reduce productivity at both work and during education (Ke and Ford-Jones, 2015; Beyene, 2023). In the UK, 23% of LA report missing work or education due to lack of food (Cretch, 2022). Moreover, those in LA (particular those who are food insecure) will often possess limited cooking abilities and the reliance on heavily processed convenience foods is therefore significant (Stok et al., 2016; McPherson, 2020; Harper et al., 2022). Consequently, this will further compound dietary intake and hence nutritional status.

In addition to this, LA will demonstrate a greater degree of risk taking (Steinberg, 2009; Stok et al., 2016). LA who are subject to food insecurity, are more likely to engage in unhealthy behaviour. For instance, skipping breakfast, inadequate sleep, consuming alcohol, smoking cigarettes, substance abuse and binge-eating, are all common practices prevalent amongst LA experiencing food insecurity. These practices will be further exacerbated in those with dietary restrictions (e.g. food allergies), consequently having devastating effects for future health status (Larson et al., 2020). Additionally, despite experiencing high levels of food insecurity, many individuals in late adolescence will not use food banks to avoid shame and stigma associated with the reliance on charitable food (Purdam et al., 2015; Fitzpatrick et al., 2016; McPherson, 2020). Likewise, these individuals find it very difficult to accept both formal

and informal support, as this would disrupt their independence. In many cases, LA would go to great lengths to hide their financial difficulties and would rather go hungry than seek support (McPherson, 2020; Cretch et al., 2022). Therefore, this will further increase food insecurity and the consequent negative health outcomes in this group. Often, the financial strain will lead to many engaging in eating less expensive food, reducing portion sizes and/or the number of meals per day, purchasing foods on loan and credit and reducing fruit and vegetable intake as this is thought to be more expensive. In some cases, LA would participate in less socially desirable coping strategies such as begging and stealing (Fricke et al., 2015; Cretch et al., 2022; Diamini et al., 2023; Yasmin et al., 2023).

2.4.5. Food Allergies and Food Insecurity

The presence of a food allergy will intensify the risk of food insecurity (Dilley et al., 2018; Guillaume et al., 2021). For these individuals, the cornerstone of management is avoidance of the offending allergen (Scurlock et al., 2022). While this is both a proven and effective technique, complete compliance is not only a challenging task, but will naturally lead to limited food selection, which will directly impact nutritional status (Dilley et al., 2018; Tackett et al., 2019). Additionally, the implementation of restrictive diets, especially if not done with care and with suitable alternatives, will further place those with food allergies at risk of an insufficient diet (de Almeida Kotchetkoff et al., 2023). Hence, those suffering from food allergies will already be at an increased risk of nutritional deficiencies, which in turn will negatively impact health status.

An adequate and healthy diet is essential to preventing malnutrition. While this is difficult for those with food allergies due to their dietary restrictions, AFF offer a safe way for those with food allergies to replace lost nutrients (Pasha-Robinson, 2023) However, purchasing these foods is difficult for those with food allergies for two primary reasons. Firstly, individuals with food allergies face a unique challenge in accessing safe AFF within their community. Despite supermarkets and retailers offering more food possibilities to accommodate for the food allergic community, enough options are not available for the rising number of people with food allergies (Searby, 2022). In the UK, these foods are commonly limited to only one section in supermarkets and are rarely seen in convenience stores, making them difficult to access (Holroyd, 2022). Research by Frame et al (2022) further support this, highlighting how those with food allergies in the US had inconsistent access to AFF. They also mention how this limited access to safe foods was associated with reduced quality of life.

Secondly, while ‘free from’ foods are a rapidly growing industry specifically designed to increase safe FC in those with food allergies, these foods are more expensive and not available via prescription (North and Brown, 2017; Allen and Orfila, 2018; Brown et al., 2020). One study conducted by the Foods Standards Agency (2022) revealed how households with food hypersensitivities spent between 12% to 27% more on their weekly food purchases, than individuals without any dietary restrictions. Specifically their study illustrated how those with food allergies faced the highest financial burden than other groups with dietary restrictions, spending an additional 14p more for every pound spent on groceries. Moreover, there is currently no ‘value range’ for allergen free products, leaving individuals with food allergies no choice but to simply spend more (Minaker et al., 2014; Allergy UK, 2023). As the cost of living continues to rise those with food allergies face extortionate prices to access safe, nutritious food. For those unable to afford AFF, they are simply left with no choice but to not purchase them. One Mintel report (2022) reported how half of UK customers would cut back on AFF when money was tight. In addition to free from foods, individuals with food allergies will have additional costs. For instance, the cost of medication, nutrition supplements and increased hospital visits are financially draining (Minaker et al., 2014; Tackett et al., 2018; Foods Standards Agency, 2022). As such, food insecurity will be significantly increased in this group.

While food banks offer a means of providing access to a wide range of foods at no cost, they are under-equipped to accommodate for medical dietary restrictions (Fong et al., 2022; Scurlock et al., 2022). This difficulty in obtaining affordable, quality food that is safe to consume due to reduced access and increased cost will not only lead to the inability to meet nutritional needs, but will greatly increase the risk of allergen exposure in those with food allergies. This will consequently increase severe reactions, leading to an increase in hospitalisations and in many cases, the negative impact on health will be detrimental (Tackett et al., 2019; Brown et al., 2020).

2.4.6. Summary

Food insecurity is a widespread phenomenon – one that proves difficult to resolve due to its multifactorial nature. Food insecurity has the ability to negatively impact all populations. However, LA with food allergies who are undergoing the crucial period of transition from late adolescence to adulthood, are perhaps the most vulnerable. Disrupted access to adequate, nutritious, safe food will elicit unhealthy behaviours, consequently leading to nutritional decline and reduced quality of life. Furthermore, poor academic performance is one of the many consequences of food insecurity. This is particularly concerning for LA as behaviours

established during this time are likely to persist into adulthood (Vilaro et al., 2018). Therefore, promoting positive change during this life stage is critical.

The data presented in this section highlights a significant issue for university students – a demographic who are already under considerable stress due to academic and social pressures. The dual burden of food insecurity and managing food allergies may increase the difficulties in maintaining a safe and balanced diet. Given the heightened risk of food insecurity among university students, particularly in the NW region, there is a need to explore how these challenges can affect LA with food allergies. Addressing this issue is crucial for understanding the broader implications on FC, food access, dietary intake and HCA. This focus aligns with the objective of this thesis in investigating the unique barriers faced by food allergic individuals and the necessity for more inclusive policies and support systems in the university environment. Interventions to limit the scale of food insecurity are not only necessary, but should be prioritised as this may alleviate the existing burden on healthcare services.

2.5. Limitations of the Review

The preceding literature review provides valuable insights into the FCs, food access and HCA of LA with food allergies. However, it is important to consider the limitations associated with the narrative approach which has been adopted.

Firstly, the selection of studies which have been included in this review could have been influenced by the availability at the time the review was conducted. This could have introduced a degree of bias in the literature review as certain points could have been overrepresented, while potentially overlooking other relevant studies. Likewise, the review may not have comprehensively captured and discussed all the relevant research, especially in rapidly evolving fields such as food allergy management and healthcare access, where new studies are continuously emerging.

Secondly, the literature review includes a diverse set of studies with varied methodologies and populations, including differences in sample size, study design and geographical context. This can make it challenging to draw definitive conclusions. Unlike a systematic review which utilises a predefined method to minimise bias and comprehensively cover relevant studies, the narrative approach used in this review may have resulted in gaps in coverage and variability in the quality of the studies, which could impact the overall validity and reliability of the findings.

Thirdly, the literature review focuses on a broad range of topics, covering various aspects of food allergies, HCA, FCs, eating behaviour , food insecurity and social deprivation. This may have diluted the discussion in certain areas and consequently limited the depth of analysis on specific areas.

Finally, the literature review is reliant upon much secondary data and published studies as opposed to direct empirical data. Therefore, this review may not have fully captured the lived experiences of individuals with food allergies, which could have provided deeper insight into their everyday challenges in relation to FC, food access, HCA and dietary intake. This could therefore have resulted in an incomplete understanding of their experiences.

Despite the limitations of this literature review inherent in its narrative approach, it does provide a foundation in understanding the challenges faced by LA with food allergies in the context of their FCs, food access and HCA. The review has also bought to light key areas which require further investigation, some of which are addressed in this thesis. Additionally, the review has identified critical gaps that present opportunities for further research aimed at enhancing the support and overall well-being of LA with food allergies – a demographic which is often underrepresented in research. Addressing these gaps will be essential in developing more effective strategies and targeted interventions, tailored to their unique needs.

2.6. Overall Summary

In conclusion, this literature review has provided a comprehensive overview of existing literature in relation to LA with food allergies FCs, food access and HCA. Though advances in allergy research and clinical practice have significantly contributed to better management and awareness of food allergies, significant gaps do remain in ensuring equitable access to food and healthcare for this demographic.

While this thesis does not directly investigate food insecurity in LA with food allergies, understanding this context provides a crucial backdrop for exploring the unique challenges faced by food allergic students. Similarly, the discussion on factors influencing eating behaviours, food banks and social deprivation enriches the understanding of the broader environment in which LA with food allergies navigate. Additionally, the focus on social deprivation through the literature review, particularly in the NW of England, provides important contextual insights. Although the research does not measure social deprivation levels of the participants, this is a key factor impacting FCs, food and HCA and dietary intake and can exacerbate the existing challenges faced by food allergic individuals. By understanding these

contextual factors, the thesis gains a deeper insight into the environment which impacts LA with food allergies, particularly as all participants for each study were recruited from the NW. This has helped to understand the challenges and more importantly has identified potential future areas of research. Addressing such areas could prove essential in developing more effective strategies for LA managing food allergies.

This literature review provides a foundation for the empirical investigations to follow, which will look at exploring the experiences of LA with food allergies in the NW of England. Specifically, this research will investigate FC, food access, HCA and dietary intake in this group. By comparing between individuals with and without food allergies, the subsequent studies will attempt to highlight the unique challenges faced by LA with food allergies as they transition from late adolescence to adulthood. The findings provide a foundation for the recommendation of targeted interventions from the unique perspectives of food allergic patients, their parents and HCPs – ultimately to improve food and health inequities and dietary intake in this population. The following chapter (Chapter 3) will focus on exploring the FCs, food access and HCA in LA with and without food allergies through quantitative methods, as means of gaining an initial insight into these areas.

Chapter 3 – Current Food Choice, Food Access and Healthcare Access in Late Adolescents (18-25years) With and Without Food Allergies

3.1. Overview

The period of transition from late adolescence to adulthood is a critical life stage which can dictate future food choices. Additionally, the management of a food allergy during this period can further influence food choice (FC). There is currently limited research investigating FC in late adolescents (LA) with food allergy. While previous studies have investigated the FCs of LA (Beasley et al., 2004; Deliens et al., 2014; Hebden et al., 2015; Kairey et al., 2015; Poobalan et al., 2014; Howse et al., 2018; Sogari et al., 2018; Sprake et al., 2018; Livingstone et al., 2021; Li et al., 2022, Mensah et al., 2022) rarely has the influence of FC been examined in LA with food allergies. In fact, to the best of our knowledge only two previous studies have investigated FC in food-allergic individuals – one in early adolescence (Sommer et al., 2014) and one in late adolescence (Laheri et al., 2022). Therefore, this study explored FC in LA with food allergies, with the results further contributing to our knowledge in this area.

Specifically this chapter focused on the current FC, food access (FA) and healthcare access (HCA) of LA with and without food allergies. A cross-sectional study was conducted to explore the various factors impacting FC and the current food and HCA available for these individuals. A key aspect of this study involved conducting a comparative analysis between LA with and without food allergies. The inclusion of a non-food allergic group allowed for a more detailed understanding of the unique challenges faced by LA with food allergies. By providing a comparison, this study better identified the specific factors and barriers related to food allergies which may not be present in the general LA population. This comparison provided valuable context, highlighting whether the issues faced by food-allergic individuals are distinct or simply reflective of the broader trends in this group.

Additionally, the study included both medically diagnosed individuals with food allergies and self-diagnosed individuals with food allergies. There is an increasing prevalence of self-diagnosed food allergies with self-reported food allergy reaching up to 20% in the UK (Allergy UK, 2024) and this can still impact individuals FCs and healthcare seeking behaviour. Including both groups reflects the real world diversity of the food allergic population and provided valuable insights into how perceived food allergies, whether medically diagnosed or self-diagnosed, impact FCs and access to food and healthcare. Although no direct analysis was conducted comparing both groups, understanding their experiences ensured that this

study is more inclusive. This approach can help to identify gaps in awareness, accessibility of safe food options and healthcare support, which can lead to interventions that address the needs of the entire food-allergic population.

Through a quantitative approach, this chapter investigated the current FC, FA and HCA of LA with and without food allergies in North West (NW) England. The findings from this analysis were discussed and based on these results and existing literature, interventions to improve each of these areas for those with food allergies were suggested.

3.2. Methodology

Ethical Considerations

Ethical approval was obtained from the National Health Service Research Ethics Committee (NHS REC) (REC Reference: 21/EE/0285, Project ID: 303224) and the University of Central Lancashire's (UCLan) HEALTH ethics committee, prior to data collection. Following approval, participants were provided with a participant information sheet, providing them with detailed information regarding the study. The participant information sheet was accessible online via a secure link and detailed the purpose and nature of the study, potential risks and benefits of the research and additionally emphasised participant confidentiality and the right to withdraw at any point. This ensured all participants had all relevant information at hand, allowing them to decide if they would like to participate. Once participants had reviewed the participant information sheet, informed consent was obtained from all those who expressed interest in the study, through an online consent form. Only after consent was given, participants were able to access the survey.

Patient and Public Involvement and Engagement

A patient steering group (n=5) comprising of a small sample of the target population was recruited prior to actual data collection. These individuals provided advice and suggestions based on individual experiences with regard to the relevance of the study. They also reviewed any material (e.g. participant information sheets, consent forms, questionnaires) that were seen by prospective participants and determined their suitability. Their feedback was essential in refining the materials to ensure they were clear and understandable to potential participants.

Questionnaire

To assess the various factors impacting FC behaviour, a quantitative survey was conducted (see Appendix 1). The questionnaire was divided into six sections. Sections one, two and three related to socio-demographic, diet and lifestyle factors. Section four assessed current food and HCA, while section five assessed current FC. FC was determined using ten different categories (sensory, convenience, social, psychological, economic, advertising, university, familiarity, health and labelling). A Likert scale of influence where 1 = not influential and 5 = extremely influential, was used in section 5. Section six related to food allergies and was only completed by those participants with food allergies.

The questions used in the questionnaire were adapted from established and validated scales, in this case the Food Choice Questionnaire (FCQ) by Steptoe et al. (1995). The FCQ is a well established tool that has undergone multiple rounds of validation in previous studies. Likewise, questions from similar research by Deliens et al. (2014), Sommer et al. (2014) and Ensaff et al. (2015) were also included in the questionnaire. These studies were chosen for their broad coverage of factors influencing FC as well as the validated measurement approach. The questions were adapted to better suit the target population of LA with food allergies, through modifying the wording of the question and adding specific questions about allergy management, and food and HCA. A mixture of close-ended, open-ended and Likert scale questions were consequently included in the questionnaires. The questionnaire is included in Appendix 1.

A pilot study (n=18) was conducted prior to data collection, to ensure suitability and effectiveness of the questionnaire. Upon completion of the pilot study, participants felt one questions was ambiguous and needed clarity. Therefore revisions were made to include definitions of what was meant by a ‘mild,’ ‘moderate’ and ‘severe’ food-allergic reaction.

Recruitment

Individuals between the ages of 18 and 25years with one/more existing food allergies and a control group of participants without food allergies were recruited. Any individuals suffering from other health conditions potentially impacting their diet (e.g. Crohn’s Disease, Irritable Bowel Syndrome (IBS), Ulcerative Colitis), were excluded from this research. Likewise, non-English speaking individuals were also excluded.

The NW of England is a an area with high levels of socioeconomic deprivation and therefore to capture a comprehensive picture of this regions diversity, all data collection took place in

the NW in areas of high and low deprivation (Blackpool, Chester, Blackburn with Darwen, Bolton, Preston, Liverpool, Oldham, Lancaster, Manchester, Wigan).

Allergy charity bodies (Anaphylaxis UK and The Natasha Allergy Research Foundation) assisted in recruitment of LA with food allergies. Both charities shared the recruitment poster via their social media sites. Additionally, Anaphylaxis UK invited all NW members via email, while also sharing details of the study in their monthly newsletter. Furthermore, four NHS trusts in the NW region (Lancashire Teaching Hospitals NHS Foundation Trust, East Lancashire Hospitals NHS Trust, Liverpool University Hospitals NHS Foundation Trust and Mersey Care NHS Foundation Trust) helped in the recruitment of LA with food allergies, by circulating the poster via their social media sites and placing posters across the hospitals. A database search using 'Evolve' and 'Quadramed' was also conducted at the Royal Preston Hospital and Broadgreen Allergy Clinic in Liverpool to identify potential patients aged 18-25years with food allergies. A text message was then sent to these individuals with a link to the online participant information sheet and after confirming their participation, a link to the consent form and FC survey were also provided to each of the participants. Non-food allergic individuals were targeted through various colleges and universities in the NW. The recruitment poster was placed around campuses and circulated through university social media sites, blackboard portals and via university-wide emails. Potential participants were provided with the online participant information sheet and upon interest were provided with a link to the consent form and survey. Social media (Facebook, Twitter, LinkedIn) also played a crucial role in targeting both LA with and without food allergies. For instance, the recruitment poster was shared with members of the food allergic community and with student group pages to effectively reach the 18-25year demographic. All data collection took place between February 2022 and mid-May 2022.

Data and Statistical Analysis

Data from all questionnaires was analysed using IBM SPSS Statistics Version 28.0. Descriptive statistics (mean and standard deviation) were conducted on demographic information. For HCA, Chi-Squared analysis determined any differences between those with and without food allergies. The Mann Whitney U test determined differences between the food-allergic and non-food allergic group, in relation to FC. The analysis for FC was performed on single question scores rather than composite scores. The reason for this approach, was to provide a detailed understanding of individual item responses as opposed to aggregating the multiple items into a composite score, which could have potentially obscured any specific variations in the data. The Kolmogorov-Smirnov test was also used to test for normality. All

data for this section was non-normally distributed ($p \leq 0.05$). Therefore, any differences between the food-allergic and non-food allergic group in relation to FC were determined by the Mann Whitney U test. A power analysis was also conducted prior to collecting data, with a sample size of 80 per group (for food allergic and non-food allergic) and Cohen's d (0.5), giving an actual power of 0.86. An ideal power of 0.86 is considered adequate (Suresh and Chandrashekara, 2012), indicating that 86 participants in each group will deliver sufficient statistical power for robust effects.

3.3. Results

A total of 196 questionnaires were completed by 18-25 year olds. Eight participants reported having a condition that would directly impact FC (Crohn's Disease, Irritable Bowel Syndrome (IBS), Ulcerative Colitis, Urticaria and Postural Orthostatic Tachycardia Syndrome (POTS)) and as such, these responses were excluded. Additionally, a further sixteen responses were excluded with these individuals residing from outside the NW (Huddersfield (n=3), Bradford (n=9), Halifax (n=4)). Therefore, the final data sample included 172 participants (86 food-allergic participants and 86 non-food allergic participants). All participants were recruited from NW - Blackpool (n=10), Chester (n=12), Blackburn with Darwen (n=49), Bolton (n=16), Preston (n=31), Liverpool (n=18), Oldham (n=5), Lancaster (n=9), Manchester (n=13), Wigan (n=9).

Participant Demographics

Categorical variables from sections one to four of the questionnaire were expressed as numbers and percentages. There was a higher number of females (n=102, 59%) than males (n= 70, 41%) who completed the questionnaire. The mean age of participants was 22.1 ± 2.2 years. Body Mass Index (BMI) was computed for each individual by dividing weight (kg) by height $(m)^2$. For both groups BMI was found to be similar, with a mean average of 23.5 ± 4.1 kg/m^2 for those with FA and 22.5 ± 4.3 kg/m^2 for those without food allergies (Table 3.1).

Participants diet was either vegan, vegetarian, mainly animal based, mainly plant based or pescatarian, with most participants following an animal based diet (n=108, 63%). Supplement use was higher in participants with food allergies (n=35, 41%) compared to non-food allergic participants (n=25, 29%). 43 (25%) participants were taking medication at the time of the study, with 19% coming from the food-allergic group. Most medication was relating to their food allergy and consisted of adrenaline-autoinjectors and antihistamines. Only 19 (11%)

reported to be current smokers, with 12 (7%) from the food-allergic group. Overall, alcohol intake was higher in those with food allergies (n=62, 72%) compared to those without (n=36, 42%). Physical activity was similar in both groups with majority (n=122, 71%) meeting recommended guidelines. Most participants possessed a driving licence (n=120, 70%) with just under half (n=85, 49%) having their own vehicle. For those without their own vehicle, the most frequent mode of transport when accessing food and/or healthcare was public transport (n=32, 62%) followed by car passenger (n=29, 56%). 44% (n=23) had a preference for walking with only 6% (n=3) using a bike (Table 3.1).

194 **Table 3.1.** Demographic Characteristics for 18-25 year olds, with a food allergy (n=86) and
195 without a food allergy (n=86)

	Food Allergy (n = 86)	**No Food Allergy (n = 86)**
Gender (n, %)		
Male	34 (40)	36 (42)
Female	52 (60)	50 (59)
Age (n, %)		
18	6 (7)	6 (7)
19	2 (2)	5 (6)
20	17 (20)	12 (14)
21	7 (8)	9 (10)
22	9 (10)	13 (15)
23	11 (13)	17 (20)
24	11 (13)	12 (14)
25	23 (27)	12 (14)
BMI ($\bar{x}$, SD)	23.5 (4.1)	22.5 (4.3)
Ethnicity (n, %)		
White British	43 (50)	31 (36)
White European	9 (10)	10 (12)
White Other	3 (3)	2 (2)
Black: British Caribbean	4 (5)	2 (2)
Black: British African	17 (20)	3 (3)
Black: British Other	1 (1)	1 (1)
Asian: British Indian	2 (2)	25 (29)
Asian: British Pakistani	0	6 (7)
Asian: British Other	0	3 (3)
Mixed Background	3 (3)	2 (2)
Chinese	3 (3)	1 (1)
Indonesian	1 (1)	0

196 **Table 3.1.** Continued

	Food Allergy (n = 86)	No Food Allergy (n = 86)
Education (n, %)		
GCSE	2 (2)	2 (2)
A-Level	24 (28)	26 (30)
Bachelors Degree	48 (56)	46 (54)
Post Graduate Degree	12 (14)	12 (14)
Occupation (n, %)		
Part-time Student	3 (3)	7 (8)
Full-time Student	47 (55)	48 (56)
Self-employed	4 (5)	0
Part-time employed	2 (2)	8 (9)
Full-time employed	26 (30)	20 (23)
Unemployed	2 (2)	3 (3)
Apprentice	1 (1)	0
Volunteer	1 (1)	0
Campus (n, %)	25 (29)	17 (18)
Household Composition (n, %)		
1	3 (3)	5 (6)
2	25 (29)	11 (13)
3	23 (27)	22 (26)
4	28 (33)	23 (27)
5+	7 (8)	25 (29)
Living Area (n, %)		
City	53 (62)	36 (42)
Town	26 (30)	47 (55)
Countryside	4 (5)	2 (2)
Village	3 (3)	1 (1)

Table 3.1. Continued

	Food Allergy (n = 86)	No Food Allergy (n = 86)
Type of Diet (n, %)		
Vegan	4 (5)	6 (7)
Vegetarian	16 (19)	11 (13)
Mainly Animal	50 (58)	58 (67)
Mainly Plant	16 (19)	9 (10)
Pescatarian	0	1 (1)
Diet Variety (n, %)		
Different Everyday	40 (47)	40 (47)
Different During the Week	9 (10)	6 (7)
Different During Weekends	13 (15)	15 (17)
Little Variation	24 (28)	25 (29)
Supplement Use (n, %)	35 (41)	25 (29)
Medication (n, %)	32 (37)	11 (13)
Smoking History (n, %)		
Current Smoker	12 (14)	7 (8)
Ex-Smoker	16 (21)	9 (10)
Alcohol (n, %)		
Everyday	3 (3)	1 (1)
3-5 times/week	20 (23)	8 (9)
Once a week	12 (14)	9 (10)
Only weekends	18 (21)	9 (10)
Occasionally	9 (10)	9 (10)
None	24 (28)	50 (58)
Physical Activity - d/wk. (n, %)		
Everyday	14 (16)	13 (15)
3-5 times/week	27 (31)	18 (21)
2-3 times/week	25 (29)	25 (29)
Once a week	11 (13)	13 (15)
Less than once/week	9 (10)	17 (20)
Driving License (n, %)	62 (72)	58 (67)
Own Vehicle (n, %)	43 (50)	42 (49)

Table 3.1. Continued

	Food Allergy (n = 86)	No Food Allergy (n =86)
Frequent mode of transport (n, %)		
Bike	3 (3)	0
Car Passenger	12 (4)	17 (20)
Bus	9 (10)	7 (8)
Train	8 (9)	4 (5)
Taxi	2 (1)	2 (1)
Walking	9 (10)	14 (16)

Table 3.2 highlights additional participant characteristics of those with food allergies. 86 participants possessed a food allergy, of which 34 (40%) were male and 52 (60%) were female. More than half were allergic to more than one food (n=52, 60%). Peanut allergy was the most common food allergy amongst participants (n=34, 40%), followed by tree nuts (n=25, 29%), milk (n=21, 24%), egg (n=19, 22%), fish (n=15, 17%), soya (n=14, 16%), sesame (n=14, 16%), crustaceans (n=10, 12%), gluten (n=9, 10%), molluscs, (n=3, 3%), mustard (n=3, 3%), lupin (n=2, 2%), sulphur dioxide (n=2, 2%) and celery (n=1, 1%). A total of 15 (17%) participants were allergic to other foods including chilli, chickpea, rice, pork, or possessed oral allergy syndrome (allergy to raw fruits/vegetables and/or nuts). Method of diagnosis varied, with 34 (40%) having had a skin prick test, 41 (48%) a blood test and 37 (43%) undergoing a food elimination diet. 10 (12%) had self-diagnosed their allergy, while 12 (14%) were privately tested.

Half of all participants suffered from an allergic reaction within the last year (n=45, 52%), with most being female (n=29, 56%). Participants were also asked the severity of their most recent reaction. 37% (n=32) considered their most recent food-allergic reaction to be ‘severe/life threatening’ (Table 3.2).

Table 3.2. Characteristics of food-allergic participants (n=86).

	Males	Females
Food Allergy (n, %)	34 (40)	52 (60)
Affected by one/more Food Allergy (n, %)		
Single	13 (38)	21 (40)
Multiple	21 (62)	31 (60)
[a]Food Causing Allergy (n, %)		
Celery	1 (3)	0
Gluten	2 (6)	7 (13)
Crustaceans	5 (15)	5 (10)
Egg	11 (32)	8 (15)
Fish	9 (26)	6 (12)
Lupin	1 (3)	1 (2)
Milk	7 (21)	14 (27)
Molluscs	1 (3)	2 (4)
Mustard	2 (6)	1 (2)
Tree Nuts	5 (15)	20 (38)
Peanuts	14 (41)	20 (38)
Sulphur Dioxide	1 (3)	1 (2)
Soya	6 (18)	8 (15)
Sesame Seeds	4 (12)	10 (19)
Other	0	15 (29)
Diagnosis (n, %)		
Skin Prick Test	9 (26)	25 (48)
Blood Test	10 (29)	31 (60)
Food Elimination Diet	20 (59)	17 (33)
Self-Diagnosed	4 (12)	6 (12)
Private	5 (15)	7 (13)
Prescribed Medication (n, %)	32 (94)	46 (88)
Always Carry Medication (n, %)	5 (15)	18 (35)

[a]Participants had the option of selecting more than one food allergy

Table 3.2. Continued

	Males	Females
Recent allergic reaction (n, %)		
Last Year	16 (47)	29 (56)
Last 2 years	9 (26)	10 (19)
Last 5 years	7 (21)	3 (6)
Last 10 years	1 (3)	4 (8)
More than 10 years	1 (3)	2 (4)
N/A – No allergic reaction	0	3 (6)
[b]Severity of recent reaction (n, %)		
Mild	9 (26)	6 (12)
Moderate	16 (47)	19 (37)
Severe	9 (26)	23 (44)
[c]FA impact on daily life (n, %)	14 (41)	33 (63)

[b]A mild reaction was characterised as redness of the skin, runny nose/sneezing and slight cough. A moderate reaction included hives, eczema, itchy mouth, stomach pain and an odd taste in the mouth, while a severe/life threatening reaction included obstructive swelling of lips, tongue and/or throat, trouble swallowing and shortness of breath.

[c]This was based on the following question asked to food-allergic patients – 'Do you feel your food allergy does impact or has previously impacted your quality of life? If yes, provide details as to how you have been affected

3.3.2. Food Choice

Section five assessed FC for those with and without food allergy. Thirty-three different determinants of FC were grouped into ten different categories (sensory, convenience, social, psychological, economic, advertising, university, familiarity, health and labelling). Overall, descriptive statistics revealed sensory (3.8 ± 0.6) and familiarity (3.8 ± 0.9) as having high mean scores, indicating their strong influence on FC. Taste had the highest mean score of 4.5 ± 0.7, making it the most influential factor in FC among all participants. On the other hand, peer influence had the lowest mean of 2.9 ± 1.2 and therefore, was not considered an influential factor of FC for this group.

A comparative analysis in relation to FC between those with and without food allergy was also conducted. Analysis highlighted no statistically significant differences between groups for each of the determinants, with the exception of food labelling and reading food labels (Table 3.3).

Participants were also asked how often they ‘read the food label’ and if they can ‘easily understand the food label’ to see if labelling of food was a significant factor influencing FC. Of the ten categories, labelling had the third highest mean (3.7 ± 1.1). Only 33% (n=57) reported ‘always’ reading the food label with majority being those with food allergies (n=37, 43%). A smaller percentage of participants reported ‘always’ understanding the food label (n=46, 27%), with participants with and without food allergy answering similarly (Fig 3.1. And 3.2). A Mann Whitney U test highlighted significant differences between those with and without food allergy, in relation to labelling and FC. Results indicated a statistically significant difference between groups in labelling with food-allergic individuals more concerned with food labelling than non-food allergic individuals ($U = 3011$ ($Z = -2.130$, $p = 0.033$). Specifically, this statistically significant difference was associated with ‘reading the food label’ ($U = 2774$ ($Z = -2.922$, $p= 0.003$), with effect size revealing the significance to be small ($r = -0.22$), in accordance with Cohen’s classification of effect sizes. No statistically significant difference occurred between groups in ‘understanding the food label’ ($U = 3514$ ($Z = -0.586$, $p = 0.558$) (Table 3.3).

246 **Table 3.3.** Influence of thirty-three factors in relation to FC, for 18-25 year olds with FA (n=86)
247 and without FA (n=86)

Variable	Mean	Median	Mode	SD	Food Allergy (n = 86) Mean Rank	No Food Allergy (n = 86) Mean Rank	u-value	z-value	p-value
Sensory	**3.8**	**3.8**	**4**	**0.6**	**86.5**	**86.5**	**3698**	**-0.000**	**1.000**
Taste	4.5	5.0	5	0.7	84.6	88.4	3533	-0.574	0.566
Smell	3.8	4.0	4	1.0	86.3	86.7	3678	-0.064	0.949
Appearance	3.4	3.0	3	1.0	84.8	88.2	3554	-0.472	0.637
Texture	3.5	3.5	4	1.1	92.1	80.9	3214	-1.539	0.124
Hunger	3.7	4.0	4	1.0	86.8	86.2	3670	-0.091	0.927
Convenience	**3.6**	**3.7**	**4**	**0.8**	**84.7**	**88.3**	**3541**	**-0.487**	**0.627**
Ease of Access	3.7	4.0	4	0.9	86.1	86.9	3665	-0.109	0.913
Cooking Skills	3.5	4.0	4	1.1	85.6	87.4	3618	-0.254	0.799
Time Taken to Prepare	3.6	4.0	3	1.1	84.7	88.4	3539	-0.506	0.613
Social	**3.1**	**3.0**	**3**	**1.0**	**83.9**	**89.1**	**3477**	**-0.682**	**0.495**
Family	3.4	4.0	4	1.3	84.6	88.4	3535	-0.516	0.606
Peers	2.9	3.0	3	1.2	86.2	86.8	3675	-0.072	0.942
Culture	2.9	3.0	4	1.3	82.8	90.2	3378	-1.002	0.316
Psychological	**3.4**	**3.5**	**4**	**1.1**	**92.3**	**80.7**	**3201**	**-1.541**	**0.123**
Emotion	3.4	3.0	3	1.2	89.3	83.7	3459	-0.756	0.450
Stress	3.4	4.0	4	1.2	93.6	79.4	3088	-1.925	0.054
Economic	**3.6**	**4.0**	**4**	**1.1**	**86.2**	**86.8**	**3672**	**-0.083**	**0.934**
Cost	3.6	4.0	4	1.2	85.6	87.4	3622	-0.242	0.808
Income	3.5	4.0	4	1.1	87.8	85.3	4271	-0.324	0.746

**A Likert scale of influence was used to explore FC with 1=Not Influential and 5=Extremely Influential*

The text in **bold refers to composite scores, combining the responses from multiple items in that category.*

248 **Table 3.3.** Continued

Advertising	**2.6**	**2.5**	**2**	**1.1**	**87.9**	**85.1**	**3581**	**-0.365**	**0.715**
Social Media	2.7	3.0	2	1.1	89.9	83.1	3406	-0.925	0.355
TV Adverts	2.4	2.0	1	1.3	85.0	88.0	3571	-0.403	0.687
University	**2.9**	**3.0**	**1**	**1.2**	**86.7**	**86.3**	**3682**	**-0.049**	**0.961**
University Environment	2.6	3.0	1	1.4	84.7	88.3	3547	-0.477	0.633
Student Life	3.0	3.0	4	1.3	86.6	86.5	3694	-0.013	0.990
Exams	3.0	3.0	4	1.4	88.6	84.4	3515	-0.575	0.566
Familiarity	**3.8**	**4.0**	**4**	**0.9**	**88.0**	**85.0**	**3567**	**-0.410**	**0.682**
Previous Experience	3.8	4.0	4	1.0	91.1	81.9	3301	-1.277	0.201
Habit	3.8	4.0	4	1.0	85.7	87.3	3626	-0.231	0.817
Health	**2.9**	**2.9**	**2**	**1.0**	**89.9**	**83.1**	**3402**	**-0.907**	**0.364**
No. of Vitamins and Minerals	2.8	3.0	3	1.3	87.1	85.9	3645	-0.166	0.868
How fresh it is	3.6	4.0	4	1.1	90.3	82.7	3375	-1.030	0.303
Ability to control weight	3.0	3.0	3	1.3	89.0	84.0	3480	-0.684	0.494
Energy Balance	2.9	3.0	3	1.2	92.2	80.8	3207	-1.549	0.121
Natural Ingredients	2.7	3.0	2	1.3	89.8	83.3	3419	-0.878	0.380
High Fibre	2.7	3.0	2	1.3	88.2	84.8	3548	-0.471	0.638
Low fat	2.9	3.0	3	1.4	86.8	86.2	3672	-0.082	0.935
Low salt	2.8	3.0	2	1.3	88.3	84.7	3540	-0.495	0.620
Low Sugar	2.8	3.0	2	1.3	85.7	87.3	3626	-0.226	0.821
Labelling	***3.7***	***4.0***	***4***	***1.1***	***94.5***	***78.5***	***3011***	***-2.130***	***0.033***
Reading food label	***3.6***	***4.0***	***5***	***1.3***	***97.2***	***75.8***	***2774***	***-2.922***	***0.003***
Understanding food label	3.7	4.0	4	1.1	88.6	84.4	3514	-0.586	0.558

**A Likert scale of influence was used to explore FC with 1=Not Influential and 5=Extremely Influential*

The text in **bold refers to composite scores, combining the responses from multiple items in that category.*

Figure 3.1. How often do those with food allergies (n=86) and those without food allergies (n=86) read food labels.

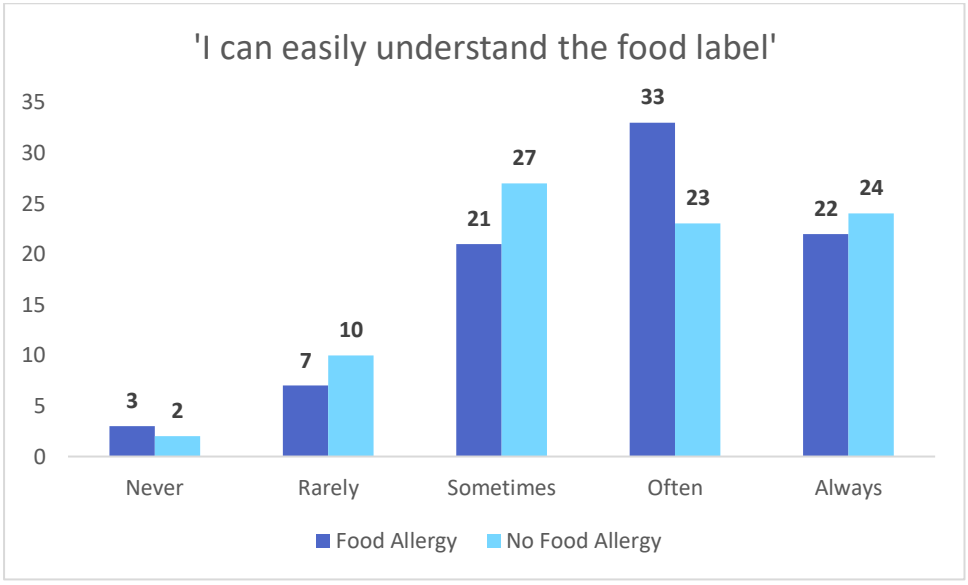


Figure 3.2. How often do those with food allergies (n=86) and those without food allergies (n=86) understand food labels.

3.3.3. Food Access

Participants were asked the distance travelled to the nearest store to purchase healthy, nutritious food. Figure 3.3 highlights the results. Overall, those with food allergies were found to travel longer distances than those without food allergies. Most individuals without food allergies travelled less than 4 miles (n=74, 86%), with only 12 participants (14%) having to travel a longer distance when purchasing healthy, nutritious food. On the other hand, more than half of participants with food allergy (n=50, 58%) were found to travel greater than 4 miles when purchasing healthy, nutritious food, of which 21% (n=18) reported travelling greater than 10 miles (Fig. 3.3). Chi squared analysis revealed a statistically significant difference between both groups (χ^2 (6) = 42.505, p < 0.001).

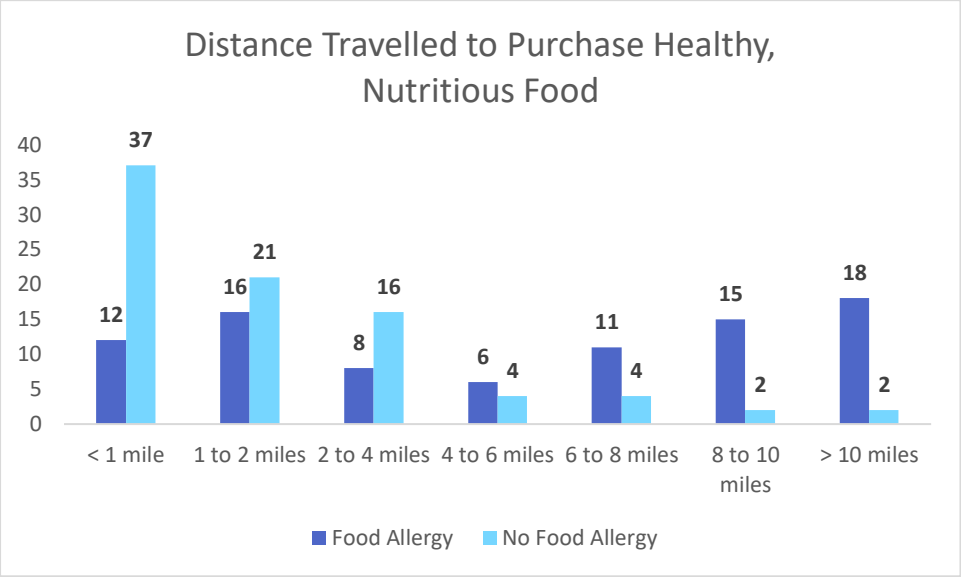


Figure 3.3. Distance travelled to the nearest store to purchase healthy, nutritious food for those with food allergies (n=86) and without food allergies (n=86)

Furthermore, those with food allergies were also asked the distance travelled to purchase allergen free food (AFF). Only 37% (n=32) of participants reported travelling within 4 miles to access this type of food, while 63% (n=54) travelled more than 4 miles. Most participants with food allergies reported travelling between 4 to 6 miles (n=24, 28%), with 8 individuals (9%) travelling greater than 10 miles to access AFF (Fig. 3.4).

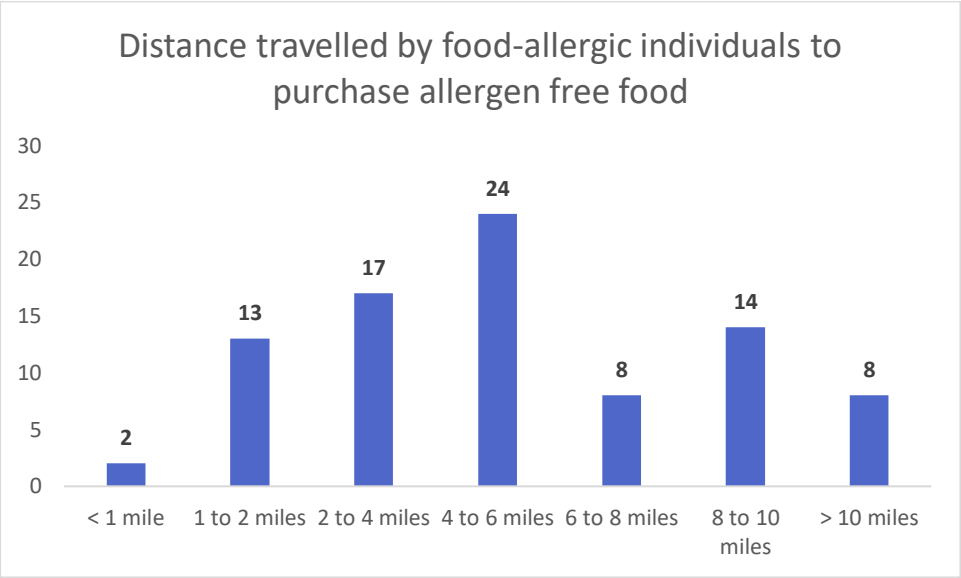


Figure 3.4. Distance travelled to purchase allergen free food for those with food allergies (n=86)

3.3.4. Healthcare Access

Section four assessed participants HCA. The distance travelled to the nearest General Practitioner/health centre is shown in Figure 3.5. Most participants travelled no more than 4 miles when accessing their GP/health centre (n = 135, 78%). Little difference existed between those with and without food allergies, with Chi-Squared (χ^2) analysis revealing no statistically significant difference between groups (χ^2 (6) = 10.229, p = 0.115).

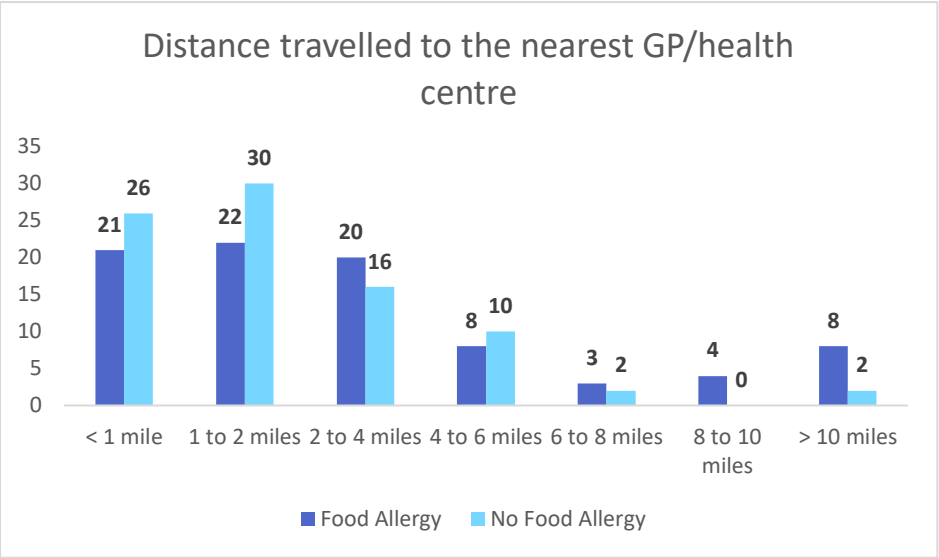


Figure 3.5. Distance travelled to the nearest GP/health centre to receive healthcare for those with food allergies (n=86) and without food allergies (n=86)

Distance travelled to the nearest hospital for healthcare is highlighted in figure 3.6. HCA varied among participants, ranging between 1 mile and >10 miles. Majority of food-allergic participants travelled >10 miles (n=32, 37%) to receive healthcare, while most without food allergy travelled between 2 and 4 miles (n=31, 36%). Chi-Squared (χ^2) analysis further confirms this, revealing a statistically significant difference between both groups (χ^2 (6) = 27.089, p < 0.001), with most food-allergic individuals travelling longer distances.

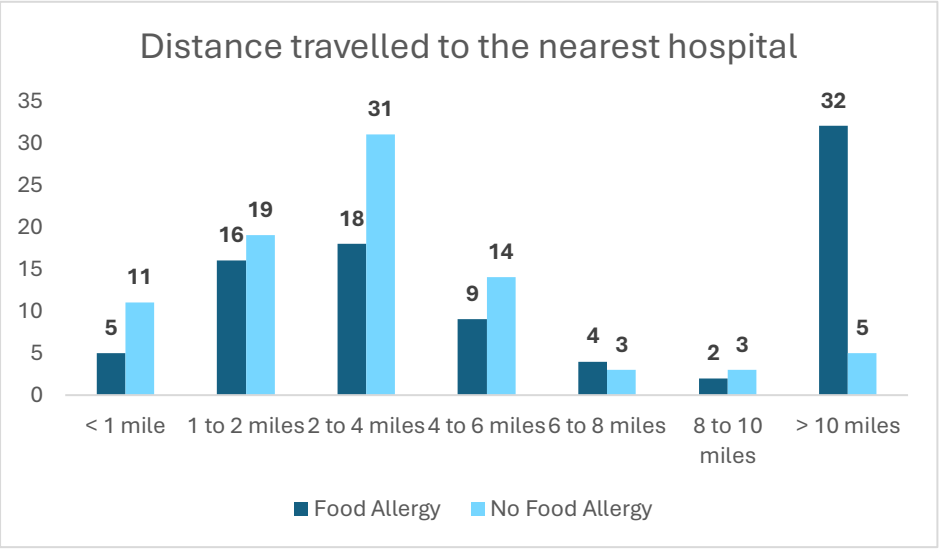


Figure 3.6. Distance travelled to the nearest hospital to receive healthcare for those with food allergies (n=86) and without food allergies (n=86)

Participants were also asked if there was any occasion in the last 12 months where they struggled to access medication, specialist care and follow-up care due to financial and travel constraints (through answering yes/no). A total of 56 (65%) individuals with food allergy and 37 (43%) individuals without food allergy reported being impacted by financial constraints. In comparison, a total of 55 (64%) individuals with food allergy and 32 (40%) individuals without food allergy were impacted by travel constraints. While both groups were clearly impacted by financial and travel constraints, those with food allergy had greater difficulty in obtaining medication and in particular specialist care and follow-up care, due to financial and travel constraints (Fig. 3.7 and 3.8). Chi-Squared (χ^2) analyses further reinforces this, with results highlighting a statistically significant difference between both groups due to financial (χ^2 (2) = 12.903, p = < 0.002) and travel constraints (χ^2 (1) = 12.304, p = < 0.001).

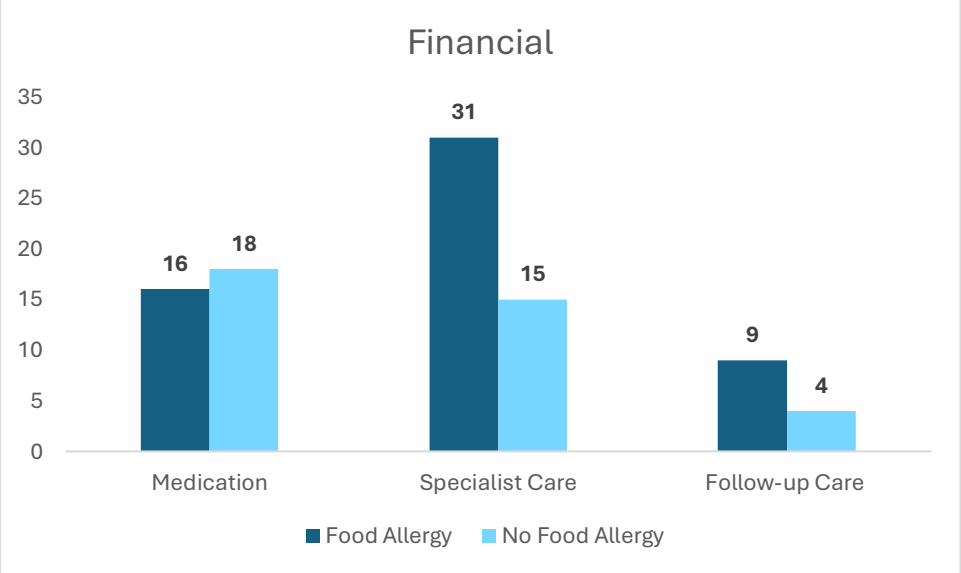


Figure 3.7. Impact of ***financial*** constraints in obtaining medication, specialist care and follow-up care in those with FA (n=55) and without FA (n=32).

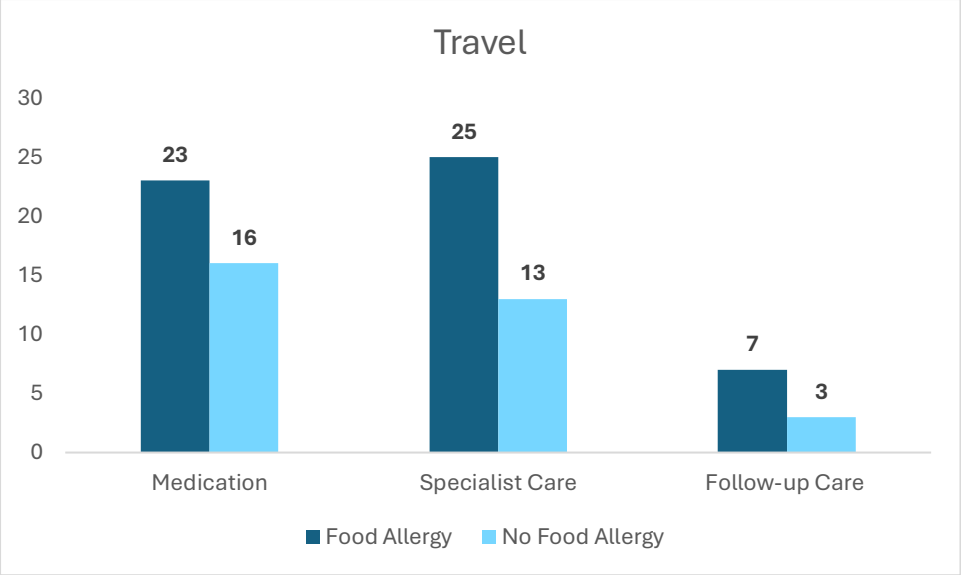


Figure 3.8. Impact of *travel* constraints in obtaining medication, specialist care and follow-up care in those with FA (n=55) and without FA (n=32).

Those with food allergy were also asked about regular attendance of healthcare services when receiving treatment for their food allergy. A large number of participants reported irregular attendance of healthcare services (n=55, 64%), with most being female (n=36, 65%) (Fig. 3.9). Reasons as to why those with food allergy chose not to regularly attend healthcare services is highlighted in Table 3.4. Two major themes emerged from participants responses explaining irregular attendance. The first was accessibility and waiting times, with food-allergic participants mentioning the allergy clinic being too far away and difficulty in getting appointments with specialists. The second theme was discontinuity in care. Participants mentioned how lack of knowledge from GPs, bad experiences and anxiety discouraged them from actively seeking healthcare.

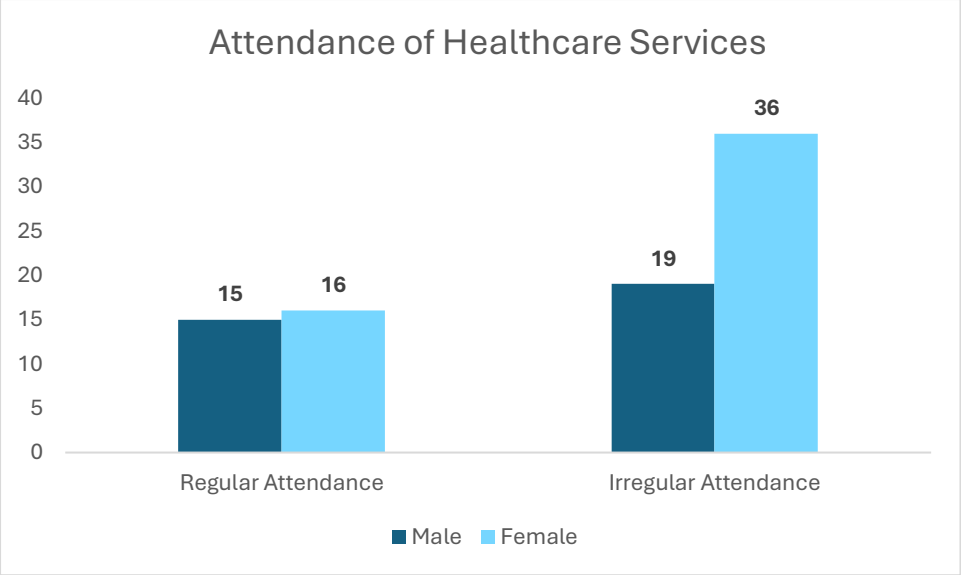


Figure 3.9. Regular and irregular attendance of healthcare services by food-allergic participants (n=86) to receive treatment for allergies

Table 3.4. Factors affecting the regular attendance of GP/hospital for those with food allergies (n=86).

ACCESSIBILITY
'The allergy clinic is too far away.'
'Nearest hospital offering allergy advice was over 70 miles away.'
'Waiting times and difficulty getting appointments.'
'Appointments were recommended every two years but department too busy too accommodate. However was seen around 3 years and passed over to adult team. Now I am 18 I have had one adult appointment no further appointments available unless my circumstances change.'
'Not had any appointments.'
'Its difficult for me to get an appointment with a specialist.'
DISCONTINUITY IN CARE
'I didn't know I could /don't know what they could do for me.'
'Sometimes reluctant to go as the testing process is intrusive.'
'I've not had the best experience. I saw an allergy service up until the age of 11/12. I was then discharged and told I didn't need an epi-pen. In my 20's I had a severe allergic reaction and only then I was prescribed an epi-pen.'

Table 3.4. Continued

DISCONTINUITY IN CARE
'There's a lack of support when I go. My GP doesn't seem to know all the information'
'Pretty poor allergy advice from my GP. I was told to use YouTube to learn how to use an epi-pen.'
'Anxiety from thoughts of going to the doctors and getting help.'
'I just carry epi-pens, I do not choose to receive treatment.'
'Anxious, don't like hospital environments.'
'It's not always helpful. GP's are not always confident.'

The availability of transition care at their local GP and/or hospital was also reported by those with food allergy. Only 44% (n=38) of food-allergic participants reported having the availability of transition care. In contrast, a larger number of participants reported no transition care availability (41% (n=35)), while 15% (n=13) were unsure if their GP/hospital provided transition care (Fig. 3.10).

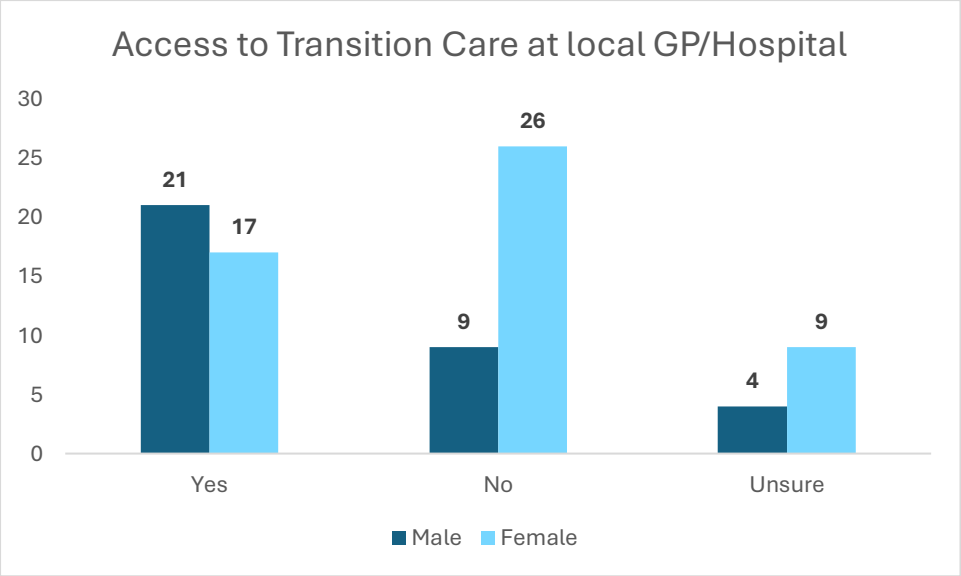


Figure 3.10. Access to transition care at local GP and/or hospitals as reported by those with food allergies (n=86)

Of the 38 participants who did report the availability of transition care at their GP/hospital, most reported the use of e-resources. Participants also mentioned phone hotlines, tailored support from HCPs, webinars and workshops as beneficial resources supporting in the management of their food allergy (Fig 3.11).

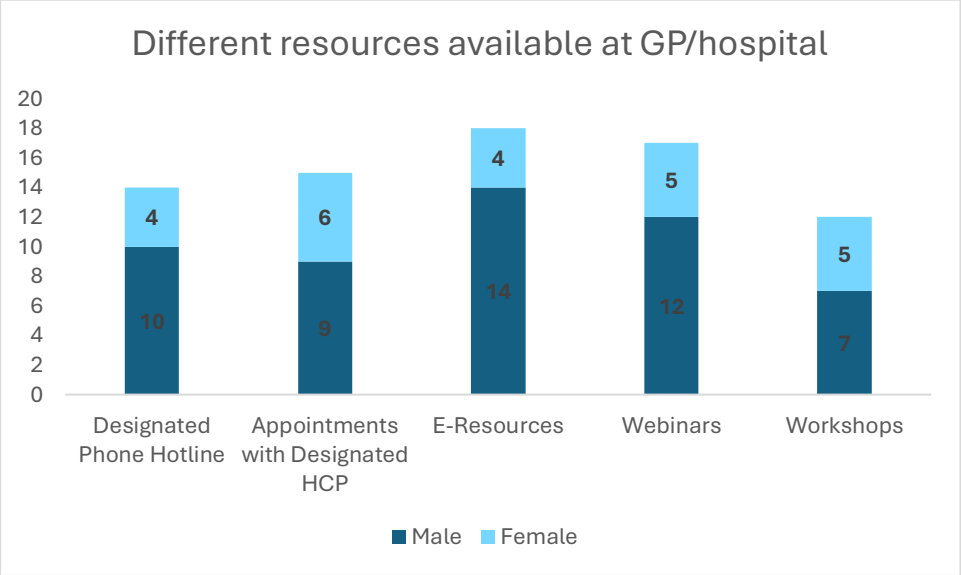


Figure 3.11. Different resources available to support management of food allergy as reported by food-allergic participants (n=38)

3.4.5. Impact on Daily Life

The presence of a food allergy and its impact on daily life was also determined. Of the 86 food-allergic participants, 46 (53%) reported their food allergy impacted various aspects of their daily life. Table 3.5 further highlights the different ways individuals felt their daily life had been impacted by their food allergy. One major theme which was expressed through participant responses was the emotional and psychological issues associated with their food allergy. Participants felt their food allergy negatively impacted their social life and prevented them from eating out. Mental health issues, such as anxiety and Post-Traumatic Stress Disorder (PTSD) following negative reactions were also common among participants and this was increased during the transitional period. An additional theme which emerged was the impact of FA on dietary habits, which led to nutritional concerns. For instance, some participants revealed their allergy limited food options, which led to reduced nutrients being obtained from their diet.

391 **Table 3.5.** How the presence of a food allergy impacts the daily life of life in food-allergic
392 individuals (n=86)

EMOTIONAL AND PSYCHOLOGICAL
Seafood was a massive part of my life and was my favourite food until my allergic reaction when I was 17. I can't enjoy going out for meals without worrying. I never eat at seaside restaurants or takeaways that have shellfish on the menu unless I have to. Friends and family haven't always taken it seriously and it has been quite upsetting.'
'Constant fear and stress has led to mental health issues, PTSD from life-threatening allergic reactions. Makes it very hard when I work abroad as a touring classical musician.'
'It's psychologically draining to be cautious all the time and sometimes people don't take it seriously which can be upsetting.'
'It makes me really anxious - struggle eating out, infact I avoid eating out. '
'I am too scared to eat out, I am even nervous eating with relatives that have known about my allergies all my life.'
'Limits what countries I can safely visit on holiday and experiences I can enjoy. They negatively affect my mental health as I often feel anxious while eating in unfamiliar places.'
'Affected confidence and independence.'
'Prevents me from going out with friends and makes family events difficult.'
'I struggle with being able to trust people in preparing my food so avoid social events and eating out.'
'More reluctant to join in with social situations where food is involved, can result in feeling quite isolated and feel as though people don't want to be friends with you as much, even if that isn't necessarily the case.'
'Was unable to eat at certain restaurants and so missed out quite a bit socially when younger. Anxiety around eating out, can never fully relax when eating unfamiliar food. Worry for example when people eat nuts in uni when they know it is a nut-free zone.'
'My anxiety has increased since I've started living away from home. My roommates don't really understand.'
'Mentally affects your ability to fit in - seeing everyone eating things you can't then proceeding to feel 'sorry' for me. Missing out on different foods that people enjoy. Happiness slightly fades when out with friends and seeing the food they can eat.'
'Previously very confident in myself and did not worry much about my allergies as I am always very careful. Coming to university has really changed things for me. My freshman year I called 911 for a friend who was experiencing anaphylaxis and that experience was rather traumatic for me. I know I do the right thing and take the necessary precautions, but this year I have experienced great amounts of anxiety and have started talking to a therapist. The transition to independence has been very difficult for me and I often find myself wishing I could just be "normal"'*
'Conscious of the impact on others, they have to check food they buy/prepare. Embarrassing in restaurants when in a group, have to ask the serving staff about the food/preparation and be really clear which can take confidence in front of a group of people.'
'Socializing and ease of just grabbing something to go has been made more difficult.'

**Note that this comment suggests this participant previously lived in the US, however at the time of data collection, they met the study's inclusion criteria having recently moved to the NW of England.*

Table 3.5. Continued

DIETARY HABITS AND NUTRITIONAL CONCERNS
'Limits what food I can eat.'
'Reluctant to try certain types of foods (e.g. from specific countries or cultures) due to previous negative reactions.'
'I can't obtain a good meal , due to lack of enough nutrients which I was supposed to obtain from the meals am allergic to.'
'Less likely to try new foods or drinks.'

Participants with food allergies also expressed ways in which to improve their current mental health (Table 3.6). Three main themes were identified. Psychological support was considered of great importance, with many participants mentioning the current support in this area was severely lacking. They had little access and where access was available, the waiting times were too long. Participants further expressed the need for this type of support to be ongoing. In addition to professional psychological support, participants with food allergies mentioned increased access to resources such as hotlines, websites and support groups as being beneficial in improving their mental health. The final theme was education. Participants felt there was a need for increased education regarding food allergy at schools and universities. One participant specifically mentioned the importance of increasing awareness of the impact of food allergy on eating disorders and mental health, with limited knowledge surrounding this topic. Additionally, the need for more accommodating laws such as clearer labelling, to provide a more supportive environment for individuals with food allergies was also mentioned.

407 **Table 3.6.** Different ways to improve mental health support for those with food allergies (n=86)

ACCESS TO PSYCHOLOGICAL SUPPORT
'Being able to speak to someone who is actually an expert in mental health. I don't remember anyone asking me how I felt about anything, was very matter of fact.. This is your allergy and here are your medications.'
'Having someone to talk to. After having a life threatening reaction I got out of hospital after 2 days and received no help after that. It happened at my workplace and I struggled emotionally going back and when I mentioned this to my GP they said they could put me on a list to talk to someone but the list was long and it would take a while.'
'Professional support by a psychologist that is free when we are diagnosed and in the aftermath of a life-threatening reaction. Even lots of doctors struggle to understand about food allergy and anxiety. '
'Every person with severe allergies should be offered psychological support for health anxiety and understanding how to be aware of your environment without feeling constantly on edge. I've been to my doctors before about having anxiety regarding my allergic reaction and they didn't help.'
'More widespread offering of ongoing psychological support.'
'Help with social aspect.'
'More people to talk about it. I'm 19 and I've never had a discussion with someone about the anxiety surrounding having an allergy.'
'Mental healthcare needs to be improved across the board but a designated service for allergies would be good. Particularly to support anxiety.'
'People with FA being automatically directed to counselling and dietary assistance.'
'There doesn't seem to be much psychological help up north in the UK.'
'There needs to be quicker support available and specific support for the challenges people with allergies might face, for example social isolation and anxiety.'
'For HCPs to keep checking in with you. Sometimes we get one appointment and that's it.'
'Debriefs after every severe reaction and more psychological support when diagnosed.'
RESOURCES
'Hotlines and access to online websites.'
'Support groups with similar age group.'
EDUCATION
'More education in universities about the severity of allergies and how that affects people with it.'
'Allergy awareness in schools at a younger age.'
'More accommodating laws like better food labels to make sure people living with allergies are protected.'
'In terms of mental health, more awareness on the impact of eating disorders. Neither is there much awareness of FA and eating disorders in the South Asian culture such as EDNOS, bulimia nervosa, Anorexia Nervosa, binge eating disorder etc.'

3.4. Discussion

3.4.1. Food Choice

Overall, in relation to FC, no statistically significant differences were found between those with and without food allergy for all factors but one - labelling. These findings are consistent with previous research which indicate the presence of food allergy does not necessarily impact FC behaviour (Sommer et al., 2014; Laheri et al., 2022). Rather, those with food allergy struggle with the feeling of being different and strive to live a similar life to that of their peers. Consequently, they are persuaded by similar determinants of FC as those without food allergy (Sommer et al., 2014; Laheri et al., 2022). Taste emerged as the most influential factor of FC with the highest mean score in both groups, with no statistically significant difference between them. Foods considered to be 'tasty' by adolescents are often associated with high levels of fat, salt and sugar (Liem and Russell, 2019; Bawajeeh et al., 2020). Research has already established the current adolescent diet is largely driven by highly processed and refined foods (Contento, 2011; Hebden et al., 2015; Hall, 2018; Sprake et al., 2018; Liem and Russell, 2019; Larson et al., 2020; Monterrosa et al., 2020; Molenaar et al., 2021; Whatnall et al., 2021). Therefore, this indicates LA may be at risk of consuming a poor diet. Food-allergic participants also reported through open-ended responses that their allergy limits the variety of foods consumed and leads to a reluctance to try new foods. This qualitative feedback indicates that implementing a restrictive diet may potentially increase the risk of nutritional deficiencies in those with food allergy. Therefore, the importance of HCP informing those with food allergy about how to consume a safe diet that is varied following diagnosis, is of extreme importance.

Peer influence has previously been found to be a rather significant factor influencing FC in LA, as individuals seek a sense of belonging and social identity (Hebden et al., 2015; Stok et al., 2016). In contrast, the results of this study revealed peer influence was one of the least influential factors of FC. Quantitative analysis revealed no statistically significant difference in peer influence on FC for either group. However, through open-ended responses participants with food allergy revealed the presence of their allergy impacted their social life. Specifically they mentioned the constant anxiety and stress of potentially fatal reactions and the embarrassment of explaining allergies when eating out with friends was also common among participants. Consequently, individuals chose to simply avoid social events and eating out with friends, explaining why the influence of peers was not necessarily a significant influencer of FC in this study. This lack of socialisation was also a cause of mental health issues as reported by participants in their open -ended responses. It is clear that living a life similar to their peers

is of great importance and this also extends to the food they eat. Social relationships built around food can provide positive experiences and has been found to positively impact mental health (Dunbar, 2017). Eating is inherently a social activity and efforts should therefore be made to increase the confidence in eating out of those with food allergy, which could contribute to a better overall experience.

Labelling of food can directly impact purchasing habits and therefore FC. In this study, labelling was identified as a statistically significant factor of FC in those with food allergies. Despite the importance of labelling, only a small percentage of participants were found to always read food labels with most being those with food allergy. Even fewer participants were found to understand the food label. Many individuals, in particular those with food allergy, are often overwhelmed with the various different statements present on food packaging e.g. PAL such as 'may contain' statement. This often deters purchase due to anxiety or risks accidental ingestion due to confusion and/or inappropriate labelling (Sheth et al., 2010; Cochrane et al., 2013). Thus, there is a need to educate participants, in particular those with food allergy, on the necessity of reading food labels. While recent efforts have been made to improve current food allergen labelling practices (VITAL, 2007; Natasha labelling law, 2018), the presentation of allergen information continues to be wide-ranging and inconsistent (Blom et al., 2021). More precise standardisation of food allergen labelling is therefore needed (Fiocchi et al., 2021; Holleman et al., 2021). Marchisotto et al. (2017), suggest the role of HCPs in explaining food labelling to food-allergic patients is crucial and can allow individuals to make more informed decisions, consequently lowering risk of accidental ingestions and improving overall well-being. Quite recently, between December 2021 and March 2022, the Foods Standards Agency (2022) undertook a consultation with stakeholders across England, Wales and Northern Ireland, discussing the use of PAL. It was determined through this consultation that PAL should be communicated more clearly and consistently, in a manner which clearly informs labelling decisions of businesses and is also understandable for the consumer. Standardisation of labelling statements was a key concept recognised by stakeholders. One way of achieving this (as discussed through this research) would be through the establishment of allergen thresholds, which only if exceeded would lead to the inclusion of PAL with standardised wording. The information obtained through this consultation will lead to the development of a range of options to enable food businesses to convey meaningful PAL, providing food-allergic consumers with the confidence in choosing products which are safe. While this provides a promising framework for improving food labelling, Madsen et al. (2020) in their research outline that establishing allergen thresholds for PAL as suggested, is far more complex than it may initially appear. They mention how determining thresholds involves numerous factors, including variations in individual sensitivities to allergens, the complexity of

food processing and cross-contact risks. They further discuss how PAL based on such thresholds could create a false sense of security for individuals with food allergies, as it would be difficult to identify a universally 'safe' threshold which would be applicable to all. Rather than simply setting quantitative limits, Madsen et al. (2020) argue that a multifactorial approach which considers comprehensive risk assessments, improved detection methods and clearer communication about the uncertainties involved may be more effective in addressing the complexities of allergen management. PAL standardisation will be a significant step in improving the lives of the food allergic community. However, it must be balanced with robust scientific evidence, to ensure it protects consumers without making labelling overly restrictive, which in turn could limit the variety of safe foods available for consumers.

3.4.2. Food Access

Food security has been defined as 'a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life' (World Food Summit, 1996). In those with food allergies, achieving food security can be far more challenging. The quantitative analysis revealed a statistically significant difference between those with and without food allergies regarding the distance travelled to purchase healthy, nutritious food. These results revealed that those with food allergies travelled longer distances in this regard. A large portion in this group travelled greater than 4 miles with some also reporting travelling as far as 10 miles to access these foods. Similarly, those with food allergies struggled in accessing AFF with most travelling between 4 and 6 miles and some also travelling greater than 10 miles. These findings emphasise the additional burden on those with food allergies in accessing appropriate food.

These findings suggest that those with food allergies face a twofold issue when accessing food: distance and availability. The greater distance of 10 miles travelled by this group reflect the limited availability of suitable AFF in local stores. Travelling these long distances could pose significant barriers, especially for those who have limited transport options and are restricted by financial constraints. These added difficulties can increase the risk of accessing food, particularly as the cost of AFF are already high (Coleman et al., 2021).

While food banks offer an excellent opportunity to support those facing challenges in accessing adequate food (Minaker et al., 2014), AFF seldom exist in food banks (Fong et al., 2022; Scurlock et al., 2022). Moreover, an increasing trend, particularly amongst LA is to

purchase AFF online. While this method can improve access, delivery and service charges are costly causing reluctance amongst many consumers (Coleman et al., 2021).

Food allergies are undoubtedly rising and with it, the 'free from' food industry has considerably grown over the years (Mintel, 2022). Yet the inclusion of a specialised diet which is both safe and nutritious continues to prove a challenge for many (Scurlock et al., 2022). Due to the rising food costs and the already high cost of AFF (Pasha-Robinson, 2023), the current access to food for those with food allergies is concerning. Half of UK customers revealed they would cut back on free from food products when money is tight (Mintel 2022). This unfortunate outcome can prove detrimental. Firstly, AFF are often fortified with key nutrients and offer a means of improving nutritional status that is otherwise compromised due to the nature of implementing a restrictive diet (Pasha-Robinson, 2023). Secondly, limiting free from foods can increase the risk of unwarranted allergic reactions, as individuals attempt to explore other alternatives which though may be cheaper, may not necessarily be safe to consume (Turits, 2019).

This financial burden of purchasing AFF and the increased travel distances as revealed in this study indicate that interventions are necessary to improve the availability and affordability of AFF in local stores and supermarkets. Based on existing literature, several interventions to overcome these challenges are proposed. Labelling is highly important for risk management of food allergies and allows for reduced exposure to food allergens. Many individuals are often deterred in purchasing AFF due to much confusion linked with the increased use of PAL (Fiochhi et al., 2021). Therefore, food manufacturers should improve the visibility of AFF through improving current labelling practices. Moreover, individuals with food allergies should be educated on reading food labels, which can reduce the risk of allergic reactions and at the same time reduce time spent shopping – a recognised burden for those with food allergies (Marra et al., 2017). Securing AFF is vital in ensuring both safety and nutritional status for those suffering from food allergies. To allow for successful management of food allergies, AFF must remain affordable (Dyer et al., 2020). Furthermore, initiatives to encourage retailers in both supermarkets and convenience stores to offer a diverse range of AFF which are more affordable is also imperative for those with food allergies, as these products are severely lacking. One beneficial strategy is to provide additional funds to food-allergic individuals, in particular to those of low income families, to ensure they have the means to obtain such foods (Minaker et al., 2014). This concept is not a new one and is currently available to sufferers of coeliac disease, who can access gluten free foods through prescription (Coeliac UK, 2024). Scurlock et al (2022) further suggests AFF should be made readily available in food banks. There has been a steep increase in the number of food banks being used following the coronavirus pandemic. Between April 2021 and March 2022 food banks in the Trussell Trust

distributed over 2.1 million food parcels – an increase of 14% from the previous year (The Trussell Trust, 2023). This increase has been particularly noticeable in the NW (Oldman, 2021). Food banks remain a primary point of access for many individuals and including more AFF can prove life-changing for many sufferers of food allergies.

3.4.3. Healthcare Access

The results of this study indicated that those with food allergies travelled significantly longer distances to obtain healthcare than those without food allergy. Additionally, those with food allergy reported greater difficulty when obtaining medication, specialist care and follow-up care due to financial and travel constraints. Currently in the NW only three allergy clinics exist (Preston, Liverpool and Manchester), with most consultations being provided by GPs. Previous research highlights travelling long distances presents an economic burden and therefore individuals in low-income families may choose to limit use of health services (Minaker et al., 2014). The results of this study further support this. Through open-ended responses, participants reported allergy clinics being too far away, waiting times and lack of appointments as some of the main reasons for irregular attendance to GPs/hospitals.

A large number of participants also reported no transition care was available when seeking healthcare for their allergy, with some participants not even aware of any such resources. Furthermore, participants expressed through open-ended responses how HCPs, in particular GPs, were not entirely helpful and there was a lack of support available. Previous research also confirms limited knowledge of food allergies among GPs (Clement et al., 2020). There currently exists a shortage of specialists and allergy clinics that can provide adequate support in the UK for food allergy, with most requiring extensive travel and presenting economic burdens. Therefore, food-allergic individuals will be reliant on local GPs to provide support, yet they are unable to meet this need (Royal College of Physicians, 2003). Literature suggests GPs should continue to follow guidance and where necessary seek advice and consult specialists. Regular training/courses in allergy education can also prove instrumental in increasing confidence of GPs when delivering food allergy information. (Royal College of Physicians, 2003; Clement et al., 2020; Khaleva et al., 2020; National Allergy Strategy Group, 2021). The presence of FA can considerably impact mental health and can also lead to lack of engagement in healthcare services. Through their open-ended responses, participants mentioned limited access to psychological resources and suggested increasing psychological support would be beneficial. There is clearly an unmet emotional need in those with food allergy and HCPs should provide food-allergic patients with advice and support that goes

beyond the avoidance of foods. Irregular attendance of healthcare services was also notably high among participants with food allergy (64%). Participants voiced reasons as to why this was the case through their qualitative responses, mentioning anxiety, bad experiences and a lack of perceived benefit from seeking care.

Interestingly, peer pressure was not statistically significant in this study, which is seemingly because food-allergic individuals may be cutting themselves off from ordinary socialising with peers, particularly eating out, as mentioned in their open-ended responses. This suggests a strong psychosocial component to the deleterious effect on mental health, with isolating behaviours seen as a defensive mechanism against the threat of making the difference of food allergy visible in day-to-day reactions with peers. While this is problematic, it perhaps suggests that supportive interventions designed to include peers could make a positive impact; in effect strengthening peers as a source of informed support. This psychosocial territory also extends to the wider community and educational approaches that engage community entities, such as schools, convenience stores, and restaurants/cafes may also be warranted (Kachru, 2020; Newman and Knibb, 2020; Rubeiz and Ernst, 2021).

3.5. Limitations

This study provides valuable insights into the current FC, FA and HCA of LA with and without food allergies in NW England. However, it is also important to consider the limitations. The data represented here signifies a single point in time, and does not necessarily capture any fluctuations in behaviour or preferences over a period of time. This is a limitation given the transitional stage of late adolescence to adulthood. Therefore, the results may not be representative of the dynamic changes associated with FC, FA and HCA in this critical period. Future research using longitudinal studies could be undertaken which focus on capturing these changes over time and provide a more comprehensive understanding of how these factors evolve throughout this period of transition.

This study was also reliant on self-reported data and as such, the data could be prone to social desirability or recall bias, impacting the accuracy of the findings. In addition to this, the study included both medically diagnosed and self-diagnosed food allergic participants. While their inclusion allowed for a reflection of the diverse real-world population of this group, no direct comparisons between groups was actually made. This lack of direct comparison limits the ability to draw specific conclusions about any differences in FC, FA and HCA between groups.

Moreover, multiple comparisons were made during the analysis when comparing the food allergic and the non-food allergic group and this could have increased the risk of Type 1 errors. Consequently, a statistically significant difference may have been found when in reality no difference existed. Despite efforts to maintain rigor through the analysis process, there is a possibility of false positives and care should therefore be taken when interpreting these results. Furthermore, although a power analysis was conducted and adequate statistical power was determined, the sample size may limit the generalisability of the findings beyond the study population. All participants were recruited from NW of England and thus, these findings may not be representative of the LA population in other regions.

3.6. Conclusion

The present study has shown how those with and without food allergies are influenced by similar determinants of FC. In addition to this, this group of individuals struggled to access AFF and adequate healthcare. To our knowledge, this is the first UK study in the NW of England investigating current food and HCA in LA with food allergy. Accessing adequate food is a complex, multifaceted and systemic issue – one which is categorically worse for those with food allergies. Access to safe, nutritious foods is a basic requirement for all individuals, yet the sad reality is that for those with food allergies this fundamental necessity can prove extremely challenging. Similarly, individuals with food allergies require sufficient healthcare to support the management of their food allergy, however adequate support is not available. Research into the geographic access of food, in particular AFF and HCA in LA with food allergies is limited (Coleman et al., 2021). Thus, there is a need for more studies to be conducted. A better understanding of the challenges faced by LA with food allergies in accessing food and healthcare, can allow for the implementation of necessary policies which in turn, can reduce the risk of allergic disease and improve their overall health and well-being (Dyer et al., 2020). The next chapter – Chapter 4, will therefore provide a geographical representation of FA and HCA in LA with and without food allergies using the results obtained in this study.

Chapter 4 – A Geographical Representation of Food Access and Healthcare Access in Late Adolescents (18-25years) With and Without Food Allergies.

4.1. Overview

This chapter provided a geographical representation of food access (FA) and healthcare access (HCA) for late adolescents (LA) with and without food allergies in North West (NW) England, building upon the foundational insights from Chapter 3. In Chapter 3, it was established that food and HCA is challenging for LA with food allergies, with many travelling long distances to obtain adequate foods and healthcare. This chapter extends these findings by employing geographical software using ArcGIS to highlight a geographical representation of these results. The reason for this approach was to reveal any regional disparities which may have been obscured by only quantitative analyses, as was the case for Chapter 3. The specific areas within the NW where access to food and healthcare was difficult, was highlighted based on the four counties where participants were initially recruited from (Cheshire, Merseyside, Greater Manchester and Lancashire). This chapter further discusses how these difficulties in accessing food and healthcare correlate with deprivation levels in the NW and how socioeconomic factors play a crucial role in determining access. The visual representation makes it easier in pinpointing the specific locations where it was most difficult in accessing food and healthcare.

Again, a comparative analysis between those with and without food allergies with regard to food and HCA in the NW of England, was highlighted. This provided valuable insights into which areas those with food allergies struggled most in accessing food and healthcare. Additionally, the comparison emphasised the length in which food and HCA is more difficult in the food allergic group. Moreover, it helped to understand if food allergy status was a key factor in accessing food and healthcare or if the trends observed are consistent with that of the general LA population.

4.2. Methodology

Geographical mapping software - ArcGIS (version 10.4.1) was used to visualise the current FC and HCA of LA with and without food allergies. The results were based on quantitative questionnaires distributed in Phase 1 of this research. Data was collected from 18 different cities/towns from four different counties in NW, England. Heat maps were illustrated based on the following four questions asked to participants.

Q1. How many miles from where you live, do you travel to obtain healthy, nutritious food?

Q1a. How many miles from where you live, do you travel to purchase allergen, free food?

Q2. How many miles from where you live, do you travel to the nearest GP/health centre?

Q3. How many miles from where you live, do you need to travel to the nearest hospital to obtain health care?

Step 01: Development of the required files

- Shapefiles were created for each county.
- Personal geodatabase files were created to generate point features for selected county locations using longitude and latitude coordinates, provided by the 'outcode' data (first part of the UK postcode e.g. *PR* for Preston and *L* for Liverpool).
- Every file was geo-referenced to WGS 1984 UTM zone 30N.

Step 02: Multiple-ring buffering

Each county was buffered in accordance with the distances travelled by the participants using the multiple-ring buffer tool provided in the ArcGIS analysis tools. Each distance category was assigned a distinct colour code for visualisation purposes.

Step 03: Map generation

To allow for a visual representation of the number of participants who travelled specific distances as previously buffered, pie charts were selected as the symbology method. These charts are particularly useful for illustrating the contribution of individual segments to an overall whole. Consistent with the previous approach, a colour coding scheme mirroring that of the multiple-ring buffering was implemented, to distinctly represent the colour of the participants in each category.

4.3. Results

A total of 172 participants (86 food allergic, 86 non-food allergic) were recruited from four different counties in NW, England (Table 4.1).

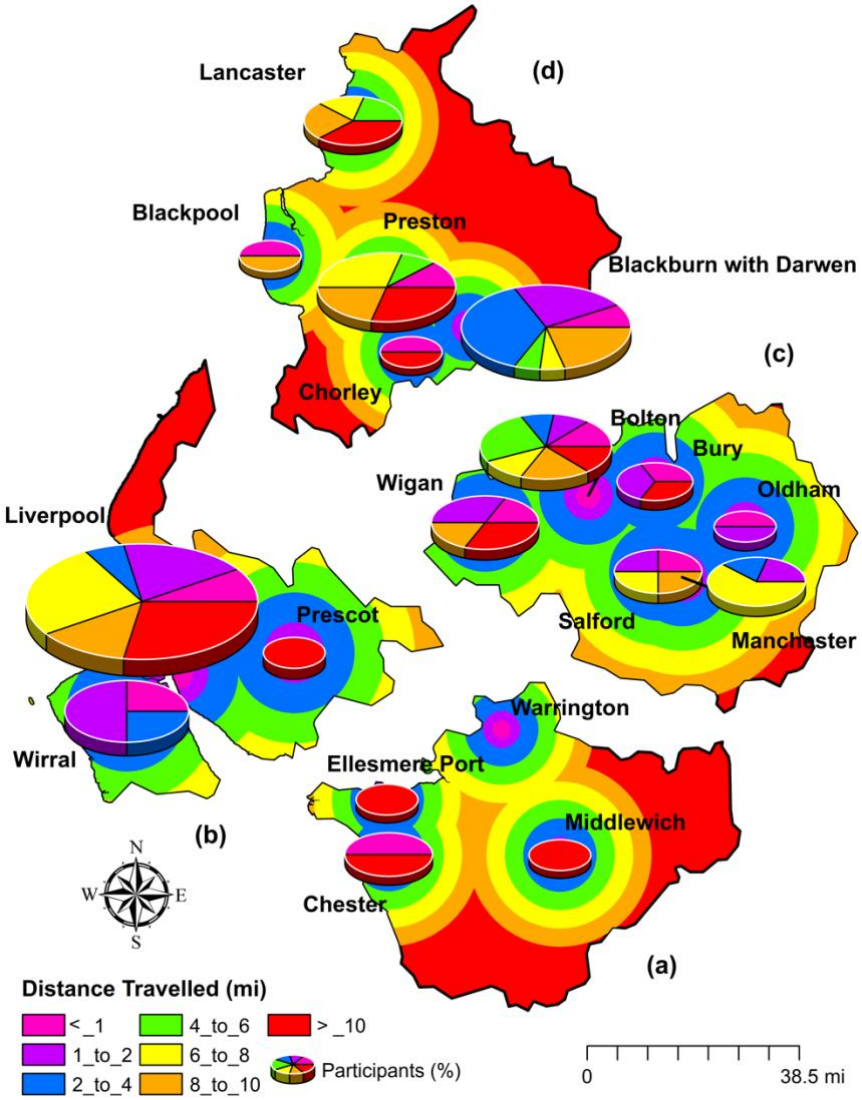
Table 4.1. Number of food allergic (n=86) and non-food allergic (n=86) participants from each county in North West, England

County	*Food Allergic Participants*	*Non-Food Allergic Participants*
Cheshire	4	3
Merseyside	19	5
Greater Manchester	29	13
Lancashire	34	65

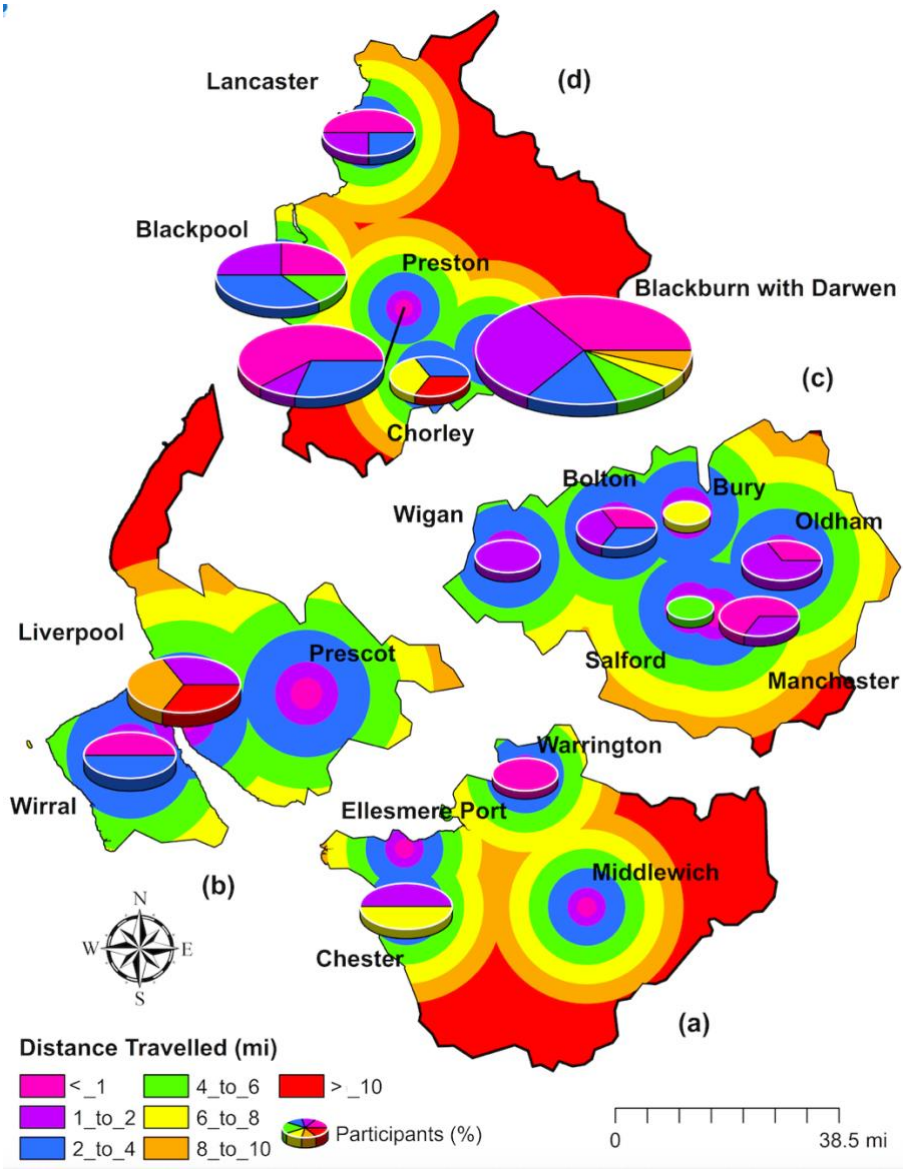
4.3.1. Healthy Nutritious Food

Figure 4.1 and 4.2 highlight the distances travelled by food allergic and non-food allergic participants to obtain healthy, nutritious food, in each of the 4 counties: Cheshire, Merseyside, Greater Manchester and Lancashire in NW, England.

Overall, those with food allergies travelled longer distances than to access healthy, nutritious food than those without food allergies. In both Cheshire (namely Chester, Ellesmere Port and Middlewich) and areas in Merseyside (namely Liverpool) many food-allergic participants travelled greater than 10 miles to obtain healthy, nutritious food. In comparison, most non-food allergic participants travelled shorter distances mostly within 4 miles. Liverpool and Chorley were the only two towns, where some participants without food allergies were found to travel greater than 10 miles to access healthy, nutritious food (Figures 4.1 and 4.2).



75 **Figure 4.1.** Distance travelled by ***food allergic*** individuals (n=86) to access healthy, nutritious
76 food in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d)
77 Lancashire in NW, England.



78 **Figure 4.2.** Distance travelled by ***non-food allergic*** individuals (n=86) to access healthy,
79 nutritious food in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d)
80 Lancashire in NW, England.

81

82 ### 4.3.2. Allergen Free Foods

83 Figure 4.3 showcases the distances travelled by food allergic participants to access AFF, in
84 each of the 4 counties: Cheshire, Merseyside, Greater Manchester and Lancashire in NW,
85 England.

From the 4 counties, food-allergic participants from Greater Manchester had the greatest challenge in accessing AFF, with many travelling up to 10 miles. The greatest difficulty was in Salford (n=4), where 75% of participants travelled between 8 and 10 miles, followed by Wigan (n=6), where 30% travelled greater than 10 miles (Figure 4.3). Similarly, those from Preston, Lancashire (n=10) had to travel greater than 10 miles to access AFF.

Overall, the data illustrates that access to AFF across the NW is limited.

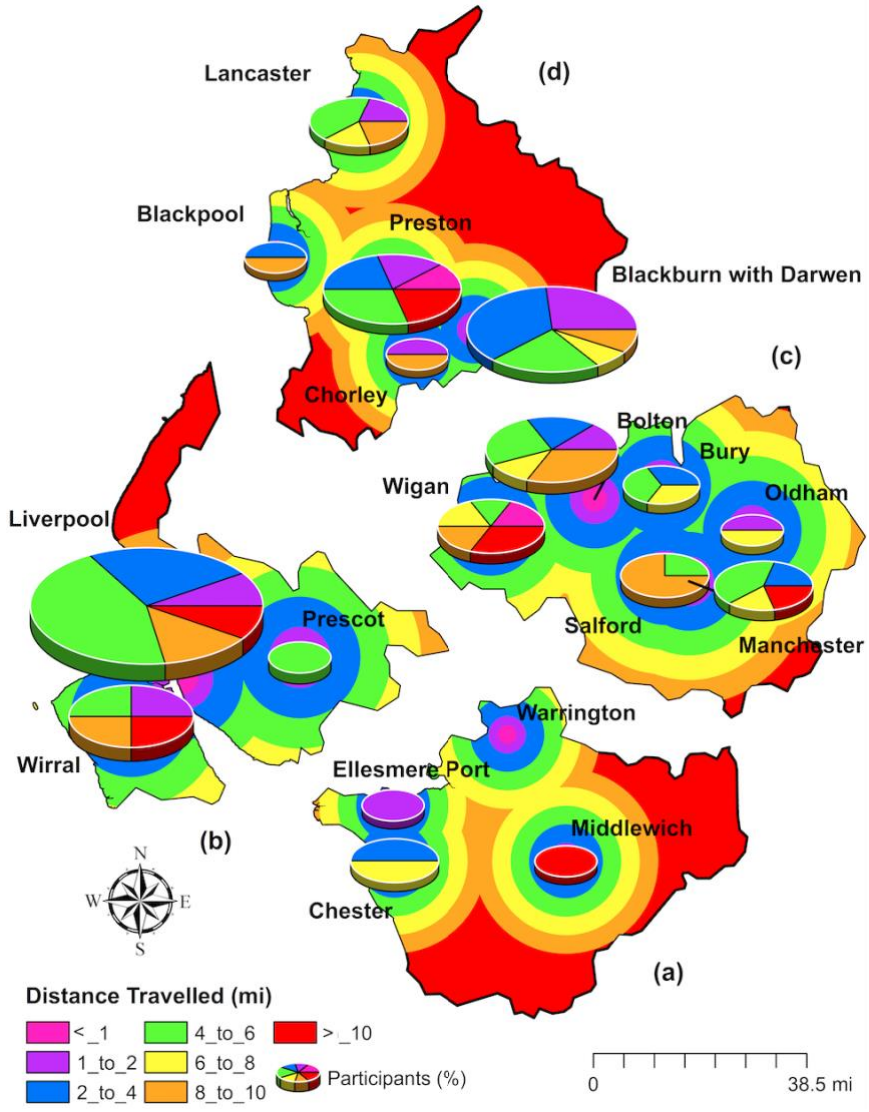


Figure 4.3. Distance travelled by ***food allergic*** individuals (n=86) to access allergen, free food in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d) Lancashire in NW, England.

4.3.3. Healthcare

Figures 4.4 and 4.5 highlight the distances travelled by food allergic and non-food allergic participants to obtain primary health care (GP's and Health Clinics) and Figures 4.6 and 4.7 highlight the distances travelled by food allergic and non-food allergic participants to obtain secondary/tertiary healthcare (hospitals), in each of the 4 counties: Cheshire, Merseyside, Greater Manchester and Lancashire in NW, England.

Overall, primary health care (GPs/health care clinics) across the NW in most towns and cities, was easily accessible. As indicated in Chapter 3, section 3.3.4, the findings revealed no significant differences between food-allergic and non-food allergic groups when accessing their GP/health centre. However, further analysis according to different counties revealed taht individuals with food allergies travelled greater distances in Liverpool and Wirral (Merseyside), Preston (Lancashire) and Bolton and Bury (Greater Manchester). Some participants without food allergies also faced challenges in accessing primary health care, namely in Liverpool and Chorley where longer distances of 10 miles were noted (Figure 4.4 and Figure 4.5).

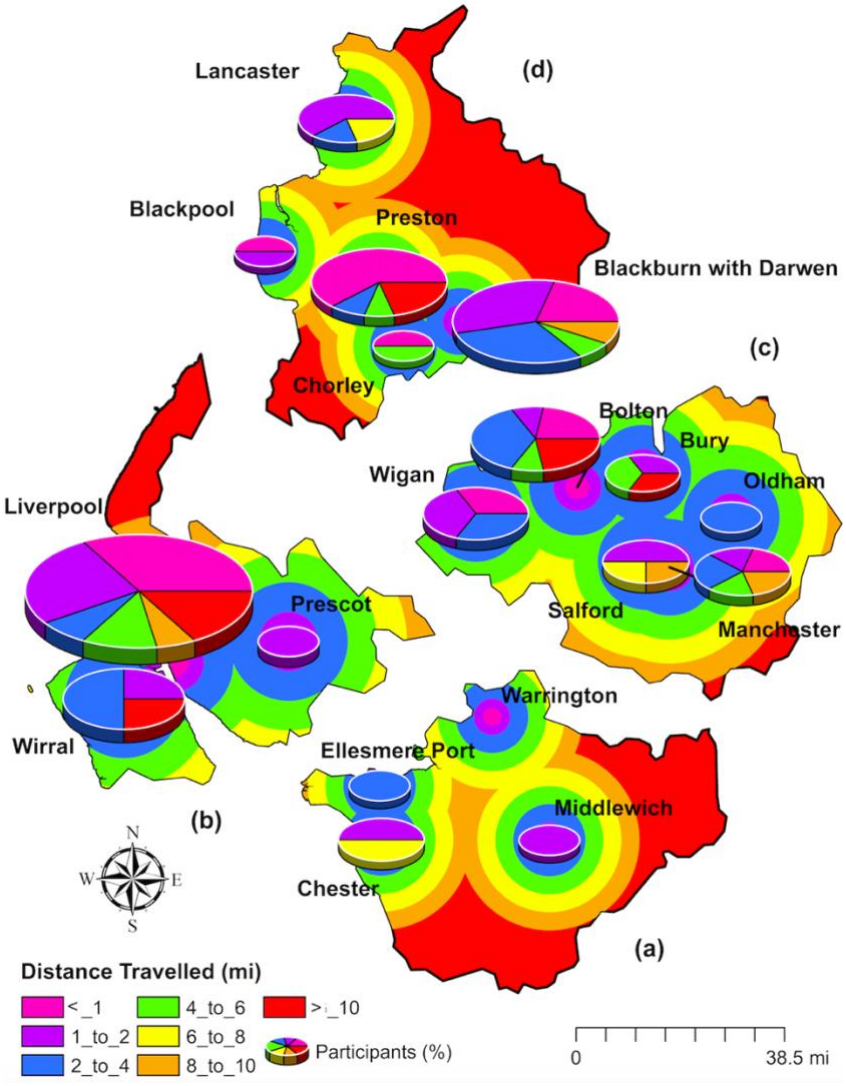
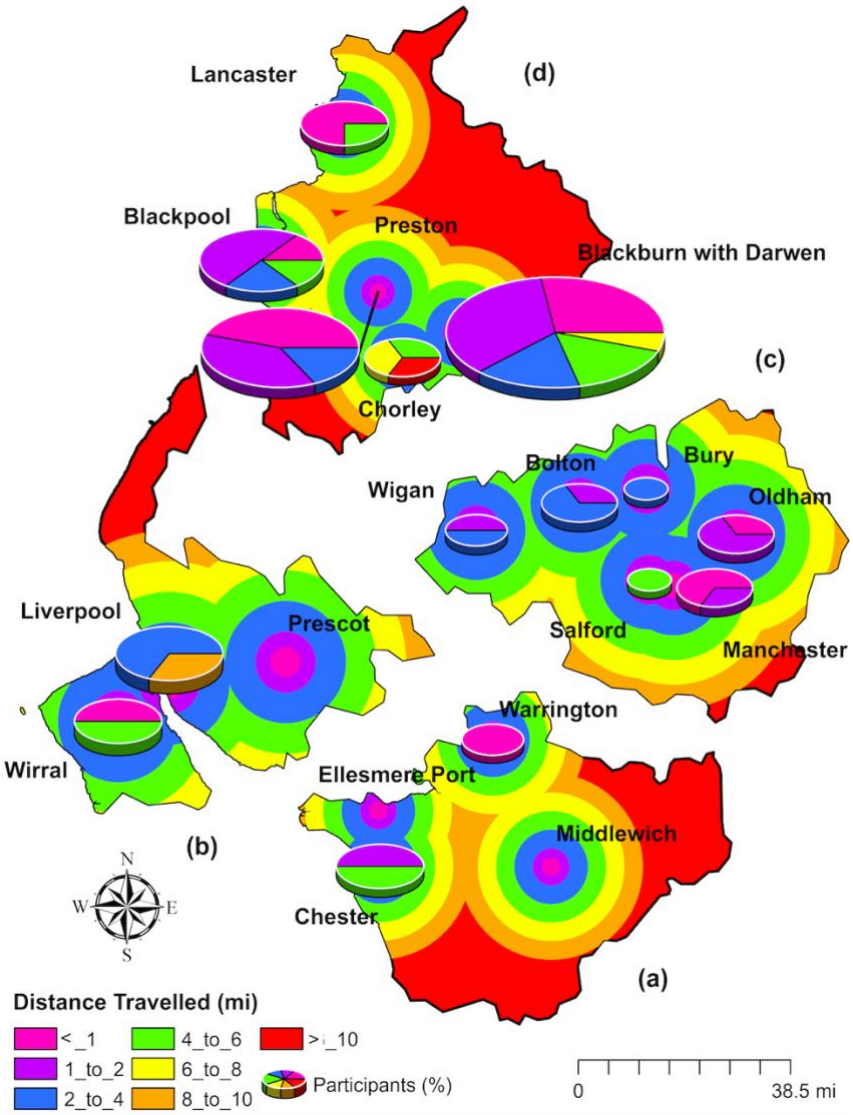


Figure 4.4. Distance travelled by ***food allergic*** individuals (n=86) to access primary health care in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d) Lancashire in NW, England.



112 **Figure 4.5.** Distance travelled by ***non-food allergic*** individuals (n=86) to access primary
113 health care in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d)
114 Lancashire in NW, England.

However, every town/city within each of the 4 counties in the NW, struggled to access secondary/tertiary health care. This access was more difficult in the food allergic group. Surprisingly at least 30% and 35% of participants in Preston and Liverpool respectively, found it difficult to access secondary/tertiary care, even though both cities possess specialist allergy clinics. Liverpool, Chorley, Blackpool and Preston were areas where both food-allergic and non-food allergic individuals struggled in accessing secondary/tertiary care (Figure 4.6 and Figure 4.7).

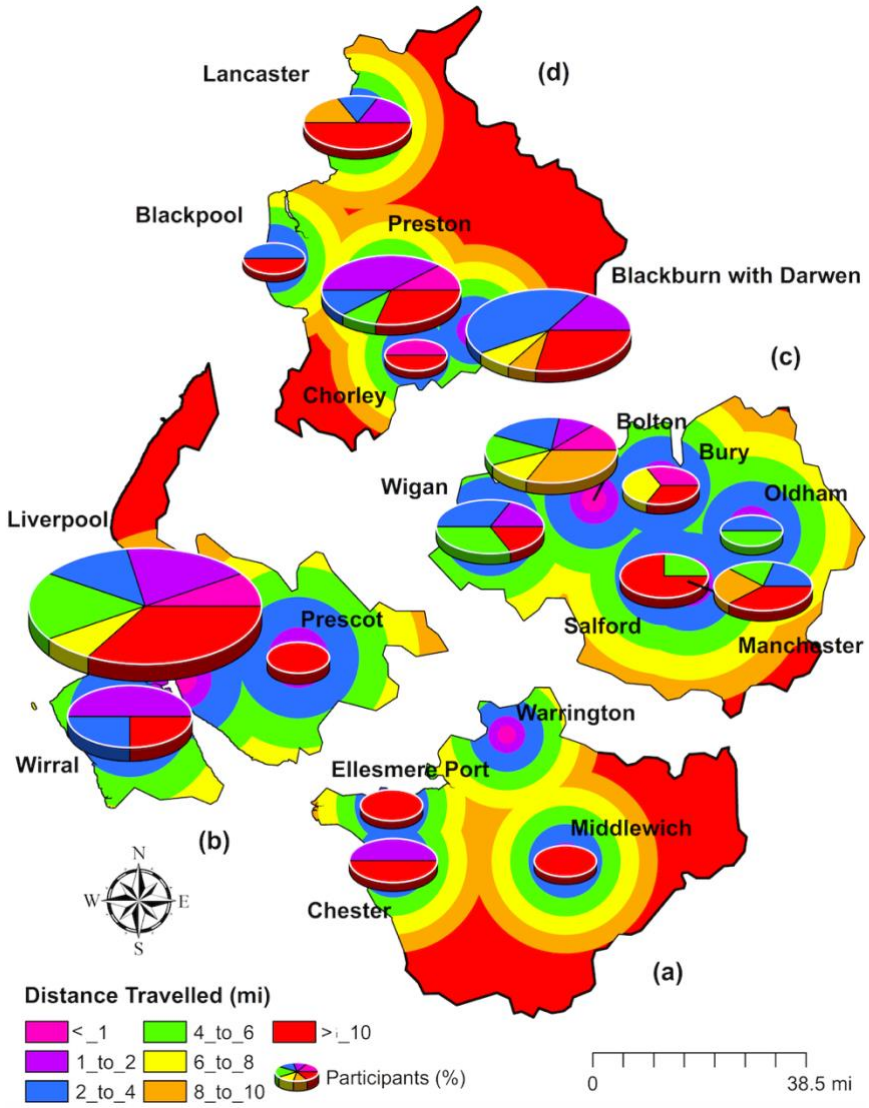
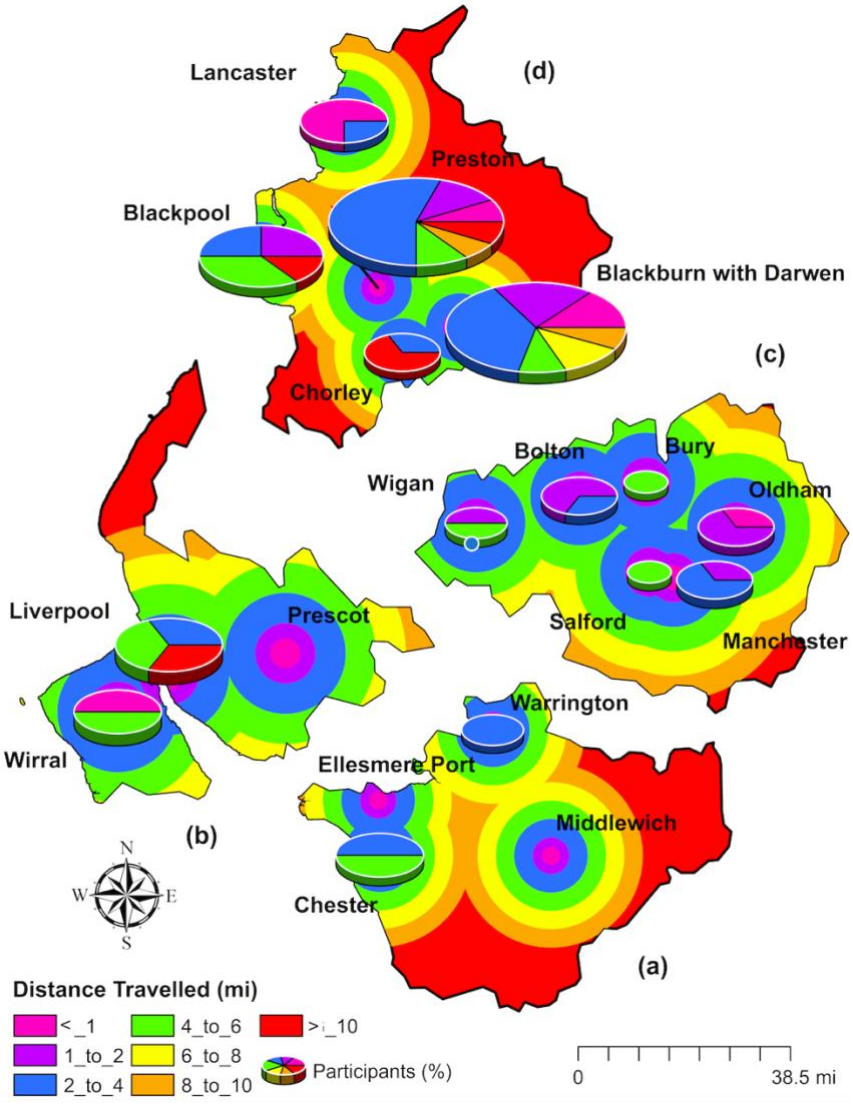


Figure 4.6. Distance travelled by ***food allergic*** individuals (n=86) to access secondary/tertiary health care in the counties of (a) Cheshire, (b) Merseyside, (c) Greater Manchester and (d) Lancashire in NW, England.



140 **Figure 4.7.** Distance travelled by ***non-food allergic*** individuals (n=86) to access
141 secondary/tertiary health care in the counties of (a) Cheshire, (b) Merseyside, (c) Greater
142 Manchester and (d) Lancashire in NW, England.

4.4. Discussion

It has already been established that the NW has a large number of neighbourhoods with high levels if deprivation *(see section 2.2.2. in Chapter 2).* Additionally, the presence of food allergies will most certainly increase the struggle to access both food and healthcare, in comparison to possessing no food allergy at all – findings which were further reinforced through this study. While discussing the results of this study, we attempted to also explore if reduced access to food and health care in those ***with*** **food allergies** in NW, England, was due to existing deprivation in each particular county. This was achieved by comparing our findings with the IMD, 2019. A specific focus on food access and specialist allergy service provision within each of the counties was also mentioned.

The NW itself consists of 5 counties: Cheshire, Merseyside, Lancashire, Greater Manchester and Cumbria. For the purpose of this discussion, deprivation relating to the counties of Cheshire, Merseyside, Lancashire and Greater Manchester will be included, as these mirror those areas in which participants were recruited from.

4.4.1. Food Access

Despite the UK being one of the most wealthiest countries, food insecurity levels are widespread and many cannot even afford basic food (McPherson, 2020. Physical access to food is necessary in order to be food secure (UK Food Security Report, 2021. While some urban areas have limited access to supermarkets or grocery stores, across England access to food shops is mostly adequate (UK Food Security Report, 2021). The findings from this study however highlighted that access to healthy, nutritious food of good quality is not easily accessible in many parts of the NW. This could be due to multiple reasons in addition to the high levels of existing deprivation. Many areas in this region have increased concentrations of fast food outlets and this constant exposure to unhealthy foods, which are also more affordable can be enticing (Caraher et al., 2010; Public Health England, 2022; Li et al., 2022; O'Neill, 2023).

Additionally, this study included 18-25year olds, of which more than half were students at university. The university environment itself is known to promote an obesogenic environment which will negatively impact dietary choices in students (Poobalan et al., 2014; Tanton et al., 2015; Roy et al., 2016; Munt et al., 2017; Sprake et al., 2018; Brennan et al., 2020; Li et al., 2022). Moreover, recent research in the NW has highlighted how food insecurity is particularly prevalent among students at university (Armstrong et al., 2023). These individuals will already have a tight budget due to additional university expenditures and as such, the affordability of unhealthy, calorie dense foods and the low cost of highly processed snacks within the

university environment will make them easier to choose (Ahmad et al., 2021; Cretch et al., 2022; Ravel et al., 2023). In those with food allergies, accessing AFF which offer a safe way to meet nutritional requirements is challenging, as outlined in this study.

Cheshire

The county of Cheshire itself is divided into four districts – Cheshire West and Chester (which includes Chester city and Ellesmere Port town), Cheshire East (which includes Middlewich town), Halton and Warrington. Individuals from areas in Cheshire West and Chester, Cheshire East and Warrington took part in this study. Table 3 highlights the overall deprivation in each of the local authorities in the NW, where participants were recruited from. The data reveals that Cheshire county has an overall less deprived population profile in comparison to other areas in the NW, with little difference between 2015 and 2019 (Table 4.3). Similarly, income deprivation within the county of Cheshire was lower in comparison to all other counties (Table 4.4). Furthermore, the health profile report for the NW of England, (PHE, 2021), reveals that in comparison to other areas within the NW, Cheshire county has a better health profile. Specifically, the report highlights that Cheshire county has one of the lowest excess mortality rates, has a higher life expectancy, has lower rates of death due to drug misuse and a lower percentage of obesity levels, when compared to other areas within the NW. Additionally, two of the three local authorities found to have increased employment rates in people ages 16-64years were in Warrington and Cheshire West and Chester, with the third being Wigan. Therefore in all aspects of health and deprivation, we can conclude that Cheshire county has a significantly better health profile and lower levels of deprivation, in comparison to the other counties across the NW.

Despite these relatively lower levels of deprivation, the results from this study highlighted that there is a struggle in accessing healthy, nutritious food across Cheshire and this is more challenging in those with food allergies. Food-allergic participants from Middlewich and Ellesmere Port and half of individuals in Chester travelled greater than 10 miles to access healthy, nutritious foods. The raw data revealed that specifically those in the postcode region of CW10, CH36 and CH65 (Appendix 2) struggled to access healthy nutritious foods the most. Cheshire county is considered a more affluent area within the NW and while levels of deprivation are not as high across this region when compared to other parts of the NW, pockets of deprivation do exist. Many residents in Cheshire county have experienced food poverty due to the rising cost of living (Francis-Devine et al., 2023). The latest Office for Health, Improvement and Disparities figures highlight how 18% of residents in Cheshire West and Chester and 11% of residents in Cheshire East suffered from food insecurity in 2021 alone. Additionally, one in five people in Cheshire West and Chester and one in nine people in

Cheshire East were consistently unable to provide their household with healthy food during this period. As such, the number of people accessing food banks in this county has rapidly increased (Farrington, 2023). Rates of deprivation are steadily increasing in Cheshire county, particularly in the city of Chester and the towns of Ellesmere Port (Noble et al., 2019) and this can therefore explain the reduced access to healthy, nutritious food seen in participants from this county.

These findings suggest that even in more affluent areas, access to essential resources like healthy, nutritious foods can also be limited. An overall better health and deprivation profile does not guarantee better access for everyone. The difference between groups highlights that the challenge in accessing healthy, nutritious foods is specific to the presence of a food allergy. Therefore, food access is not only influenced by levels of deprivation, but is tied to the individual needs of certain groups. Those with food allergies will actively be searching for AFF which are often difficult to access due to their limited availability and increased expense (REF). This emphasises the need for more targeted interventions and policies to address the unique needs of those with food allergies, consequently ensuring more equitable access.

Merseyside

Merseyside county is made up of six local authorities – Halton, Knowsley, Liverpool, Sefton, St Helens and Wirral. Overall, one third of the Merseyside population live in the most deprived 20% of neighbourhoods in England (Noble, 2019). In this study, participants from areas in Knowsley (Prescot), Liverpool and Wirral took part. The IMD 2019 report highlights that all three of these areas became relatively more deprived in 2019 when compared to 2015. Knowsley ranked as the third most deprived borough in England, followed by Liverpool, which is currently ranked as fourth, with both areas in the worst 20% of local authorities in England. Additionally, both areas have just under half of LSOA's in the most 10% deprived nationally (Table 4.3). With respect to local income deprivation, Knowsley and Liverpool ranked as 2nd and 4th respectively, indicating high rates of low income across both boroughs (Table 4.4). In comparison, of the six local authorities in Merseyside, Wirral is one of the least deprived areas with only Sefton ranking higher on the average rank scale. Currently, Wirral ranks as 77th and though has become relatively more deprived since 2015, is no longer considered amongst the 20% most deprived authorities in England (Table 4.3). Despite this, within Wirral, many areas of severe deprivation do also exist and when compared to other areas across the NW, it is still quite deprived.

Public Health reports (PHE, 2020; PHE, 2021; Lewis et al., 2021) further highlight deprivation across Merseyside and show how this high level of deprivation has resulted in poorer health

outcomes across the county. Social and health inequalities have worsened throughout Merseyside and this has further exacerbated existing inequalities in the more deprived areas. There are higher rates of coronary heart disease, obesity, mental health illness and lower life expectancy compared to the national average (PHE, 2020; PHE, 2021; Lewis et al., 2021). The prevalence of these conditions coupled with economic challenges faced by residents across Merseyside (Table 4.4.), can make it more challenging for individuals to access healthy, nutritious foods.

The findings from this study highlight that individuals with and without food allergies living in Merseyside, particularly Liverpool and Knowsley, face considerable challenges in accessing healthy, nutritious foods. Specifically it was revealed that residents living in the following areas had the most difficulty in accessing healthy, nutritious food – L12, L15, L16, L17, L19, L23 and L34 (Appendix 2). This difficulty can be directly linked to the high levels of deprivation and food insecurity existing in these specific areas. One report revealed how over 78% of households in Merseyside were 'severely' food insecure, with many residents skipping meals owing to financial instability (House of Commons, 2018). Previous data has revealed that in the city of Liverpool, 32% of adults are food insecure (Blake et al., 2021), while in Knowsley this is 57% (Dowdeswell , 2023). Additionally, in Liverpool there exists many food deserts – areas where there is a reduced access to affordable, nutritious foods (Titis et al., 2022). Reports highlight how Liverpool is home to half of the 10 most economically deprived food deserts in England Liverpool City Region Combined Authority, 2022), further emphasising why participants from Liverpool travelled longer distances when accessing healthy, nutritious foods. The results from this study highlighted little difference between those with and without food allergies when accessing healthy, nutritious foods. This indicates that the difficulties related to access are more closely linked with high levels of deprivation and food insecurity, rather than the presence of a food allergy. In comparison, both food-allergic and non-food allergic participants from Wirral generally travelled much shorter distances when accessing healthy, nutritious foods, likely owing to the lower deprivation levels in this region. Further emphasising that challenges in food access are likely linked to high deprivation levels and food insecurity in these areas and not only the presence of a food allergy.

Greater Manchester

Greater Manchester consists of ten districts and boroughs – Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan. Participants from six areas (Bolton, Bury, Manchester, Oldham Salford and Wigan) took part in this study. High levels of deprivation do exist across Greater Manchester. Five of these six areas became relatively more deprived in 2019 compared to 2015 (Oldham, Salford, Bolton, Wigan and

Bury). The city of Manchester is considered the most deprived area within Greater Manchester, with 43% of LSOA's in the most deprived 10% nationally, and also ranks second in terms of deprivation across the entire UK (Table 4.3).

High levels of deprivation exist across Greater Manchester, including high unemployment rates, low life expectancy and increased levels of child poverty and obesity. Specifically in the city of Manchester, 42% of children under-16 are currently living in poverty (PHE, 2021; Manchester City Council, 2022). These high levels of deprivation across Greater Manchester will have a direct impact on accessing essential resources such as healthy, nutritious foods.

The results from this study revealed that those with food allergies travelled longer distances in accessing healthy, nutritious foods in Greater Manchester than those without food allergies. The challenges were more pronounced in the areas of Wigan, Bolton, Bury, Manchester and Salford. This indicates that while deprivation affects all residents, those with food allergies are more severely impacted due to their specific dietary requirements. Even in Bury, where deprivation levels are lower, those with and without food allergies faced barriers in accessing healthy, nutritious foods. This suggests that accessibility issues are not only linked to deprivation but other factors such as , the availability of AFF, the geographic distribution of food stores and individual economic barriers, may also play a role. Therefore, this emphasises that food access is both challenging and complex and is influenced by a combination of factors, in addition to deprivation.

Lancashire

Lancashire is home to 14 districts – Burnley, Chorley, Fylde, Hyndburn, Lancaster, Pendle, Preston, Ribble Valley, Rossendale, South Ribble, West Lancashire, Wyre, Blackburn with Darwen and Blackpool. In this study, participants from five areas took part (Blackpool, Lancaster, Preston, Chorley and Blackburn with Darwen). Amongst these districts, there is a clear contrast in deprivation levels. Chorley is one such area where deprivation is quite low. It currently ranks 192nd on the average rank scale and has become less deprived since 2015. In fact, only 5% of LSOA's in Chorley are among the most deprived 10% nationally. Similarly, Lancaster is considered an area of lower deprivation when compared to other areas within Lancashire, ranking 112th with a small number of 13 LSOA's in the most deprived 10% nationally (Table 4.3). Additionally, income deprivation in both Chorley and Lancaster was much lower in comparison to other areas within Lancashire (Table 4.4). In contrast, Preston, followed by Blackburn with Darwen and Blackpool were all areas with higher levels of overall deprivation and income deprivation in Lancashire (Tables 4.3 and 4.4).

These high levels of deprivation in Lancashire contribute to poorer health outcomes in this region. For instance, life expectancy across many areas in Lancashire is much lower in comparison to the national average. Rates of obesity in both children and adults are particularly high across Lancashire and are expected to rise. The data reveals that 25% and 23% of children are overweight and obese respectively, while 67% and 64% of adults are overweight and obese respectively. Additionally, those living in areas of higher deprivation in Lancashire, e.g. Blackpool and Blackburn with Darwen, are twice as likely to have mental health issues including depression, anxiety, and schizophrenia. Similarly, across all local authority districts in the Lancashire region, mortality rates from chronic conditions which are considered preventable were much higher than the national average (PHE, 2021; Institute of Health Equity, 2022).

Participants in this study from Lancashire, struggled in accessing healthy, nutritious foods and this could be attributed to the high levels of deprivation in this region. Overall, the challenge was greater in those with food allergies with these individuals travelling longer distances to access healthy, nutritious foods. This suggests that specific dietary needs can exacerbate food access. The results further highlighted that some participants both with and without food allergies in Chorley, which is relatively less deprived, struggled in accessing healthy, nutritious foods. This suggests that although deprivation is a key factor in determining food access, it is not the only one. The need to travel longer distances in less deprived areas, could reflect individual circumstances and other factors such as the availability of AFF and the geographic distribution of food stores. Thus underscoring that food access is multifactorial and can affect not only those with specific dietary requirements, but also the general population.

4.4.1.1. Access to Allergen Free Foods

The results from this study revealed that all participants struggled to access AFF across the entire NW region, suggesting that access to AFF was not necessarily linked with living in areas of high deprivation. Even in regions where there existed lower overall deprivation, such as Cheshire, Chorley and Lancaster, participants faced barriers in accessing AFF. Thus suggesting that a better overall health and deprivation profile, does not necessarily mean better access to these specialised foods. When looking at the raw data, those living specifically in the postcode areas of BB3, FY8, PR2, PR4, PR7, LA9, CH28, CH32, CW10, BL3, BL5, M6, M7, M9, WN2, WN3, WN4, L12, L23 and L29 (Appendix 2) travelled the longest distance, indicating that these areas had limited access to AFFs. This reduced access found in participants can be attributed to two main reasons. Firstly, AFF (despite the growing population of the food allergic community) are not widely accessible. Their availability is commonly limited to only one section in large supermarkets and they are rarely present in convenience stores

(Holroyd, 2022). In addition to this, the range of AFF which are provided are also only a few, meaning that those with food allergies won't have many options to choose from (Searby, 2022). Secondly, even when individuals are able to access these foods, they are considerably more expensive (North and Brown, 2017). Previous research has highlighted how individuals with milk allergy struggled to access safe allergy-friendly foods due to their high cost (Abrams et al., 2020; Fong et al., 2022). In many cases, this expensive nature of AFFs will leave many to simply not purchase them (Mintel, 2022), leading to the inability to meet nutritional needs, a repetitive diet and an increased exposure to allergens, which will all detrimentally impact overall health (Tackett et al., 2019; Brown et al., 2020). In areas of higher deprivation levels, such as Manchester, Oldham, Salford, Blackpool, Blackburn with Darwen and Preston, there was an increased difficulty in accessing AFF, with participants reporting travelling greater than 10 miles. Therefore, this does indicate that deprivation was a factor in the limited availability of AFF.

In conclusion, the results of this study indicate that food access, especially for those with special dietary requirements is influenced by multiple factors including but not limited to deprivation, food availability and geographic distribution. Efforts to improve the access of AFF within the NW are essential to allow equitable access and improve overall health outcomes.

4.4.2. Healthcare Access

With regard to HCA, allergy services do currently exist within the NW. However, the data from this study revealed that many participants with food allergies were found to travel considerably long distances to access health care in each of the counties. Multiple reasons can explain this. Although the prevalence, severity and complexity of allergy has been steadily increasing, allergy services continue to remain inadequate (Diwakar et al., 2017). Few specialists who can provide the necessary allergy support currently exist in the NW (RCP, 2010; Sinnott et al., 2011). Additionally, GPs who provide the majority of allergy care in the UK lack knowledge and training and are unable to provide adequate support for those with allergies. This lack of knowledge and training will cause patients to be inappropriately referred to specialists, resulting in an increased wait time for specialist appointments. This inadequate care at the primary care level will place an increased burden on the few secondary/tertiary allergy centres in the NW that do exist, further generating long wait times for families. The inability to access adequate care will create unnecessary and unwanted anxiety among patients and families and will dramatically reduce quality of life (Sinnott et al., 2011; Agache et al., 2013; Diwakar et al., 2017; Daniels et al., 2021). Consequently, many will resort to alternative forms of support which though may be easily accessible, will prove more detrimental to health (Morris,

2019; King et al., 2020). Given that primary care physicians are the gatekeepers for secondary and tertiary care services, access to specialised allergy care will also be limited.

The findings from this study also revealed that overall, access to primary care was relatively easy with most participants travelling between less than 1 mile to 4 miles. In some areas, there was a greater difficulty in accessing primary care. The raw data revealed that this was specifically in the postcode areas of BB2, PR2, PR4, L12, L16, M11, M6, BL3, BL6, BL8 and CH61 (Appendix 2). The following few sections will focus on access to specialist allergy care by participants at the secondary/tertiary level.

Cheshire

Those with food allergies in Cheshire did struggle to access secondary/tertiary health care. Particularly, the city of Chester was one such area within the county of Cheshire where individuals were found to travel longer distances to access health care for their food allergies, when compared to other areas within Cheshire. Though deprivation in Cheshire is relatively low, small pockets of deprivation do exist, namely in urban areas in Cheshire county e.g. Chester and Ellesmere Port, thus explaining these findings (Noble et al., 2019). Moreover, no specialist allergy care (tertiary centres) exists within Cheshire specifically for those with food allergies with patients having to travel outside of the county to access services. In fact, Macclesfield District General Hospital (Cheshire East) Warrington Hospital and Countess of Chester Hospital (Cheshire West and Chester) are the only three hospitals within the county of Cheshire where secondary centres providing allergy care exist, with all three focusing only on pediatric allergy services (Table 4.5). Thus, further supporting why 18-25year olds with food allergies from this study, struggled to access healthcare for their food allergies in Cheshire county. Additionally, these findings indicate that a better overall health and deprivation profile does not necessarily guarantee better access to specialised allergy services. While socioeconomic deprivation clearly plays a role in healthcare accessibility, the specific needs of those with food allergies also presents unique challenges that are not always reduced by living in less deprived areas.

Merseyside

Accessing secondary/tertiary health care by 18-25year olds with food allergies was found to be difficult by many in Merseyside. Specifically, all participants in Prescot (Knowsley) and 25% of participants in Wirral, struggled to access specialist health care for their food allergy with these individuals travelling greater than 10 miles. Currently, no secondary or allergy services are available in Knowsley, while in Wirral, one secondary centre which has direct tertiary input does exist (Wirral University Teaching Hospital NHS Foundation) (Table 4.5), however, this

centre provides only allergy services for children. This explains the long distances travelled by participants in this study. Additionally, the data revealed that 36% of participants in the Liverpool city region also travelled distances greater than 10 miles to access specialist health care for their allergy. Specifically, this was found in participants living in the L12, L19, L23, L27 and L34 (Appendix 2) postal code areas. The results are surprising for participants living in the L12 area given that it is close to one specialised allergy and immunology services for adult patient - Royal Liverpool and Broadgreen University Hospitals NHS Trust, which provides adult allergy and immunology services (Table 4.5). Reasons to explain why participants in Liverpool were still found to travel long distances of more than 10 miles, could be due to increased wait times for appointments due to limited allergy services and the lack of allergy specialists available (RCP, 2003; Warner et al., 2006; Finlay and Egner, 2010; RCP, 2010; Diwakar et al., 2017; Daniels et al., 2021). Even though Wirral is a less deprived area, some participants here still faced difficulties when accessing healthcare. Perhaps due to pockets of deprivation which may emulate barriers similar to those found in more deprived areas, indicating that localised deprivation can also reduce efforts in accessing healthcare.

Greater Manchester

Across Greater Manchester, a proportion of participants in every city/town struggled to access health care for their allergy. Within Greater Manchester, many allergy services for both children and adults are available. However, most of these focus on providing paediatric allergy care. Although three specialised adult allergy services do exist, all are based in the city of Manchester (Central Manchester University Hospitals NHS Foundation Trust, University Hospital of South Manchester NHS Foundation Trust and Wythenshawe Hospital), explaining why many participants living in other parts of Greater Manchester travelled considerable distances to access health care (Table 4.5). Particularly, the results from this study revealed that in the city of Salford there was a great difficulty in accessing health care, with three quarters of participants traveling greater than 10 miles. This is quite surprising given that one specialised adult allergy service does also exist in the city of Salford (Salford Royal NHS Foundation Trust) (Table 4.5). Again, this can be explained by the increased wait times for appointments and/or referrals which many food allergic participants experience, along with the reduced number of allergy specialists that are currently available within the UK (RCP, 2003; Warner et al., 2006; Finlay and Egner, 2010; RCP, 2010; Diwakar et al., 2017; Daniels et al., 2021). Furthermore, across Greater Manchester, health conditions such as dementia, stroke, diabetes, coronary heart disease and depression were higher than the national average (Age UK, 2019). This high prevalence of other health conditions in the Greater Manchester area could make it more challenging for food allergic individuals to access timely and appropriate care, as healthcare resources may already be stretched.

Lancashire

In the county of Lancashire, almost half of participants in each of the cities/towns travelled long distances when accessing health care. Within Lancashire four NHS Trusts providing allergy services do exist. However, three focus on paediatric allergy and offer services only for children (University Hospitals of Morecambe Bay NHS Foundation Trust – Royal Lancaster Hospital, East Lancashire Hospitals NHS Trust and Blackpool Teaching Hospitals NHS Foundation Trust). Only one centre providing services for adults exists in Lancashire (Lancashire Teaching Hospitals NHS Foundation Trust – Royal Preston Hospital) (Table 4.5), thus explaining these long distances travelled by participants when accessing health care for their allergy. What is interesting is that some participants within the city of Preston did in fact struggle to access health care and travelled long distances, despite the adult allergy service being based in Preston. Once again, previous research has mentioned that the current care being delivered for allergy patients is inadequate, with many experiencing long waiting times for appointments to see specialists, with incorrect diagnosis/treatment being provided by primary care physicians (RCP, 2003; Warner et al., 2006; Finlay and Egner, 2010; RCP, 2010; Diwakar et al., 2017; Daniels et al., 2021). Hence, leaving them no choice but to travel further distances to seek out alternative health care. Additionally, in areas like Chorley where there exists lower levels of deprivation participants still travelled longer distances, which could indicate that even in less deprived areas, geographical factors such as dispersed services could also increase accessibility challenges. Thus, emphasising the complexity of accessing healthcare in both deprived and less deprived regions.

4.5. Conclusion

Clearly many individuals in the NW are struggling to access adequate food and health care. This can be attributed to the high levels of deprivation that exist in the North. This particular study focused on physical access to food and health care and measured the distances travelled by LA with and without food allergies. Our results in this and a previous chapter (Chapter 3) highlighted that a significant difference did exist between both groups when accessing healthy, nutritious food and secondary/tertiary health care, with the data indicating that the presence of a food allergy made it more difficult in both cases. With regard to accessing primary health care, while the results in chapter 3 found no significant differences between groups, further analysis considering the location of the participants did reveal differences between the food-allergic and non-food allergic group.

Where you live will significantly impact access to food and health care. Furthermore, the presence of a food allergy will significantly increase the challenge in accessing both food and health care - the consequences of which could prove fatal. Additionally, in those with food allergies, access to AFF also proved difficult across the NW, with a large number of participants travelling longer distances to obtain such foods. Certain postal code areas in each county were also revealed in this study, as those specifically lacking in the availability of both food and healthcare.

Interventions to improve the accessibility and availability of healthy, nutritious foods in the NW are clearly needed. A specific focus in the areas of poorer access outlined in this study should be prioritised. Local shops which are easily reached are important in accessing a healthy diet. Convenience stores which are ever-present in the community and therefore, more accessible to consumers, play an important role in shaping healthier diets (Foss et al., 2019). Yet, they offer little in the choice of healthier foods (Shaw et al., 2023). It is possible to positively influence the buying and eating habits of consumers at convenience stores, through increasing the access to healthier foods, as highlighted through previous research (Bestway Good Food Wholesale Project, 2020; Haboush-Deloye et al., 2023). Therefore, this is something to be considered within the NW, particularly in those areas where many travelled longer distances to access healthy, nutritious foods.

There is a need to improve the quality of allergy primary care and one fundamental means of achieving this, is through training as highlighted in Chapter 2. Furthermore, the use of non-clinician practitioners, for instance nurses, dietitians, psychologists and pharmacists who each can provide a unique skill set and tailored support for patients with food allergies, are not optimally used. Providing greater access to these various allied health professionals can not

only reduce the burden on both GPs and allergy specialists, but will in fact offer a more comprehensive and holistic form of care (Mercer et al., 2015; Skypala et al., 2018, Knibb et al, 2019; Barker et al., 2021; Daniels et al., 2021; Knibb et al., 2023).

Overall the results from this study emphasise that those with food allergies in areas of the NW experience challenges when accessing food and healthcare and that this is likely due to a combination of factors – high levels of deprivation, the limited availability of specialised food and health services specific to their food allergy and increased pressure on the few existing allergy services. The findings from this study therefore emphasise the need for more targeted interventions that address both socioeconomic deprivation and the specific needs of those with food allergies.

4.6. Limitations

This study provides valuable insights into the geographic variations in food and healthcare access in those with and without food allergies in the NW of England. It is also important however, to acknowledge the limitations associated with this study, which may have impacted the generalisability of the findings.

Firstly, the study included 172 participants, which may not be large enough to capture the full variability of food and healthcare access across the NW region. In addition to this, the distribution of participants across the four counties – Cheshire, Merseyside, Greater Manchester and Lancashire, was uneven. For instances, some regions like Cheshire had very few participants – only seven in total. This could have limited the ability to make conclusions about access in these areas. The low number of participants included could mean that the results may not fully represent the experiences of the wider population in those areas.

Secondly, while this study attempted to cover a wide geographic area within the NW, some areas were not represented or underrepresented in this sample. This could have led to a skewed understanding of the issues in relation to access of food and healthcare and limits the studies comprehensiveness in representing the entire NW region. Thirdly, there was a reliance on self-reported data in this study and issues with recall bias and subjective interpretation could have been present. For instance, participants perceptions of the distance travelled and the difficulty in accessing resources may vary and this could have affected the accuracy of the results.

Fourthly, the study focused on only one aspect of accessibility - the physical distance when accessing food and healthcare. Other factors which may affect accessibility were not measured in this study, such as the price and distribution of AFF and the cost of healthcare

services. Therefore, the findings may not have captured the complexity of the different barriers faced by individuals when accessing food and healthcare for their allergy. Finally, while the role of socioeconomic deprivation was acknowledged in this study, other factors associated with this for example, participants employment status, education level and food security status were not explored in the study population. These factors could have provided unique insights into the food-allergic population and how various socioeconomic factors influence their access to food and healthcare.

To conclude, while this study provides unique insights into the challenges faced by LA with and without food allergies when accessing food and healthcare, limitations do exist. Further research with a larger sample, broader geographic coverage and a more comprehensive exploration of various socioeconomic factors impacting access to food and healthcare is needed to build on these findings.

Through Chapter 3 and Chapter 4, the challenges identified in accessing food and healthcare in those with food allergies were identified. It is also crucial to understand the perspectives of HCPs, who are directly involved in providing care for LA with food allergies. Therefore, the next chapter - Chapter 5, will investigate the current HCA in LA with food allergies from the perspectives of HCPs who provide this care. This will help to determine any systemic and structural issues within the healthcare system that may potentially contribute to the difficulties experienced by LA with food allergies.

561 **Table 4.3.** Overall deprivation in each of the Local Authorities, across the four counties in the
562 NW where participants were recruited from

Local Authority	Average Rank (2015/326)	Average Rank (2019/317)	Number of LSOA's in each Local Authority (2019)	Number of LSOA's in the most 10% deprived nationally (2019)	Percentage of the most 10% deprived nationally (2019)
CHESHIRE					
Cheshire West and Chester	163rd	161st	212	16	7.5
Cheshire East	223rd	216th	234	4	2
Warrington	147th	148th	127	10	8
MERSEYSIDE					
Liverpool	7th	4th	298	145	49
Wirral	103rd	77th	206	72[1]	35[1]
Knowsley	5th	3rd	98	46	47
LANCASHIRE					
Chorley	186th	192nd	66	3	5
Preston	72nd	46th	86	16	19
Blackpool	4th	1st	94	39	41
Lancaster	125th	112th	89	13	15
Blackburn with Darwen	24th	14th	91	33	36
GREATER MANCHESTER					
Manchester	1st	2nd	282	122	43
Oldham	51st	29th	141	42	30
Salford	22nd	20th	150	45	30
Bolton	64th	47th	177	42	24
Wigan	107th	97th	200	34	17
Bury	132nd	110th	120	12	10

**Source: Indices of Deprivation, Department for Communities and Local Government, 2015 & 2019*
**Note: The smaller the number for 'average rank' the greater the relative deprivation*
[1]Refers to the number of LSAO's in the most deprived 20%, as no data currently mentions the number of LSOA's in the most deprived 10%

563 **Table 4.4.** Local income deprivation in each of the Local Authorities, across the four counties
564 in the NW where participants were recruited from

Local Authority	Average Rank (2019/317)	Number of LSOA's in the most 20% deprived nationally (2019)	Percentage of the most 20% LSOA's deprived nationally (2019)
CHESHIRE			
Cheshire West and Chester	161st	37	17
Cheshire East	226th	13	6
Warrington	153rd	22	17
MERSEYSIDE			
Liverpool	4th	177	59
Wirral	38th	65	32
Knowsley	2nd	57	58
LANCASHIRE			
Chorley	177th	8	12
Preston	55th	29	34
Blackpool	3rd	46	49
Lancaster	110th	20	22
Blackburn with Darwen	10th	50	55
GREATER MANCHESTER			
Manchester	8th	159	56
Oldham	21st	66	47
Salford	24th	64	43
Bolton	29th	73	41
Wigan	76th	63	31.5
Bury	83rd	30	25

**Source: Indices of Deprivation, Department for Communities and Local Government, 2019*
**Local Income Deprivation measures the proportion of the population in an area experiencing deprivation relating to low income*
**Note: The smaller the number for 'average rank' the greater the relative deprivation*

565 **Table 4.5.** Allergy service provision across the NW

Trust	Region	Service Provided	NHS Service
CHESHIRE			
East Cheshire NHS Trust **-** Macclesfield District General Hospital	Cheshire East	Paediatric Allergy	Secondary with Direct Tertiary Input
Countess of Chester Hospital	Cheshire West and Chester	Paediatric Allergic Clinic	Secondary
Warrington and Halton Hospitals NHS Foundation Trust	Warrington	Paediatric Allergy Clinic	Secondary
MERSEYSIDE			
Alder Hey Children's Hospital NHS Foundation Trust	Liverpool	Paediatric Allergy and Clinical Immunology	Tertiary
Royal Liverpool and Broadgreen University Hospitals NHS Trust	Liverpool	Adult Allergy and Immunology	Tertiary
Wirral University Teaching Hospital NHS Foundation Trust	Wirral	Paediatric Allergy Clinic	Secondary with Direct Tertiary Input
LANCASHIRE			
Lancashire Teaching Hospitals NHS Foundation Trust - Royal Preston Hospital	Preston	Adult and Paediatric Allergy Clinic	Secondary with Direct Tertiary Input
University Hospitals of Morecambe Bay NHS Foundation Trust - Royal Lancaster Hospital	Lancaster	Paediatric Allergy	Secondary with Direct Tertiary Input
East Lancashire Hospitals NHS Trust	Blackburn	Paediatric Allergy Clinic	Secondary
Blackpool Teaching Hospitals NHS Foundation Trust	Blackpool	Paediatric Allergy Clinic	Secondary

**Sources:*

Sinnott et al., NW NHS Specialised Commissioning Group (2011)

British Society for Allergy and Clinical Immunology (2023)

566 **Table 4.5.** Continued

Trust	Region	Service Provided	NHS Service
GREATER MANCHESTER			
Southport and Ormskirk Hospital NHS Trust	Southport	Paediatric Allergy Clinic	Secondary
Central Manchester University Hospitals NHS Foundation Trust	Manchester	Adult Immunology (with allergy) paediatric allergy and immunology	Tertiary
University Hospital of South Manchester NHS Foundation Trust	Manchester	Adult Allergy	Tertiary
Salford Royal NHS Foundation Trust	Salford	Adult Immunology (with allergy)	Tertiary
Stockport NHS Foundation Trist	Stockport	Paediatric Allergy Clinic	Secondary
Bolton NHS Foundation Trust	Bolton	Paediatric Allergy Clinic	Secondary
The Pennine Acute Hospitals NHS Trust	Oldham	Paediatric Allergy Clinic	Secondary
Wrightington, Wigan and Leigh NHS Foundation Trust – Royal Albert Edward Infirmary	Wigan	Paediatric Allergy Clinic	Secondary with Direct Tertiary Input
Wythenshawe Hospital	Manchester	Allergy Centre and Paediatric Allergy Clinic	Secondary with Direct Tertiary Input

**Sources:*

Sinnott et al.., NW NHS Specialised Commissioning Group (2011)

British Society for Allergy and Clinical Immunology (2023)

Chapter 5 – Healthcare Access in Late Adolescents (18-25years) With Food Allergies – Perspectives of Healthcare Professionals

5.1. Overview

The period of transition from late adolescence to adulthood represents a shift in responsibility for managing chronic conditions, which can be quite challenging for those with food allergies. Ineffective management during this period can lead to poorer health outcomes and potentially life-threatening allergic reactions. Understanding how current healthcare services support this transition is a key aspect in improving the care for LA with food allergies. This chapter therefore, attempts to explore the current healthcare access (HCA) for late adolescents (LA) with food allergies from the perspective of different healthcare professionals (HCPs). As HCPs play a central role in the management of food allergies, their insights will prove valuable for identifying any gaps in the current care available. Specifically, a key focus on the current training completed by HCPs as well as the current transition care is explored using a cross-sectional survey. By focusing on the perspectives of the HCPs, this chapter aims to provide a deeper understanding of structural and systemic issues that may contribute to the difficulties experienced by HCPs when providing care for LA with food allergies.

In this chapter, the following objectives were explored:

- The current training of HCPs in managing food-allergic patients,
- The availability of transition care resources,
- The communication and co-ordination between local allergy clinics and primary care providers

By exploring the above, this chapter provided insights into the current challenges faced by HCPs in providing care for LA with food allergies in the NW region. The results are then discussed and interventions based on existing literature to improve the delivery of care by HCPs for LA with food allergies, are mentioned.

5.2. Methodology

Ethical Considerations

Ethical approval was obtained from the National Health Service Research Ethics Committee (NHS REC) (REC Reference: 21/EE/0285, Project ID: 303224) and the University of Central

Lancashire's (UCLan) HEALTH ethics committee, prior to data collection. Following approval, participants were provided with a participant information sheet providing them with detailed information regarding the study. The participant information sheet was accessible online via a secure link and detailed the purpose and nature of the study, potential risks and benefits of the research and additionally emphasised participant confidentiality and the right to withdraw at any point. This ensured all participants had all relevant information at hand, allowing them to decide if they would like to participate. Once participants had reviewed the participant information sheet, informed consent was obtained from all those who expressed interest in the study, through an online consent form. Only after consent was given, participants were able to access the survey.

Patient and Public Involvement and Engagement

A patient steering group (n=3) comprising of a small sample of each of the target population was recruited prior to actual data collection. These individuals provided advice and suggestions based on individual experiences with regard to the relevance of the study. They also reviewed any material (e.g. participant information sheets) that were seen by prospective participants and determined their suitability. Their feedback was essential in refining the materials to ensure they were clear and understandable to potential participants.

Questionnaire

To assess the current HCA for LA with food allergies, a structured questionnaire was utilised. The questionnaire is included in Appendix 3. The questionnaire consisted of 21 questions relating to sociodemographic factors, training of participants and the current health care available to LA with food allergies, in the NW. Questions were adapted from a validated questionnaire developed by Khaleva et al. 2020, who conducted a similar study looking at the challenges experienced by HCPs when providing care for adolescents and young adults with allergies, their current transition practices and access to specific healthcare resources. To account for the specific context of the NW region and the unique challenges faced by LA with food allergies, changes were made to the questionnaire. A mixture of close-ended, open-ended and Likert scale questions. A pilot study (n=5) was conducted prior to data collection, to ensure suitability and effectiveness of the research. Following this, a few changes were made to the questionnaire. Where participants where asked about transition resources and the age in which transition care starts, the number of responses were increased to capture a broader range of responses that may have existed across different health services.

Additionally, one question in relation to the responsibility of transition care was considered to be ambiguous and was therefore revised before it was included in the final questionnaire.

Recruitment

HCP who assist in the care of LA with food allergies were recruited. Effective care of LA with FA requires a multi-disciplinary approach and therefore a range of HCPs were recruited, including GPs, allergy specialists, nurses and dietitians. All HCP were recruited from NW England – a area with high levels of socioeconomic deprivation.

In order to target HCPs, a letter of invitation for the study was circulated by local hospitals (i.e. East Lancashire Hospitals NHS Trust, Liverpool University Hospitals NHS Foundation Trust and Mersey Care NHS Foundation Trust). The letter included a link which directed interested participants to the online information sheet, consent form and the HCA questionnaire. Additionally, GP surgeries in the NW were contacted via email/phone to allow for recruitment of GPs. Social media (Facebook, Twitter, LinkedIn) was also used to target HCPs. Specifically, the recruitment poster for his study was shared with members of the food allergic community and researchers with interests in allergy, who circulated this poster through their social media pages. Additionally, NHS trusts (Lancashire Teaching Hospitals NHS Foundation Trust, East Lancashire Hospitals NHS Trust, Liverpool University Hospitals NHS Foundation Trust and Mersey Care NHS Foundation Trust) also shared this poster through social media to boost recruitment of HCPs. All data collection took place between February 2022 and mid-May 2022.

Data and Statistical Analysis

Data from all questionnaires was analysed using IBM SPSS Statistics Version 27.0. Descriptive statistics was conducted on all demographic information from section one. Chi-Squared analysis was conducted on training and attitudes of different HCPs in relation to HCA.

5.3. Results

Participant Demographics

A total of 42 questionnaires were completed by HCP who had worked with or currently work with 18-25year olds with one/more existing food allergies. All participants were recruited from NW (Blackpool (n=3), Chester (n=1), Blackburn with Darwen (n=16), Bolton (n=1), Preston (n=6), Liverpool (n=6), Lancaster (n=3), Leeds (n=2) and Manchester (n=4) (Table 5.1).

Table 5.1. Demographic Characteristics for healthcare professionals treating 18-25 year olds with one/more existing food allergies (n=42)

	Frequency (n, %)
Gender	
Male	18 (43)
Female	24 (57)
Age	
20-29	6 (14)
30-39	14 (33)
40-49	14 (33)
50-59	7 (17)
60+	1 (2)
Current Profession	
GP	23 (55)
Nurse	7 (17)
Dietitian	6 (14)
Health Care Assistant	6 (14)
Place of Work	
Primary Care	27 (64)
Secondary Care	9 (21)
Tertiary Care	7 (17)
Private Practice	3 (7)
Area of Work	
City	19 (45)
Town	25 (60)
Countryside	8 (19)
Village	10 (24)

Table 5.1. Continued

	Frequency (n, %)
Specialist Field	
Primary Care	20 (48)
Paediatrics	4 (10)
Adult Medicine	5 (12)
Allergy	7 (17)
N/A – I do not specialise in any field	5 (12)
Age Range Covered	
All ages	27 (64)
0-14	2 (5)
15-17	6 (14)
18-24	13 (31)
25+	9 (21)
Other	2 (5)
Years current workplace has treated 18-25yrs with FA	
0-5	19 (45)
6-10	12 (29)
11-20	7 (17)
20+	4 (10)
Patients 18-25yrs with FA seen in the last year	
0-5	23 (55)
6-10	7 (17)
11-15	5 (12)
16-20	1 (2)
21-25	3 (7)
26+	3 (7)

5.3.2. Training

Majority of HCP did not receive any specific training for 18-25year olds with food allergies (n=32, 76%). Only few participants reported receiving training for this group (n=6, 14%) (Fig

5.1), with Table 5.2 providing details. Chi Squared (χ^2) analysis revealed no significant different between the different types of HCP in this study and training received (χ^2 (6) = 9.373, p = 0.154). Health care assistants were the only group where no individuals had received any training. Despite minimal training amongst participants, most HCP did report some level of confidence when treating 18-25year olds with food allergies – somewhat confident (n = 16, 38%), fairly confident (n=9, 21%) and completely confident (n=3, 7%). 19% of HCP reported no confidence when providing advice/treatment for this age group, with most being GPs (Fig. 5.2). However, Chi Squared (χ^2) analysis highlighted no significant differences between all types of HCP and level of confidence in providing specific advice/treatment for LA with food allergies (χ^2 (9) = 13.003, p = 0.162).

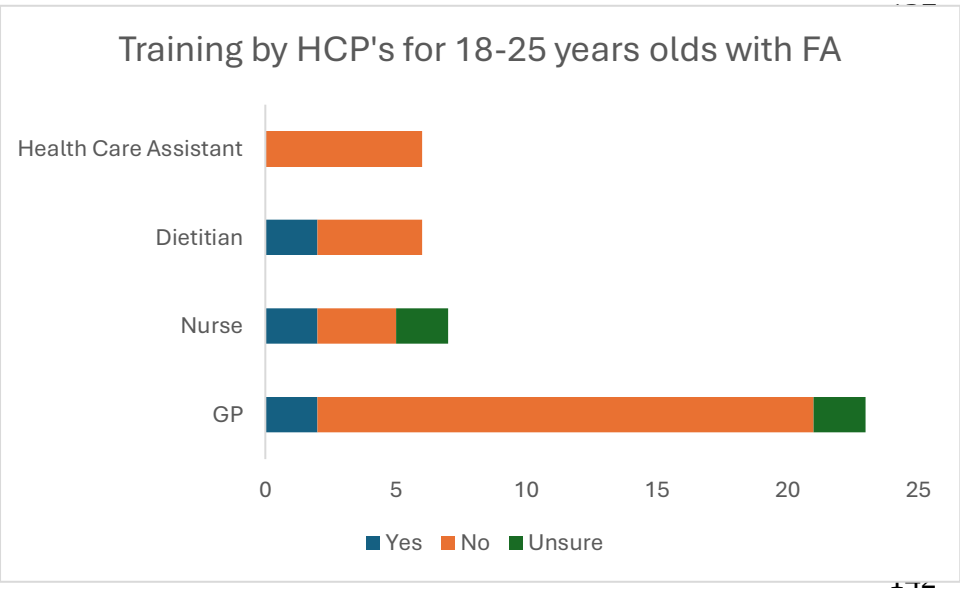


Figure 5.1. Training received by healthcare professionals for 18-25year olds with one/more existing food allergies (n=42)

Table 5.2. Specific training as reported by healthcare professionals for 18-25years with one/more existing food allergies (n=6)

TRAINING BY HEATHCARE PROFESSIONALS FOR 18-25 YEARS WITH FOOD ALLERGIES
'Attended lectures/patient briefings at conferences regarding adolescence transitions.'
'I have Celiac disease, an egg allergy and sunflower seed anaphylaxis so I can advise to a certain degree.'
'MSc Allergy University of Southampton
'MSc course, annual, national and international conferences and own research.'
'Post grad allergy module accredited by open university. Allergywise for GPs. Learnt by networking and attending national meetings and conferences. None of this specific to 18-25years but considerations for this age group are covered in these activities.'
Training in allergy and immunology for 5 years.'

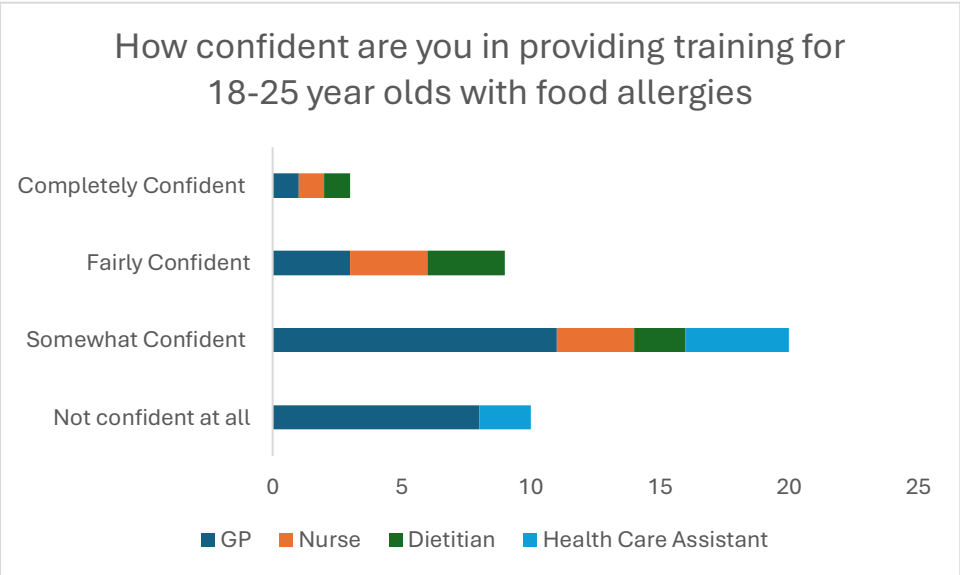


Figure 5.2. Healthcare professionals confidence in providing training for 18-25 year olds with one/more existing food allergies (n=42)

Transition Care

Participants were also asked regarding transition care of LA with food allergies. The responsibility of transferring patients from paediatric to allergy services varied between allergy consultants (n=13, 31%), allergy nurses (n=4, 10%), GPs (11, 26%) and the patient themselves (n=11, 26%) (Table 5.3). Most HCP believed transfer of patients should start between 15-17years (n=18, 43) or 10-14years (n=15, 36%). Despite this, 48% reported no transition care existed at their practice. HCP were asked regarding different resources available for LA with FA. 57% (n=24) reported no specific resources were available. Of the resources that were available, E-resources (n=11, 26%) was the most common, followed by appointments with practice/service lead (n=7, 17%) and transition guidelines (n=4, 10%) (Table 5.3).

Table 5.3. Transition care for 18-25 year olds with food allergies

	Frequency (n, %)
Who is responsible for deciding when patients should transfer from paediatric to allergy services?	
Allergy Consultant	13 (31)
Allergy Nurse	4 (10)
GP	11 (26)
Patient	8 (19)
Unsure	11 (26)
What age do you believe transition care should begin?	
10-14 years	15 (36)
15-17 years	18 (43)
18-25 years	6 (14)
26+ years	1 (2)
Other	2 (5)
What age does transition care begin at the place in which you work?	
10-14 years	5 (12)
15-17 years	9 (21)
18-25 years	6 (14)
Other	2 (5)
N/A – Currently no transition care	20 (48)

Table 5.3. Continued

	Frequency (n, %)
How important do you believe transition care is?	
Not important at all	2 (5)
Slightly Important	7 (17)
Important	17 (41)
Fairly Important	6 (14)
Extremely Important	10 (24)
Transition Care Resources	
Designate Phone Hotline	3 (7)
Appointments with designated practice/service lead	7 (17)
E-resources	11 (26)
Workshops	1 (2)
Transition Guidelines	4 (10)
Transition Assessment Tools	1 (2)
N/A – no specific resources	24 (57)

Attendance

Most HCP reported 18-25year olds with food allergies did not regularly attend appointments for health care. Majority reported irregular attendance by patients would also lead to discharge from their practice (n=31, 74%). The current communication between local allergy clinics and their primary care providers regarding food-allergic patients was also highlighted. Examples of communication include if food allergies patients are ready for discharge or require additional support and discussing protocols and strategies for treatment. Most HCP reported the relationship to be ‘poor’ (29%) to ‘average’ (43%) (Table 5.4).

Table 5.4. Attendance profile of 18-25year olds with food allergies and communication between healthcare providers as reported by healthcare professionals (n=42)

	Frequency (n, %)
Attendance by 18-25year olds as reported by HCP	
0-10%	16 (38)
11-25%	5 (12)
26-50%	3 (7)
51-75%	3 (7)
76-100%	5 (12)
Unsure	10 (24)
Regular attendance leads to patient discharge	
Yes	31 (74)
No	5 (12)
Sometimes	4 (10)
Unsure	2 (5)
Communication between local allergy clinics and primary care providers	
Good	5 (12)
Average	18 (43)
Poor	12 (29)
Very poor	7 (17)

5.4. Discussion

A large number of HCPs in this study reported no transition care existing at their service, yet believed transition care to be of some importance. Additionally, specific resources to aid in the effective support of transition care for LA with food allergies did exist among health services, but was limited and not consistent among all practices. Previous research highlights how transition care resources can prove extremely beneficial for LA with food allergies undergoing the period of transition (Khaleva et al., 2020; Roberts et al., 2020). Thus, more efforts need to be made across all levels of health care to not only provide greater access of dedicated resources for transition care, but to ensure the use of existing resources. Furthermore,

standardising transition care resources across practices is essential, as this will allow for the availability of consistent, comprehensive and quality care that will assist LA with the necessary guidance to manage their food allergies independently.

Majority of HCP had received no specific training in the care of LA with food allergies. For the few that did receive training this included attending courses, lectures and conferences. One participant was reliant on personal experience of food allergies to provide information to patients, while another reported that while they did receive training in food allergies this was broader and not specifically tailored for 18-25year olds. This lack of specific training and support can significantly reduce quality of care and is something already voiced by food-allergic participants in phase 1 of this study (see Chapter 3). This will consequently lead individuals to limit use of health care services (NICE, 2011) and is further emphasised through results of this study – HCP reported only a small percentage of food allergic 18-25year olds regularly attending appointments, with irregular attendance causing patients to be discharged. Previous research by Filippidou et al. (2014), which was undertaken in North London also supports the notion that irregular attendance is a common issue within UK health services. It should be noted here that while the study by Filippidou et al. (2014) provides useful insight, caution should be taken when making direct comparisons, as their study focused on a different region with potentially different healthcare dynamics and infrastructure and different socioeconomic factors influencing access and use of the health services.

The results of this research also revealed the relationship between local allergy clinics and their primary care providers as mainly average or poor. Effective communication between primary care providers and specialist allergy clinics is key in allowing for smooth and successful transition (Protudjer et al, 2019; Khaleva et al, 2020). For example, emotional and psychosocial stress are commonly associated with food allergies (Larson et al., 2020) and many food-allergic participants have already expressed a need to be signposted to expert psychologists and dietitians that can provide developmentally appropriate support for their allergies (See Chapter 3). Healthcare services should therefore consider an integrated approach, whereby information/feedback regarding patients food allergies is easily transferable between clinicians and where needed, input from specialists can be made easily available.

Furthermore, in the previous chapters (Chapter 3 and Chapter 4) it was found that access to healthcare services for LA with food allergies was a challenge. Specifically, while primary healthcare services were more easily accessed, secondary/tertiary health services were more difficult. This disparity in accessing healthcare services illustrates a crucial gap in the

healthcare system for the management of food allergies. Moreover, despite the presence of some specialised allergy services within the NW, many participants still struggled in accessing this care, suggesting that these services are under significant strain. Perhaps due to increasing pressures on the few services that currently exist to meet the demands of the growing food-allergic community, or even the increased wait times for appointments and/or referrals which many food allergic participants experience, along with the reduced number of allergy specialists that are currently available within the UK (RCP, 2003; Warner et al., 2006; Finlay and Egner, 2010; RCP, 2010; Diwakar et al., 2017; Daniels et al., 2021). This along with the results of this study reinforce the need for a more accessible network of specialised health services to support those with food allergies. Even though primary healthcare is more easily accessible, this may not compensate for the specific care required for food-allergic patients, as many GPs in the UK are under qualified in this field, lacking knowledge and training that is needed to provide adequate support for this group (Daniels et al., 2021). This is further reinforced by the findings from this study, where GPs themselves highlighted little training in providing care for LA with food allergies. There is a need to address the current healthcare infrastructure for patients with food allergies, to ensure that tailored services are available and accessible to meet the needs of this growing population. Improving the capabilities of primary care practitioners and increasing the access to secondary/tertiary services will be an essential component of providing comprehensive and continuous care for LA with food allergies.

5.5. Conclusion

To our knowledge, this is the first UK study investigating the current transition care for LA with food allergies, from the perspective of the HCP. The findings from this study indicate that HCP are unable to meet the specific needs of LA with food allergies. Lack of resources, training and poor communication between health providers were all barriers mentioned in providing sufficient care for this group. Often inadequate funding, particularly in GP settings, will pose a significant challenge for HCP. This can hinder the implementation of necessary services and training programmes, affecting the delivery of proper care in LA with food allergies (Owen et al., 2019). Greater awareness is therefore needed and collaboration with healthcare organisations, key stakeholders and advocacy groups is vital, in an effort to secure funding which will enhance the quality of care for LA with food allergies

5.6. Limitations

This study provided valuable insights into the current HCA available for LA with food allergies and the challenges faced by HCPs in providing care for this group. It is also important to consider the limitations associated with this study that could impact their generalisability.

The study sample included only four different types of HCPs – GPs, dietitians, healthcare assistants and nurses. This narrow representation may not fully capture the spectrum of perspectives within the healthcare system as various other HCPs such as, pharmacists, psychologists and allergy specialists, also play a crucial role in the management of food allergies. Including a broader range of HCPs could provide a more comprehensive understanding of the systemic challenges in healthcare access for patients with food allergies. There was also a limited sample size with only 42 HCPs from the NW taking part. This may make it difficult to draw conclusions and generalise the results to the wider population. Additionally, the limited sample size means that the findings may not be representative of all HCPs who manage food allergies. Moreover, there was a reliance on self-reported data and participants may have provided answers which were socially desirable rather than their actual practices or beliefs. This study also focused on solely quantitative data , which may not have fully captured the depth and complexity of the experiences and challenges of HCPs when delivering care for LA with food allergies. Using qualitative methods such as interviews and/or focus groups could provide richer data and insights into the challenges this group face when delivering care for LA with food allergies. Furthermore, this study was conducted specifically in the NW region, which may have unique characteristics in terms of the healthcare provided here and the different socioeconomic factors that could potentially impact HCA and the delivery of healthcare by HCPs. Therefore, the findings may not be directly applicable to other regions in which the healthcare system may differ. Further research should therefore aim to address these limitations by recruiting a larger number of HCPs which also includes representatives of all HCPs working with food-allergic patients. Additionally, a mixed methods approach should be considered to capture a more comprehensive understanding of the current HCA available for LA with food allergies and the challenges HCPs face when delivering care.

To further understand these issues, and building upon Chapters 3, 4 and 5 the next chapter – Chapter 6, will explore FC, FA and HCA in LA with food allergies in the NW of England through qualitative focus groups. This approach will allow for a deeper understanding of the lived experiences of LA with food allergies and the challenges they face, offering valuable insights that will complement the quantitative data presented in earlier chapters.

Chapter 6 – Exploring Food Choice, Food Access and Healthcare Access in Late Adolescents (18-25years) with Food Allergies in North West England, through Qualitative Focus Groups

6.1. Overview

The management of food allergies for LA presents a unique set of challenges that are linked with their food choice (FC), food access (FA) and healthcare access (HCA). This research builds on the previous chapters (which primarily employed quantitative methodology) by using a qualitative approach to explore each of these aspects. The unique perspectives and lived experiences of food-allergic patients (FAP), parents/carers (P/C) of children and/or young adults with food allergies and healthcare professionals (HCPs) with previous experience in providing care for 18-25year olds with food allergies are all considered. Exploring and understanding these factors are crucial in developing strategies that can support LA with food allergies – a group who face unique challenges as they attempt to navigate their allergies in the critical period of transition from LA to adulthood.

In this study, we include P/C of children with food allergies of any age rather than those only in LA. Parents play a key role in providing care throughout their child's life and their influence will likely continue into LA. The decision to focus on a broader age range was to capture a more comprehensive view of the parental role. The management of food allergies at different stages can offer insights into the long-term implications of food allergies, with parents able to highlight any changes in FC, FA and HCA as their children grow older.

Through qualitative focus groups, this current chapter delved deeper into the current FC, FA and HCA of LA with food allergies. The qualitative insights gained through this chapter complement the quantitative data from the previous chapters, providing a richer understanding of how these factors impact the everyday lives of LA with food allergies. Thematic analysis was employed as means of analysing the data and the results were then discussed in relation to the emergence of the overarching themes and subthemes for FC, FA and HCA. Based on the findings of the studies in this chapter, interventions informed by existing literature were discussed, as potential means of improving the current FCs, FA and HCA of LA with food allergies.

6.2. Methodology

Participants

Three different groups of participants took part in the focus group sessions. Participant criteria for the first group of participants included individuals between the ages of 18 and 25years who were clinically diagnosed with one/more existing food allergies. Those individuals who were unable to provide confirmation of clinical diagnosis or who were self-diagnosed, were excluded from the study. Similarly, any individuals suffering from any additional health conditions that would impact FC, FA and HCA were also excluded. The second group of participants included P/C of a child or late adolescent with one/more existing food allergies. The final group of participants included HCPs who had experience in providing care for LA with food allergies. Additional requirements for all groups of participants was to reside in NW England and to fluently speak and understand English. Any individuals not meeting these criteria were not included within the final sample.

Focus Group Topic Guide Development

Topic guides (Appendix 4) were created and utilised in each of the focus groups to prompt discussion. The topic guide was based on a similar study (Sommer et al., 2014) and adapted to suit the purpose of this study. These questions were simply used to guide the focus group sessions with the development of the conversation being largely driven by the participants themselves. Therefore removing any preconceptions and allowing for unexpected perspectives and themes to emerge.

Mock Focus Group

Prior to actual data collection, a mock focus group was also conducted. This was overseen by colleagues at the University of Central Lancashire. The purpose of the mock focus group session was to ensure that delivery of the focus groups by the lead researcher was sound, having not engaged in this methodology before. Following the session, feedback was provided and areas of strength and weakness were identified which were then considered for the main focus groups.

Recruitment

Food allergic participants who took part in the initial food selection questionnaire from Phase 1 of this study (questionnaires), were invited to take part in the focus groups. For parents of food-allergic individuals, the main recruitment took place by asking food-allergic participants if their parents would be interested in participating. For HCPs, four NHS trusts in the NW region (Lancashire Teaching Hospitals NHS Foundation Trust, East Lancashire Hospitals NHS Trust, Liverpool University Hospitals NHS Foundation Trust and Mersey Care NHS Foundation Trust) shared details of the focus group study to relevant practitioners. A recruitment poster was also created and shared via social media (Facebook, Twitter and LinkedIn) through food allergy community groups and NHS pages as means of boosting recruitment for all three groups of participants.

Ethical Considerations

Ethical approval was obtained from the National Health Service Research Ethics Committee (NHS REC) (REC Reference: 21/EE/0285, Project ID: 303224) and the University of Central Lancashire's (UCLan) HEALTH ethics committee, prior to data collection. Following the initial ethical approval, it was decided to use MS Forms to obtain demographic information from the participants. This required minor amendments to the ethics and a reapproval process was undertaken. Following final approval, participants were then provided with a participant information sheet, which included detailed information regarding the study. Three different participant information sheets were created to suit the demographics and needs of each participant group. The participant information sheet was accessible online via a secure link and detailed the purpose and nature of the study, potential risks and benefits of the research and additionally emphasised participant confidentiality and the right to withdraw at any point. This ensured all participants had all relevant information at hand, allowing them to decide if they would like to participate. Once participants had reviewed the participant information sheet, informed consent was obtained from all those who expressed interest in the study, through an online consent form. Only after consent was given, participants were able to take part in the focus groups.

Focus Groups

All data collection took place between mid-November 2023 and concluded in early December 2023. Focus groups were used to gain a greater, more detailed understanding of the impact of food allergies on FC and diet as well as food and HCA in LA with food allergies. Previous studies looking at similar research areas have also employed focus group methodology

(Sommer et al., 2014; Moen et al., 2019; Memauri et al., 2022). Furthermore, this qualitative technique allowed for participants to engage in a stimulating discussion while in a relaxed group setting, encouraging them to explore the relevant research questions. This method therefore drew upon the thoughts and behaviours of the individuals though group interaction. Consequently, providing a holistic viewpoint from participants, otherwise not obtained through individual interviews or quantitative methods alone. This beneficial nature of using qualitative focus groups has been highlighted in previous literature (Nyumba et al., 2018; Gundumogula, 2022).

Each participant was initially asked to complete an MS Form which asked them to provide socio-demographic information, including age, gender and ethnicity. In addition to this, food-allergic patients were asked to provide details of their allergies and current education status. Likewise, P/C were asked to also provide this information for their child. HCPs were asked to additionally include details of their profession.

A total of four focus groups took place, each with a maximum of 10 participants. The first two sessions included food-allergic participants and explored their FC, FA and HCA in relation to their food allergies. The third session considered the perspective of the parent and explored diet and HCA in relation to their child's food allergies. The fourth focus group included HCPs who had previous or current experience of delivering care for food-allergic patients between 18-25years. This session focused on exploring facilitators and barriers experienced by HCPs in providing care for LA with food allergies.

Each of the focus group sessions took place online via MS Teams, as this was most convenient for all participants. The focus groups lasted for approximately one hour. To begin the focus groups, an overall outline of the research project and the purpose of the focus group was provided to participants. The confidential nature of the discussion and the right to leave at any point during the session was also emphasised to participants. With all focus groups being conducted virtually, participants were encouraged to turn on their cameras to emulate an 'in person' focus group setting. As the moderator, I actively and carefully listened to each of the participants. I also encouraged them where needed and this was achieved both verbally and non-verbally. In each of the focus group sessions, a note-taker was also present. Their role consisted of taking relevant notes and recording the session. All participants received a £25 voucher via email to thank them for their time, following completion of the focus group session. This was in accordance with NIHR payment for participants and public contributors in research (NIHR, 2022). Each of the focus group sessions were transcribed using MS

Teams. Immediately after the sessions, transcriptions were checked against the original audio recordings to ensure accuracy.

Data Analysis

Thematic Analysis

The analytical approach of thematic analysis was chosen for this study. Thematic analysis is a widely used qualitative analytic method whose purpose is to identify, analyse, organise, describe and report themes within data (Braun and Clarke, 2006; Braun and Clarke, 2022). The analysis of this study was guided by Braun and Clarkes six step framework for thematic analysis (Figure 6.1). Step one is to familiarise yourself with the data. Upon completion of each of the focus group sessions, transcribed data was read and re-read several times. Through this process initial concepts, themes and impressions were noted. The second phase involved producing initial codes from the data. This was achieved through the use of the software NVivo (version 14). All transcribed data was input into the NVivo database and organised into meaningful groups i.e. coded. Each transcribed document was systematically worked through, without overlooking any of the data. Both deductive coding (themes are based on pre-existing theories or concepts) and inductive coding (themes emerge from the data itself, without pre-defined structures) are used in focus group data analysis (Braun and Clarke, 2006; Braun and Clarke, 2022). For this research, a deductive coding approach was initially used based on themes outlined in existing literature. This provided an initial framework for the analysis of the data. Specifically, the data was first mapped onto three pre-defined domains relevant to the study – Food Choice, Food Access and Healthcare Access. This deductive approach ensured that the analysis of the data aligned with already established theories and concepts. However, through the process of coding new themes also emerged and an inductive coding approach was also considered at this point, as certain parts of the data did not neatly fit into the pre-defined themes. This inductive analysis was applied after the data was already mapped onto the three domains, allowing for the identification of additional themes that were not initially considered. This combination of both deductive and inductive approaches further enriched the overall analysis of the data, thus providing a more comprehensive understanding. The purpose of this phase was to also reduce the data into a more manageable format. This led to the third phase - searching for themes, where the initial codes were placed into potential themes that captured something interesting or significant in relation to the research questions. While going through this process, any codes that did not fit into a theme were temporarily labelled as a ‘miscellaneous’ theme. At this stage, a preliminary thematic map was created

highlighting the emergence of initial themes. The fourth phase looked at reviewing these initial themes and refining them to produce overarching themes and subthemes. This involved the re-reading of all transcribed data to ensure nothing was missed. There was potential for bias to occur through the coding process. To overcome this, the data from the mock focus group was coded to practice and refine the coding process. Additional reflective practice was regularly employed throughout the coding process to recognise and address any influences from my decisions. In phase 5, the existing themes were clearly defined and further refined to capture the 'essence' of the theme. This was achieved through a short summary which highlighted the significance of each theme and why. A final thematic map was produced at this stage. The final stage of the analysis as outlined by Braun and Clarke (2006; 2022), was the write-up of the report. This provides a narrative to the reader of the main themes that developed through the qualitative focus groups, in relation to the key research questions.

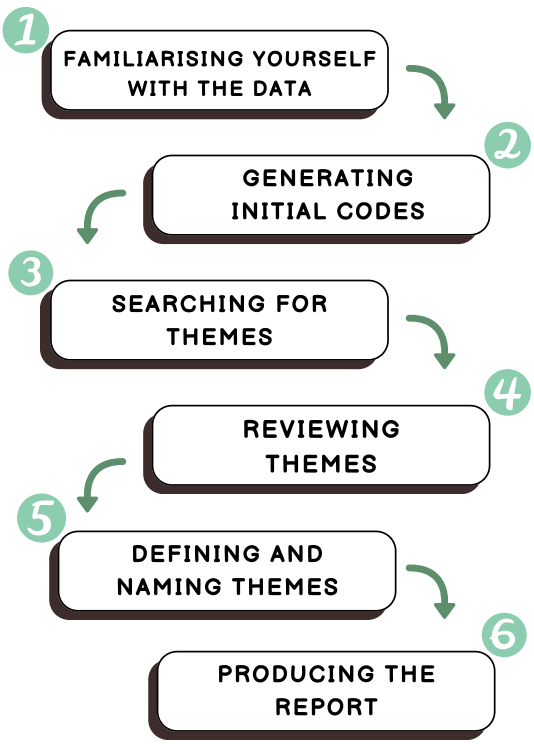


Figure 6.1. Braun and Clarkes (2006; 2022) six step framework to Thematic Analysis

Statistical Analysis

IBM SPSS Version 29.0 was used to conduct all statistical analysis. All categorical variables were expressed as numbers and percentages.

6.3. Results

6.3.1. Food Allergic Participants

Participant Demographics

A total of four focus groups took place. The first two focus groups included food-allergic patients. Each focus group consisted of 10 food allergic participants. Table 6.1 highlights their demographic information. Three quarters of participants were males, with only 5 of the 20 being female. All participants were between the ages of 18-25years, with most being 19 years of age (n=7, 35%). Majority of the group were Black British (n=13, 65%). All participants lived in urban areas. All participants were also studying at university and were students living on campus. Most participants had multiple food allergies (n=18, 90%), with only 2 participants (10%) reporting suffering from a single allergy. All participants also underwent a clinical diagnosis to confirm their allergy (Table 6.1).

Table 6.1. Demographic characteristics for 18-25year olds with food allergies (n=20)

	FAP (n=20)
Gender (n,%)	
Male	15 (75)
Female	5 (25)
Age (n,%)	
18	4 (20)
19	7 (35)
20	2 (10)
21	2 (10)
22	0 (0)
23	3 (15)
24	0 (0)
25	2 (10)

Table 6.1. Continued

	FAP (n=20)
Ethnic Background (n, %)	
White British	2 (10)
Black: British African	10 (50)
Black: British Caribbean	3 (15)
Asian British	1 (5)
Chinese	1 (5)
Mixed	3 (15)
Living Area (n, %)	
Urban	20 (100)
Student Status (n, %)	
Student (Living on Campus)	20 (100)
Education Status (n, %)	
Foundation Year	2 (10)
Undergraduate	16 (80)
Postgraduate	2 (10)
Type of Food Allergy (n, %)	
Single	2 (10)
Multiple	18 (90)
Food Causing Allergy (n, %)	
Peanut	7 (35)
Tree Nuts	3 (15)
Fish	4 (20)
Shellfish	2 (10)
Milk	14 (70)
Egg	7 (35)
Soy	10 (50)
Wheat	6 (30)
Diagnosis (n, %)	
Skin Prick Test	20 (100)
Blood Test	13 (65)
Food Elimination Diet	6 (30)

Thematic Maps

Following analysis of the data through the software NVivo, thematic maps for each focus group were generated. For food-allergic patients, a total of three main domains (FC, FA and HCA) and eight overarching themes were generated from the two focus group discussions. To maintain anonymity, participant details are indicated in brackets – this follows for each section in this chapter).

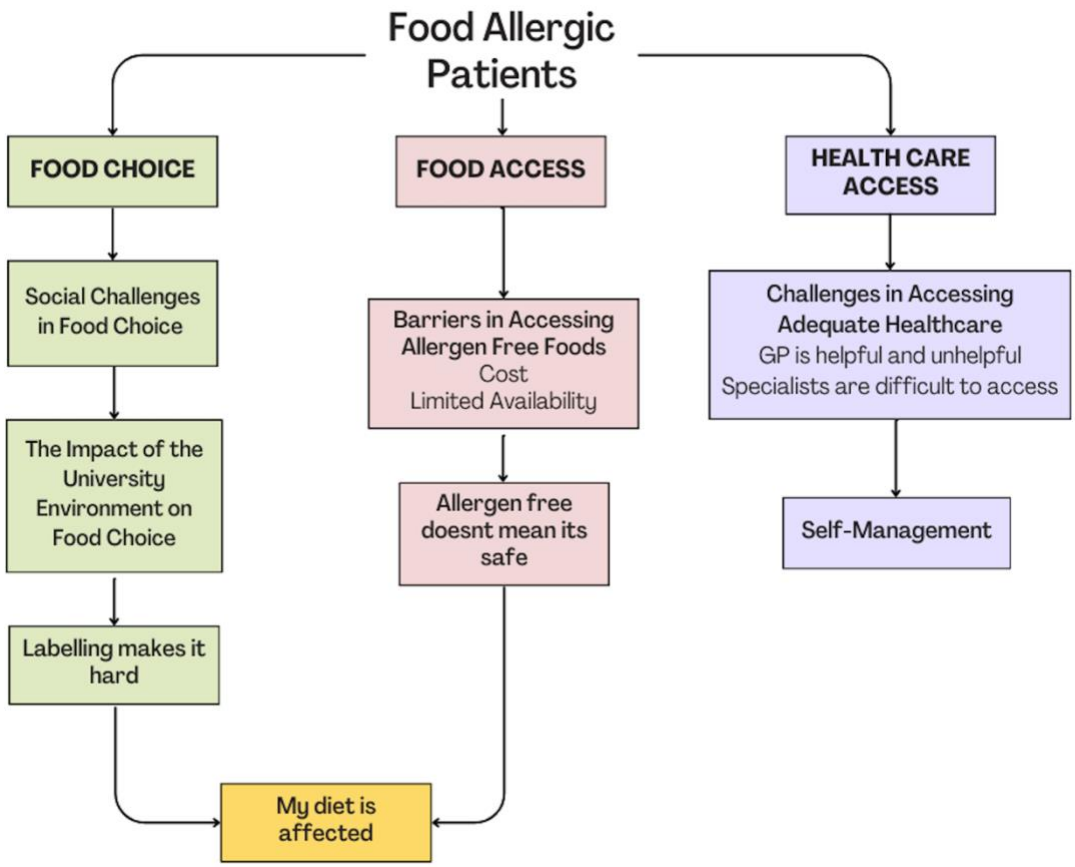


Figure 6.2. Thematic map for food-allergic patients

FOOD CHOICE

Theme 1: The Social Challenges in Food Choice

In this study several LA from both focus groups reported how their food allergies did present significant challenges, impacting their ability to fully engage in social activities. However, while it was challenging to navigate their food allergy in a social setting, for many this did not stop

them from going out. Rather, to manage the situation and reduce the risk of an allergic reaction, the easiest and safest option was simply to just not eat at all. This decision was likely due to anxiety over potential exposure to allergens and the perceived lack of understanding from peers with regard to the severity of their condition.

'Yeah I mean I do take part in social activities, you know I will go but it doesn't mean I'll eat. Yeah there'll be periods where I'll be hungry but its worth it. At least this way I can enjoy some time with my friends.' (FAP 2, Male, Milk Allergy)

Some participants also mentioned that the challenge in eating out when engaging in social activities, was due to the lack of allergen information and limited staff knowledge. This uncertainty of whether a meal was safe to eat often led to increased anxiety and fuelled the decision to abstain from eating, further liming their FC. Additionally, participants felt that many people failed to understand the serious nature of their food allergy and were unable to safely accommodate their dietary needs, which further restricted their FC. There was a sense of feeling misunderstood and this was a common theme among participants, who felt that friends and staff did not fully appreciate the risks involved with their food allergies.

'Sometimes I just don't feel comfortable going to a restaurant because well not everything is clear on the menu and the staff are not always helpful. They think I'm asking too many questions and that I'm fussy about my food. Sometimes if I do end up going out though, I'll just order drinks. Maybe there's one thing on the menu which I know for definite is okay for me so then I'll stick with that. But to be honest I can't trust it so most times I don't bother eating.' (FAP 4, Female, Wheat, Soy and Egg Allergy)

One participant with a milk allergy also reported that it was easier to not eat when going out, as the fear of having a reaction, which would physically show on the face, was too embarrassing. This fear of public judgement illustrates the emotional burden and social stigma associated with food allergies. The potential for physical display of their allergic reaction was a source of anxiety, directly influencing social behaviour in this group.

'*I do tend to stay indoors most of the time but sometimes I will go out, but well I have a milk allergy, so if sometimes by accident I take milk if it is hidden and I don't know it shows the reaction on my skin. So eating outside is kind of embarrassing, so I just tend to avoid eating really when I'm out. It's just easier that way.' (FAP 12, Male, Milk, Egg and Egg Allergy)*

Food allergic participants also mentioned that navigating food allergies in a social environment was dependent on the level of association with that person. All participants agreed that eating was easier with family as they were more understanding and supportive. This supportive environment reduced the anxiety around eating and also led to improved dietary habits, as family members often went out of their way to prepare meals which met their specific dietary needs.

'My family have been really supportive. Whenever we get together they make sure that my food is not prepared with any of my allergies, so I think at home I'm really more in comfort of my allergy. I don't have to worry at all really.' (FAP 16, Male, Shellfish, Milk, Soy Allergy)

'When its just me I'll just eat the same few things really. But when I go to my parents, they really go all out. I definitely feel like my diet is better when I eat at home.' ((FAP 2, Male, Milk Allergy) ' (FAP 4, Female, Wheat, Soy and Egg Allergy)

In contrast, eating with friends was considered more challenging. Participants frequently described feeling like a burden or being perceived as overly demanding and this discomfort led to the same strategy of avoiding food when in the company of friends. This highlights the emotional toll of managing food allergies in social settings, where individuals will often feel alienated or pressured to conform. These different experiences shared by participants with friends and with family indicate the significant impact that social relationships have on FC.

'Some of my friends don't really understand my food allergy. So it's only me in my group and sometimes it's like I'm a burden to them or they feel like I'm requesting special treatment.' (FAP 13, Male, Milk and Soy Allergy)

Overall, the social challenges in FC were a significant aspect in the lives of food-allergic individuals. The need to balance social activities with the risk of allergic reactions led many to adopt strategies of simply not eating in social settings. Although this was effective in managing their food allergies, it also limited their social experiences leading to feelings of isolation. The contrasting experiences with friends vs family emphasise how social support plays an essential role in assisting individuals with food allergies navigate their dietary choices.

Theme 2: The Impact of the University Environment on Food Choice

The impact of the university environment on FC was also discussed. A common theme which emerged was the limited number of safe food options at the university, that were suitable for those with food allergies. This led to many food allergic participants avoiding eating on campus.

'Practically all the foods around campus have milk and egg and that's some of my allergies so I just have to avoid eating there.' (FAP 7, Male, Soy, Peanut and Tree Nut Allergy)

A large number of participants additionally mentioned that the limited availability of suitable foods on the university campus led to them exploring other options. One frequent response discussed by participants, involved going outside of the campus environment to purchase foods. Many participants agreed that while this increased the number of options they had, these foods were more expensive and the limited time due to the busy nature of the university schedule made it difficult. This often led participants to rely on fast foods which were considered to be cheaper or in some cases, they would go through periods of irregular eating. This highlights a crucial issue – the intersection of financial constraints and dietary needs, forcing students to compromise their nutritional well-being due to limited resources and time.

'And even though there are actually more options outside of campus, I find that it is quite expensive and it just takes more time to get it.' (FAP 6, Male, Soy and Egg Allergy)

'Sometimes I won't eat too, because it does get quite expensive then. I've had like periods where I won't eat because I can't afford it.' (FAP 8, Female, Peanut and Milk Allergy)

The limited number of suitable foods offered on campus caused many participants to take a more proactive approach. This involved planning ahead, packing suitable foods and cooking their own meals. This highlights the increased level of vigilance and consideration needed for those with food allergies, to maintain a safe and balanced diet in an environment that is not conducive to their dietary needs. While this allowed participants to gain more control in their FCs, this was more challenging and not always possible. Again the cost of buying suitable ingredients which were more expensive and the time needed for preparation, especially during exam weeks and deadlines, were two of the main barriers experienced by food allergic participants at university. This approach further emphasises the additional time, energy and stress students with food allergies must undergo, to manage their dietary needs which could potentially detract from their academic and social experiences. Some participants also mentioned they had limited knowledge of cooking and this led to a repetitive diet.

'I always try to make sure I cook something from home before I leave but it means I have to wake up very early to cook my food so this is a challenge and sometimes I dont have enough time because of my studies so then I just don't eat.' (FAP 13, Male, Milk and Soy Allergy)

'Sometimes there is no time to source the foods I need. And I don't always have time to cook everyday so this is challenging. I also don't really know how to cook many foods. I mean I'm still learning but it does mean I eat the same stuff all the time.' (FAP 7, Male, Soy, Peanut and Tree Nut Allergy)

Overall the university environment significantly impacted FC in students with food allergies. The limited availability of safe foods on campus and the additional financial and time constraints experienced by participants were some of the challenges mentioned. This forced participants to adopt certain strategies that although were effective in managing their allergies, came at the cost of convenience, nutritional quality and overall well-being. Clearly, there is a need for greater support and accommodation within the university setting, as students with food allergies navigate the pressures of academic life and the management of their food allergy.

Theme 3: 'Labelling Makes It Hard'

Food labelling is an important tool allowing those with food allergies to make safe and informed choices (Fiocchi et al., 2021). All food allergic participants in this study mentioned difficulty in interpreting food labels. This caused them to avoid many foods, which in turn limited their FC. The complexity and inconsistency of labelling practices left participants feeling confused and led to mistrust of food labels, forcing many to avoid certain food altogether rather than risk an allergic reaction. Participants also highlighted the stress of constantly scrutinising food labels, which added an extra layer of difficulty in managing their food allergy. This indicates both the emotional and psychological toll of unclear food labelling, leaving many with food allergies to adopt restrictive eating habits out of fear of an allergic reaction

'And plus the labelling really confuses me. Sometimes it says its got no peanuts in but then it will also say that it might have this or it might have that and then it just gets really frustrating and it stresses me out. I don't really trust a lot of the foods now.' (FAP 9, Male, Soy, Mil, Peanut and Tree Nut Allergy)

'*It's very necessary to go through the labels to know if what your eating is right for your food allergy, but it's really hard. The labelling does confuse me and I've had some bad experiences, so now I'll just avoid the food when I don't understand.' (FAP 9, Male, Soy, Mil, Peanut and Tree Nut Allergy)*

In some instances, participants also mentioned that the act of reading food labels was too time consuming and on many occasions they would risk purchasing foods hoping that no reaction

would follow. This was more common in familiar foods. This behaviour highlights the difficult balance that individuals with food allergies must maintain between exercising caution and managing the practicalities of their daily lives.

'Sometimes, when the time is too less I'll just still get the food, and hopefully there's no reaction. If it's something I've had before then I won't bother reading the food labels. I've been okay so far.' (FAP 6, Male, Soy and Egg Allergy)

Participants faced significant challenges with food labelling and this in turn impacted their FCs, leading to increased caution, increased anxiety and the implementation of restrictive diets. The ambiguity and inconsistency of labelling practices created a sense of mistrust in participants, forcing them to avoid food they may have otherwise consumed. These challenges emphasise the need for clearer and more consistent labelling practices, which can better support those with food allergies.

FOOD ACCESS

Theme 4: Barriers in Accessing Allergen Free Foods

Allergen free foods (AFF) offer a safe and suitable means of enjoying a variety of food options, while avoiding necessary allergens for those with food allergies (Frame et al., 2022; Pasha-Robinson, 2023). Despite this, the cost and limited availability of AFF presented significant challenges for food allergic participants in this study.

Almost all participants in this study felt that purchasing AFF was too expensive and this was particularly a struggle due to already existing costs associated with university. Some participants mentioned how they would lower food intake in order to manage their finances, while other's would keep a look out for offers and purchase AFF in bulk. Individuals with food allergy are burdened with significant financial stress owing to the high cost of managing their dietary needs while balancing daily living expenses.

'Since I moved away for uni it's been more difficult. The expenses, there is a lot and sometimes I can't afford AFF all the time. It can get really frustrating, I mean why do they have to be more expensive. It's actually not fair because well it's not like we chose for the food allergy.' (FAP 10, Female, Milk, Soy and Wheat Allergy)

In addition to the high cost of AFF, many participants felt that these foods were not as easily obtainable due to limited availability and stock in supermarkets and convenience stores, which

further complicated access. This often led to feelings of frustration and anxiety among participants, with one respondent mentioning periods of depression due to the lack of accessing sufficient foods. This emphasises the impact of these barriers of accessing AFF on participants mental health, where often the struggle to maintain a safe and balanced diet can lead to feelings of helplessness and isolation. One option exercised by participants was to purchase these foods online, however this came with added costs. While a wider selection of products were available, the additional cost of delivery made this option less practical for those students already facing financial difficulties. In those with food allergies, even simple solutions can increase the burden as opposed to alleviating it.

'It's just quite limited you know, it's not like it can be found in virtually every place which is frustrating. It takes me longer to just do my shopping and I'm not driving yet so I have to wait on someone to take me, its frustrating to be honest. It does stress me out at times and sometimes when I don't have enough food I feel depressed sometimes. It's hard.' (FAP 13, Male, Milk and Soy Allergy)

'There are more options for AFF online but it can actually add up because the delivery charge is super expensive.' (FAP 4, Female, Wheat, Soy and Egg Allergy)

Overall, the barriers of accessing AFF (cost and limited availability) clearly impacted participants ability to effectively manage their food allergy. While strategies were employed to overcome this, such as accessing AFF online, this was compounded by financial sacrifices and increased stress. These barriers were linked with an increased emotional and psychological toll which highlights the need for more accessible options of AFF, especially for students who are managing the financial demands of academia alongside their food allergy.

Theme 5: 'Allergen Free Doesn't Mean It's Safe'

Through the focus group discussion, participants also discussed how in instances where AFF were accessible, the food still caused an allergic reaction. This led to distrust in certain food products by participants and also deterred participants from purchasing these foods in the future. In addition to this, the constant fear of being exposed to an allergic reaction, left participants feeling anxious and this also led to a reduced quality of life. The inconsistency of what was promised on the label and the actual safety of the product itself reduced the confidence of participants who were reliant on these foods to manage their food allergies. There was also an emotional toll associated with these experiences, further increasing the anxiety in food allergic individuals lives. The unpredictability of AFF caused participants to

remain more vigilant concerning these foods, which contributed to a reduced sense of safety in their dietary choices and increased stress in their daily lives.

'You know its like you think that you have to be careful with all the foods except for the allergen free ones, but actually there is still a fear of accidental exposure or an allergic reaction with these too and this makes me anxious all the time and it impacts me everyday.' FAP 16, Male, Shellfish, Milk, Soy Allergy)

The unpredictability in the safety of AFF led to increased anxiety and mistrust in these products by food-allergic participants, which impacted the quality of their daily life. Participants were forced to increase vigilance even surrounding foods that were supposed to be safe, which contributed to ongoing stress and limited FC. There is a need for better safety assurances in the production and the labelling of AFF, in the hopes of increasing trust and reducing anxiety amongst the food allergic community and ultimately their FC.

Theme 6: 'My Diet Is Affected.'

Restricted FC and limited access to appropriate foods will have an impact on dietary intake of those with food allergy. One common theme which also emerged from the focus group discussion, was how reduced FC, the struggle of accessing food and finding suitable alternatives made it difficult for participants to maintain a well-balanced diet. Participants additionally felt that the quality of AFF was poor. Consequently, this also negatively impacted participants health. Participants mentioned that their diets were compromised due to avoiding a wide range of foods in order to prevent allergic reactions. This led to inadequate nutrient intake and unintentional weight loss. These challenges highlight the real-world consequences related to limited FC, where for those with food allergies, the need to prioritise safety can lead to poor dietary choices. The quality of AFF was also expressed as a concern. Although AFF are fortified with certain nutrients, they also contain high levels of salt, sugar and fat. This raises concerns about the long-term health implications of relying on such foods which are supposed to be a safe option for those with food allergies. It is unsurprising therefore that participants felt they struggled in maintaining a balanced diet.

'I just have to avoid lots of foods but my weight has dropped a lot cos my diet isn't really that great. So yes I would say that my nutrition has been affected.' (FAP 8, Female, Peanut and Milk Allergy)

'Yeah and for me I do feel like even when I have AFF and that's supposed to help my diet, the quality is still not that great. We were checking that time and the salt and even the

sugar was a lot more, like almost double so that worried me.' (FAP 6, Male, Soy and Egg Allergy)

The restricted FCs and poor quality of AFF significantly impacted the dietary intake and overall health of participants with food allergies. There is an increased challenge in obtaining safe, nutritious foods that are of high quality for this group, which will inevitably impact health. Better access to more nutritionally balanced and safe food alternatives is therefore needed for individuals with food allergies, without which they will continue to struggle in maintaining a well-balanced diet that could have long-term health implications.

HEALTHCARE ACCESS

Theme 7: Challenges in Accessing Adequate Healthcare – GPs and Specialist Care

Accessing good quality health care is crucial for those with food allergies. In the UK majority of allergy care is delivered by GPs (Diwakar et al., 2017). In this study, some participants mentioned how accessing their GP was relatively easy. In some cases (for example during emergencies) participants did indicate a struggle in obtaining an appointment with their GP. However, on these occasions participants also mentioned being able to have a consultation over the phone or through virtual means, which was particularly helpful. This suggests that where GPs are more knowledgeable about food allergies and they are more accessible, they can play a key role in supporting patients with food allergies.

'I think that I have necessary care that I need for my food allergy. I think from the community pharmacy, I'm able to get drugs that I require in case of an emergency and then also my GP has helped me too. He's doing a great job in making sure that I am able to manage my condition very well. He's told me about going to some support groups and that's helped me cos its just not me you know.' (FAP 4, Female, Wheat, Soy and Egg Allergy)

'I've found it quite easy to access my GP actually, because well I also deal with mine too, you know, online. So we just talk and sometimes I call him on the phone to tell him if I have any complications and then we tend to talk about it virtually.' FAP 10, Female, Milk, Soy and Wheat Allergy)

While some participants felt their GP provided sufficient support, other's did not find it adequate. Participants reported bad experiences following consultations with their GP, which 'put them off' as quoted by one participant. Additionally, many participants also felt their GP

had a lack of knowledge in food allergies and were not able to provide suitable support. The inability to access appropriate care from primary care physicians, often deterred many participants from meeting with their GP again, with the alternative either going online or simply attempting to manage the food allergy themselves.

'They cant really help me that much because it feels like they don't really know that much, it's actually quite scary. I feel like there isn't any point going to them anymore cos they don't really provide solutions.' (FAP 9, Male, Soy, Milk, Peanut and Tree Nut Allergy)

The inconsistency in GP care highlights a crucial gap in the reliability of primary care for those with food allergies. Not only will the quality of care that patients receive be affected but also there are serious implications for their overall health and well-being.

The challenges did not stop at primary care. Participants also encountered significant barriers when attempting to access specialist allergy care. Almost all participants agreed that this was difficult to access, with only one participant sharing their previous positive experience. Three main barriers as mentioned by participants in accessing specialist allergy care emerged through the discussion. These included cost, distance and increased waiting time for appointments. These barriers not only reduced access to necessary specialist care but also had profound emotional and psychological effects on the participants, with many expressing feelings of stress, frustration, annoyance and helplessness.

'OK, for me it's quite difficult as, the hospital is quite far from where I live and so sometimes I have to go up and go down the stairs it makes it difficult to meet up with the appointment 'cause of the distance which can get quite annoying and then trying to get transportation because I don't drive and it's quite expensive, so this makes it quite difficult really. Sometimes I might not even go because getting there, it's too far and the transport well sometimes it is quite difficult financially.' (FAP 16, Male, Shellfish, Milk, Soy Allergy)

'I get frustrated and stressed quite a lot. The appointments take too long so it's difficult in the period in between. And then when you do get it after that it takes ages to get another appointment so I just don't bother sometimes cos it means I'll have to take time out from Uni and I've already missed so many weeks, especially at the beginning.' (FAP 13, Male, Milk and Soy Allergy)

These barriers mentioned by participants indicate a key gap in the healthcare system to provide reliable, timely and effective care for individuals with food allergies. The

inconsistencies in GP care and the barriers in accessing specialist care suggest a need for improved training, increased resources and accessibility at both the primary and secondary/tertiary level. If such gaps are not addressed, it is likely patients with food allergies will continue to face challenges in the management of their food allergy, potentially leading to reduced health outcomes.

Theme 8: 'The Best Option Is To Manage It Myself'

Given the difficulties in accessing high quality healthcare, as outlined by food-allergic participants in this study, many agreed that the best option, was the self-management of their food allergies. For most participants, this included an increased reliance on using the internet to manage allergies, which was thought to be both quick and useful. Participants did acknowledge the importance of HCPs in providing support but where this was not always possible, accessing relevant information online was a good enough alternative.

'Well, to me online is just the first place to go, it's just the fastest way to get information. Before anything I'll try to find information online before even contacting the doctor, because they'll be busy and there's no time to go to the hospital.. So yeah I have been able to find resources or information online. I mean it would be really great to always go to the HCP but that's hard and well for me online is enough.' (FAP 4, Female, Wheat, Soy and Egg Allergy)

This reliance on the self-management of food allergies through online resources raises questions about the quality and reliability of the information being obtained. Despite the internet offering a wealth of information, there are also risks involved such as misinformation possibly leading to inadequate management. There is clearly a gap in the healthcare system as patients with food allergies feel that the current system is not enough, leaving them to take matters into their own hands. Better support and more accessible healthcare options for patients with food allergies are needed to ensure they are not left alone to navigate their condition.

6.3.2. Parents/Carers

Participant Demographics

The third focus group consisted of P/C of a child or young adult with one/more existing food allergies. Overall, a total of 9 P/C took part in this focus group session. All P/C had a child with one/more existing food allergies (Table 6.2).

382 **Table 6.2.** Demographic characteristics for parents/carers of a child/young adult with food
383 allergies (n=9)
384

	Parent/Carer (n=9)
Gender (n,%)	
Male	7 (78)
Female	2 (22)
Age (n,%)	
25-35	2 (22)
36-45	2 (22)
46-55	4 (44)
56-65	1 (11)
Ethnic Background (n, %)	
White British	2 (22)
Black: British African	4 (44)
Black: British Caribbean	2 (22)
Mixed	1 (11)
How old is your child with food allergy (n, %)	
<10	2 (22)
18	1 (11)
19	3 (33)
20	1 (11)
21	2 (22)

Table 6.2. Continued.

	Parent/Carer (n=9)
Which food allergy/allergies does your child have?	
Peanut	1 (11)
Tree Nut	2 (22)
Fish	1 (11)
Milk	6 (67)
Egg	5 (56)
Soy	2 (22)
Wheat	2 (22)
Diagnosis (n, %)	
Skin Prick Test	9 (100)
Blood Test	9 (100)
Food Elimination Diet	9 (30)

**Parents/carers had the option of choosing more than one food allergy*

Thematic Maps

Following the focus group discussion with P/C and thematic analysis through the software NVivo, a total of three main domains and five overarching themes were generated. The themes which emerged are quite similar to the FAP. However, it is important to consider these from the perspective of the P/C.

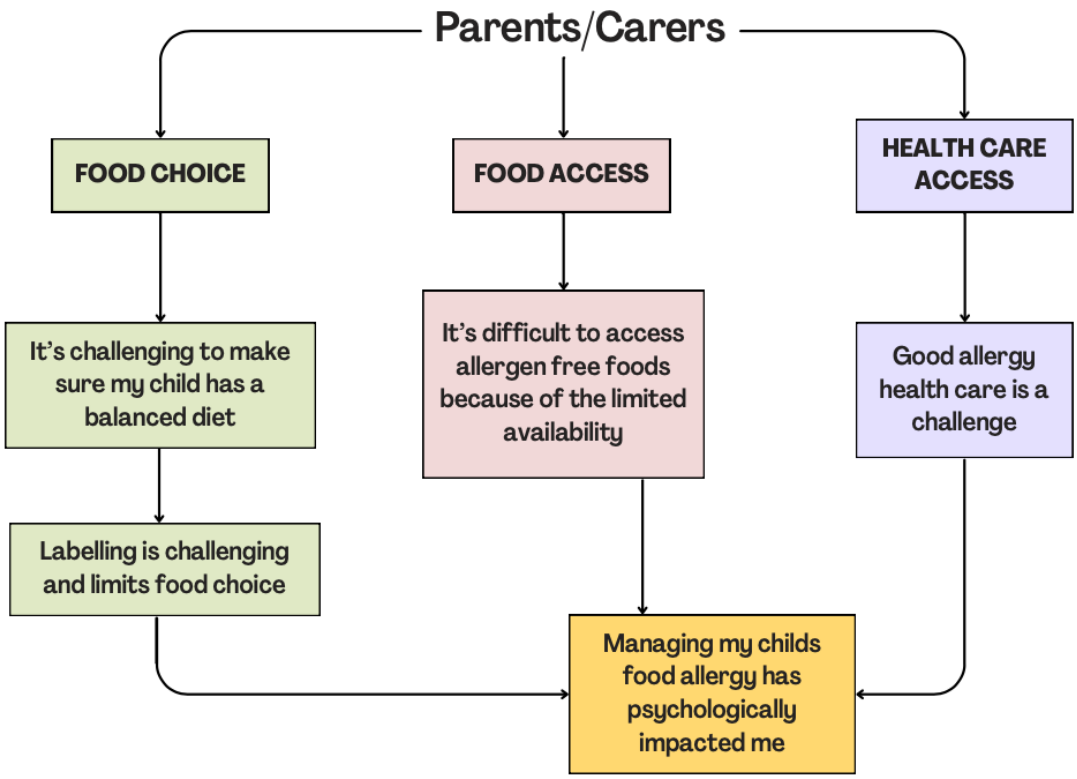


Figure 6.3. Thematic map for Parents/Carers

FOOD CHOICE

Theme 1: 'It's Challenging To Make Sure My Child Has a Balanced Diet'

It has been well established that eating outside of the home is challenging for those with food allergy and it is often the case that many food allergic individuals will avoid eating out (Mackenzie et al., 2010; Stjerna, 2015; Barnett et al., 2018; Feng and Kim, 2019; Newman and Knibb, 2020). This avoidance is often linked with safety concerns and the limited availability of suitable food options, which makes maintaining a balanced diet difficult. One common theme which emerged from this focus group discussion with P/C was the challenge in ensuring their child was able to maintain a balanced diet while managing food allergies. P/C felt restricted in providing a diverse range of foods, which often compromised the quality of their child's diet. All P/C had dietary concerns when choosing foods for their food allergic child and this was related to not being able to source suitable replacements. Consequently, this left P/C feeling that their child's diet was limited and lacked essential nutrients. Additional barriers mentioned included limited options of good quality safe foods and little help from HCPs in providing dietary advice. Many P/C also voiced concerns of their child meeting dietary requirements when starting university, where the FCs were now out of their control and the

period of independence was one of carelessness and increased privacy. P/C are left trying to balance the need to ensure their child's safety while respecting their independence, often fearing their child may not be fully equipped to make safe and healthy FCs on their own.

'So yeah, it's really does compromise the quality of the food because you have limited options of foods and you want to make sure your child is eating the best, but sometimes the quality you want is not what you can give because that is the only thing he or she can eat and you don't have a choice.' (P/C 1, Female)

'I think one important thing that which is also challenging is letting them manage FCs independently and be able to manage the situation on their own when they're in university. Because now you have almost a full grown adult and then trying to interrupt and or trying to help them manage their diet aswell, so striking that balance could also be a problem. So it's basically a communication challenge. How do you communicate with them because now they don't tell you everything. It's a real challenge.' (P/C 5, Male)

P/C of children with food allergies face challenges in ensuring their child is able to maintain a balanced diet while navigating their food allergy. Challenges in sourcing suitable alternatives which were of good nutritional quality, limited help from HCPs and increased anxiety over their child's ability to manage FCs independently were all mentioned. These concerns highlight the need for better access to safe, high quality foods, more comprehensive support from HCPs and education for their children and LA in managing their dietary needs independently. Addressing these factors can potentially reduce parental anxiety and ensure that children with food allergies are able to maintain a balanced diet throughout their lives ,while managing their food allergy.

Theme 2: 'Labelling Is Challenging and Limits Food Choice'

Difficulty in making sense of food labels was something which all P/C experienced in this study. The main challenge was the diligence required to constantly read food labels which took additional time, followed by the confusion in interpreting them. Not only did this reduced understanding of food labels limit FC, but in some cases foods of lower nutritional quality were inadvertently chosen and inappropriate foods were selected, which then led to accidental reactions. The constant need to scrutinise and interpret food labels adds a significant burden for P/C. There is likely increased anxiety about the safety and nutritional adequacy of the food they choose for their children, which could further limit FCs.

'Well, I think it's not really easy, but it's quite challenging because you try to acquire a product by reading the labelling which can be confusing and then you won't bother getting it because your not too sure. And quite unfortunately at times you get it wrongly for them. So it's quite a challenge for me.' (P/C 7, Male)

'It's something I always do, though it's might be time consuming. Tiring. You know, I need to put in extra effort. Imagine going to the shopping mall to get groceries, groceries and then just stop with reading each and every label before picking. So it's really time consuming but we have to do it for our children.' (P/C 1, Female)

P/C also face challenges with regard to labelling that impact the FCs for their children. Efforts to improve clarity on labelling is needed, as this may reduce the time spent interpreting them, enhance understanding and increase the range of safe food options for families managing food allergies. Educating P/C on how to interpret food labels could additionally help to reduce these challenges and allow P/C to effectively interpret food labels, consequently increasing FC.

FOOD ACCESS

Theme 3: 'It Is Difficult To Access Allergen Free Foods Because of the Limited Availability'

AFF offer a means of improving dietary quality which is safe. Despite this, P/C mentioned an increased difficulty in accessing these types of foods, with supermarkets not providing enough options. This limited access will often lead P/C to seek out larger stores, which can be time consuming and inconvenient and can further compound their ability to provide a well-balanced diet for their children. All P/C further acknowledged that AFF were expensive, but were still willing to purchase them to ensure their child was able to obtain a 'proper' diet while 'staying safe.' This willingness on the part of the P/C to purchase AFF, highlights the commitment to their child's wellbeing, even when faced with financial burdens and limited food options. Some participants additionally mentioned how the quality of these foods were lacking. This further indicates that AFF, though a safe option for those with food allergies, may not necessarily meet nutritional requirements. This could pose a dilemma for P/C who must choose between safety and nutritional quality.

'And then I would also like to add that we should have more options being made available because we have less availability of AFF, it's very difficult to access. You have to go to really big shopping stores before you can find it.' (P/C 7, Male)

'They are more expensive a lot more actually but I think for me the big issue is the availability and then the quality too. Sometimes, it doesn't have all the nutrients or in the past I have actually found that the AFF they have much higher sugar in them.' (P/C 5, Male)

The findings indicate that P/C also face challenges in accessing affordable, high-quality AFF, which are limited and often of poorer nutritional quality. It is clear that more availability and accessibility of AFF is required, for instance in local supermarkets, which could help to reduce the burden on families managing food allergies. It is also important to consider improving the nutritional quality of AFF while keeping them affordable, to address concerns raised by both FAP and P/C in this study in relation to cost and health-related concerns.

HEALTHCARE ACCESS

Theme 4: 'Good Allergy Healthcare Is a Challenge'

P/C of FAP discussed their previous experiences when accessing healthcare for their child with food allergies. The main theme which emerged from the discussion was the struggle in accessing good quality healthcare and this was primarily due to lack of knowledge of GPs in this field, inadequate resources, the increased costs associated with obtaining healthcare and a limited number of allergy specialists who were available. GPs provide the first point of contact in healthcare and therefore, the concerns outlined by P/C highlight a key issue in primary care which can lead to delays in being referred to specialists, delaying necessary treatment and thus increasing anxiety for P/C. Similarly, the inadequate resources can also lead to delays in diagnosis and treatment which can complicate the management of food allergies. Additionally, the financial struggle in accessing allergy services can impact families receiving timely and appropriate care. These issues are further compounded by the limited access to allergy specialists. Without this expert care, families will be left to manage food allergies without enough guidance and support that may, potentially leading to inadequate management and health risks.

'Yeah, I actually think that the whole process of having to see a GP before we get some sort of referral is quite difficult as sometimes GPs I feel don't have the best amount of knowledge really and they are not quite familiar with the severity of allergies and sometimes this causes some delay factors in referring you to see a specialist. So I really don't feel comfortable when a GP gives me certain procedures or advice to follow. I prefer a referral, a referral to an allergy specialist, but you cant get that without the GP so it is really challenging.' (PC 2, Male)

'When I spoke to the GP it was quite difficult getting the referral to an allergist and even when we got referral to NHS Hospital for allergies, it was a long waiting list and was really a challenge for me because this was my first experience. And so it was really difficult. And then, when we actually got booked for the testing, then the whole process, the whole skin prick test of blood test and food challenge, was really costly and we experienced some delays and that was challenging when accessing healthcare generally. And I think there must be quite limited specialists for allergy because the whole process wasn't really great.' (PC 7, Male) (Note here that allergy tests within the NHS are free and the participant is referring to indirect costs associated with travel. The term 'costly' may also be used broadly here to reflect the overall burden of the experience and not just the financial expenses.)

The challenges outlined by P/C in accessing healthcare for their child's food allergy associated with lack of knowledge at the primary care level, inadequate resources, cost and reduced access to specialist care have previously been mentioned by FAP in this study. This indicates a persistent issue within the current healthcare system and emphasises the importance of making improvements. There is a need to improve the current quality of allergy healthcare and addressing these specific challenges can benefit families managing food allergies, ensuring they receive timely and appropriate care.

Theme 5: 'Managing My Child's Food Allergy Has Psychologically Impacted Me'

An underlying theme which emerged from the focus group discussion with P/C was the lack of psychological support being offered. Many P/C expressed feelings of worry, stress and anxiety due to the management of their child's food allergy, which directly impacted their daily life. There is an emotional burden associated with consistently ensuring the safety of their child's diet. The daily task of reading food labels and preparing safe, nutritionally adequate meals can lead to increased stress affecting P/C mental health. P/C further mentioned experiencing anxiety even when their children gained independence, suggesting that the psychological impact of food allergy can continue to affect P/C long-term. Consequently, all P/C agreed that more psychological support from HCPs was needed, with this areas often overlooked.

'It's more like you both share the allergy the food allergy because you have to make sure you choose the right foods that are suitable and the label will make it confusing and then the extra preparation, sometimes you are restricted to eat whatever they eat and then sometimes you have to cook the meals separately. I'll make a mistake and then I'll restart and sometimes it gets to me. It's hard, really hard.' (P/C 9, Female)

'Recognising the psychological impacts of allergies in parents is really important. It definitely has affected me, my whole has changed too. Mental health support services are really needed us the parent and it would be really good if more research of this natures can be done because I think there's close relationship between food allergy and mental health.' (P/C 2, Male)

P/C revealed how the management of their child's food allergy had a profound psychological impact, which negatively impacted their daily life. To better support families, there is a need for HCPs to provide more psychological support and for HCPs to be further trained in this area so as to provide tailored services for families managing food allergies and FAP. This in turn could help to reduce the current psychological burden associated with navigating food allergies.

It is also important to note here that although this study included P/C of children with food allergies across different ages groups, no differences occurred in FC, FA and HCA based on the age of the child. This indicates that P/C who manage food allergies for their child face similar challenges throughout this care period, irrespective of their child's age. This further suggests that any differences in FC, FA and HCA may be more noticeable in the child themselves as they move to a period of independence, rather than in the experiences of the parents.

6.3.3. Healthcare Professionals

Participant Demographics

The fourth focus group was made up of HCPs, all of whom had previous experience in providing care for 18-25year olds with food allergies. There was a total number of 10 HCPs in this group. A diverse group of HCPs were involved as shown in Table 6.3.

Table 6.3. Demographic characteristics for healthcare professionals with experience of providing care for 18-25 year olds with food allergies (n=10)

	HCP (n=10)
Gender (n,%)	
Male	5 (50)
Female	5 (50)
Age (n,%)	
25-30	5 (50)
31-35	3 (30)
36-40	1 (10)
41-45	1 (10)
Ethnic Background (n, %)	
White British	6 (60)
Black: British African	2 (20)
Black: British Caribbean	1 (10)
Mixed	1 (10)
What is your current profession (n, %)	
General Practitioner	3 (30)
Dietitian	4 (40)
Nurse	2 (20)
Social Worker	1 (10)

Thematic Maps

In this focus group discussion, HCPs discussed barriers and facilitators of providing care to LA with food allergies. A total of two main domains and six overarching themes were generated following thematic analysis through the software NVivo.

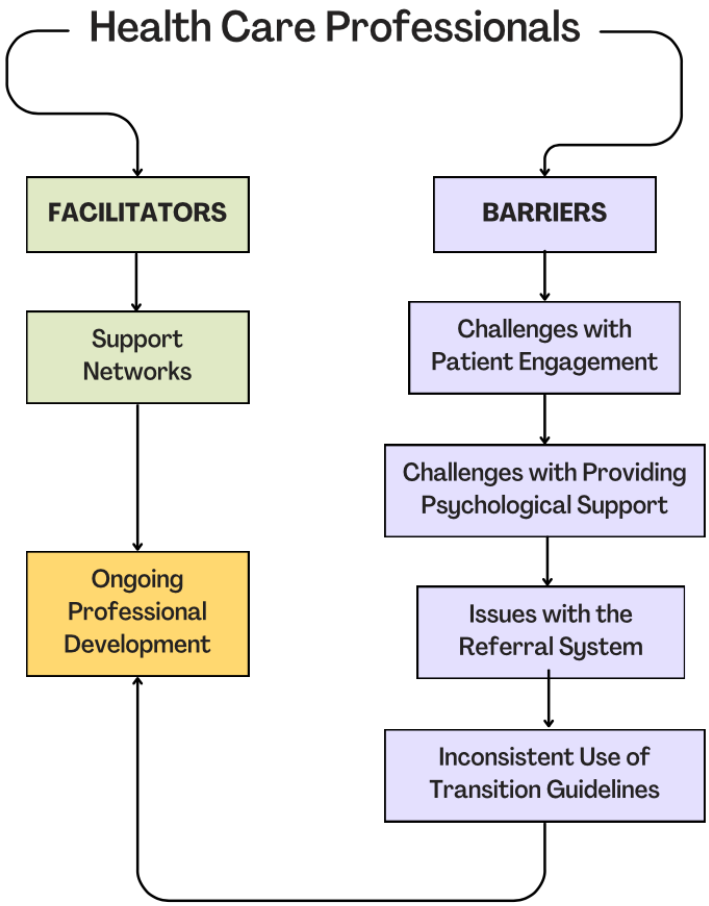


Figure 6.4. Thematic map for healthcare professionals

BARRIERS

Theme 1: Challenges with Patient Engagement

Through this focus group discussion, HCPs expressed that one of the biggest concerns in providing care for LA was their failure to attend, which directly impacts the effective management of food allergies. Some of the main reasons for this was the lack of seriousness about their food allergy and financial difficulties on the part of the patient. This lack of attendance by FAP is a key issue as it will likely disrupt the continuity of care for patients with food allergies and additionally will limit HCPs in providing continuous and comprehensive treatment.

'No, I'm always having appointment with someone, then he or she is not able to turn up due to some reason. Maybe you know, sometimes they will call and say that they do not have enough financial support to come. Maybe transportation fee or something. And that stops them from coming. So that's one of the challenges I've faced, like not try not meetings up with the appointments I have with them.' (HCP 2, Social Worker)

One of the GPs within the focus group also mentioned how there was little they could do if patients did not attend, owing to little time and the pressures of workload. This quote reflects the systemic pressures in primary care settings where increased workloads limit follow ups, which can further complicate patient care.

'And then also for me some of my patients won't come consistently so it can be hard and we don't really have time to chase them up, because we have other patients. It means that we'll just have to leave them which is difficult because you know that they need the help.' (HCP 3, GP)

Engaging with patients is a key aspect of managing food allergies. However, HCPs in this study highlighted that missed appointments due to financial issues and a lack of perceived seriousness regarding food allergies were significant barrier in providing care for LA with food allergies. There is a need to encourage patient engagement through educating patients on the importance of consistent care and the severity of their food allergy, as well as addressing financial barriers to ensure they have the necessary resources to regularly attend appointments.

Theme 2: Challenges with Providing Psychological Support

HCPs themselves acknowledged the lack of services available to support the psychological aspect of managing food allergies. Most HCPs included in the focus group, felt they lacked the competency to adequately provide this type of support due to limited time, resources and specific training in this area. The psychological aspects of food allergy are often overlooked, despite it being a key aspect in the management of food allergy. There is a gap in the training of HCPs which focuses mainly on physical health rather than the holistic needs of patients, including mental well-being. Additionally, the lack of resources to adequately deliver psychological care highlights the lack of support systems currently in place for managing all aspects of food allergy.

'It's also really important to have a good understanding of the social, emotional and behavioural impacts of food allergy and the physical and nutritional needs too. This is

something we don't really get taught and will be really helpful for us as HCPs. I think it will really improve patient care.' (HCP 4, Nurse)

'We have time constraints and limited resources, which can make it difficult to provide individualised care, especially for the psychological aspect of it. It becomes a lot more difficult particularly for adolescents with multiple food allergy.' (HCP 3, GP)

Only one participant from this focus group discussion – a social worker, mentioned that psychological support was available in some capacity in the place in which she worked. This indicates that accessing psychological support is sometimes available, highlighting the inconsistencies across different healthcare settings. Further underscoring the gap in comprehensive care for the management of food allergies.

'There is mental health support for people with allergy at my practice, we have some resources and then we'll refer them to support groups, which they can decide to attend. Sometimes, it can be limited and depending on the schedule we might not always be able to refer the patient to psychologist, but we do have this available.' (HCP 2, Social Worker)

HCPs highlighted how the challenge in providing adequate psychological care for patients with food allergy was a barrier in the management of food allergies. While HCPs are aware of the importance of providing this care, they are unable to meet the needs of patients in this regard owing to insufficient training, time and resources. Additionally, the inconsistency in the availability of this care was also highlighted indicating an uneven distribution across different healthcare settings. It is crucial to address these gaps through incorporating some form of psychological training into the professional development of HCPs. Moreover, establishing more robust support systems that can address the physical and psychological needs of patients with food allergies may also prove beneficial. Furthermore, ensuring that psychological support is more consistently available across all healthcare settings can ensure the delivery of holistic care that can assist in the effective management of food allergies.

Theme 3: Issues with the Referral System

Many of the HCPs additionally felt that inappropriate referrals wasted a lot of time and played a big part in reducing the quality of care for FAP. Some HCPs mentioned how the healthcare needs of patients with food allergies could easily be managed earlier and didn't necessarily require specialist support. The outcome of this is likely inefficiencies in the healthcare system as HCPs will have to spend additional time resolving issues that could have been addressed in primary care settings. HCPs further acknowledged that the issues with the referral system

was due to a lack of knowledge and training, emphasising the need for more education and continued ongoing professional development to ensure primary care providers have the necessary skills to manage allergy cases effectively.

'Sometimes we don't really get really enough information from whoever they have been referred by, so maybe it's the GP or the nurse and then it is quite a long process and does take extra time to sort which we don't always have.' (HCP 7, Dietitian)

Inappropriate referrals can act as a barrier for HCPs in providing comprehensive care for FAP. It is often a lack of training and education which results in these unnecessary referrals, draining both time and resources which can impact the quality of care being provided. Therefore, improving the education and training of GPs and additionally improving the communication between different levels of care is a crucial aspect of ensuring patients receive timely and appropriate care. This can also enhance the efficiency of the healthcare system by making sure that the patients receive the right care at the right time.

Theme 4: Inconsistent Use of Transition Guidelines

The management of food allergies during the transitional period of late adolescence to adulthood is challenging, due to the many psychosocial changes which occur (Huntley et al., 2023). Transition guidelines offer a means of providing necessary tailored support, for the unique challenges presented in this age demographic (Khaleva et al., 2020). Despite this, HCPs in this focus group discussed how the current guidelines at their practice were not particularly useful. HCPs felt that the current transition guidelines at their practice were not detailed enough to be considered useful. This often deterred them from being used, highlighting the need for more thorough and useful practical guidelines that are clearly defined. HCPs in this study also felt the need for more improved transition guidelines at their practice which could facilitate better care, further reinforcing the need for more clear guidelines that can ensure better quality care.

'Sometimes the transition guideline is not clear and comprehensive so this can be challenging. It's really important that the plan includes specific goals and objectives as well as timelines and milestones. Sometimes there is not proper policies and procedures in place to ensure continuity of care such as a formal handover process and a system for transferring medical records. This is actually quite poor at the moment for us.' (HCP 3, GP)

The fact that HCPs mentioned *'we just know they are ready to move on so then they will go to the adult allergy clinic' (HCP 8, GP)* indicates that the transition process is not treated as a carefully managed handover that provides LA with the necessary support during this critical transitional period, but rather as a routine administrative process.

HCPs highlighted that the current transition guidelines at their practice were not clear and comprehensive and this led to little use. Transition guidelines can provide a crucial means of smooth transition from pediatric to adult allergy services. It is important therefore, to improve these guidelines ensuring there use is consistent, to provide continuous and effective care for LA with food allergies. Educating HCPs on how to effectively implement these guidelines will also prove beneficial in maintaining the standard of care during this period.

FACILITATORS

Theme 5: Ongoing Professional Development

It has been well established that sufficient knowledge and appropriate training are essential factors for ongoing professional development and can improve the level of care provided to patients with food allergies (Skypala et al., 2018; Barker et al., 2021; Daniels et al., 2021). In this study, HCPs differed in their level of knowledge and training. Those who received specific training found it useful and felt they were able to competently deal with their patient's needs. HCPs mentioned that where training was accessible, they felt more confident and competent in managing their patient's needs. This indicates the importance of continuous education and training, which can clearly improve the quality of care.

'The hospital where I work, they do this thing every year where they produce some brochures or material videos that they share to all of us that are taking care of patients with food allergy. This material contains up to date research and provides us with better ways to understand and take care of our patients. It's been really useful for me.' (HCP 5, Dietitian)

On the other hand, many of the HCPs in this group also experienced barriers in providing care to their FAP, due to lack of knowledge and limited training opportunities, which highlights inconsistencies in the training provided across different healthcare settings. HCPs believed that without regular, comprehensive training, they would struggle in providing the level of care needed to effectively manage their patient's needs.

'Well for me I think that, so I'm a dietitian and my role involves mainly managing diet plans with patients and when to introduce foods. But I think more training is necessary for me to improve my care for LA with FA and it should include more information and knowledge about FA especially for patients with multiple FA and I'm not always confident in the elimination diets so this for me is an area I need to work on.' (HCP 7, Dietitian)

'Sometimes I won't be able to answer all of the questions asked by the patient. We don't have many opportunities for specific training and it wasn't, I cant recall being taught it while studying. Sometimes we have to do an e-learning course, but it's not all the time and it's certainly not compulsory.' (HCP 9, GP)

HCPs through this study revealed that while training is extremely beneficial in enhancing care for patients with food allergies, the lack thereof can act as a significant barrier. The variation which currently exists in knowledge and training among HCPs highlights the need for ongoing professional development to allow for the successful management of food allergies. Standardising and enhancing the current training opportunities across healthcare settings for HCPs who treat patients with food allergies, is an essential aspect of improving patient outcomes. This can help to empower HCPs in the management of food allergies, allowing them to provide consistent, high quality care.

Theme 6: Support Networks

One area which helped to improve the care provided by HCPs, was directing FAP to support groups. All HCPs were able to provide details of community support groups and online forums, which based on feedback from some of their patients proved useful. This highlights that across the board support networks are a valuable tool in assisting in the management of food allergies. Not only do they provide practical advice, but also emotional support which fosters a sense of community that can enhance and complement the care provided by HCPs.

'There are these online support groups which former patients are a part of. So the new patients are also advised to be added to the online community where they can ask questions about how they're feeling, share their experiences and reactions and they will be able to have a discussion with some of our older patients.' (HCP 4, Nurse)

Despite the beneficial nature of support groups, HCPs discussed how patients will not always join support groups and further mentioned how more efforts need to be made in encouraging LA to attend. This indicates a key challenge regarding patient engagement. The reluctance to join could also stem from multiple factors such as a lack of awareness of the benefits,

misconceptions about what support networks may offer and even time or accessibility issues. Addressing these factors is important along with exploring alternative forms of support for example, one to one support or even digital platforms where this support can be offered to those less willing to attend traditional groups.

'Sometimes the patient is reluctant to join the support group so encouraging them more and exposing them to it more is needed, because it can really help to provide a sense of community and understanding among other's who have similar experiences with food allegry. It offers an opportunity to share tips, advice and even provides emotional support' (HCP 8, GP)

While support networks are clearly of benefit for FAP, it is also important to consider how these can also support HCPs. Professional networks, for instance the British Dietetic Association (BDA) Food Allergy Specialist Group (BDA The Association of UK Dietitians) offers a platform for dietitians working in food allergy to share experiences, discuss challenges, offer continuous professional development opportunities and even keep them informed of the latest food allergy research. Although this aspect of support networks for HCPs was not specifically discussed by HCPs in this study (with the focus primarily on improving patient care), it is an essential component of supporting HCPs in their roles. Engaging in such professional support networks can improve their skills and knowledge and allow them to be better equipped in providing more effective care for FAP.

Support networks play a crucial role in the management of food allergies. Not only do they offer patients with practical advice and emotional support, but they are equally valuable for HCPs presenting them with opportunities for professional development and knowledge sharing. Patient engagement in these networks is often a challenge due to multiple factors. It is essential to address these barriers to ensure that FAP and HCPs can fully benefit from these networks, as they can lead to the better management of food allergies and improve overall patient outcomes.

6.4. Discussion

There currently exists a paucity of research in LA with food allergies, despite this being a unique life stage, which can jeopardise or optimise future health (Vilaro et al., 2018; Huntley et al., 2023). The use of in-depth focus groups, offer a much needed valuable lens into the attitudes, feelings, experiences and beliefs of each individual group. The focus groups centred

on three main elements - FC, FA and HCA, with the primary objective of improving each one consequently allowing food-allergic LA to take effective control of their allergic disease.

6.4.1. Food Choice

The Social Impact

Three main factors of FC were explored in this group of LA with food allergies. The first was the social impact of FC. Eating is inherently a social activity and previous research has indicated how the presence of a food allergy will limit social gatherings and lead to social isolation in LA (Stjerna, 2015; Feng and Kim, 2019; Newman and Knibb, 2020). Interestingly, the findings from this study differed to that of existing literature. A common theme which emerged from the discussion with FAP, was the continued involvement in social activities despite the management of food allergies. LA hold social ideals in high regard (Dix et al., 2022; Friedman et al., 2022) and the need for this group to socialise together is one of great importance, with peer interaction considered to be crucial for development (Herman, 2017; Orben et al., 2020).

The beliefs of peers are an important factor in shaping LA eating behaviour. Food allergic participants in this group felt that managing their food allergy around friends was a struggle. General feelings of unacceptance and being misunderstood by friends were highlighted and the perception of being ‘fussy’ in FC and being seen as ‘different’ was burdensome. As a result, this discouraged eating behaviour in this group. Maintaining social connections play a vital role in the development of LA (Herman, 2017; Orben et al., 2020). Communication is key and informing peers and friends of the severity of FA has the potential to reduce risk taking in this group (Sampson et al., 2006). While this choice allowed for the fulfilment of social and emotional needs and ensured safety in preventing allergenic reactions, food intake was limited. In some instances, participants felt that the lack of clear information on menus and the limited knowledge and flippant attitude of staff made not eating the easy option – findings which mirror that of existing research (Monks et al., 2010; Barnett et al., 2018).

Those with food allergy will already have a reduced intake of foods due to the nature of an avoidance diet. The outcome of further limiting food intake due to mistrust will pose greater concerns, leading to nutritional imbalance and potential health issues (Sommer et al., 2014; Skypala and McKenzie, 2019; Leone et al., 2022; de Almeida Kotchetkoff et al., 2023). P/C also highlighted similar concerns with regard to the diet of their children, noting that there was

an increased difficulty in sourcing AFF of high quality. This added to the difficulty in maintaining a balanced diet – a worry of both FAP and P/C which was expressed in this study. Substantial efforts therefore need to be made to implement and monitor changes which improve the social aspect of eating out in those with food allergies. Through their research Barnett et al. (2018), found that for FAP, the best dining out experience involved 'knowledgeable' and 'attentive' staff. Thus, increasing allergen awareness of employees through providing specific training will prove valuable in achieving this. In addition to this, the simple proactive approach of staff themselves enquiring about consumers dietary requirements holds considerable value with food allergic consumers, making them feel more confident and trusting in their FC (Begen et al., 2016; Barnett et al., 2018). In the same way, FAP should also be more proactive in sharing their allergies with personnel, to ensure a safe dining experience. HCPs play a key role in facilitating this, through educating and encouraging FAP about the potential risks involved with limiting food intake, rather than allowing fear to be a barrier (Begen et al., 2016; Newman et al., 2022). The importance of proactive communication was further emphasised by HCPs in this study, who mentioned how lack of patient engagement was a challenge they had experienced and how more efforts were needed to encourage patients in regularly attending appointments, through informing them of the benefits of adherence and risks of non-attendance.

Beliefs about navigating food allergies in different social environments were also discussed. Food allergic participants felt that the management of their food allergy in the presence of family was easier. Feelings of comfort and relax were expressed, with FAP happy to leave the responsibility of their safety to family who were 'understanding', 'supportive' and 'careful'. These findings are similar to that of previous research where the studies reinforce the perceptions of family home as the safest food allergy environment for FAP (Sommer et al., 2014; Stjerna et al., 2015). Participants additionally agreed that food intake was better when eating in the company of family in comparison to eating alone. Where parents are in control and select the foods of the family diet, food intake will naturally be improved (Poobalan et al., 2014; Scaglioni et al., 2018). In contrast, when eating alone simple and quick meals will frequently be chosen and this discourages a well-balanced diet (Chae et al., 2018).

For LA who are living independently and are imposed by the added expenses of university life, financial difficulties will arise (Defeyter et al., 2020; Ahmad et al., 2021; Ravel et al., 2023). To manage situations, LA will often compromise food intake through the selection of suboptimal foods (Bauer et al., 2016; Larson et al., 2020) or in some instances, portion sizes and/or the number of meals per day will be reduced (Cretch, 2022). Educating food allergic LA on how to make informed FC and providing them with cooking skills is a key responsibility

for parents, which can empower LA to acquire and eat healthier foods (Harper et al., 2022). Food vouchers provided by institutions, particularly to food-insecure students through this period of independence, could additionally help to combat the financial restrictions. Not only will this enhance access to quality foods but simultaneously will improve academic attainment (Broton et al., 2023). While many universities in the NW have taken this approach, the current cost of living and the price of food will mean that vouchers alone will not provide a long-term solution (Vittozzi, 2023). Perhaps governmental policy change is needed to ensure access to adequate nutritious meals for all university students.

The University Environment

The second factor in relation to FC which was discussed by food allergic participants, was the impact of the university environment. All participants mentioned the limited availability of safe foods in the university, which is in line with previous research (Greenhawt et al., 2009; Wu and Wang., 2023). Not eating on campus was a common theme discussed as a result of the challenge in accessing AFF. Food allergic participants were consequently forced to look for alternative options. The majority of food allergic participants in this study explored seeking foods outside of the campus environment. While this did provide more options, these foods were considered more expensive and the added time required to purchase them was an inconvenience. Some participants further mentioned how the availability of 'lots of fast food places' outside of campus made it easier to access foods. The inexpensive nature of such foods made them more tempting. This is worrying as the overconsumption of takeaway foods, which is a common practice among LA, has been strongly linked to lower dietary quality and increased nutritional deficiencies (Larson et al., 2020; Racine et al., 2022). Planning meals and cooking can allow LA to take control over their FCs while improving diet and especially in those with food allergies, can ensure safety. Although this proactive approach was taken by some participants from this study, managing time constraints while preparing and sourcing foods was a challenge. Some participants expressed concerns of limited cooking knowledge, which made navigating food allergies at university difficult. Providing education in relation to meal preparation strategies, including batch cooking and knowledge of simple and quick recipes, can provide food allergic individuals with a more manageable approach while simultaneously maintaining a safe quality diet (Sommer et al., 2014; Sicherer et al., 2023). Additionally, universities themselves have a responsibility in supporting food allergic students. One way to ensure the dietary needs of food allergic students are met, is through the promotion of AFF both in campus dining areas and in vending machines. Additionally, clear signposting of designated allergy safe spaces and improved visibility of food labelling, particularly in dining areas, is needed (Dyer et al., 2018; Wu and Wang., 2023). Furthermore,

some participants mentioned feeling anxious in relation to managing food allergies in the university setting. This mirrors the perspectives of the P/C who also reported experiencing anxiety even when their children gained independence, suggesting that the psychological impact of food allergy can continue to impact P/C long-term.

Labelling

An additional theme which impacted the FC of this group also emerged through the discussion. Firstly, both FAP and P/C expressed concerns with current food labelling practices. Much literature has reported the difficulty which food allergic individuals and their families experience with food labels (FSA, 2001; Joshi et al., 2002; Noimark et al., 2009; MacKenzie et al., 2010; Barnett et al., 2011; Walkner et al., 2015; Fiocchi et al., 2021) and the results from this study further add to these findings. Many participants in this study expressed feelings of 'confusion' when reading food labels and found it 'difficult' to interpret them. Participants further communicated feelings of distrust in food products due to the lack of clarity on packaging. P/C additionally felt that the inadequate labelling was an obstruction in purchasing healthier foods. Moreover, the increased time spent screening food labels to determine safety was 'tiring' and led to feelings of frustration and increased stress in participants. The outcome for many led to simply avoiding foods, which limited both FC and food intake. The complexity of food labels further deterred individuals in reading them and resulted in two risky outcomes in food allergic participants, leading to accidental ingestion. Either food allergic participants were reliant on the same foods over and over, which could cause them to miss any possible changes in ingredients (Versluis et al., 2023), or they disregarded food labels and took a chance with foods in the hopes of no reaction. Ignoring food labels is a common practice among LA with food allergies (Barnett et al., 2011; Marchisotto et al., 2017), which was dissimilar to P/C behaviour in this study, who felt they had a 'responsibility' to continuously check food labels despite it being 'tiring' and 'complicated'. Overall both FAP and P/C did struggle in navigating food labels indicating a shared burden that exists in ensuring a safe and nutritionally, adequate diet. This challenge also emphasises the need for more clearer and consistent labelling practices to better support FAP and their families in making more informed choices.

A vital aspect in the everyday life of food allergic individuals is reading and correctly interpreting food labels, to effectively identify and avoid ingredients which could pose health risks (Barnett et al., 2013; Martinez-Pineda and Yague-Ruiz, 2022). Yet the current labelling system makes this difficult. It is a priority to ensure clearer and standardised labelling practices to reduce the confusion that currently exists across labelling practices. This obligation lies with

food manufacturers, government bodies and policy makers, all of whom play a crucial role in helping FAP and their parents to gain more confidence in food decision making (Barnett et al., 2013; Newman et al., 2022). There is a need to harmonise current labelling practices and Holleman et al. (2021), recommend the use of only one Precautionary Allergen Labelling (PAL) (e.g. may contain) wording to reduce labelling confusion. Furthermore, through a recent study with key stakeholders, the FSA (2022) propose the use of standardised PAL on packaging, only when certain allergen thresholds are exceeded. This will allow for meaningful information on food labels, further increasing FAP and parents in greater confidence and trust in food products and will consequently assist them in making better dietary choices.

6.4.2. Food Access

Cost

Food allergies pose a significant economic burden for all those affected and their families. Increased hospital visits, medication and nutrition supplements are some of the expenses faced by this group (Minaker et al., 2014; Diwakar, 2017; Tackett et al., 2018; Foods Standards Agency, 2022). A necessary component of managing food allergies is the inclusion of AFF, which offer a safe means of improving diet (Frame et al., 2022). It is well known that AFF are difficult to access for the food allergic community and one of the primary reasons for this, is cost. AFF are considerably more expensive than non-allergen counterparts and multiple studies have highlighted this (Bollinger et al., 2006; Groetch et al., 2013; Gupta et al., 2013; Sommer et al., 2014; Bilaver et al., 2016;Polk and Dinakar, 2017; Bozen et al., 2020; Hurst et al., 2021; FSA, 2022; Memauri et al., 2022; Allergy UK, 2023). The results from this study further add to this collection of literature, with all food allergic participants echoing the high cost of AFF. While the management of food allergies pose a financial problem to all those suffering, some groups, namely low-income and minority individuals, are at an increased risk (Scurlock et al., 2022; Tepler et al., 2022). While socioeconomic status was not determined in this study, we can assume that this group of participants were of lower income. This is because all participants were students living at university, which is a period of high expenditure owing to the added costs of tuition fees, utilities and accommodation (Ahmad et al., 2021; Cretch 2022; Ravel et al., 2023). In fact, one of the primary reasons for the struggle in accessing AFF mentioned by participants in this study, was due to the added expenses of university. In addition to this, a large percentage of food allergic participants in this study (90%) reported suffering from multiple food allergies, which have been associated with higher rates of allergic

comorbidities, for example asthma, atopic dermatitis and allergic rhinitis (Raimundo et al., 2021). Managing both multiple food allergies and allergic comorbidities require multiple medications (Memauri et al., 2022) and will further exacerbate the already existing financial strain in this group.

This theme of financial strain is a recurring one among all groups and is not only associated with the cost of AFF. While FAP struggled with balancing the financial pressures of academia and the management of their food allergy on campus, P/C noted the high cost associated with AFF and the overall economic burden of food allergies on families. HCPs also recognised the impact of financial difficulties which often led to missed appointments and inconsistent care, which negatively impacted the effective management of food allergies. Consequently, this shared financial burden voiced by all groups highlights the increased economic challenges that are linked with the management of food allergies.

Clearly there is a huge financial burden in the management of food allergies. As such, many individuals will have to prioritise their spending in order to manage finances. Often food will be compromised with medication naturally given greater importance (Bilaver et al., 2016). Similar findings were reported in this study, with a large number of food allergic participants reducing food intake in order to 'save.' At present, there is little support available to support the huge financial burden experienced by FAP and their families. In particular, strategies to improve the access to AFF through improving their affordability and availability is needed. Dietitians should provide guidance to FAP in finding appropriate substitutes, which are less expensive than 'free from' counterparts, while maintaining dietary requirements (Leone et al., 2022).

Availability, Safety and Diet Quality

Both FAP and P/C felt that AFF were limited to large supermarkets and rarely available in convenience stores. Previous literature has also mentioned this limited availability of AFF (North and Brown, 2017; Polk and Diwakar, 2017; Tepler et al., 2022), suggesting it is widespread and a shared concern for the entire food allergic community. Moreover, on occasions where AFF were able to be obtained, concerns over the safety of these products were raised by FAP. Many individuals experienced allergenic reactions following consumption of these foods, despite the product clearly stating it was 'free from.' Food allergic individuals place great trust in AFF. The claim of a product to be 'free from' should guarantee its safety, yet countless AFF products have been recalled due to the presence of undeclared food allergens (Bedford et al., 2020; Martinez-Pineda and Yague-Ruiz, 2022). Even if any individual

with food allergies were to exercise all safety measures, there is still a chance of an allergic reaction, which will cause increased fear among sufferers. The inability to obtain sufficient, safe foods in individuals with food allergies, will lead to reduced nutrient intake and an increased exposure to allergenic reactions. It will also present psychological issues, with increased stress, anxiety and depression common occurrences mentioned by participants.

Furthermore, one common finding in both P/C and food allergic participants, which arose through the focus group discussions, was that the quality of AFF were poor and their inclusion made it difficult to maintain a well-balanced diet. AFF are designed to replace lost nutrients due to FA while also maintaining safety (Pasha-Robinson, 2023) and therefore, these results are surprising. Some studies have reported the reduced nutritional quality in gluten-free foods (Saturni et al., 2010; Missbach et al., 2015; Hosseini et al., 2018). However, there is no mention of this in 'free from' foods for those with specifically food allergies and as such, further investigation into the quality of AFF is warranted.

A major theme which also emerged from the focus group discussions, was the negative impact of food allergy on diet. One central aspect in the long-term management of food allergies, involves the implementation of avoidance diets. While this is necessary, it can often lead to nutritional inadequacies (Steinman et al., 2010; Mehta et al., 2014; Meyer et al., 2014; Hossny et al., 2019; Groech and Venter, 2020; Leone et al., 2022; de Almeida Kotchetkoff et al., 2023). As expected, the findings from this study added to this existing literature, with many food allergic participants expressing concerns over their diet, following the avoidance of a 'lot of foods'. The restricted FCs and difficulty in accessing safe and nutritious foods (as was the case for many participants in this study) impacted the diet variety of food allergic participants, with many consuming 'the same stuff all the time.' These findings are supported with previous research, which also mention how restrictive FC in those with FA will lead to a monotonous diet (Polloni et al., 2013; Sommer et al., 2014; de Almeida Kotchetkoff et al., 2023). The implementation of avoidance diets, poor FCs and a repetitive diet can cause inadequate nutrient intake, which can directly impact health (Leone et al., 2022). FAP themselves commented on this, specifically mentioning weight loss as one negative outcome.

There is an essential need to increase the availability of AFF and improve the diet quality of FAP. The role of the dietitian is key to ensure the adequate intake of nutrients and improving the overall diet of those with food allergies. They can offer nutrition education, advice on reading and interpreting food labels, monitor food elimination diets and offer appropriate alternatives of foods where needed (Mazzocchi et al., 2017; Groetch and Venter, 2020; Leone et al., 2023). In one study conducted by Memauri et al. (2022), who interviewed a range of

HCPs, dietitians themselves recommended providing supermarket tours, cooking classes and meal preparation sessions to individuals with FA and their families, which could additionally help to improve the nutritional profile of allergy suffers. This will particularly benefit LA with food allergies who are undergoing the transitional period of late adolescence to adulthood, as they will likely be managing their food allergy for the first time. The role of the dietitian is clearly invaluable for FAP. However, they are currently limited in the field of allergy (Venter et al., 2012) and greater efforts must be made to improve their availability. Additionally, even when accessible, dietitians are often limited in their knowledge around food allergy management (Memauri et al., 2022) and so, greater food allergy education is needed in this group. HCPs should also emphasise the importance of food variety in the diet of those with food allergies, as an unvaried diet is a common practice among FAP (Polloni et al., 2013; de Almeida Kotchetkoff et al., 2023).

6.4.3. Healthcare Access

The Perspective of the Patient and the Parent

In addition to FC and FA, the current HCA in FAP and P/C were explored. Overall, good quality health care for allergy was difficult to access. Specifically, both groups of participants responded how allergy care at the primary level was poor and this was particularly attributed to the lack of knowledge perceived in GPs. This common theme among both FAP and P/C highlights a systemics issue in allergy management at the primary care level. While GPs were easily accessible, participants felt they did not possess enough knowledge to deliver sufficient care, with some participants describing their previous bad experiences. The results obtained through this study mirror that of existing research, which additionally illustrate the inadequate knowledge of GPs to competently deal with allergy patients (RCP, 2003; Levy et al., 2004; Agache et al., 2013; Diwakar et al., 2017; Ryan et al., 2017; Daniels et al., 2021). GPs are the first point of medical contact and bad experiences will often deter patients from seeking further help. The use of remote consultations (which have increased post Covid (Mold et al., 2021)) were found to be of particular benefit and allowed quick access, with one participant stating ‘technology has made everything easier.’ One exception to this was in the event of emergencies, where food allergic participants found a greater difficulty in reaching the GP. The mixed response in GP care mentioned by FAP in this study, highlight how allergy care at the primary level is not consistent and is likely dependent on the individual knowledge of the primary care physician.

In comparison to primary allergy care, specialist allergy care was more difficult to access in majority of participants. Reasons which contributed to this increased struggle as revealed through the study, were cost, distance, inadequate resources, increased waiting times for appointments and the limited number of allergists – barriers which have all been previously mentioned in existing literature (Diwakar et al., 2017; Khaleva et al., 2020). A small number of participants in the food allergic group did mention that accessing the allergist wasn't a challenge as 'everything is just right at my doorstep.' The NW is home to three specialist-led services (Liverpool, Manchester and Preston), indicating that where access to specialist allergy care was easier for participants, they were likely living in these areas. Geographic variations do exist in the delivery of UK allergy care (Chong et al., 2023) and will lead to inconsistent health care experiences in FAP – findings which are supported by this study. The consequences of these findings extend to P/C who will also have to navigate these logistical challenges in accessing care for their children.

In the food allergic group, one consequence of the inability to access sufficient allergy care led to the self-management of their food allergy. Notably the use of online resources were mentioned, with participants highlighting this was both 'quick' and 'easy. The online search of health related information is a common practice among younger demographic groups (Central Statistics Office, 2018; Sitaru et al., 2023), particularly in the case of allergy related information, which is challenging to access (King et al., 2020). While this information is free and easily accessible, the internet is unregulated and so provides much inaccurate, non-evidence based information on allergies and their management (Ryan et al., 2005; Halls et al., 2018; Morris, 2019). This trend in the use of online resources poses risks for both FAP and their parents. In fact, reliance on such information will lead to poor management of allergic disease. A negative impact on the health of patients will be seen and there will be an increase in hospital visits which will prove counterproductive. Consequently, this will contribute to the already high burden on primary care and specialist allergy services (King et al., 2020).

Reduced access to quality health care can cause psychological issues. FAP and P/C further shared feelings of the psychological impact of food allergy management. Increased stress, anxiety frustration and annoyance were common feelings reported by participants. The psychological burden of managing food allergies is another significant parallel between both groups, with this study highlighting that both FAP and P/C encounter similar emotional struggles when managing food allergies. In fact, P/C mentioned how the management of their child's food allergy contributed to a reduced quality of life, with a common feeling of 'sharing' the allergy with their child. Many studies have also reported the significant impact of food allergy on the quality of life of P/C, with increased stress and anxiety levels commonly seen in

this group (Primeau et al., 2000; Bollinger et al., 2006; Akeson et al., 2007; Springston et al., 2010; Morou et al., 2014; Birdi et al., 2016; Feng and Kim et al., 2018). University years are characterised by an increasing level of independence. The relationship between the parent and the child changes, with adolescents exercising more privacy and parents unable to readily monitor their child. P/C in this study further mentioned increased levels of worry and fear, when the main control of the food allergy moved to their child. This is a common feeling among food allergic P/C, with previous research also highlighting the additional concern parents face during the transitional period to adulthood (Feng and Kim, 2018; Moen et al., 2019).

Literature also indicates that mothers are more likely to be impacted than fathers and present an increased psychological burden being the primary carers (King et al., 2009; Rouf et al., 2012). Hoehn et al. (2017) posit that this increased psychological distress seen in mothers is because they are seen as the traditional caregivers and are more likely to take part in food allergy studies. Interestingly, the majority of P/C in this study were fathers (78%), suggesting that this particular group had an increased responsibility in managing their childs food allergy. Earlier research has mentioned a divided responsibility between parents, where mothers primarily take on the caregiving role and fathers were more likely to deal with financial expenses (Mitchell et al., 2007). Further research highlights that fathers are taking more of a central role in the direct care of their child's health (Knop and Brewster, 2016). In their study Hoehn et al. (2017), did find that while mothers were the primary care givers for their food allergic child and had increased psychological distress, where fathers were more involved, they would also experience their child's health as more burdensome. More recent research by Acaster et al., (2020) highlights that both mothers and fathers experience similar levels of psychosocial burdens in the management of food allergy. In their study, both parents were equally anxious and suffered the same level of negative career impact, productivity and health-related quality of life when caring for their child's peanut allergy, thus challenging the traditional view of caregiving roles. There currently exists limited research in fathers of children with food allergy and thus, the findings of this study contribute to filling this research gap.

Despite the increased psychological impact experienced by P/C of children with food allergy, little psychological support was offered to this group. These results are unsurprising as while some psychological support is offered in tertiary centres in the UK, not much exists in the NW region. A wide body of literature further highlights the limited availability of psychological resources for both FAP and their parents (Mandell et al., 2005; Mercer et al., 2015; Young and Minshall, 2016; Feng and Kim, 2018; Knibb and Semper, 2013; Knibb et al., 2019; Santos et al., 2023). Patients and parents face a unique challenge in food allergy management which is clearly burdensome. Both FAP and P/C highlighted how the scarcity of psychological

support increased stress and anxiety levels. Therefore, quality psychological health care for food allergies is therefore an essential component to reduce maladaptive and risky behaviours and to promote overall health. Feng and Kim, (2019), highlight the beneficial nature of support groups which can offer a vital platform in fostering a supportive environment for both patients and parents, to navigate the challenges of food allergy. Furthermore, Barker et al. (2021) recommend the inclusion of psychosocial aspects of allergy within the undergraduate curriculum of medical students to increase the accessibility of psychological support at the primary care level.

The Perspective of the Healthcare Professional

The barriers and facilitators experienced by HCPs in delivering care for LA with food allergies were also explored. The perspective of the GP, dietitian, nurse and social worker were all considered in this study. The challenges which were identified by HCPs in this study such as the absence of psychological support and barriers in attending appointments, are similar to the experiences reported by FAP and P/C in this study. Consequently, this indicates a systemic issue within the current healthcare framework, where both patients and healthcare providers face similar struggles.

One key barrier outlined by HCPs was the failure for LA to attend appointments. Non-attendance of healthcare appointments by patients can lead to several consequences, including challenges in managing individual health, exacerbation of existing health conditions and the development of new conditions, which can contribute to an increased cost to the healthcare system (Paterson et al., 2010; Naqvi et al., 2018; McQueenie et al., 2019). LA will often struggle to prioritise healthcare and missed appointments are a common occurrence in this group (Neal et al., 2001; Masding et al., 2010; Paterson et al., 2010; Davey et al., 2012; Ellis et al., 2012). In this study, HCPs mentioned that the main reason for non-attendance was related to the financial constraints of patients. Both FAP and P/C echoed this, also mentioning the struggle in balancing the costs of managing food allergies with other expenses. This is a common theme emphasised in previous research (Bedford et al., 2020; Dawkins et al., 2021; Chapman et al., 2022). LA will often experience increased financial insecurity owing to the pursuit of independence, managing expenses and student expenditures (Ahmad et al., 2021; Tepler et al., 2022; Ravel et al., 2023). The management of food allergies during this period will further contribute to this economic burden (Minaker et al., 2014; Tackett et al., 2018). There is a marked geographical variation in allergy service provision across the UK and offering services closer to home (for instance the inclusion of allied health professionals or General Practitioners with Extended Roles (GPwERs) at the primary care level) can help to

combat financial difficulties and support the ability for patients to attend (Angier and Jay, 2019). HCPs additionally felt that LA were not serious about their condition and this contributed to their lack of engagement in health care appointments. Crosby et al. (2009) suggest providing education relating to the risks of missed appointments and the consequent negative impact on health can help to facilitate attendance.

Another main barrier which emerged through the focus group discussion was the inability to provide adequate psychological support to patients, which was seen as a necessary component of their healthcare needs. HCPs felt limited in their ability to offer psychological support to their patients due to limited time, resources and training, barriers which have all been repeatedly mentioned in previous literature (Feng and Kim, 2018; Knibb et al., 2019; Memauri et al., 2022). This limitation can be directly related to the limited psychological support reported by FAP and P/C in this study, both of whom expressed a need for better psychological support to assist in their management of food allergies. Allied health professionals have a key role in supporting the delivery of psychological support in those with food allergies. Primary care physicians should foster collaborations with psychologists (who are trained in coping strategies e.g. cognitive behavioural therapy), social workers (who can address social and emotional aspects), dietitians (who can provide personalised dietary guidance) and nurses (who can reinforce education and support medical encounters), each of whom can provide tailored support, to create a more comprehensive and supportive environment for patients and reduce the burden associated with food allergy management (Mercer et al., 2015; Memauri et al., 2022). Vazquez-Ortiz et al. (2023), through their development of a ‘toolbox’ present a range of resources to help HCPs address the psychological needs of their patients. Web resources, self-help initiatives and cognitive behavioural therapy were some of the resources identified. There is a clear unmet need in the psychological management of food allergy and the regular implementation of such resources can provide crucial assistance to HCPs and consequently for FAP and their P/C.

Incorrect referrals were additionally identified as barriers in optimising the care for FAP. Not only did this waste a lot of time, but HCPs in this group (namely dietitians, some of whom worked alongside allergists) felt that incorrect referrals unnecessarily delayed patients in receiving appropriate care. This frustration in delayed care was also expressed by FAP and P/C in this study, who as a result experienced increased stress and anxiety. Much research has previously reported how GPs had difficulty in the referral process and this was owing to the lack of knowledge and training in this group (Levy et al., 2004; Ryan et al., 2005; Agache et al., 2013; Conlon et al., 2015; Diwakar et al., 2017; Ryan et al., 2017). In the primary care setting, the inclusion of GPwER’s where physicians will have an increased level of specialist

training can allow for more accurate assessments and ensure patients are directed towards the right specialists/services at the right time (Levy et al., 2009; El-Shanaway et al., 2019). Thus, improving the overall management of food allergy and reducing the burden on tertiary centres.

Between the ages of 18 and 25years there occurs many developmental changes and this transitional period from late adolescence to adulthood is a unique life stage (Roberts et al., 2020). The needs of this group differ to that of the child and the adult and hence this period is one which requires tailored support (Beresford and Stuttard., 2014). Transition guidelines can help to address the specific needs of LA with food allergies, but they are lacking in the field of allergy (Khaleva et al., 2020). The findings in this study were no different, with HCPs expressing a need for improved transition guidelines at their practice, which were unclear and thought to not provide enough guidance. Some HCPs mentioned how despite the existence of transition guidelines at their workplace they were not regularly used. This inconsistent use of guidelines reinforces the inconsistency in care experienced by FAP and P/C who reported different experiences. Consequently, this highlights a gap in the continuity of care for FAP, which can significantly impact the health of the patient. The use of specific transition resources can support health care providers in strengthening the consistent care across all services, which will ensure the effective and successful long-term management of allergies (Knibb and Gore, 2020; Vazquez-Ortiz et al., 2023). Health providers should therefore be encouraged to regularly adopt and follow such guidelines, which will improve patient outcomes during this unique life stage of late adolescence. Recent allergy research has led to the development of a selection of targeted and practical transition resources to support the needs of the HCP, the patient and their families (Vazquez-Ortiz et al., 2023). The implementation of these resources should be considered across all health care settings. Regular reflection and reviews by HCPs should also be undertaken to facilitate improvement in service provision and optimise the level of care provided to LA with food allergies.

Training was considered to be both a barrier and facilitator in this group of health providers. Where participants mentioned they received specific training, they felt more confident in delivering the care to food allergy patients. This is consistent with previous research which highlights how training interventions can enhance knowledge and therefore confidence of professionals, improving the provision of care to patients with allergies (Sinott et al., 2011). In contrast, some HCPs found that they did not possess enough knowledge and were limited in providing care for this group. This lack of training directly correlates with the issues raised by FAP and P/C in this study, who frequently expressed dissatisfaction with the care they had previously received. At present, allergy barely features in the undergraduate medical

curriculum, leaving qualified physicians with little to no knowledge in treating FAP (RCP, 2003; RCP, 2010; Diwakar et al., 2017; Busse et al., 2012; Reid et al., 2019). Through the discussion, dietitians also expressed feeling inadequate in providing nutritional support to patients and recognised the need for more training. Memauri et al. (2022) report these same findings and further illustrate how this is a common trend among other HCPs, including nurses and even allergists. This gap in training for HCPs explains why FAP were compelled to self-manage their allergy, as the care they received was inadequate, owing to the lack of training of HCPs. Health professionals in this study further mentioned that despite this lack of training, few opportunities were available to enhance their knowledge and of the little which was offered, it was not mandatory.

Interestingly, none of the HCPs who took part in the focus group session mentioned any awareness or use of the recently published EAACI toolbox and transition guidelines (Vazquez-Ortiz et al., 2023). This toolkit which has been specifically designed for HCPs, patients and P/C to improve the management of food allergies during the transitional period of late adolescence to adulthood, serves as a means of providing more structured guidance and a more holistic form of care. Therefore, this points to a potential lack of awareness of HCPs, where these resources could greatly benefit all groups as they attempt to navigate the management of food allergies in the crucial transitional period. This further indicates that there is an absence of these guidelines by HCPs, which could have contributed to the variation in care experienced by FAP and P/C. Consequently, this emphasises the urgent need for better education and awareness to allow for the effective implementation of these beneficial resources in healthcare settings.

In addition to training, HCPs highlighted the value of support groups which had helped in improving the level of allergy care provided to their participants. The beneficial nature of support groups for FAP and their families have been emphasised before (Sharma et al., 2012; Feng and Kim, 2019). One issue highlighted through the focus group discussion with HCP, was the difficulty in ensuring LA would regularly attend these support groups. Through the unique period of transition into adulthood, the acceptance of support for LA is for many, a means of admitting vulnerability or disrupting independence and this will often lead to disengagement in this group (Salaheddin and Mason, 2016; McPherson, 2020; Cretch et al., 2022). Support groups offer a platform for food allergy patients and parents to share similar experiences, offer valuable emotional support and share practical advice. They additionally provide a sense of community for this group, who often will exhibit feelings of isolation during the management of their food allergy (Feng and Kim, 2019). Therefore, there is a need for HCPs to educate patients on the beneficial aspects of support groups, in order to encourage

attendance. HCPs play a key role in facilitating engagement with support groups as this can directly influence the quality of care received by FAP and P/C. By fostering their active participation, HCPs can ensure FAP and their families are able to gain valuable emotional support and practical advice, which in turn can allow them to better manage their food allergies.

Through this study we sought to better understand the health care experiences of the patient and the professional, during the unique transitional period from late adolescence to adulthood. What is clear, is that LA with food allergies are at an increased risk of inconsistent, untimely care, often delivered by practitioners with lack of training and limited resources. This can impact HCPs, FAP and P/C, leading to a shared struggle in the management of food allergies. Although multiple studies highlight the need for improved resources and increased training in HCPs (Skypala et al., 2018; Demoly et al., 2019; Daniels et al., 2021; Memauri et al., 2022), the implementation of these guidelines have seldom been seen. As such, there is a continued reliance on self-management among patients (as mentioned in this study) who feel they cannot rely on the current healthcare system to provide consistent, high-quality care. One potential reason for this is due to competing financial priorities and constraints. Allergy service provision does not receive the same level of attention in comparison to other health conditions, e.g. obesity and cancer (Levy et al., 2009; Sinnott and Dudley-Southern., 2011; Vance et al., 2021).

To address the unmet educational need in HCPs, the British Society for Allergy and Clinical Immunology (BSACI) Allergy Education Network have recently developed a National Allergy Education Strategy – the first of its kind, to be implemented in the UK (Vance et al., 2021). The strategy, which has been written by a multidisciplinary team of HCPs, focuses on improving their education and training in undergraduate, community and hospital settings. Allied HCPs are a central aspect to the strategy and the competencies outlined by the European Academy of Allergy and Clinical Immunology (EAACI) will be incorporated (Skypala et al., 2018). The development of this strategy will produce an increased number of educated and trained health professionals, thus allowing for the delivery of high quality care for allergic patients. Through this, a greater allergy awareness will be raised and thus, it is hoped that this will lead to an increase in funding and investment to allow for the delivery of optimal, cost-effective healthcare (Vance et al., 2021). A more recent advance in allergy research in the UK, has led to the development of a GPwER framework, to create a network of specialist GPs who are trained in the field of allergy. This new framework will aim to standardise training for GPs to support the delivery of allergy care and improve the quality of services at the primary care level. This will be achieved through ensuring GPs have better access to training and

allowing them to understand and develop the required knowledge and skills beyond their role as a generalist. Consequently, enabling them to become more suitably qualified in demonstrating competence when delivering allergy care. As such, this initiative aligns with the broader need for improved HCA and quality, whose lack thereof has been consistently mentioned by FAP and P/C in this study. This scheme is set to be trialled and piloted in December 2023 by two GP members. Following this pilot phase, it is hoped that a UK map of GPwERs in the field of allergy will be created and linked to existing pediatric and adult allergy networks (BSACI, 2023).

6.5. Conclusion

This qualitative study is one of the first to explore FC, FA and HCA in specifically LA with food allergies from the diverse perspectives of the FAP, the P/C and the HCP. Overall it was found that the social environment, university life and labelling each play a crucial role in shaping the FCs and eating behaviours of LA with food allergies. Additionally, FAP and P/C faced challenges in accessing AFF due to their high cost, limited availability and uncertainty in their safety all of which negatively impacted their diet quality. The research further highlights how the struggle in accessing specialist allergy care, particularly psychological support is a common theme in FAP and P/C. This study also provided rare insight into the lived experiences of HCPs who discussed barriers and facilitators when providing care for LA with food allergies. The challenges identified by the entire group underscore the need for more comprehensive solutions in the management of food allergies and the perspectives of the FAP, the P/C and HCPs will be vital in achieving this.

6.6. Limitations

This study provides valuable insights into the current FCs, FA and HCA of LA with food allergies through the unique insights of the FAP, P/C and HCPs. However, it is important to also consider the limitations associated with this study, which could have impacted the findings.

First, the nature of this study was qualitative and due to time constraints and for the convenience of the participants, each of the focus groups took place online via MS teams. This may have influenced the dynamics of the discussion. For instance, participants may not have easily shared their thoughts and feelings in a virtual setting compared to an in-person environment. Consequently, this could have limited the depth of the data collected.

Second, only two focus groups for FAP and one each for P/C and HCPs were conducted and thus, saturation of focus groups was not reached. The limited number of focus groups means that potential additional themes may not have been identified and explored, affecting the comprehensiveness of these findings.

Third, thematic analysis was used as the approach for data analysis and for this study involved both deductive and inductive methods. This dual coding process could have introduced researcher bias in the identification and development of themes. Although a mock focus group was conducted and reflective practices were employed to reduce this, the subjective nature of thematic analysis means that different researchers could have identified different themes or interpreted the data differently.

Fourth, when sharing their experiences on FC, FA and HCA, participants may have been unintentionally subject to recall bias. They may have inaccurately shared details or presented them in ways they felt were more socially acceptable, which could have then impacted the accuracy of the results.

Finally, it is also important to note here that all participants were recruited from the NW of England and the regional focus in this area may not have fully captured the diversity of experiences for LA with food allergies in other areas. Therefore, this limits the generalisability of the results, especially in relation to FC, FA and HCA which may differ based on factors such as socioeconomic deprivation and differences in healthcare infrastructure. Therefore, further research should consider these regional variations to capture a more comprehensive understanding of the various factors influencing FC, FA and HCA in the LA group.

Understanding the current FCs, FA, and HCA of LA with food allergies was the focus of this and the previous chapters. Each of these factors are closely linked with overall dietary intake and as such, provide crucial context for understanding the nutritional behaviours of this group. Therefore, the next chapter – Chapter 7, will focus on the dietary intake of LA with and without food allergies in NW England. By exploring this aspect, important insights into how LA with food allergies manage their diet within the constraints of their FCs, FA and HCA will thus be explored.

Chapter 7 – Dietary Intake of Late Adolescents (18-25years) With and Without Food Allergies

7.1. Overview

The period of late adolescence (LA) to adulthood is one characterised by significant changes in independence, lifestyle and also dietary habits. Often LA will gain autonomy over their food choices (FCs) as they transition to university life or start working for the first time. These changes will cause a shift in FC and dietary habits, which could impact long-term health outcomes. During this crucial period, habits are established and will likely persist into later life. Therefore, it is important to understand the dietary intake of LA.

Especially in those with food allergies, the importance of understanding dietary intake is key as this group will often restrict a variety of foods and therefore nutrients, as they attempt to navigate their food allergy. Although there is a growing prevalence of food allergies, little is known about the dietary intake in this group. In particular, most research focuses on children of the adult population, leaving a significant gap in our current understating of LA with food allergies.

The aim of this chapter therefore was to provide a comparative analysis of dietary intake between LA with and without food allergies. Little is known about the dietary intake and therefore nutritional status of LA with food allergies. To our knowledge, this is the first study to directly compare dietary intake of LA (18-25years) with and without food allergies. The rationale for comparing these groups was to determine if there existed any potential differences in dietary intake, owing to the presence of a food allergy. A detailed diet log was collected over a period of 4 consecutive days to achieve this. Results were compared to the UK dietary reference values (UK DRVs), based on the current UK DRVs set by SACN 2015 and COMA 1991 (Public Health England, 2016) for adults aged 19+. The findings are discussed in terms of their contribution to current literature, with regard to the dietary intake of LA with and without food allergies.

7.2. Methodology

Ethical Considerations

Ethical approval was obtained from the National Health Service Research Ethics Committee (NHS REC) (REC Reference: 21/EE/0285, Project ID: 303224) and the University of Central Lancashire's (UCLan) HEALTH ethics committee, prior to data collection. Following approval, participants were provided with a participant information sheet, providing them with detailed information regarding the study. The participant information sheet was accessible online via a secure link and detailed the purpose and nature of the study, potential risks and benefits of the research and additionally emphasised participant confidentiality and the right to withdraw at any point. This ensured all participants had all relevant information at hand, allowing them to decide if they would like to participate. Once participants had reviewed the participant information sheet, informed consent was obtained from all those who expressed interest in the study, through an online consent form. Only after consent was given, participants were able to access the take part in the research.

Participant Recruitment

The target population for this study was 18-25year olds with one/more existing food allergies. Both food allergic and non-food allergic participants who took part in the initial food selection questionnaire from Phase 1 of this study, were invited to complete a food diary. A control group of non-food allergic participants, who consumed an unrestricted diet were also recruited. A recruitment poster was also created and shared via social media (Facebook, Twitter, LinkedIn) as means of boosting recruitment for both groups. The recruitment poster was shared with members of the food allergic community and with student pages to effectively reach the 18-25year demographic. For those with food allergies, inclusion criteria included clinical diagnosis of their food allergy through either a Skin Prick Test, Serum specific IgE along with a detailed medical history or an oral food challenge. Participants were excluded if method of diagnosis was unknown or self-diagnosed. Additionally, any participants suffering from any additional health conditions that directly impacted their dietary intake e.g. diabetes, were also excluded. Furthermore, any incomplete diaries were not included for data analysis. All participants were required to reside in North West (NW), England and be able to fluently speak and understand English.

All data collection took place over 3 weeks:

22nd to 25th February 2023

15th to 18th March 2023

26th to 29th April 2023

The main reason as to why data collection was spread over three different weeks, was to meet availability of participants, thus also boosting recruitment. All participants received a £10 gift voucher via email to thank them for their time upon completion of their diet diary. This is in accordance with NIHR payment for participants and public contributors in research (NIHR, 2022).

Study Design

Client Information Profile and Survey

Each participant was asked to complete a client information profile and short survey (Appendix 5) prior to completing the diet diary. Reminder emails were sent to each participant if this information was not completed within two weeks. Participants were asked to provide socio-demographic information. Lifestyle questions relating to smoking status, alcohol intake and exercise and occupation activity level were also asked. Participants were additionally asked to provide information regarding their dietary behaviours including type of diet, variety of diet and supplement intake. Additionally, participants were asked to rate on a scale of 1-5, the attention paid to healthy eating when consuming foods, with 1 being never and 5 being always. Moreover, those with food allergies were asked further questions relating to their allergy. All profiles were reviewed by the lead researcher (myself) and in the case of any missing information, participants were contacted via email and asked to complete them.

Dietary Assessment Method

In order to assess habitual dietary intake, participants were asked to complete a 4-day diet diary. The diet diary consisted of 4 consecutive days – three weekdays and one weekend. Participants were asked to electronically document all foods and beverages consumed within this time period using an application called ‘Libro’ (Figure 7.1). Libro is a voice assisted smartphone application that has been created by Nutritics – a nutrition software. This application can easily be downloaded on both iPhone and Android. Therefore, allowing participants to easily record food intake wherever they may be, saving time and improving accuracy. All participants were also provided with a link to a short video clip which explained how to navigate through the application. Detailed instructions on how to accurately record intake was provided through this video, with participants being shown how to add foods to their diet log manually or alternatively by scanning the barcode of a food item. Participants were also shown how to build recipes using the recipe creator function, for any home cooked

meals. Any supplements taken, were also asked to be recorded by all participants. Participants were encouraged to provide as much detail as possible when recording intake.

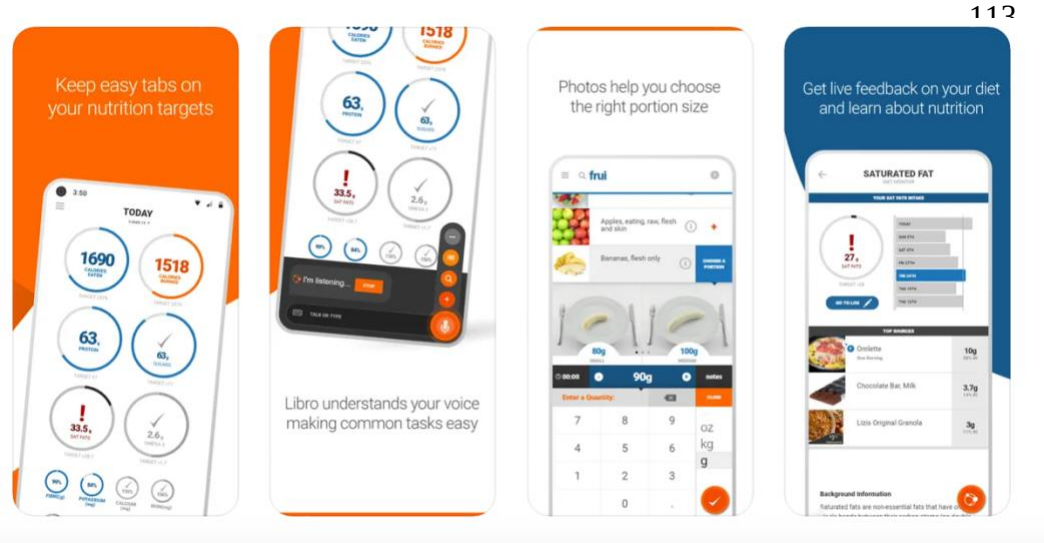


Figure 7.1. Screenshot of Libro app used in 4-day diet diary

Dietary Analysis Software

Dietary intake from the 4-day diet diary was analysed and interpreted using the software Nutritics (Research Edition v5.88). Reasons as to why this software was chosen include the Nutritics database being extremely vast, containing over 772,000 foods. Additionally, the database itself includes a range of dietary supplements and 'free from' foods which was particularly useful for the food-allergic group. There was also potential for participants to add an unlimited number of new foods, products and supplements that were not initially part of the database. The software Nutritics also uses smart portion sizes allowing clients to choose from different serving sizes for both foods and recipes. Life size portions of foods were suggested in the form of common household utensils (e.g. cups, spoons) and small, medium and large portion sizes. These were based on various portion size resources, manufacturers data or from direct weighing by trained Nutritics staff. This visual representation of different portions sizes were available to participants, allowed them to accurately record intake. There was also an option for participants to modify the smart portions by increasing or decreasing the quantity or alternatively manually typing in any unit of measure in the box provided, when creating a recipe or adding a food. The software Nutritics also provided an option for demographic portion size, which took into account participants age and gender and were based on the National Diet and Nutrition Survey by Wrieden et al. (2004).

The completed 4-day food log for each participant was imported directly from Libro into the software Nutritics, for analysis. Mean energy and nutrient intake were automatically calculated for each participant. DRV's were compared to the current UK DRV's set by SACN 2015 and COMA 1991 (Public Health England, 2016) for adults aged 19+ and were expressed in the form of Reference Nutrient Intakes (RNI's). Estimated Average Requirements (EAR) were used when comparing energy intake between both groups.

Statistical Analysis

IBM SPSS Version 29.0 was used to conduct all statistical analysis. All categorical variables were expressed as numbers and percentages. Continuous variables were expressed as mean and standard deviation. In order to test for the normality of distribution, the one-sample Kolmogorov-Smirnov test was used. All continuous variables were found to not be normally distributed and therefore, to determine any differences between macro and micronutrient intake between the food allergic and non-food allergic group, the Mann Whitney U test was used. Despite the data being non-normally distributed (based on the one-Kolmogorov-Smirnov test), a two-way ANOVA was employed to determine the impact of food allergy status on nutrient intake in participants with and without food allergies. The reason for using ANOVA is that this test is robust to errors of the normality assumption. Therefore, even when data does not meet the criteria for a normal distribution, ANOVA can still provide valid results.

7.3. Results

A total of 74 participants aged 18-25 years were recruited from NW, England. Of these, 33 participants were clinically diagnosed with a food allergy and 41 participants formed the control group with no food allergy. Three participants produced incomplete diaries and decided to withdraw from the study. The final sample therefore, included a total of 71 participants – 31 with food allergies and 40 without food allergies.

Participant Demographics

Table 7.1 highlights the demographic characteristics of participants, with only slight differences found between both groups. Overall, a higher number of males took part in the diet diaries (n=39, 55%) in comparison to females (n=32, 45%), with both groups averaging a similar number of males and females. The mean age for those with food allergies was 21.7 ± 1.8 years, while for those without food allergies was 23.1 ± 1.6 years. BMI was computed for

each individual by dividing weight (kg) by height $(m)^2$. A difference existed between groups for BMI, with food allergic participants averaging a lower BMI (22.6 ± 2.7 kg/m^2) in comparison to those without food allergies (27.2 ± 9.2 kg/m^2).

In both groups, more than half of participants were students living on campus (n=39, 55%), while 30% (n=21) were students not living on campus. Only eleven (15%) participants were non-students, with a greater number being from the food allergic group (n=8, 11%). Occupation and activity level varied between groups, with a larger percentage of participants having an increased activity level for exercise in comparison to occupation. Majority of participants from both groups followed a vegetarian diet (n=37, 52%). Of the 71 participants, only 17 (24%) were taking supplements. The most common supplements taken by participants were Vitamin D (n=6, 35%) and Vitamin B12 (n=5, 29%) (Table 7.1).

Table 7.1. Demographic Characteristics for 18-25 year olds, with a food allergy (n=31) and without a food allergy (n=40)

	Food Allergy (n = 31)	**No Food Allergy (n = 40)**
Gender (n, %)		
Male	17 (54.8)	22 (55.0)
Female	14 (45.2)	18 (45.0)
Age (n, %)		
18	0 (0)	0 (0)
19	3 (9.7)	3 (7.5)
20	7 (22.6)	0 (0)
21	5 (16.1)	1 (2.5)
22	8 (25.8)	8 (20.0)
23	2 (6.5)	12 (30.0)
24	3 (9.7)	8 (20.0)
25	3 (9.7)	8 (20.0)
BMI ($\bar{x}$, SD)	22.6 (2.7)	27.2 (9.2)
Ethnic Background (n, %)		
White British	16 (51.6)	12 (30.0)
White European	3 (10.0)	1 (2.5)
White Other	2 (6.5)	2 (5.0)
Black: British Caribbean	2 (6.5)	6 (15.0)
Black: British African	2 (6.5)	2 (5.0)
Asian: British Indian	2 (6.5)	5 (12.5)
Asian: British Pakistani	2 (6.5)	6 (15.0)
Asian: British Other	1 (3.2)	3 (7.5)
Mixed Background	1 (3.2)	1 (2.5)
Chinese	0 (0)	2 (5.0)
Living Area (n, %)		
Rural	9 (29.0)	9 (22.5)
Urban	22 (71.0)	31 (77.5)

Table 7.1. Continued

	Food Allergy (n = 31)	No Food Allergy (n = 40)
Student Status (n, %)		
Student (Living on Campus)	16 (51.6)	23 (57.5)
Student (Not Living on Campus)	12 (38.7)	9 (22.5)
Non-Student	3 (9.7)	8 (20.0)
Occupation Activity Level (n, %)		
Sedentary	3 (9.7)	10 (25.0)
Lightly Active	14 (45.2)	8 (20.0)
Moderately Active	7 (22.6)	10 (25.0)
Very Active	6 (19.4)	10 (25.0)
Extremely Active	1 (3.2)	2 (5.0)
Exercise Activity Level (n, %)		
Sedentary	0 (0)	11 (27.5)
Lightly Active	4 (12.9)	7 (17.5)
Moderately Active	13 (41.9)	9 (22.5)
Very Active	12 (38.7)	8 (20.0)
Extremely Active	2 (6.5)	5 (12.5)
Type of Diet (n, %)		
Different Every Day	17 (54.8)	17 (42.5)
Different During the Week	7 (22.6)	5 (12.5)
Different During the Weekends	0 (0)	3 (7.5)
Does not Vary	7 (22.6)	15 (37.5)
Dietary Preference (n, %)		
Vegetarian	16 (51.6)	21 (52.5)
Vegan	5 (16.1)	11 (27.5)
Halal	1 (3.2)	2 (5.0)
Kosher	4 (12.9)	1 (2.5)
Other	5 (16.1)	5 (12.5)

Table 7.1. Continued

	Food Allergy (n = 31)	**No Food Allergy (n = 40)**
How Actively Do You Try To Eat Healthily (n, %)		
Never	8 (25.8)	13 (32.5)
Rarely	6 (19.4)	4 (10.0)
Sometimes	11 (35.5)	10 (25.0)
Very Often	3 (9.7)	6 (15.0)
Always	3 (9.7)	7 (17.5)
Supplement Use (n, %)	7 (22.6)	10 (25.0)
Smoking (n, %)	5 (16.1)	17 (42.5)
Alcohol (n, %)		
Everyday	0 (0)	0 (0)
3-5times/week	0 (0)	0 (0)
Once a week	4 (12.9)	4 (10.0)
Only Weekends	3 (9.7)	4 (10.0)
Occasionally	13 (41.9)	17 (42.5)
Never	11 (35.5)	15 (37.5)

Table 7.2 provides further details regarding the food allergic group. Of the 31 participants who were clinically diagnosed with one/more existing food allergies, 65% (n=20) were found to have a single food allergy, while 35% (n=11) possessed multiple food allergies. Type of food allergy varied amongst participants. Majority of participants were found to have a reaction to peanuts (n=14, 45%), followed by tree nuts (n=8, 26%), egg (n=8, 26%), fish (n=6, 19%), shellfish (n=5, 16%), dairy (n=5, 16%), red meat (5, 16%), poultry (n=4, 13%), oral allergy syndrome (n=4, 13%), milk (n=2, 6%) and finally sesame seed (n=2, 6%). Diagnosis of food allergy was confirmed through either skin prick tests, blood tests, food elimination diets or a combination of tests. Food elimination diet was found to be the most common amongst participants (n=22, 71%), followed by skin prick tests (n=15, 48%) and blood tests (n=7, 23%).

Table 7.2. Demographic Characteristics of Food Allergic Participants (n=31)

	Male	**Female**
Food Allergy (n, %)	17 (54.8)	14 (45.2)
Type of Food Allergy (n, %)		
Single	8 (47.1)	12 (85.7)
Multiple	9 (52.9)	2 (14.3)
Food Causing Allergy (n, %)		
Egg	5 (29.4)	3 (21.4)
Dairy	4 (23.5)	1 (7.1)
Milk	1 (5.9)	1 (7.1)
Peanuts	7 (41.2)	7 (50.0)
Tree Nuts	4 (23.5)	4 (28.6)
Sesame Seed	1 (5.9)	1 (7.1)
Fish	4 (23.5)	2 (14.3)
Shellfish	4 (23.5)	1 (7.1)
Oral Allergy Syndrome	2 (11.8)	2 (14.3)
Poultry	3 (17.6)	1 (7.1)
Red Meat	2 (11.8)	3 (21.4)
Diagnosis (n, %)		
Skin Prick Test	9 (52.9)	6 (42.9)
Blood Test	3 (17.6)	4 (28.6)
Food Elimination Diet	12 (70.6)	10 (71.4)

7.3.1. Macronutrient and Micronutrient Comparison Between Groups

Tables 7.3 highlights the daily macronutrient, vitamin and mineral intake for all participants with and without food allergies. It was found that those with food allergies had higher intakes of all macronutrients, in comparison to those without food allergies. Although differences did exist in macronutrient intake between groups, the Mann Whitney U test revealed these were not statistically significant differences. Similarly, there was no statistically significant differences found between groups in daily vitamin intake. Daily mineral intake was found in higher quantities in potassium, magnesium, phosphorus, iron, copper, zinc and iodine for those with food allergies. Sodium, chloride and selenium were found in higher quantities in those without food allergies than those with food allergies. From the 12 minerals included for analysis, the Mann Whitney U test (Appendix 6) revealed a statistically significant difference between groups in only Chloride levels ($U = 432$ ($Z = -2.180$), $p = 0.029$) with food allergic individuals having a higher intake. The mean salt intake was also calculated by converting the average sodium consumed, multiplying by 2.542 and then dividing by 1000 (D'Elia et al., 2019). Following conversion, it was found that those without food allergies were consuming higher levels of salt (10.1 ± 24.3g) compared to those with food allergies (9.1g ± 7.8g) (Table 7.3).

Table 7.3. Daily Macronutrient and Micronutrient Intake and Mann Whitney U Test for those with Food Allergies (n=31) and without Food Allergies (n=40)

	Food Allergies (n=31)		No Food Allergies (n=40)		Mann Whitney U test				
					Food Allergies (n=31)	No Food Allergies (n=40)			
	Mean	**SD**	**Mean**	**SD**	**Mean Rank**	**Mean Rank**	**u-value**	**z-value**	**p-value**
Macronutrients									
Energy (kcal)	3017.2	2754.9	2153.6	1474.9	40.6	32.5	479.0	-1.635	0.102
Protein (g)	98.4	61.2	86.3	61.0	38.4	34.2	546.0	-0.858	0.391
Fat (g)	94.6	60.3	73.5	45.2	39.7	33.2	507.0	-1.310	0.190
Carbohydrate (g)	436.7	659.6	277.7	249.0	40.4	32.6	485.0	-1.565	0.118
Free Sugars (g)	238.8	655.9	84.6	67.8	38.2	34.3	551.0	-0.800	0.424
Fibre (g)	31.2	21.0	27.4	22.6	39.0	33.7	528.0	-1.067	0.286
Saturated Fat (g)	31.4	24.4	21.8	15.1	40.3	32.7	487.0	-1.542	0.123
Monounsaturated Fat (g)	23.6	20.0	17.7	14.8	39.0	32.7	496.0	-1.283	0.200
Polyunsaturated Fat (g)	10.7	8.5	8.7	7.7	39.1	32.6	492.0	-1.330	0.183
Cholesterol (mg)	261.5	379.9	159.4	173.4	37.2	32.3	490.0	-1.028	0.304
Vitamins									
Vitamin A (ug)	1035.4	1688.4	633.4	1167.5	40.0	32.9	495.0	-1.449	0.147
Vitamin C (mg)	174.4	319.2	117.4	106.8	35.6	35.5	598.5	-0.018	0.986
Vitamin D (ug)	4.6	9.1	3.0	5.7	36.9	33.5	535.0	-0.706	0.480

Table 7.3. Continued

	Food Allergies (n=31)		No Food Allergies (n=40)		Mann Whitney U test				
	Food Allergies (n=31)		No Food Allergies (n=40)						
	Mean	SD	Mean	SD	Mean Rank	Mean Rank	u-value	z-value	p-value
Vitamins									
Vitamin E (mg)	8.7	6.4	7.4	7.0	40.3	32.7	487.0	-1.542	0.123
Vitamin B1 (mg)	1.8	2.1	1.4	1.5	39.4	33.4	515.0	-1.217	0.223
Vitamin B2 (mg)	1.3	1.0	0.9	0.7	39.8	33.1	503.0	-1.356	0.175
Vitamin B3 (mg)	25.2	19.6	25.2	23.7	37.0	35.3	591.0	-0.336	0.737
Vitamin B6 (mg)	1.6	1.0	1.3	0.9	40.0	32.9	495.0	-1.449	0.147
Vitamin B12 (ug)	3.3	3.0	2.7	3.0	39.2	32.6	489.5	-1.360	0.174
Biotin (ug)	24.2	23.1	22.2	23.6	36.3	35.8	610.0	-0.116	0.908
Folate (ug)	221.6	212.6	135.1	107.0	40.5	32.5	481.0	-1.611	0.107
Minerals									
Sodium (mg)	3565.7	3060.7	3987.8	9550.2	41.0	32.2	466.0	-1.785	0.074
Potassium (mg)	3340.6	3248.5	2262.4	1477.6	39.0	33.7	526.0	-1.090	0.276
Calcium (mg)	701.8	737.9	601.4	448.6	36.6	35.6	602.0	-0.209	0.835
Magnesium (mg)	386.0	676.4	264.7	243.6	37.1	35.2	586.0	-0.394	0.693
Phosphorus (mg)	1054.8	780.7	1026.2	831.4	35.8	36.2	614.0	-0.070	0.945

Table 7.3. Continued

	Food Allergies (n=31)		No Food Allergies (n=40)		Mann Whitney U test				
	Food Allergies (n=31)		No Food Allergies (n=40)						
	Mean	SD	Mean	SD	Mean Rank	Mean Rank	u-value	z-value	p-value
Minerals									
Iron (mg)	11.4	7.5	9.7	7.2	39.3	33.4	517.0	-1.194	0.232
Copper (mg)	1.3	1.0	1.0	0.8	39.3	33.5	519.0	-1.171	0.242
Zinc (mg)	8.7	8.3	7.7	7.4	37.6	34.8	572.0	-0.556	0.578
Chloride (mg)	5305.4	4664.5	5949.5	14402.3	**42.1**	**31.3**	**432.0**	**-2.180**	**0.029**
Manganese (mg)	3.5	2.6	3.5	3.9	38.0	34.4	557.0	-0.730	0.465
Selenium (ug)	41.5	39.6	44.1	64.1	37.9	34.5	560.0	-0.696	0.487
Iodine (ug)	74.0	71.3	62.5	57.8	38.2	34.3	553.0	-0.777	0.437
Salt (g)	9.1	7.8	10.1	24.3					

7.3.2. Macronutrient and Micronutrient Comparison to DRV's

Daily macro and micro nutrient intake was compared to DRV's between male and female participants with and without food allergies. For those with and without food allergies, participants easily met the DRV's and in most cases exceeded the recommended intake. Energy levels were exceeded in comparison to the EAR in males and females with food allergies. In those without food allergies, male participants failed to meet EAR, while energy levels in females were above recommended intake. All participants met RNI for protein intake. Male participants in both groups were within recommended levels for fat intake and therefore cholesterol. Surprisingly, in females with and without food allergies, fat levels, including saturated fat levels were exceeded, but cholesterol levels were within range. Levels of carbohydrate were exceeded by males with food allergies (63%), beyond the recommended daily intake of 50% (BNF, 2021). In contrast, carbohydrate intake was below the recommended DRV for males without food allergies. However based on average daily energy intake for male participants in this group, carbohydrates levels were consumed in excess (54%). Carbohydrate intake was met by both females with food allergies (49%) and without food allergies (49%). All participants in both groups exceeded the RNI for free sugars. With an average daily intake of 37.6 ± 21.6g, males with food allergies were the only group to meet fibre levels (Tables 7.4 and 7.5).

When comparing vitamin intake to RNI's, it was found that for vitamin A, vitamin C, vitamin E, vitamin B1, vitamin B3 and vitamin B12, male and female participants with food allergies exceeded recommendations in comparison to both genders without food allergies. Vitamin D levels were not met by both groups in males and females and were considerably lower in those without food allergies. Vitamin B2 and vitamin B6 levels were just met by all participants in both groups while folate levels were not met by participants without food allergies (Tables 7.4 and 7.5).

Daily mineral intake was met by participants and in most cases levels were exceeded. Selenium and iodine levels were found in lower quantities when compared to RNI in all food allergic participants and non-food allergic participants. Males with food allergies were easily able to meet RNI for all other minerals, while males without food allergies also failed to meet potassium, calcium and magnesium levels. In addition to selenium and iodine, female participants with and without food allergies failed to meet RNI's for potassium. Calcium levels were not met by females with food allergies. Iron levels were met by males in both groups, in comparison to females in both groups who failed to meet the RNI for iron. Following

273 conversion, salt intake was found to be in excess of the recommended 6g/day in all
274 participants irrespective of food allergy status and gender (Tables 7.4 and 7.5).

Table 7.4. Daily Macronutrient and Micronutrient Intake for Males and Females (19-25years) with Food Allergies (n=31) in comparison to Dietary Reference Values

	Males			Females		
	DRV's	**Mean**	**SD**	**DRV's**	**Mean**	**SD**
Macronutrient						
Energy (kcal)	2500	3498.1 ↑	3447.9	2000	2433.3 ↑	1487.5
Protein (g)	55.5	104.0 ↑	65.7	45	91.5 ↑	57.0
Fat (g)	<97	93.3	60.7	<78	99.5 ↓	62.1
Carbohydrate (g)	333	552.4	868.8	267	296.1	190.7
Free Sugars (g)	33	341.7 ↑	877.2	27	113.8 ↑	122.7
Fibre (g)	30	37.6	21.6	30	23.5 ↓	18.0
Saturated Fat (g)	<31	30.0	23.3	<24	37.8 ↑	26.5
Monounsaturated Fat (g)	36	23.6 ↓	24.0	29	23.7 ↓	14.8
Polyunsaturated Fat (g)	18	11.6 ↓	10.6	14	9.6 ↓	5.0
Cholesterol (mg)	300	261.1	470.1	300	189.1	225.1
Vitamins						
Vitamin A (ug)	700	1357.6	2158.8	600	644.2	736.3
Vitamin C (mg)	40	168.4	172.1	40	121.3	439.2
Vitamin D (ug)	10	5.1 ↓	10.9	10	3.9 ↓	6.5
Vitamin E (mg)*	-	10.1	7.8	-	7.0	3.8
Vitamin B1 (mg)	1	1.7	1.1	0.8	1.9	3.0
Vitamin B2 (mg)	1.3	1.3	1.0	1.4	1.6	1.0
Vitamin B3 (mg)	16.5	26.7	21.6	13.2	23.4	17.5
Vitamin B6 (mg)	1.4	1.4	1.1	1.6	1.8	0.8
Vitamin B12 (ug)	1.5	3.7	3.2	1.5	3.0	2.7
Biotin (ug)	30	31.2	27.8	105	35.6 ↓	15.9
Folate (ug)	200	226.6	184.4	200	235.4	249.8

**No dietary reference values existed for vitamin E and Manganese at the time of the study*

Red accompanied by an up ↑ arrow indicates above the recommended limit

Red accompanied by a down ↓ arrow indicates below the recommended limit

Green indicates within the recommended limit

Table 7.4. Continued

		Males			Females	
	DRV's	**Mean**	**SD**	**DRV's**	**Mean**	**SD**
Minerals						
Sodium (mg)	2400	3342.1 ↑	1926.0	2400	3837.2 ↑	4112.0
Potassium (mg)	3500	3748.5	3738.6	3500	2845.4 ↓	2582.3
Calcium (mg)	700	849.8	942.5	700	521.9 ↓	315.8
Magnesium (mg)	300	486.8	894.3	270	265.5	204.9
Phosphorus (mg)	550	1154.3	898.5	550	933.9	619.8
Iron (mg)	8.7	11.5	7.5	14.8	11.1 ↓	7.7
Copper (mg)	1.2	1.3	1.0	1.2	1.3	1.1
Zinc (mg)	9.5	9.7	9.5	7.0	7.5	6.8
Chloride (mg)	2500	4728.4 ↑	2431.8	2500	6006.0 ↑	6478.2
Manganese (mg)*	-	3.8	2.9	-	3.0	2.2
Selenium (ug)	75	46.5 ↓	44.0	60	35.5 ↓	34.2
Iodine (ug)	140	82.3 ↓	80.8	140	63.9 ↓	59.2
Salt (g)	6	8.5 ↑	4.9	6	9.8 ↑	10.5

**No dietary reference values existed for vitamin E and Manganese at the time of the study*

Red accompanied by an up ↑ arrow indicates above the recommended limit

Red accompanied by a down ↓ arrow indicates below the recommended limit

Green indicates within the recommended limit

Table 7.5. Daily Macronutrient and Micronutrient Intake for Males and Females (19-25years) without Food Allergies (n=40) in comparison to Dietary Reference Values

		Males			Females	
	DRV's	**Mean**	**SD**	**DRV's**	**Mean**	**SD**
Macronutrient						
Energy (kcal)	2500	2101.1 ↓	1793.9	2000	2217.7	1003.6
Protein (g)	55.5	81.2	71.9	45	85.6	45.5
Fat (g)	<97	67.1	52.1	<78	93.6 ↑	34.8
Carbohydrate (g)	333	282.3 ↓	314.6	267	272.1	141.2
Free Sugars (g)	33	90.7 ↑	87.0	27	77.1 ↑	33.0
Fibre (g)	30	27.7 ↓	23.3	30	27.1 ↓	22.4
Saturated Fat (g)	<31	18.1	14.0	<24	31.5 ↑	15.7
Monounsaturated Fat (g)	36	14.6 ↓	17.2	29	21.2 ↓	10.7
Polyunsaturated Fat (g)	18	8.1 ↓	9.8	14	9.4 ↓	4.2
Cholesterol (mg)	300	118.0	194.0	300	208.0	135.3
Vitamins						
Vitamin A (ug)	700	726.7	1540.7	600	519.3 ↓	412.2
Vitamin C (mg)	40	113.7	115.0	40	98.3	98.8
Vitamin D (ug)	10	3.8 ↓	7.6	10	2.2 ↓	2.2
Vitamin E (mg)*	-	6.4	8.4	-	8.5	4.4
Vitamin B1 (mg)	1	1.1	1.3	0.8	1.7	1.7
Vitamin B2 (mg)	1.3	1.3	0.8	1.4	1.8	0.5
Vitamin B3 (mg)	16.5	19.7	27.2	13.2	31.8	17.1
Vitamin B6 (mg)	1.4	1.4	0.9	1.6	1.7	0.8
Vitamin B12 (ug)	1.5	1.8	2.1	1.5	3.7	3.6
Biotin (ug)	30	29.4	18.9	105	30.2 ↓	27.8
Folate (ug)	200	116.1 ↓	115.3	200	158.4 ↓	93.7

**No dietary reference values existed for vitamin E and Manganese at the time of the study*

Red accompanied by an up ↑ arrow indicates above the recommended limit

Red accompanied by a down ↓ arrow indicates below the recommended limit

Green indicates within the recommended limit

Table 7.5. Continued

	Males			Females		
	DRV's	**Mean**	**SD**	**DRV's**	**Mean**	**SD**
Minerals						
Sodium (mg)	2400	4848.4 ↑	12763.0	2400	2935.8 ↑	2426.3
Potassium (mg)	3500	1884.4 ↓	1665.4	3500	2724.4 ↓	1082.6
Calcium (mg)	700	493.1 ↓	478.4	700	733.9	381.1
Magnesium (mg)	300	224.7 ↓	204.7	270	313.5	282.4
Phosphorus (mg)	550	872.1	936.4	550	1214.5	659.1
Iron (mg)	8.7	10.6	6.2	14.8	11.2 ↓	8.1
Copper (mg)	1.2	1.1	0.8	1.2	1.2	0.9
Zinc (mg)	9.5	5.7 ↓	5.8	7.0	10.1	8.7
Chloride (mg)	2500	7108.2 ↑	19165.0	2500	4533.3 ↑	4275.4
Manganese (mg)*	-	3.1	2.8	-	4.0	5.0
Selenium (ug)	75	41.6 ↓	68.6	60	47.1 ↓	60.0
Iodine (ug)	140	40.3 ↓	39.5	140	89.6 ↓	65.5
Salt (g)	6	12.3 ↑	32.4	6	7.5 ↑	6.2

**No dietary reference values existed for vitamin E and Manganese at the time of the study*

Red accompanied by an up ↑ arrow indicates above the recommended limit

Red accompanied by a down ↓ arrow indicates below the recommended limit

Green indicates within the recommended limit

Two-way ANOVA was conducted to assess the impact of gender and food allergy status on nutrient intake. Results revealed a statistically significant difference in calcium [F (1, 67) = 4.112, P = 0.047] and iodine [F (1, 67) = 5.193, p = 0.026] (Table 7.6). Simple mains effect analysis showed that no statistically significant difference existed on calcium (p = 0.321) and iodine (p=0.968) intake between genders in those with food allergies (Table 7.7). However, in those without food allergies, simple mains effect tests indicated that females had a statistically significant higher intake of calcium (p =0.034) and iodine (0.008), in comparison to males.

Table 7.6. Results of Two-Way ANOVA on the impact of food allergy status and gender for macronutrient and micronutrient intake

	df	Mean Square	F	*p*
Macronutrients				
Energy (kcal)	1	6036133.4	1.332	0.253
Protein (g)	1	2483.2	0.652	0.422
Fat (g)	1	551.5	0.198	0.658
Carbohydrate (g)	1	261778.9	1.172	0.283
Free Sugars (g)	1	198661.4	1.890	0.309
Fibre (g)	1	791.7	1.677	0.200
Saturated Fat (g)	1	104.0	0.267	0.607
Monounsaturated Fat (g)	1	179.1	0.594	0.444
Polyunsaturated Fat (g)	1	45.0	0.681	0.412
Cholesterol (mg)	1	206362.0	2.538	0.116
Vitamins				
Vitamin A (ug)	1	1107428.8	0.552	0.460
Vitamin C (mg)	1	92.0	0.002	0.966
Vitamin D (ug)	1	1.241	0.022	0.882
Vitamin E (mg)	1	117.1	2.637	0.109
Vitamin B1 (mg)	1	0.8	0.242	0.624
Vitamin B2 (mg)	1	1.7	2.441	0.123
Vitamin B3 (mg)	1	1016.5	2.135	0.149
Vitamin B6 (mg)	1	5.6	6.464	0.013
Vitamin B12 (ug)	1	29.4	3.4	0.070
Biotin (ug)	1	1316.3	2.429	0.124
Folate (ug)	1	12394.8	0.466	0.497

Table 7.6. Continued

	df	Mean Square	F	*p*
Minerals				
Sodium (mg)	1	25065748.3	0.442	0.508
Potassium (mg)	1	13137655.2	2.266	0.137
Calcium (mg)	**1**	**1398461.0**	**4.112**	**0.047**
Magnesium (mg)	1	421260.2	1.812	0.183
Phosphorus (mg)	1	1370012.5	2.100	0.152
Iron (mg)	1	46.132	0.858	0.358
Copper (mg)	1	0.569	0.648	0.424
Zinc (mg)	1	183.590	3.069	0.084
Chloride (mg)	1	64175930.3	0.496	0.484
Manganese (mg)*	1	12.755	1.081	0.302
Selenium (ug)	1	1169.2	0.380	0.540
Iodine (ug)	**1**	**19814.679**	**5.193**	**0.026**

Table 7.7. Results of simple main effects analysis on the impact of food allergy status and gender for calcium and iodine intake in those with and without food allergies

With Food Allergies	**Mean Rank Male (n=17)**	**Mean rank Female (n=14)**	**df**	**Kruskal-Wallis H**	**p**
Calcium (mg)	17.47	14.21	4.112	0.985	0.321
Iodine	15.94	16.07	1	0.002	0.968
Without Food Allergies					
Calcium (mg)	16.95	24.83	1	4.497	0.034
Iodine	16.05	25.94	1	7.098	0.008

7.4. Discussion

7.4.1. Between Groups

Often with LA, the quest for identity and purpose, the transition into university life and the importance of social dynamics can lead to poor FC and therefore, poorer dietary intake (Pelletier et al., 2014; Herman, 2017; Sprake et al., 2018). In addition to this, individuals with food allergies will have dietary restrictions and if alternative foods that can support and maintain a healthy diet are not incorporated, there is an increased risk of malnutrition (Kim et al., 2013; Dilley et al., 2018; Tackett et al., 2019; Groetch and Venter, 2020). Therefore, it was expected that the diet of those with food allergic participants in this study would be deficient. Yet this was not highlighted in this particular research. When comparing between groups, nutrient intake in those with and without food allergies was largely similar. Participants with food allergies were found to consume higher quantities of all macronutrients, vitamins and most minerals, with only sodium, chloride and selenium found in higher quantities in those without food allergies. Analysis revealed a statistically significant difference in only one nutrient between both groups - chloride levels, with higher intakes found in the food allergic group. No previous research has looked at dietary intake exclusively in LA with food allergies. However, one similar study which focused on early adolescence (11-18years) did report the same findings as our research (Maslin et al., 2018).

7.4.2. DRV Comparison

The following section will look into the different macro and micronutrients and suggest reasons as to why participants were or were not able to meet daily guidelines. This will allow us to provide an overall picture of the dietary intake in LA with and without food allergies, in the NW of England.

7.4.2.1. Macronutrients

Energy

When comparing to DRV's, most participants in both groups met their age and gender specific recommendations for macronutrients. In order to meet the physiological demands of the body during the period of late adolescence, an increase in energy intake is necessary (Jodhun et al., 2016). Energy levels in comparison to the EAR were exceeded by all participants with food

allergies and female participants without food allergies. Male participants without food allergies were the only group who failed to meet energy requirements, which is similar to findings from a previous study (Ayogu et al., 2022). Additionally, a noticeable difference existed between groups in BMI, with food-allergic participants averaging a BMI of 22.6kg/m^2 and non-food allergic participants averaging 27.2kg/m^2. This difference indicates that those with food allergies are within a healthy weight range, while those without food allergies are considered to be overweight. These findings are dissimilar to that of a similar study (Maslin et al., 2018), which found no differences between groups in BMI. Despite differences in BMI in the present study, no statistically significant differences existed in the percentage of energy derived from protein, fat and carbohydrates between the food-allergic and non-food allergic group.

Fat

Regarding fat intake, no statistically significant differences were found between those with and without food allergies, however differences in gender did exist. Male participants in both groups were within recommended levels of 35% and 11% of fat and saturated fat respectively and therefore cholesterol. In contrast, females both with and without food allergies exceeded overall fat and in particular saturated fat levels. Although these findings are consistent with previous research (Nasreddine et al., 2020) they are also somewhat surprising, given that literature describes women as more health conscious and having higher nutritional knowledge and therefore, more inclined to meet recommendations than men (Arganini et al., 2012; Jodhun et al., 2016; Munt et al., 2017; Bennett et al., 2018; Lombardo et al., 2019; Barebring et al., 2020). These findings could possibly be explained by the results from previous chapters in this research, where LA with food allergies experienced reduced access to healthier food options and AFF. This limited availability could have caused participants, especially females who may have prioritised convenience or affordability, to consume foods high in saturated fats. Additionally, although saturated fat levels were exceeded in female participants, cholesterol levels in this group were well within range. Thus indicating that other lifestyle and dietary factors played a role in contributing to this lowered cholesterol. Additionally, genetics also play a crucial role in determining cholesterol levels. Particularly, young females are genetically predisposed to lower total cholesterol levels due to the increased hormonal changes during this life stage (Mumford et al., 2011; Downer et al., 2014; Lephart, 2018; Nie et al., 2022). Hence, this can provide a potential explanation for the results observed in female cholesterol levels.

Carbohydrate

Concerning carbohydrate intake, male participants in both groups exceeded recommendations of 50%, while females in both groups met these requirements. Previous research has also reported a higher intake of carbohydrate in men than women (Zhao et al., 2020; Liu et al., 2021). Carbohydrates are a major source of energy and all participants in this study either met or exceeded intakes. However, the quality of carbohydrates is undesirable and a cause for concern.

a) Free Sugars

Firstly, all participants exceeded in their consumption of free sugars. DRV's indicate free sugars should make up no more than 5% of daily energy intake (Public Health England, 2016). Despite this, those in the food-allergic group had an intake of 40% and 19% of free sugars for males and females respectively. Similarly, in the non-food allergic group an intake of 17% and 14% was found in males and females respectively. The increased sugar intake seen in food allergic participants can be as a result of the inclusion of AFF in their diet. Research has found that the nutritional composition of 'free from' foods is compromised, with excessive amounts of fat, salt and sugar added to increase palatability (Saturni et al., 2010; Moreno et al., 2014). Therefore, those with food allergies will be at a far greater risk of an imbalanced diet as mirrored by these findings. However, the previous studies from this research suggest that the high cost and limited availability of AFF will often pose barriers in purchasing these products. There is a possibility that LA with food allergies may compensate for this high cost and limited availability of AFF by consuming increased amounts of non-AFF that are cheaper, more readily available, but likely less nutritious. This indicates a potential coping strategy where the reduced access to AFF force individuals to consume foods of lower nutritional quality, leaving them in a state of persistent unhealthy eating habits.

In addition to this, the increased overall free sugar intake in both groups is in actual fact unsurprising. Much literature has found how LA consume a diet high in free sugars (Chatelan et al., 2019; Livingstone et al., 2022). One reason to explain this increased sugar intake is due to social norms. The search for a social identity and sense of belonging is a significant aspect of development in LA. As individuals seek to form and establish their identity, they will attempt to gain peer approval. This strong need for group acceptance suggests that LA are more susceptible to peer norms, which will largely shape their food intake (Higgs and Thomas, 2016; Stok et al., 2016; Bevelander et al., 2020). LA often contextualise energy dense, but poor nutrient foods with peer and social gatherings and such foods are often an indication of meal

enjoyment (Qutteina et al., 2019). Poobalan et al. (2014), further supports this, showing that LA were more likely to engage in poor eating behaviour when in social settings. In particular, they found that eating habits of university students were more irregular and consisted of an increased level of meal skipping and snack and fizzy drink consumption. Specifically, it was revealed that only 40% consumed sufficient fruits and vegetables, while 60% were consuming greater than 4 snacks a day which included chocolates, crisps and fizzy drinks. It was also found that LA irrespective of education level or socioeconomic status were aware of what constitutes a healthy and unhealthy diet and also had knowledge of the negative impacts of eating poorly, yet they were unable to translate this into actual behaviour (Poobalan et al. (2014). Studies have further reinforced this showing that even when individuals possessed appropriate nutritional knowledge, they were still willing to choose fast foods when in social environments and with peers, as it would be considered too risky to deviate from these accepted norms (Brown et al., 2000; Stead et al., 2011; Pelletier et al., 2014). While much literature does indicate the impact of social norms and peer influence on high sugar intake, the previous studies in this piece of research indicate that LA with food allergies often avoid eating out due to concerns with allergen exposure or feelings of being different. Therefore, the high sugar intake observed in this study could be related to the increased consumption of packaged and processed foods in certain environments where individuals feel safe. Hence, the avoidance of eating in social settings does not necessarily reduce sugar consumption, but instead shifts it towards different contexts where LA with food allergies feel more comfortable.

Furthermore, in contrast to our results, several studies have highlighted that women have higher intake of sugar than men (Grunberg and Straub, 1992; Oliver and Wardle, 1999; Wansink et al., 2003). Bennett et al. (2018), found that UK women are also more likely to consume higher quantities of fruit (a natural source of sugar), which will increase total sugar intake. Moreover, despite women reporting wanting to eat healthier, research has found that women are more likely to consume an increased quantity of foods such as cookies, chocolate and ice cream than men, all of which contribute to a higher sugar intake (Wansink et al., 2003; Kanter and Caballero, 2012; Spence, 2017; Livingstone et al. 2022). Likewise, females have been reported to engage in higher levels of snacking of energy dense foods (Wansink et al., 2003; Kanter and Caballero, 2012; Spence, 2017). Additionally, they were more likely to skip more meals than men and were found to consume foods more times during the day and uncontrollably too, even if they were not hungry (Lombardo et al., 2019). Meanwhile, research by Mohamed et al. (2020), indicate that during times of stress (in particular during university years), males are more reliant on convenience and takeaway foods, potentially explaining the differences in free sugar intake seen in between genders.

b) Fibre

In this study, most participants struggled to meet dietary fibre requirements. Limited UK research currently is available looking at the dietary fibre intake of LA. However, of the literature which does exist, inadequate fibre levels were found to be a common occurrence in this group (Chourdakis et al., 2010; Nicklas et al., 1995; Chourdakis et al., 2010; Buil-Cosiales et al., 2017; Seljak et al., 2021). This can be due to many reasons. Firstly, LA will be leading independent lifestyles and perhaps for the first time in their lives will be responsible for their individual FCs (Hafiz et al., 2023). Previous research highlights how this reduced parental supervision will lead to LA making poorer FCs, which include an increased concentration of energy dense nutrient poor foods (Hebden et al., 2015; Haugland et al., 2019; Ziegler et al., 2021). Secondly, this group of individuals are especially vulnerable to a poor food environment, making it easier to choose such foods. A high percentage of participants in this study (85%) were students at university and much literature informs us that the university environment is considered 'obesogenic,' making it difficult to eat healthier (Poobalan et al., 2014; Tanton et al., 2015; Pulz et al., 2016; Munt et al., 2017; Brennan et al., 2020; Martinez-Perez et al., 2021; Coyle et al., 2023). This will lead individuals to have an increased consumption of processed foods high in saturated fat, salt and sugar and a diet low in fruits, vegetables and whole grains (Larson et al., 2020), which consequently will contribute to their reduced fibre intake. Finally, cost and time are both important predictors of FC in LA who often have limited funds to spend and limited time to prepare foods. (Contento, 2011; Graziose, 2016; Stok et al., 2016; Hall, 2018; Sogari et al., 2018; Liem and Russell, 2019; van den Bogerd et al., 2019; Monterrosa et al., 2020; Hutchesson et al., 2022). While fruits and vegetables contribute to increased fibre intake, these foods are considered more expensive limiting their purchase and consumption (Fricke et al., 2015; van den Bogerd et al., 2019; Diamini et al., 2023). Despite their low nutritional quality, heavily processed foods, fast foods and ready to eat meals, which contain little fibre will be consumed a great deal more by LA, as they are both more affordable and convenient.

Dietary fibre is an essential component of a healthy diet. A high fibre diet will support digestion and promote a healthy gut microbiome and additionally reduce the risk of many non-communicable diseases (Barber et al., 2020; McKeown et al., 2022) Consequently, these findings of low fibre in this study are quite concerning. Not only do they reflect poor FCs in this group of LA, which further emphasises poor dietary quality, but these individuals will naturally be at an increased risk of developing a range of health issues. Despite the low levels of fibre, those with food allergies did have a higher consumption than those without food allergies, suggesting a greater desire to eat healthily in this group. Only male food allergic participants

were able to meet daily recommendations of fibre, further suggesting that these individuals had better dietary choices.

An increased intake of refine carbohydrates has been associated with higher blood pressure, increased weight gain, digestive issues and increased mortality (Pal et al., 2014; Dehghan et al., 2017, Liu et al., 2021). A diet high in free sugars and low in dietary fibre, as observed in this study, will therefore prove problematic.

Protein

All participants were easily able to meet RNI for protein intake. In fact, the average protein intake was almost double in both males and females with and without food allergies. No statistically significant differences existed in gender or in food allergy status, which mirrors findings from similar studies where nutrient intake was compared between adolescents and adults of food allergies with healthy controls (Maslin et al., 2018; Skypala et al., 2018). 24% of participants reported using supplements in this study, of which 65% consumed protein supplements. Therefore, this could also have contributed to the increased protein intake observed in both groups of participants. In the food-allergic group, many participants suffered from allergies whereby exclusion of the offending allergen would naturally lead to protein deficiency. However, the results from this study reveal that food-allergic participants had the knowledge and ability to easily find suitable replacements and consequently meet dietary protein requirements.

Snacking

The increased fat and carbohydrate intake in females and males respectively, the increased sugar levels and reduced fibre intake observed in participants could also be attributed to snacking behaviours. Snacking accounts for a large portion of LA overall diet (Wansink et al., 2003; Tanton et al., 2015; Larson et al., 2016; Almoraie et al., 2021). This was also through the diet diaries in this study, where the raw data showed an increased consumption of junk foods and energy bars. Snacking of energy dense foods, in addition to meals is a major contributor to weight gain and obesity (Bellisle, 2014; Livingstone et al., 2022). Previous research highlights how LA in the UK have a poorer diet quality than Europeans of the same age and were on average consuming snacks more than 2.5 times per day (Llaurado et al., 2016). Similar results have been reported among LA in the USA (Stockton et al.,. 2013; Bangladesh (Goon et al., 2014), Lebanon (El-Kassas et al., 2015), Italy (Teleman et al., 2015) and Saudi Arabia (Mohamed et al., 2020).

Snacking behaviours amongst university students has been associated with increased caloric intake, lower diet quality and inevitable weight gain (Bellisle, 2014; Almoraie et al., 2021; Livingstone et al., 2022). Furthermore, during the period of late adolescence, individuals will be experiencing one of the most significant changes in their lives, as they move away from home for the first time, while attempting to gain autonomy from their parents. During this time, individuals often struggle to eat healthily and make positive FCs. As LA continue to transition into a state of independence, they begin to develop their own values relating to food (Jodhun et al., 2016). There will be a high preference for snacks as they are perceived to be more palatable, due to their increased sugar and fat content, and require minimal time to prepare (Kanarek et al., 1997).

While at university, an increase in unhealthy snacking behaviour will take place, due to an increase in the exposure and use of convenience stores, vending machines (particularly on campus), food delivery services, restaurants and fast food outlets (Poobalan et al., 2014; Tanton et al., 2015; Jodhun et al., 2016; McGowan et al., 2017; Munt et al., 2017). All of which promote and encourage unhealthy eating practices amongst individuals. Due to the increased consumption of refined carbohydrates, sugar and reduced fibre indicates that perhaps snacking behaviour was widespread among all participants. This further suggests LA with food allergies are likely to engage in risk taking behaviour, as snacking foods often contain high traces of food allergens (Maslin et al., 2018). In Chapter 6 of this research, participants highlighted a reduced access to AFF on campus, which could have increased snacking behaviour in this group, exposing them to potentially harmful allergens. For food-allergic participants this is particularly concerning, given that an increased exposure and consumption of allergenic foods can prove extremely detrimental to health and in many cases will be fatal (Tackett et al., 2019; Brown et al., 2020). The limited availability of AFF on campus alongside the increased snacking habits may potentially increase risky eating behaviours in this group, consequently compromising their dietary quality.

7.4.2.2. Micronutrients

Vitamins

The results from this study revealed that all participants were easily able to meet RNI's for most vitamins and in most cases levels were exceeded. Food-allergic participants had higher intakes of all vitamins in comparison to those without food allergies.

Vitamin D was considered to be an at risk nutrient for participants, with all individuals failing to meet requirements. Despite not meeting requirements, those in the food-allergic group had higher intakes of vitamin D than those without food allergies - findings which support previous research (Maslin et al., 2018). In the general adolescent population (18-25years) vitamin D deficiency is a common finding, further supporting our results (Tangprich et al., 2002; Tonnesen et al., 2016; Crowe et al., 2019; Dong et al., 2021). Poor dietary choices among LA, such as consuming foods low in vitamin D and also increased snacking can contribute to the reduced levels of vitamin D observed in participants (Tangprich et al., 2002; Perez-Lopez et al., 2010; Tonnesen et al., 2016). Research further indicates that missing breakfast, a common trait in LA, can additionally contribute to vitamin D deficiency as foods consumed during this meal time are an important source of vitamin D (Fagnant et al., 2022). Furthermore, in those with food allergies the implementation of a restrictive diet will naturally lead to a difficulty in obtaining nutrients (Steinman et al., 2010; Groetch and Venter, 2020). Skypala et al. (2021) highlight low levels of many nutrients in food allergic adults, with iron, zinc, vitamin B12 and vitamin D found well below the reference range. Foods such as oily fish, red meat and eggs are high in vitamin D (NHS, 2020) and for those individuals in this study who were suffering from these specific food allergies, vitamin D levels would naturally be reduced. These are some possible reasons that explain our findings. Surprisingly, a small percentage of participants in this study (n=17, 24%) were taking supplements, of which the most popular was vitamin D (76%). Often LA will have low adherence of supplement intake due to reduced parental supervision and therefore forgetfulness, the cost and also difficulty in swallowing pills (Brorsson et al., 2020; Spetz et al., 2022). Hence, additionally providing a potential explanation for the low intake seen in participants. Adequate vitamin D levels are important to ensure good health. In fact, vitamin D deficiency is commonly linked with high blood pressure, heart disease and an increased risked of osteoporosis (Tonnesen et al., 2016). Additionally, research has also indicated that vitamin D plays an important role in cognitive function (Devere, 2014; Sultan et al., 2020). For LA who are perhaps at the peak of higher education, this will have unfavourable consequences.

Minerals

Overall, the food-allergic group had higher intakes of minerals when compared to the non-food allergic group, further emphasising their healthier lifestyle.

All female participants in this study failed to meet iron levels. An insufficient consumption of iron rich foods can further provide an explanation for the low iron levels observed in females.

Moreover, this study revealed little differences in iron intake existed in those with and without food allergies, indicating that the presence of a food allergy in this group of participants did not necessarily impact iron intake. These findings are dissimilar to previous research, which highlight that those with food allergies had significantly lower intakes of iron than those without food allergies (Skypala et al., 2021).

Vitamin C is known to enhance absorption of non-heme iron (Lynch and Cook, 1980; Li et al., 2020). Although females in both the food allergic and non-food allergic groups exceeded the RNI for vitamin C, it is possible that the uptake of iron was reduced due to the presence of anti-nutrients. Anti-nutrients are compounds found in certain foods that can interfere with the absorption of nutrients (Petroski and Minich, 2022). For example, antinutrients like phytic acid and oxalates can bind to minerals like iron and reduce their absorption in the digestive tract. This can lead to a lower bioavailability, impacting their use by the body. Anti-nutrients are often found in grains and legumes, which are common components of a vegetarian and vegan diet. A large number of participants in this study observed a vegetarian diet which could explain their inability to meet minerals such as iron.

Regarding calcium intake, this varied in both groups. While in those with food allergies, males easily met and exceeded levels, females struggled to meet dietary requirements. When looking at the raw data, a greater number of females adopted a vegetarian diet and so, anti-nutrients could again have potentially interfered with the absorption of calcium, further explaining why females were unable to meet requirements. Additionally, egg, milk and dairy allergy, as reported by some food-allergic participants in this study, can all contribute to calcium deficiency (Hildebrand et al., 2019; Darwin et al., 2021). Fewer females reported these allergies in comparison to males, suggesting that in addition to the exclusion of these allergenic foods, additional factors such as the inadequate dietary intake from calcium rich foods led to calcium deficiency. These particular findings also suggest that in comparison to females, males with egg, dairy and milk allergy consumed alternative foods to ensure the adequate consumption of calcium. In contrast, in those without food allergies the opposite was true. Male participants were unable to meet RNI requirements, while females met the intakes in this group. Thus indicating that in the non-food allergic group, females had better dietary choices owing to their ability to meet calcium requirements. Moreover, vitamin D levels play a significant role in the absorption of calcium (Khazai et al., 2009; Veldurthy et al., 2016). Research highlights that approximately a mere 10 and 15% of calcium is likely to be absorbed, compared to 40% when vitamin D levels are adequate (Soliman et al., 2014). This particular vitamin was found to be considerably low in participants and can further contribute to the reduced calcium levels observed in this study. Especially in LA where it is necessary to ensure

the possibility of maximum skeletal growth, calcium deficiency can lead to suboptimal bone health and therefore, the occurrence of conditions such as osteomalacia (a condition whereby softening of the bones occur) and osteoporosis (a condition which results in the bones becoming extremely porous and fragile) (Zadka et al., 2018; Rouf et al., 2020).

Furthermore, irrespective of gender and food allergy status, all participants failed to meet selenium and iodine levels. These findings echo that of previous research (Maslin et al., 2018). The challenges of meeting macro and micronutrient intakes are further exacerbated by dietary lifestyle choices. One major contributing factor to explain these selenium and iodine results, as well as the deficiency in many of the vitamins and minerals and even macronutrients determined through this study, is the adherence to a vegan or vegetarian diet (Fallon and Dillon, 2020; Bakaloudi et al., 2021), as was adopted by many in this study. Both vegetarianism and veganism are common diets adopted by LA and particularly university students. While this is often due to religious/cultural beliefs and moral/environmental concerns, many embrace this eating behaviour as a means of restricting calorie and/or fat intake, or even as a means of showing independence by adhering to a diet different to that of their family (Hargreaves et al., 2021). Results from this study revealed that just over half of participants (52%) were conforming to a vegetarian diet. Fewer participants observed a vegan diet (23%). Overall, vegetarianism and veganism formed the most common diets chosen by participants in this study. LA and adults adopting a vegetarian or vegan diet, will be at an increased risk of nutrient deficiencies. In particular diets will be low in vitamin B12, vitamin D, zinc, calcium, iron and fibre (Fallon and Dillon, 2020; Bakaloudi et al., 2021; Skypala et al., 2021).

In addition to this, all participants regardless of food allergy status and gender exceeded salt intake. Research indicates that FCs in LA are highly influenced by taste and there is a greater preference for high salty foods (Liem and Russell, 2019; Bawajeeh et al., 2020). More than half of participants were students living on campus. As individuals experience the process of transition from their family diet to one of their own choice, highly processed foods make up a large portion of their diet (Contento, 2011; Hebden et al., 2015; Hall, 2018; Sprake et al., 2018; Liem and Russell, 2019; Larson et al., 2020; Monterrosa et al., 2020; Molenaar et al., 2021; Whatnall et al., 2021). In the UK, 95% of dietary sodium is found in processed foods (Anderson et al., 2010). These types of foods are convenient and readily available in and around campus making them an obvious choice for many (Jiet and Soma, 2017). Therefore, it is no surprise why students at university can easily exceed the daily RNI for salt intake. Moreover, multiple studies have highlighted all individuals who depend on campus foods will consume higher

quantities of salt (Park et al., 2009; Rasmussen et al., 2010; Ahn et al., 2013; Faria et al., 2022).

Furthermore, constant exposure to such foods, as is the case for university students living on campus, will cause individuals to develop a taste preference for foods with high salt content (Faria et al., 2022). Salt intake was also found to be higher in food-allergic participants than non-food allergic participants. Many free-from foods contain high levels of salt to increase palatability, in comparison to their standard counterparts. A previous study conducted by Consensus Action on Salt and Health (CASH), revealed how across 71 supermarkets, more than half of free from products (56.3%) contained higher levels of salt than the standard version with only less than a third of free from products containing low levels of salt (26.7%) (Action on Salt, 2009). This is a possible explanation as to why those with food allergies were consuming higher quantities of salt. Additionally, it is also important to note here that in the previous studies from this research, participants reported AFF as difficult to access due to their limited availability and high cost. Not all participants who took part in the previous surveys and focus groups were part of the dietary intake study and so it is possible that LA who took part in the diet diaries were able to access AFF despite the general trend observed, thus leading to a higher salt intake amongst this group. Moreover, the increased salt intake found in LA in this study may not be solely due to the consumption of AFF. Again participants who struggled in accessing AFF may have compensated for this by increasing their intake of readily available, highly processed foods, which were perhaps high in salt.

These findings illustrate the complex relationship between FA and FC, which directly influences dietary intake. This high salt intake indicates poor FCs amongst participants and may result in lower diet quality. The impact on health may also prove detrimental, with increased salt consumption associated with the development of many non-communicable diseases (Jiet and Soma, 2017; Webb et al., 2017).

7.5. Interventions

The transition from late adolescence to adulthood is a unique life stage which presents challenges in developing targeted and effective dietary interventions. Existing literature has mentioned various interventions that can improve the dietary quality of specifically LA. The role of the university environment is crucial in promoting healthy eating behaviours (Tanton et al., 2015). Previous research demonstrates that vending machines, which are prevalent across campus, can serve as a targeted means of improving the eating behaviour of LA (Grech

et al., 2015; Whatnall et al., 2020). Therefore, one approach is that universities should implement interventions that can improve the availability of healthier items that are cost-friendly in existing vending machines. In their research, Brown et al. (2014), demonstrated the simple yet effective nature of providing knowledge in vending machines. They provided nutrition information, through using colour coded stickers (red = less healthy, yellow = moderately healthy, green = more healthy). The use of this information intervention was successful and led to the increased purchase of healthier snack items (green stickered items) and a reduced purchase of red and yellow stickered food beverages. In this study, high sugar and salt intake were observed amongst participants and therefore, interventions like this could be especially useful in shifting dietary habits towards more healthier options. Likewise, Whatnall et al. (2020), further suggest that placing educational and motivational information cards/posters in or on vending machines can promote healthier food and drink choices. Similarly, exposing adolescents to information suggesting how limiting unhealthy foods can be beneficial to health, was found to be a successful intervention in reducing junk food consumption (Robinson and Higgs, 2013). Furthermore, Kim et al. (2013), suggest the importance of enhanced nutritional education for those with food allergies who will be naturally adopting an elimination diet. Skypala et al. (2021) also reinforces this and further suggests the need for nutritional counselling to be made available for students on campus with food allergies. This will be quite useful as participants in this study, though meeting requirements for many nutrients, still faced challenges with specific nutrients such as Vitamin D and Calcium.

Social norms increasingly influence eating behaviours in the 18-25 age range. It is clear that LA are willing to adjust eating behaviour to achieve these social goals. Much research has proven how the social modelling theory can be used to impact FC and food intake behaviour in LA and adults (Hermans et al., 2009; Robinson et al., 2014; Cruwys et al, 2015; Liu and Higgs, 2019; Kimura et al., 2019). One example includes informing individuals of other people's dietary behaviour (particularly that of peers). Croker et al. (2009) found that when individuals were told 'Eighty percent of people try to eat at least 5 portions of fruit and vegetable per day' this was enough to increase consumption of these types of food in a sample of participants in the UK. Pelletier et al. (2014), emphasise the role of peers and have also suggested targeting existing friends' groups, to modify eating behaviour positively. It is important to consider here that the presence of a food allergy may often discourage LA to attend social gatherings, as highlighted in the previous chapters from this research. Therefore, the strategies which promote healthy eating through social influence may need to be adapted for those with food allergies. One example could include accommodating for dietary

restrictions in peer environments so as to not exclude LA with food allergies from the positive benefits of social influences in modifying eating behaviours.

Additionally, habitual consumption of certain types of foods is extremely common in this group of LA and habits have been shown to be a major determinant of unhealthy snacking behaviour (Verhoeven et al., 2012; De Vet et al., 2015). Social norm interventions i.e. descriptive norms (what other people do) and injunctive norms (what other people approve of) have been proven as powerful social norm interventions based on the social model of eating, that can break unhealthy eating habits (Robinson et al., 2013; Stok et al., 2016; Suwalska and Bogdanski, 2021). While research in this area is still evolving, studies have revealed the benefit of such interventions in promoting healthier eating/drinking behaviours (Herman et al., 2003; Pliner and Mann, 2004; Hermans et al., 2009; Robinson et al., 2014; Stok et al., 2014; Cruwys et al, 2015; Sharps and Robinson, 2016; Smit et al., 2016; Stok et al., 2016; Liu and Higgs, 2019; Kim et al., 2019; Kimura et al., 2019). Therefore, interventions based on social models can and should be utilised to improve the consumption of healthy foods. Moreover, Pliner and Mann. (2004), did find that it was easier to influence the consumption of palatable foods through social modelling than unpalatable foods and hence, individual taste preferences should also be considered when increasing healthy food intake. Although for LA with food allergies, avoiding social contexts is a common practice as outlined in the previous research from this study and so future research could perhaps focus on developing similar social models in controlled environments where LA with food allergies feel safer, as means of encouraging healthier eating.

A healthy lifestyle should not only be focused on promoting positive FCs, but also learning to resist the temptation of healthy foods. One beneficial approach which considers this and has proven successful in improving dietary choices of specifically LA, is self-regulation. Self-regulation strategies are a learned set of strategies that can be applied in certain situations to tackle a known temptation (Vohs and Baumeister, 2011). This concept is quite fitting for LA. Not only is the independence of the individual considered, but the bridge between intention and behaviours will be reduced. Hence, it is no surprise why much literature has highlighted the beneficial role of self-regulation strategies, in promoting a healthier diet throughout the period of adolescence (Schroder et al., 2013; Tomasone et al., 2015; Kliemann et al., 2016; Price et al., 2017; McClelland et al., 2017; Ling and Zahry., 2021).

Furthermore, research suggests that diet quality of LA will improve if they had more time to prepare food and greater access to healthier food (Poobalan et al., 2014; Sexton-Dhamu et al., 2021). There is a need to encourage LA to have regular meals and reduce snacking

behaviours and one way to achieve this, is through improving cooking skills (Poobalan et al., 2014). Research also indicates teaching meal preparation skills can assist in improving dietary behaviour by reducing the reliance on convenience and takeaway foods (Thorpe et al., 2013; Pelletier et al., 2014).

Many established interventions, that have proven successful to improve the dietary intake of LA, clearly exist. Yet, the present study highlights how still this group of individuals are at an increased risk of nutritional deficiencies and a poor quality diet. Especially for those with food allergies, there are additional barriers such as the limited access to AFF and social exclusion, which need to be addressed. With eating habits during this life stage likely to persist into adulthood, more must be done in order to improve the FCs and therefore diet quality of LA. Consequently, ensuring the overall long-term health of this group.

7.6. Conclusion

To our knowledge, this is the first piece of research to provide a comparative analysis of macro and micronutrient intake between LA with and without food allergies. Overall, dietary intake in LA with and without food allergies was broadly similar. The results of this study did reveal that participants with food allergies were on average, consuming higher quantities and easily met requirements of macro and micronutrients, than non-food allergic participants. Thus, suggesting a healthier lifestyle in this group. Key findings from this research highlight that irrespective of food allergy status and the ability to meet requirements for many nutrients, FC and hence diet quality overall in this group of participants was poor. There was an increased consumption of saturated fat, refined carbohydrates, sugar and salt in all participants. A high quality diet, enriched with a variety of nutrients is essential. Firstly, as a means of supporting physical and mental growth and development during this critical period of late adolescence and secondly, to optimise academic performance (Abraham et al., 2018; Larson et al., 2020). What is quite significant, is that behaviours established during the period of late adolescence are likely to persist into adulthood (Vilaro et al., 2018). Therefore, there is a clear need to alter the diet quality of LA.

7.7. Limitations

This study provided important contributions, as to our knowledge it is the first piece of research to provide a comparative analysis of macro and micronutrient intake in LA with food allergies. Although there are several limitations of this study that must be acknowledged.

A relatively small sample size of 71 participants took part in this study, which could have impacted the generalisability of the findings. Again this study focused solely on LA in the NW region, which means that the results may not be representative of other regions or populations. Another key limitation is the reliance on self-reported dietary intake through the use of diet diaries. Participants may have underreported or overreported the consumption of certain foods to provide socially desirable answers, which could have influenced the accuracy of this data. Also, this study employed a cross-sectional design which captured dietary intake at a single point in time. Therefore, this approach did not account for any variations in food availability or even consumption patterns, which could have impacted dietary intake in this group. A longitudinal study could have provided a more comprehensive understanding of dietary intake over a period of time. Moreover, a large number of comparisons were made between those with and without food allergies. Conducting multiple statistical tests can increase the risk of Type 1 errors, thereby indicating a statistically significant difference when one may not actually exist. Again despite any efforts to maintain rigor throughout the analysis process, false positives could have occurred. Care should therefore be taken when interpreting these results. In addition to this, multiple other factors which could have impacted dietary intake of the study population were not considered, for instance socioeconomic status, nutrition education level and access to food resources. Any differences between groups could potentially have been influenced by these additional factors and this should be considered when interpreting the results of this study. Further research which takes into account these limitations should therefore be considered, as this may allow for a more accurate understanding of the dietary intake between LA with and without food allergies. Additionally, this could help to refine interventions which are specifically aimed at increasing dietary quality in this group.

Overall, this study has provided valuable insights into the dietary intake of the LA population both with and without food allergies. Although in many instances participants easily met daily nutrient requirements, there was a common finding of poor dietary quality amongst both groups. These findings, along with those outlined in the previous chapters with regard to FC, food access and healthcare access, nicely set the stage for the next chapter. Consequently, Chapter 8 will focus on exploring possible interventions to improve FC, food access, healthcare access and dietary intake in LA with food allergies, through qualitative focus groups. The strategies discussed will aim to enhance the overall well-being in this group who often encounter numerous challenges, as they attempt to navigate their food allergies perhaps independently, thorough the critical transitional period that is LA to adulthood.

Chapter 8 – Improving Food Choice, Food Access and Healthcare Access of Late Adolescents (18-25years) with Food allergies in North West, England – *Possible Interventions*

8.1. Overview

There is a growing prevalence of food allergies and for those in late adolescence (LA), the management of these allergies becomes increasingly difficult throughout the period of transition from LA to adulthood, owing to a number of additional challenges. During this time, making appropriate food choices (FCs) and accessing adequate food and healthcare is a challenge. Therefore there is an urgent need to explore strategies that can improve the current management of food allergies in this group.

In the previous chapters of this research, it was found that LA with food allergies face challenges in making safe FCS, due to the limited availability and high cost of allergen free foods (AFF) in the North West (NW) region, especially in the context of the university setting. Gaps in healthcare were also highlighted, especially in relation to nutritional and psychological support. Therefore, in this chapter from the perspectives of the food-allergic patient (FAP), parent/carers (P/C) and healthcare professionals (HCPs) we suggest possible strategies to improve the current FC, food access (FA) and healthcare access (HCA) of LA with food allergies in the NW of England. This chapter aims to lay the groundwork for further research and policy development, which can allow LA to better manage their food allergies during the crucial transitional stage of LA to adulthood.

8.2. Methodology

For this final focus group discussion, FAP, P/C and HCPs who had participated in each of the previous focus group sessions, were invited to take part. The main findings of the preceding focus groups were shared with the participants, who then discussed their views on how to improve the current FC, FA and HCA of LA with food allergies. *Please refer to Chapter 6, section 6.2 for a detailed review of the methodology.*

8.3. Results

Participant Demographics

In this intervention focus group, a total of six participants took part - two FAP, two P/C and two HCPs. Table 8.1 highlights their demographic information. Both FAP were males between the ages of 18 and 25years and were suffering from multiple food allergies, which included milk, peanut and dairy allergy. Two P/C of a child undergoing the period of transition and with one/more existing food allergies also took part in this intervention focus group along with two HCPs – one GP and one dietitian - both of whom had previous experience in providing allergy care to LA with food allergies

Table 8.1. Demographic characteristics for food allergic patients, parents/carers and healthcare professionals who took part in the intervention focus group (n=6)

FOOD ALLERGIC PATIENTS	
Gender (n, %)	
Male	2 (100)
Age (n, %)	
18-25years	2 (100)
Ethnicity (n, %)	
White British	1 (50)
Black: British African	1 (50)
Type of Food Allergy	
Multiple	2 (100)
Food Causing Allergy	
Milk	2 (100)
Peanut	1 (50)
Dairy	1 (50)
PARENTS/CARERS	
Gender (n, %)	
Male	1 (50)
Female	1 (50)
Age (n, %)	
25-30years	1 (50)
45-50years	1 (50)
Ethnicity (n, %)	
White British	1 (50)
Black: British African	1 (50)
How old is your food allergic child?	
18-25years	2 (50)
Food causing allergy in your child	
Peanut	1 (50)
Egg	1 (50)
Fish	1 (50)

Table 8.1. Continued

HEALTHCARE PROFESSIONALS	
Gender (n, %)	
Male	1 (50)
Female	1 (50)
Age (n, %)	
25-30years	1 (50)
31-35years	1 (50)
Ethnicity (n, %)	
Black: British African	2 (100)

Thematic Maps

Thematic analysis through the software NVivo resulted in a total of eight interventions, for the three main domains – FC, FA and HCA.

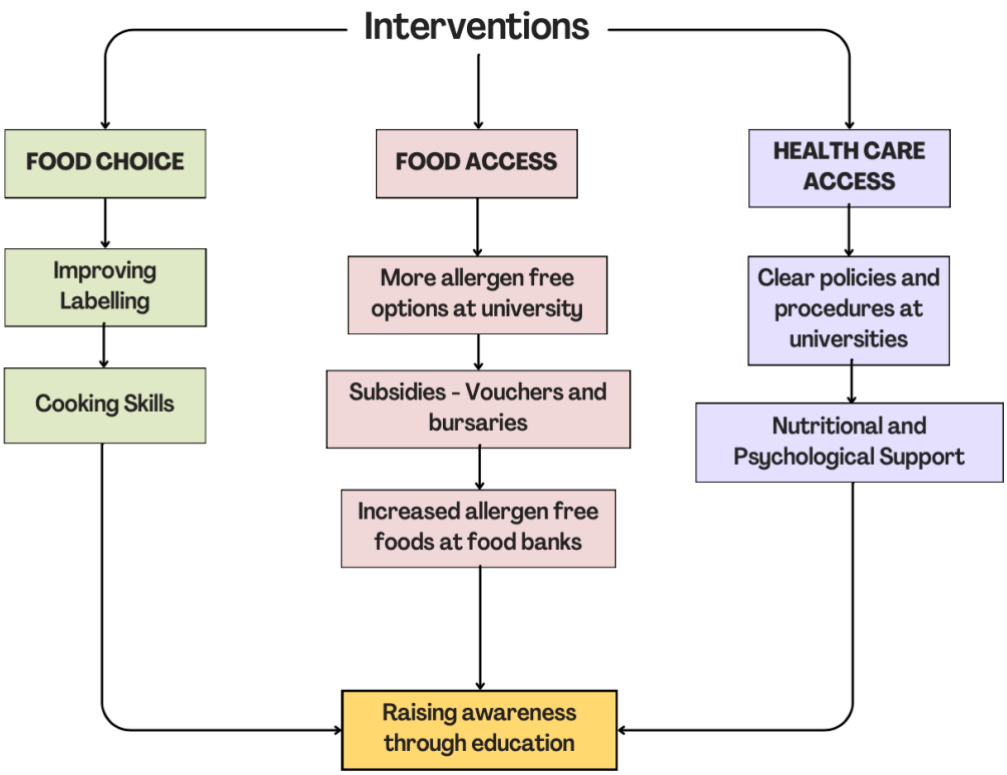


Figure 8.1. Developed thematic map for a series of interventions, based on the combined perspectives of the food allergic patients, the parents/carers and the healthcare professionals.

FOOD CHOICE

Intervention 1: 'More efforts to improve labelling'

An agreed intervention discussed by all participants was to improve current labelling standards. Participants mentioned improving the consistency of labels and making the allergens more noticeable would make choosing foods easier. Clear signposting of allergens on campus was also suggested.

'I think especially making it more noticeable, so putting it on the front of the packet is a clear way and making sure the writing is a lot larger so it stands out, that can make it quite easy for us. What would be quite good is a separate section for just the allergens and this would actually help us to check quickly if the food is safe' (Parent 2, Female)

'And making sure there is clearer labelling in the cafeteria and clear signposting on menus of which foods are safe to eat, because I hardly have seen that and it would really help.' (FAP 1, Male, Milk and Peanut Allergy)

Intervention 2: 'Opportunities to learn more cooking skills'

Participants suggested the need for cooking classes to be offered on campus for food allergy students.

'It's important for us to learn how to cook proper meals aswell, so when we're at university it makes it easier for us. I personally have struggled with that.' (FAP 2, Male, Peanut and Dairy Allergy)

'To ensure you know that they can cook when they are living on their own is really really important. I think if the university provides some cooking classes for them then that can be helpful because not everyone will know how to cook.' (HCP 2, Female, Dietitian)

FOOD ACCESS

Intervention 3: 'More allergen free food available on campus'

Participants felt that allergen free foods (AFF) were limited on campus and more options needed to be provided, with particular reference to more safe, hot foods. One of the HCP (a dietitian) mentioned the use of a survey to gain insight into preferable food options which could help to meet food allergic students' specific dietary needs.

'…and the cafeteria should have like a timetable for the food they are going to be serving and more options for allergy free foods, hot foods too, because right now its hardly offered.' (FAP 1, Male, Milk and Peanut Allergy)

'Most of them might find it difficult to try new foods at university and more attention should be given to the kind of dishes that they prefer or that might be a lot more preferable for them and this is linked with the policies the universities have. Maybe some sort of survey to ask them about their dietary needs and then from there what options they would like to see, I think this will really give them more access to the foods and help to improve their FCs and what they eat.' (HCP 2, Female, Dietitian)

Intervention 4: 'We should be offered more subsidised foods'

AFF are more expensive and participants agreed that subsidies in the form of vouchers from healthcare services and bursaries from universities would potentially improve their access to AFF.

'I think maybe some coupons or vouchers or something like this for the people with food allergies, so they can afford the AFF. Maybe the GP can give some sort of prescription.' (Parent 1, Male)

'Food for allergic people you know is quite expensive. So yes I do agree with the coupons, even the universities should provide a bursary for us students with food allergies, which would make it easier.' (FAP 1, Male, Milk and Peanut Allergy)

Intervention 5: 'Providing allergen free foods at food banks'

Participants further mentioned the inclusion of more AFF at food banks would be a beneficial way of improving access to these foods, particularly during times of financial need.

'Yeah I think we mentioned food banks last time. I believe you know it will definitely work because it's not only some people that will be going to the food banks. We have different people that will be going to the food bank and some of them will be people with allergies, so more of these foods should be available. So it's very essential that food banks have arrange of non-perishable foods for people with Food allergies so that people can make choices that they can't always afford.' (FAP 2, Male, Peanut and Dairy Allergy)

'I think food banks are a great idea. Essentially they should kind of ideally include a diverse selection of allergen friendly options, so canned foods and rice, pasta which are

common and are allergy free because they don't really have too many options at all. And they should make an effort to include items that are specifically labelled as allergen free, a separate section.' (Parent 2, Female)

HEALTHCARE ACCESS

Intervention 6: 'Clear policies and procedures on campus to assist in health care'

Participants felt the universities had an obligation to provide clearer policies and protocols to improve the access to healthcare.

'I think it's really important that there is a clear protocol for managing allergic reactions at the university and including the availability of adrenaline and trained staff to administer it on campus, because to consider the health of the students is part of the rules and regulations of the university and sometimes things like this won't be in place.' (Parent 1, Male)

Intervention 7: 'Greater access to nutritional and psychological support'

Participants discussed different ways to improve the accessibility of health care for LA with food allergies. A specific focus on increasing access to dietary and psychological support was discussed, including universities employing dietitians to facilitate educational workshops and utilising on campus counsellors to provide relevant psychological support.

'As a dietitian I agree that there needs to be more opportunities for us to help patients with food allergies. I think for the students especially, something like an educational workshop on campus every now and then could really help to improve their access to this type of support. So where dietitians can come at certain times and educate the students. Maybe even an on campus dietitian could be employed and they could lead this. I think exploring resources with them during the workshop is something we can do, so we use Allergy cookbooks and recipes that can help adolescents develop their culinary skills and we also help them to explore a variety of allergen friendly meals, going over labelling and this is something which can be done in the workshop, because it can be quite difficult to get appointments regularly, so I think this could work quite well.' (HCP 2, Female, Dietitian)

'Psychological support should be regularly provided on campus too, maybe regular counselling with an on-campus counsellor, just making the food allergy students aware that this support is there cos I can imagine them not even knowing about it. I know a lot of my patients have asked for this type of support, especially dealing with mental health and we can't

always offer the time or even expert advice, but this could be worth exploring. (HCP 1, Male, GP)

Intervention 8: 'Educating the wider community – It's a network'

An underlying theme of education was considered to be of great importance expressed by participants in the management of food allergies. TV adverts to raise awareness of food allergies were proposed as a potential way of increasing the knowledge of the wider community.

'It's a network and it's more about everyone in the community helping and supporting people with food allergies.' (Parent 1, Male)

'I also think that you see them a lot now on tv, for raising awareness different adverts for different health conditions. You don't really see this for Food allergies though I remember I was in the cinema and I saw an advert raising awareness for IBS so I think something like this for food allergy will be really beneficial to just educate everyone, make them more aware really. They are quite useful to be honest and they do get people talking more than say a pamphlet.' (FAP 1, Male, Milk and Peanut Allergy)

8.4. Discussion

One novel aspect of this PhD research was the collaboration of FAP, PC and HCPs who came together to discuss and suggest possible interventions, to improve the current FC, FA and HCA of LA with food allergies. The suggested interventions were based on findings from each phase of this study. The contribution of this unique group of participants, all of whom are directly involved in the management of food allergies, allows for a more inclusive, patient-centred approach in developing solutions that address the real-world needs of individuals with food allergies. It is important to note here that this study provides suggestions for interventions only, based on the insights gathered from the focus groups.

FOOD CHOICE

Through the focus group discussions, current food allergy labelling was a key issue raised by participants, which needed improvement. Participants suggested improving the visibility, readability and location of allergens in food labels, with participants agreeing front of pack labelling and a dedicated section for all included allergens would help in making the allergens

more noticeable. These changes have all been recommended through previous research (Barnett et al., 2011; Ju et al., 2015; Blom et al., 2021), yet evidently continue to remain a persistent issue for the food allergic community. The need for clearer signposting of food allergens across the campus cafeteria was also mentioned. While an increasing number of universities are recognising the importance of addressing the needs of their food allergic students, policies greatly vary across institutions and all staff may not have sufficient knowledge in dealing with food allergies (Choi and Rajagopal, 2013; Dyer et al., 2018). An effective labelling system is very important for the health of food allergy sufferers. Although, efforts have been made and are ongoing in the improvement of food allergy labelling (FSA, 2022) more must be done. A whole system approach is required and collaboration between allergy consumers, HCPs, the food industry, regulatory bodies and university food services is key, in the hopes of achieving more clearer and consistent labelling.

In addition to improvements in food allergy labelling, participants also mentioned the need to improve cooking skills. Knowledge of cooking can provide an excellent way to empower students with essential skills in planning and preparing foods and existing research has emphasised the benefit of this (O'Kane et al., 2021). Harper et al. (2022) further highlight how the knowledge of cooking in students will not only increase FC, but will improve overall health by allowing individuals to eat healthier. At present, no research has detailed the facilitation of cooking classes for specifically food allergic students, who require knowledge of safe FC and confidence in managing their dietary needs. Therefore, further research into this area for this group should be conducted.

FOOD ACCESS

Through the focus group, participants mentioned a few different ways to improve the current access to safe, AFF. Universities have an obligation to cater for the needs of all students and more efforts must be made to expand the availability of AFF on campus.

In addition to this, one limiting factor in accessing AFF is their high cost. It was therefore suggested that prescription vouchers provided by healthcare services would offer a solution for food allergy sufferers, in easing the financial burden of accessing safe foods. A similar initiative for the increased access to gluten free foods for coeliac sufferers is available in certain areas (Coeliac UK, 2024). However, there is yet to be a comparable approach for those with food allergies, highlighting a gap in the support system for a community which is ever growing. Bhamra et al. (2023) found that providing families with food allergies with food

subsidies in the form of coupons had a positive impact. Food costs were reduced and stress related to purchasing allergen friendly foods also declined in participants, showing the effective nature of this concept. Implementing such a strategy should be considered, as it can ensure equitable access to AFF and improve the overall well-being of food allergy patients and their families. Participants further suggested that universities should also provide additional bursaries for food allergic students, which would help them financially. Currently, universities do offer bursaries for food insecure students (Vittozzi, 2023), however there has been no record of this for students with food allergy.

The inclusion of AFF at food banks was also mentioned by participants, which would help to increase the access to safe foods during times of financial need. Previous research has also posited that while this is a good idea, food banks rarely accommodate for the dietary needs of those with food allergy (Minaker et al., 2014; Fong et al., 2022; Scurlock et al., 2022), something which was also acknowledged by participants in this study. Collaborating with food donors and suppliers to provide more allergen friendly foods in food banks, could serve as one means of overcoming this.

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Different ways to improve the HCA of LA with food allergies on campus were also discussed. To our knowledge, no UK study has explored the university campus environment and the challenges food allergic students may face while transitioning to campus life. Some studies in relation to this topic have been undertaken in the US, which mention how university campuses are not fully equipped to deal with the needs of food allergy students (Greenhawt et al., 2009; Choi and Rajagopal, 2013; Dyer et al., 2018; Bajaj et al., 2023; Wu and Wang, 2023). The authors in these studies mentioned how steps need to be taken to create a safe and supportive environment for students with food allergies, including the development of policies which are regularly updated and reviewed, incorporating adrenaline autoinjectors on campus, training staff in the case of reactions and increasing awareness of food allergies across the campus. These recommendations were echoed by the participants in this study, suggesting that the current UK universities are also under equipped to manage food allergy students. However, more research must be done in this area to gain valuable insight into the current practices of universities and challenges faced by students with food allergies. This will help to develop specific interventions that can promote the well-being of students with food allergies and foster a safe and inclusive environment for all.

The dietitian and psychologist offer a unique role in the management of food allergies (Daniels et al., 2021; Leone et al., 2022). However, the difficulty in accessing this support is a recognised challenge for FAP, as reported in Chapter 6 and previous studies (Knibb et al., 2019; National Allergy Strategy Group and All Party Parliamentary Group, 2021). Through the focus group discussion, participants discussed ways to improve the access to this type of support for students with food allergies on campus. Universities will often employ counsellors and directing food allergy students to this already existing service, may prove to be a valuable way to address their mental health and well-being needs. Many universities have excellent services to accommodate the needs of students with food allergies, including counselling and wellbeing services. Reading, Birmingham and Kent university are all excellent examples of this (Allergy UK, 2024). In comparison, NW universities are lagging behind in the support they provide for students with food allergies, suggesting a need for more research in these institutions to inform policy and practice. The recommendations discussed provide a promising approach to increase the ongoing access to dietary and psychological support for students managing food allergies at university. Further research should therefore assess the effectiveness of these approaches.

A well-informed community is a key aspect in the management of food allergies that can improve FC, FA and HCA. LA are not only reliant on their individual competence, but additionally on the understanding and competence of other's. There is a sense of shared responsibility between themselves, their social networks and the institutions of which they are a part of (Stjerna et al., 2015; Feng and Kim, 2019; Higgs et al., 2021). Therefore, educating the wider members of the community is key. This was also acknowledged by participants who proposed an interesting means of achieving this. They suggested the development of more TV adverts which were considered to be a powerful tool in raising awareness and educating the public. Anaphylaxis UK actively raises awareness for food allergies and have produced some impactful short films to that effect e.g. ‘Take the Kit’ and ‘Leos Story’. While these are powerful in nature, they may often miss reaching the broader layperson audience. Additionally, although food allergies are gaining more TV and media traction, they are often misrepresented which can lead to greater confusion and misunderstanding among the wider public (Opper, 2015). Over the last 10 years the media has drastically changed the way in which we acquire and share information, in particular for the emerging adulthood demographic (Huntley et al., 2023). TV adverts offer a crucial means of sharing health information and working alongside media experts, allergy charity bodies, FAP, HCPs and lay members of the community can result in a an innovative, engaging, comprehensive and most importantly informative means of raising awareness of food allergies.

8.5. Conclusion

The conceptualisation of the proposed interventions outlined by participants in this study offer a unique insight into the current needs of LA with food allergies, in relation to their FC, FA and HCA. Eight potential interventions under three key domains i.e., FC, FA and HCA were identified. To our knowledge, this is the first study to consider the perspectives of a diverse group of individuals in the development of suggested interventions that can optimise and ensure success in the ongoing, daily task that is food allergy management. It is again important to note here that these proposed interventions are only preliminary suggestions. Therefore, pilot testing these interventions to assess their feasibility and effectiveness is important and the consequent implementation of such strategies can assist in empowering LA with food allergies to take effective control of their allergic disease.

8.6. Limitations

Through this study we obtained valuable insights into the perspectives of the FAP, P/C and HCPs, where potential interventions to improve the overall heath and wellbeing of LA with food allergies were outlined. Despite this, it is important to discuss the limitations associated with this study.

Firstly, the proposed interventions suggested by participants were largely focused on the university context, as all FAP in this study were university students. As such, the focus on the university setting may limit the generalisability of these findings to LA who do not attend university, as they may experience different challenges and have differing needs than those in an academic environment. Therefore, this study may not fully address the broader needs of the entire LA population with food allergies.

Secondly, there was a small sample size with only two participants representing each group (FAP, P/C and HCPs). Thus, this study may not have captured the full diversity of the experiences and perspectives within each group. Again the focus of this study was in the NW of England and so the experiences shared may not reflect that of LA with food allergies in other regions, further limiting generalisability.

Thirdly, the focus groups were conducted online via MS teams to suit the varying schedules of the three different groups. Although this allowed for flexibility and allowed for individuals to partake in the session, the online format may have impacted the dynamics of the group

discussion. For example, non-verbal cues (as some participants did not turn on their camera) and the natural flow of the conversation (due to lags or delays) were less apparent with this method. Consequently, the depth of the data may have been restricted when compared to an in-person environment.

Given these limitations, it is important for further research to validate and refine the proposed interventions outlined in this study. Furthermore, pilot testing these interventions will provide a means of assessing their feasibility, especially in non-university settings as this will help to potentially address the diverse needs of all LA with food allergies. In turn, this may enhance their current management of food allergies.

Overall, the findings from this study regarding possible interventions alongside the findings from the previous chapters contribute to our understanding of FC, FA, HCA and dietary intake of the LA population, particularly in those with food allergies. Together, these studies collectively provide a comprehensive foundation for developing further interventions that can help to improve the effective management of food allergies and overall health and wellbeing. The final chapter – Chapter 9, will go on to provide a final conclusion which highlights the key findings and implications of this research, focusing on areas for further research to complement the areas that were investigated through this thesis.

Chapter 9 – Overall Conclusion

9.1. Overview

Through the previous chapters of this research, the current food choice (FC), food access (FA), healthcare access (HCA) and dietary intake of late adolescents (LA) with food allergy were explored using a mixed methods approach. This final chapter aims to provide a comprehensive understanding of the research carried out throughout this PhD research. This section begins with a brief summary of the rationale and the principal aims of this PhD research, emphasising the need to understand the unique challenges faced by LA with food allergies. This is followed by a short discussion on the overall findings from each of the studies which were undertaken and the implications of these findings. After this, recommendations for further research are discussed to build upon the findings from this research and address the ongoing challenges in the areas which were investigated. This chapter finished by mentioning the overall limitations of the research followed by an overall conclusion.

9.2. Rationale, Aims and Findings – A Summary

The period of late adolescence to adulthood is unique and complex. There is a need for individuals to explore and experiment and this is heightened as social identity is pursued, naturally leading to much risk taking in this group. The additional task of navigating food allergies during this period is challenging. Despite this being a vulnerable time, little support is currently available to meet their specific needs and limited research currently exists looking at the management of food allergies in this group. Therefore, each study in this PhD research exclusively focused on the period of late adolescence to adulthood (18-25years).

As late adolescents (LA) transition into adulthood, shifts in food choice (FC) and eating habits will occur and this will directly impact dietary intake. In those with food allergies, the implementation of an avoidance diet and the limited access to safe, nutritious foods will present additional difficulties. Moreover, access to comprehensive healthcare to manage food allergies is vital for LA who are undergoing the unique transitional period, yet this remains a challenge. Specifically this piece of research revealed that LA with food allergies struggle with the balance of managing safe, nutritious FCs, while also navigating social pressures and challenges to obtain autonomy. Enhancing access to quality food and healthcare are essential components of successfully managing food allergies, particularly for LA, as behaviours established during this period are likely to persist into later life. While some research on LA

FC, food access, healthcare access (HCA) and dietary intake do exist, this has seldom been studied in specifically LA with food allergies. Further exploration into these areas is therefore warranted and this consequently led to the development of this PhD research project. The overall aim of this research was to investigate the current FC, FA, HCA and dietary intake in LA with food allergies in NW England. Five objectives were set out to fill the existing research gaps.

1. To understand the various factors impacting FC behaviour in LA with and without food allergies,

2. To determine the access to healthy, nutritious food and allergen free food in LA with and without food allergies,

3. To explore the current HCA in LA with food allergies, from the perspective of the food-allergic patient, the parent and the HCP,

4. To determine the dietary intake of LA with and without food allergies.

5. To suggest preventive interventions with FAP, P/C of children with food allergy and healthcare practitioners who have had experience in providing care for LA with food allergies.

By addressing the above aim and objectives, valuable insights into the challenges faced by LA with food allergies in relation to food and HCA were obtained.

Four studies (Chapters 3, 4, 5 and 6) utilising mixed method approaches were undertaken to explore the current FC, FA and HCA of LA with food allergies. In relation to FC, the main finding which emerged was that despite the presence of food allergies, food-allergic LA are very similar in their determinants of FC to that of the general late adolescent population. Findings from these studies further made apparent that accessing specialist foods, due to their limited availability and high cost, is a struggle for LA with food allergies. Therefore, this indicates that although LA with food allergies share similar decision making processes to their peers, their FCs are restricted due to the need to avoid food allergens. Additionally, this piece of research found gaps in accessing healthcare for LA with food allergies. While primary care was more easily accessible, the allergy care provided at this level was not adequate with GPs often lacking in training. Specialist support was more difficult to access, in particular

participants mentioned the limited access to nutritional and psychological support. Chapter 7 utilised food diaries to gain insights into the dietary intake of LA with and without food allergies. The results highlighted how irrespective of food allergy status, dietary intake was largely similar in both groups of participants. It was additionally highlighted that despite meeting dietary requirements, overall diet quality was poor in both groups. This can be linked to poorer FCs during a time of increasing independence and lifestyle change. Each of the studies which were undertaken additionally provided a foundation for the recommendation of targeted interventions (Chapter 8), to improve the current food and HCA in this group of LA and support the management of their food allergies.

Through this PhD research we have been able to comprehensively understand the current FCs, FA, HCA and dietary intake of LA with food allergies in NW England. The insights gained from this PhD research alongside the recommended interventions can be used to inform policy and practice. This study provided several original contributions to knowledge. This is the first study to:

- explore FC, FA and HCA in LA with and without food allergies through qualitative and quantitative means.

- geographically map the access to safe, nutritious foods and AFF in LA with and without food allergies

- provide a comparative analysis between LA with and without food allergies for dietary intake.

- collaborate between FAPs, PC and HCP in the recommendation of evidence-based interventions, to improve the current FC, FA, HCA and dietary intake of LA with food allergies.

9.3. Implications of Findings

Overall, the findings from this research contribute to our understanding of FC, FA, HCA and dietary intake in LA with food allergies. There are several implications of this research which are outlined below.

Firstly, this piece of research advances our current knowledge of the complex interplay between food allergies, dietary behaviour and healthcare needs during the period of LA. Through identifying challenges LA face when making FCs, especially in the university context and the difficulties in accessing appropriate healthcare, this study fills an important gap in the existing literature. Not only do these findings provide us with a broader understanding of the different factors influencing food and HCA in this group, but it further enhances our understanding of the unique needs of LA with food allergies, a group which is often underrepresented in research.

Secondly, the findings of this study contribute to our knowledge of theoretical frameworks in the field of health, nutrition and the management of food allergies for LA. For instance, it was found that traditional models of improving FC may need to be adapted for LA, who often avoid or restrict eating in social contexts to effectively manage their food allergy. Future models should therefore consider the food safety and accessibility of those with food allergies as research indicates that social identity and peer influence can shape eating behaviour. The gaps in healthcare also found in this study illustrate the need for nutritional and psychological support to be better integrated within healthcare systems, so as to improve the effective management of food allergies in this group.

Finally, the practical implications of this research are profound. It was found that an increased access to AFF which are affordable is needed, particularly in the university environment options are currently limited and where LA spend large amounts of time. Additionally, gaps in healthcare were identified and the research indicated a need to provide more adequate care at the primary level and provide increased nutritional and psychological support. A holistic approach to food allergy management is needed and therefore healthcare practices may need to be revised to incorporate strategies that not only focus on the physical aspects of managing food allergy, but also the emotional and mental well-being of patients.

Overall, this piece of research provided key insights into the current FCs, FA, HCA and dietary intake of LA with food allergies. These findings point to several areas for future research which are outlines in the subsequent section.

9.4. Recommendations

Following the implications of this study, several important recommendations are mentioned to guide future research.

One unique aspect of this study was the intervention phase, which involved food-allergic patients, parents/carers and HCPs. The first-hand experiences and thoughts of this group are highly valuable and led to the development of interventions that are tailored to the specific needs, concerns and preferences of the target population. The implementation of these interventions will increase the likelihood of success, leading to positive outcomes in this group. Therefore, it is recommended that these interventions are pilot tested to assess their feasibility in a real-world setting and determine any potential drawbacks, allowing for any necessary changes to be made.

LA between the ages of 18 and 25years undergo a transitional phase marked by increasing independence and decision-making, which present unique challenges in the management of their food allergy. However, this group is often neglected in research. Therefore, more research focusing on this critical period of late adolescence to adulthood is needed in relation to food and HCA. Exploring how beliefs and attitudes change throughout this period of independence will also prove insightful and this can be achieved through longitudinal studies. This information can then be used to prepare LA in the effective management of their food allergies during this crucial period of development. A comparison between those in early adolescence and adulthood should also be considered, as this can provide insight into the management of food allergy and how it may evolve through the different life stages. This will prove particularly valuable for HCA, where understanding the challenges and opportunities faced by individuals in pediatric allergy care, adult allergy care and while transitioning between the health services can lead to the development of interventions, which can enhance the overall healthcare experience for all those managing food allergies. Such studies would benefit from a mixed methods approach, where using both cross-sectional and longitudinal methodology alongside interviews and focus groups can effectively capture the depth of experiences, attitudes and behaviour. Thus providing a more comprehensive understanding of how different factors influence the management of food allergies.

In addition to this, little research currently exists which has measured the food insecurity of LA with food allergies. Food insecurity can hinder the ability for this group to access safe, nutritious foods, which can influence educational attainment impacting long-term financial stability. Moreover, the period of late adolescence is one of increased growth and development and food insecurity can negatively impact nutritional choices and dietary patterns. The NW of England has a large number of neighbourhoods with high levels of socioeconomic deprivation. Focusing research in these specific areas can help to identify food deserts and uncover specific factors that contribute to the increased vulnerability of FA in this

group. Additionally, accessing AFF are difficult due to cost and limited availability. Therefore, conducting further research on the availability and variety of AFF in food banks is important for addressing the needs of LA with food allergies.

At present, there is a paucity of research looking at the management of food allergies in the university setting. The university environment presents unique challenges for individuals with food allergies and addressing this gap in knowledge is crucial. Research should focus on effective strategies to navigate these difficulties faced by LA with food allergy during this time. As the presence of food allergies will affect attendance, academic performance and overall health, future studies should also explore the impact of food allergies on the academic performance of food-allergic students. The effectiveness of existing university policies which have been designed to support food-allergic students during their time at university, should additionally be investigated. This can inform the need for any improvements in protocols which can benefit the food-allergic student population. In the same way, a closer look at the knowledge, attitudes and practices of staff at the university, in particular dining services, will prove beneficial in determining the level of allergy preparedness and identify any training gaps. Both surveys and interviews with students and university staff can help to assess the level of allergy preparedness in the university context and identify any gaps in training and policy. The research findings from these proposed studies can serve as a basis to encourage policy change allowing universities to adopt evidence-based practices, thus creating an inclusive and supportive environment, one which prioritises the safety and the well-being of all students with food allergies.

Furthermore, additional research could focus on exploring the economic burden of food allergies in LA and their families. A specific focus in the context of university life for LA who are students could potentially be considered. There is a significant financial strain associated with higher education and this coupled with the management of food allergies during this time can create additional challenges for this group. Investigating how these pressures of university life directly impact the management of food allergies can provide valuable insights into the need for financial support such as bursaries and subsidies that are specifically tailored for students with food allergies. Quantitative surveys with food allergy students and their families can provide initial insights. Employing qualitative methodology such as semi-structured interviews and focus groups can further add to this data providing more depth. Additionally, using longitudinal study methods can also provide an understanding of how financial pressures and the management of food allergies may evolve over time and influence academic outcomes. These combined approaches can provide a greater, more

comprehensive understanding of the economic challenges faced by LA with food allergies in the university environment, which could ultimately inform future interventions and polices.

9.5. Overall Limitations

A mixed methods approach was utilised for this PhD research. This combination of both quantitative and qualitative methodologies allowed for a more comprehensive understanding of the research questions. While this study has made useful contributions, it is also essential to recognise, discuss and reflect upon the limitations that existed in this research, which may have impacted the interpretation and generalisability of the results.

For phase one of this research, online questionnaires were used to initially collect data for the FC, FA and HCA of LA. While this allowed for a quick and easy manner of gathering a large amount of data, without a researcher present, participants may have misinterpreted some questions - although a pilot study was conducted to overcome this. For the first questionnaire directed toward LA with and without food allergies, the term 'healthy, nutritious food' was not defined. This could have led to different interpretations based on individual beliefs, culture and nutritional knowledge. This subjectivity may have resulted in varied responses, making it challenging to draw clear conclusions and generalise the results.

One primary limitation of this study is the reliance on self-reporting. Participants may not have provided accurate and/or truthful information when completing the online questionnaires. This is especially true for the food diaries where participants were asked to share information relating to their personal diet. It is often the case that adolescents are reluctant to truthfully share about their diet due to fear of judgement and in many cases will report what they perceive to be as socially acceptable, as opposed to actual dietary habits (Jones et al., 2021). Memory bias could have also played a part in the potential for inaccurate responses in the participants who completed the food diaries. Despite the software Libro being employed to ease recording of food consumption, some participants may have struggled to remember all the foods and beverages consumed over the four days, especially if they did not record this information immediately after consumption. Moreover, recording all foods and beverages over a period of 4-days may prove burdensome for some participants, which may have also led to inaccurate recordings. One additional factor to be considered as a limitation, is the period of time in which the diet diary responses were collected. To allow for a larger number of participants to take part, three separate weeks were used for data collection. The different time periods could have captured variations in the eating habits of the participants due to

social and environmental factors e.g. assignment or exam stress which is known to alter dietary habits (Hafiz et al., 2023), making it difficult to draw reliable and consistent conclusions regarding the overall dietary intake of the group.

One strength of the qualitative focus groups was the unique insight into the lived experiences of food-allergic patients, parents and HCPs. However, there is also an element of social desirability with this method where participants may have provided responses influenced by perceived societal expectations, thus impacting the validity of the results. In addition to this, all focus groups were conducted online via MS Teams due to time constraints and scheduling challenges due to the diverse nature of the participants group (food-allergic patients, parents and HCPs). This presented some challenges. For example, some participants experienced technical difficulties causing them to miss parts of the session, which disrupted the flow of the focus group. Additionally, although participants were encouraged to turn on their cameras to mirror an 'in person' focus group setting, not everyone complied making it difficult to interpret body language and facial expressions. Many participants also faced distractions in their home/work environment, as was evident through background noise, which could have affected their focus and impacted the quality of their contributions. There was also an unequal participation from participants in each focus group. Perhaps the nature of the online setting discouraged some participants to actively engage, despite efforts from myself. Furthermore, saturation of focus groups, where the emergence of new themes and information reaches a standstill, allows for a comprehensive understanding of the research questions. However, due to limited time, it was only managed to conduct two focus groups for the food-allergic patients and one for parents/carers and HCP. Thus, there may be new themes that remain unexplored.

Across each of the studies, sample size could have posed potential issues, which could have affected the generalisability of the results to the broader population. Time constraints of course played a part in this. In particular, recruiting HCP was challenging due to their limited availability and accessibility, with a considerably smaller number of this group taking part in the initial questionnaires (n=42). Similarly, despite data collection for the diet diaries spread over three weeks, a small number of participants (n=72) were included in the final sample for this study. This could be attributed to the burdensome nature of recording food and beverage intake or possibly the limited time constraints experienced by LA owing to the balance of education, work and social activities.

In addition to this, the sample of food-allergic LA in this study while providing valuable insights, had limitations in terms of representation. Most participants were LA from university settings. There is a lack of representation as the experiences of food-allergic LA who do not attend

university were not captured. Future research should therefore include a more diverse participant pool, ensuring a broader representation of the food-allergic population.

Despite the limitations mentioned above, this piece of research does add to the existing literature and additionally contributes new insights in relation to the FC, FA, HCA and dietary intake of LA with food allergies. Future studies should aim to consider these limitations through refining methodologies, while also employing more diverse methods, which can help to provide a more comprehensive understanding of the complex interplay between FC, FA, HCA and dietary intake of LA with food allergies.

9.6. Overall Conclusion

In conclusion, this PhD research endeavoured to gain insights into the current FC, FA, HCA and dietary intake of LA with food allergies. The recommendations and the limitations outlined above are designed to inform future research in the areas studied that will lead to the development of practical, targeted interventions, in the hopes of improving the management of food allergies in LA and their overall quality of life. This piece of research stands as a stepping stone toward a deeper understanding of the challenges faced by LA with food allergies. Ongoing collaboration and efforts between food-allergic patients and their families, HCPs, allergy charity bodies, key stakeholders and researchers is required, to enhance the experiences and outcomes of this too often neglected yet critical life stage.

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Appendices

Appendix 1 – Food Choice Questionnaire

Food Choice Behaviour

Page 1

An Investigation into the Current Food Choice Behaviour of Late Adolescents with and without Food Allergies

Page 2: Consent

Project Background:

Individuals between 18 and 25 years will be in a state of transition from late adolescence to adulthood. This period of transition presents a challenging developmental stage, due to factors such as increased peer pressure and heightened emotions, which can lead to poor food choice. Food insecurity has been defined as the inability to acquire sufficient food to meet nutritional requirements, due to financial or resource constraints. Food insecurity can negatively impact all populations. However, individuals with a food allergy undergoing this crucial period of transition from late adolescence to adulthood, are the most vulnerable. Poor food selection behaviour is prevalent in this group of individuals and is associated with adverse physical and mental health effects.

Furthermore, an under recognition of food allergies exists in those with a lower socio-economic status. These individuals have poorer access to food and once diagnosed, cost of medication and continued support (e.g. travelling long distances for safe quality food and health care) presents an economic burden.

Late adolescents with food allergies who are subject to reduced food access, are more likely to engage in unhealthy behaviours. For instance, skipping breakfast, inadequate sleep, consuming alcohol, smoking cigarettes, substance abuse and binge-eating, are all common practices prevalent amongst late adolescents experiencing food insecurity. This can have devastating effects for future health status, as behaviours established during late adolescence are likely to persist into adulthood. Therefore, promoting positive change during this life stage is critical.

Limited research is currently available investigating the food choice for those with food allergies, undergoing the period of transition from late adolescence to adulthood.

Aim:

The research aims at understanding the impacts of food allergy and socioeconomic status on food access, nutritional status and health care access in late adolescents with and without food allergies.

Participant Criteria:

You have been invited to take part in this study because you fulfill the following participant inclusion criteria:

- Between the ages of 18 and 25
- Diagnosed with a food allergy OR Do not suffer from any food allergy

1. If you agree to participate in this research, please select 'I agree' ✱ *Required*

- ○ I agree
- ○ I disagree

Page 3: Section One - About You

2. What is your Age? ✱ *Required*

- 18
- 19
- 20
- 21
- 22
- 23
- 24
- 25

3. What is your Gender? ✱ *Required*

- Male
- Female
- Transgender
- Prefer not to say

4. What is your Height (cm)? ✱ *Required*

5. What is your Weight (kg)? ✱ *Required*

4 / 31

6. What is your Postcode? ✱ *Required*

7. What is your Ethnicity? ✱ *Required*

- White British
- White European
- White Other
- Black: British Caribbean
- Black: British African
- Black: British Other
- Asian: British Indian
- Asian: British Pakistani
- Asian: British Other
- Mixed Background
- Chinese
- Other

7.a. If you selected Other, please specify:

8. What is your highest level of Education? ✱ *Required*

- None

- GCSE (or equivalent qualification)
- A-Level (or equivalent qualification)
- Bachelors Degree
- Post Graduate Degree
- Other

8.a. If you selected Other, please specify:

9. What is your current Occupational Status? ✱ *Required*

- Part-time Student
- Full-time Student
- Self-employed
- Part-time employed
- Full-time employed
- Unemployed
- Other

9.a. If you selected Other, please specify:

9.b. If 'student' was selected, do you currently live on campus?

- Yes
- No

10. How many individuals including yourself live in your household? ✱ *Required*

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ Other

10.a. If you selected Other, please specify:

11. Which of the following best describes the area in which you live? ✱ *Required*

- ○ City
- ○ Town
- ○ Countryside
- ○ Village
- ○ Other

11.a. If you selected Other, please specify:

Page 4: Section Two: About your Diet/Diet Quality

12. Which type of diet do you currently follow? ✱ *Required*

- ○ Vegan
- ○ Vegetarian
- ○ Mainly animal based foods, with some plant based foods
- ○ Mainly plant based foods, with some animal based foods
- ○ Other

12.a. If you selected Other, please specify:

13. How would you best describe your overall diet? ✱ *Required*

- ○ Different everyday
- ○ Different only during the week
- ○ Different only during the weekends
- ○ Not much variation

14. Do you currently take any supplements? ✱ *Required*

- ○ Yes
- ○ No

14.a. If Yes, which one/s?

15. Have you been told by a medical practitioner to alter your diet due to medical conditions other than food allergy, such as diabetes, obesity, Crohn's disease, ulcerative colitis?' ✱ *Required*

- ○ Yes
- ○ No

15.a. If Yes, which one/s?

16. Do you currently take any medication? ✱ *Required*

- ○ Yes
- ○ No

16.a. If Yes, which one/s?

Page 5: Section Three: About your Lifestyle

17. Do you currently smoke? ✱ *Required*

- ○ Yes
- ○ No

17.a. If Yes, how many per day?

17.b. If No, have you previously smoked on a regular basis?

- ○ Yes
- ○ No

18. How often do you consume alcohol? ✱ *Required*

- ○ Everyday
- ○ 3-5 times/week
- ○ Once a week
- ○ Only on weekends
- ○ Other
- ○ N/A - I do not consume alcohol

18.a. If you selected Other, please specify:

19. How many days/week do you perform exercise? ✱ *Required*

- ○ Everyday
- ○ 3-5 times/week
- ○ 2-3 times/week
- ○ Once a week
- ○ Less than once a week

Page 6: Section Four: About your Food and Health Care Access/Availability

20. Do you currently possess a driving license? ✱ *Required*

- ○ Yes
- ○ No

21. Do you currently own your own vehicle? ✱ *Required*

- ○ Yes
- ○ No

22. If No to Questions 18 and 19, what is your most frequent mode of transport when accessing food and/or health care? ✱ *Required*

- ○ Bike
- ○ Car (Passenger)
- ○ Bus
- ○ Train
- ○ Taxi
- ○ Walking
- ○ Other

22.a. If you selected Other, please specify:

12 / 31

23. How many miles from where you live, do you need to travel to the nearest store to purchase healthy, nutritious food? ✱ *Required*

- < 1 mile
- 1 to 2 miles
- 2 to 4 miles
- 4 to 6 miles
- 6 to 8 miles
- 8 to 10 miles
- > 10 miles

24. How many miles from where you live, do you need to travel to your nearest GP or health centre? ✱ *Required*

- < 1 mile
- 1 to 2 miles
- 2 to 4 miles
- 4 to 6 miles
- 6 to 8 miles
- 8 to 10 miles
- > 10 miles

25. How many miles from where you live, do you need to travel to your nearest hospital? ✱ *Required*

- < 1 mile
- 1 to 2 miles
- 2 to 4 miles
- 4 to 6 miles

- 6 to 8 miles
- 8 to 10 miles
- > 10 miles

26. In the last 12 months, has there been any occasion when you were in need of the following - Medication, Specialist Care, Follow-up Care - but due to FINANCIAL constraints you were unable to do so? ✱ *Required*

- Yes
- No

26.a. If Yes, which one/s were you unable to access? *Optional*

- Medication
- Specialist Care
- Follow-up Care

26.b. If Yes, has the Covid-19 pandemic influenced your financial ability to access Medication/Specialist Care/Follow-up Care?

- Yes
- No

27. In the last 12 months, has there been any occasion when you were in need of the following - Medication, Specialist Care, Follow-up Care - but due to TRAVEL constraints you were unable to do so? ✱ *Required*

- Yes
- No

27.a. If Yes, which one/s were you unable to access?

- ☐ Medication
- ☐ Specialist Care
- ☐ Follow-up Care

27.b. If Yes, has the Covid-19 pandemic influenced your travel ability to access Medication/Specialist Care/Follow-up Care?

- ○ Yes
- ○ No

Page 7: Section Five: About your Food Choice

Food choice is a complex and multifactorial process. Below is a list of different determinants of food choice, which have each been placed into different categories. Using the 5-point Likert scale, rate how influential each of the following items within each category are, with respect to your food choice.

28. Sensory Aspects of Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 5 answer(s).

	Not Influential	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Taste	☐	☐	☐	☐	☐
Smell	☐	☐	☐	☐	☐
Appearance	☐	☐	☐	☐	☐
Texture	☐	☐	☐	☐	☐
Hunger	☐	☐	☐	☐	☐

29. Convenience and Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 3 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Ease of Access	☐	☐	☐	☐	☐
Cooking Skills	☐	☐	☐	☐	☐

Time taken to prepare	☐	☐	☐	☐	☐

30. Social Aspects of Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 3 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Family	☐	☐	☐	☐	☐
Peers	☐	☐	☐	☐	☐
Culture	☐	☐	☐	☐	☐

31. Psychological Aspects of Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 2 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Emotion	☐	☐	☐	☐	☐
Stress	☐	☐	☐	☐	☐

32. Economic Aspects of Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 2 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Cost	☐	☐	☐	☐	☐
Income	☐	☐	☐	☐	☐

33. Advertising and Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 2 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Social Media	☐	☐	☐	☐	☐
TV Adverts	☐	☐	☐	☐	☐

34. University and Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 3 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
The University Environment (living on campus)	☐	☐	☐	☐	☐
Student Life	☐	☐	☐	☐	☐
Exams	☐	☐	☐	☐	☐

35. Familiarity and Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 2 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
Previous Experience (It is familiar)	☐	☐	☐	☐	☐
Habit (It is usually what I eat)	☐	☐	☐	☐	☐

36. Health Aspects of Food Choice ✱ *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 9 answer(s).

	Not influential at all	Slightly Influential	Moderately Influential	Very Influential	Extremely Influential
The number of vitamins and minerals it contains	☐	☐	☐	☐	☐
How fresh it is	☐	☐	☐	☐	☐
Ability to help control weight	☐	☐	☐	☐	☐
Energy Balance	☐	☐	☐	☐	☐
If it contains only natural ingredients	☐	☐	☐	☐	☐
High Fibre	☐	☐	☐	☐	☐
Low fat	☐	☐	☐	☐	☐
Low salt	☐	☐	☐	☐	☐
Low sugar	☐	☐	☐	☐	☐

37. Labelling and Food Choice * *Required*

Please don't select more than 1 answer(s) per row.

Please select at least 2 answer(s).

	Never	Rarely	Sometimes	Often	Always
I read the food label...	☐	☐	☐	☐	☐
I can easily understand the food label...	☐	☐	☐	☐	☐

Page 8: Section Six: About Your Food Allergy

The following section is only to be completed by those participants who possess one or more food allergies.

38. Do you have a Food Allergy?

- ○ Yes
- ○ No

39. Which food/s are you allergic to?

- ☐ Celery
- ☐ Gluten
- ☐ Crustaceans
- ☐ Egg
- ☐ Fish
- ☐ Lupin
- ☐ Milk
- ☐ Molluscs
- ☐ Mustard
- ☐ Tree Nuts
- ☐ Peanuts
- ☐ Sulphur Dioxide
- ☐ Soya
- ☐ Sesame Seeds
- ☐ Other

39.a. If you selected Other, please specify:

40. How were you diagnosed with your food allergy? ✱ *Required*

- [ ] Skin prick test
- [ ] Blood test
- [ ] Food elimination diet
- [ ] Self-Diagnosed
- [ ] Other

40.a. If you selected Other, please specify:

41. Have you been prescribed any medication for your food allergy? ✱ *Required*

- ○ Yes
- ○ No

41.a. If Yes, which medications have you been prescribed? *Optional*

41.b. If Yes, do you always take your prescribed medication with you wherever you go? *Optional*

- Yes
- No

41.b.i. If No, why not?

42. Do you currently live with anyone who also possesses a food allergy?

- Yes
- No

42.a. If Yes, what is your relationship with this individual?

43. When was the last time you experienced an allergic reaction?

- In the last year
- In the last 2 years
- In the last 5 years
- In the last 10 years
- More than 10 years
- N/A - I have never had an allergic reaction

44. Was your last allergic reaction accidental?

- Yes
- No
- Unsure
- N/A - I have never had an allergic reaction

45. How would you rate the severity of your most recent allergic reaction?

- MILD (Redness of the skin, runny nose/sneezing, slight cough)
- MODERATE (Hives, eczema, itchy mouth, stomach pain, odd taste in the mouth)
- SEVERE/LIFE THREATENING (obstructive swelling of the lips, tongue, and/or throat, trouble swallowing, shortness of breath, turning blue, drop in blood pressure, loss of consciousness, chest pain, weak pulse)
- N/A - I have never had an allergic reaction

46. How much does your food allergy influence your diet?

- Not influential at all
- Slightly Influential
- Moderately Influential
- Very Influential
- Extremely Influential

47. How often do you avoid the food/s you are allergic to

- Never
- Rarely

- ○ Sometimes
- ○ Often
- ○ Always

48. What precautions do you take to avoid the food/s you are allergic to?

- ☐ Reading food labels
- ☐ Contacting food companies
- ☐ Asking cooks/chefs when eating out
- ☐ Asking waiters/service staff when eating out
- ☐ Checking menus/websites
- ☐ Asking friends about food they have prepared
- ☐ Carrying an adrenaline auto-injector
- ☐ Wearing a medical ID
- ☐ Other

48.a. If you selected Other, please specify:

49. Have you used an adrenaline auto-injector before?

- ○ Yes
- ○ No
- ○ Unsure

50. Do you know how to accurately administer an adrenaline auto-injector?

- Yes
- No
- Unsure

51. How often do you carry an adrenaline auto-injector with you?

- Never
- Rarely
- Sometimes
- Often
- Always

52. Do you feel your food allergy does impact or has previously impacted your quality of life?

- Yes
- No

52.a. If Yes, provide details as to how you have been affected

53. How many miles do you need to travel to the nearest store to purchase allergen free food?

- < 1 mile
- 1 to 2 miles
- 2 to 4 miles
- 4 to 6 miles
- 6 to 8 miles
- 8 to 10 miles
- > 10 miles

54. How many miles do you need to travel to receive health care for your food allergy?

- < 1 mile
- 1 to 2 miles
- 2 to 4 miles
- 4 to 6 miles
- 6 to 8 miles
- 8 to 10 miles
- > 10 miles

55. Do you regularly attend your health care centre to seek or receive treatment for your food allergy?

- Yes
- No

55.a. If No, why not?

56. Do you currently have access to transition care at your local GP clinic or hospital, to support the management of your food allergy? *(Transition care can be defined as the process of providing the necessary support - medical, psychosocial and educational needs - to those in late adolescence, as they prepare to move from paediatric allergy services to adult allergy services)*

- ○ Yes
- ○ No
- ○ Unsure

56.a. If Yes, what resources are available? *(Tick all that apply)*

- ☐ Designated phone hotline
- ☐ Appointments with a designated health care professional
- ☐ E-resources
- ☐ Webinars
- ☐ Workshops
- ☐ N/A - no specific resources
- ☐ Unsure
- ☐ Other

56.a.i. If you selected Other, please specify:

57. Which Healthcare Professional/s do you feel have helped you the most throughout your food allergy? *(Tick all that apply)*

- ☐ Allergy Specialist
- ☐ Allergy Nurses
- ☐ GP
- ☐ Pharmacists
- ☐ Dietitians
- ☐ Speech and Language Therapist
- ☐ Psychologists
- ☐ Other

57.a. If you selected Other, please specify:

58. Have you been seen by an allergy specialist before? ✱ *Required*

- ○ Yes
- ○ No

58.a. If Yes, for how long?

58.a.i. Has your experience/s with an allergy specialist been useful?

- ○ Yes
- ○ No

58.b. If No, why not?

59. Do you feel you could be better supported in managing your food allergy? ✱ *Required*

- Yes
- No

59.a. If Yes, please provide details as to how.

60. Do you feel there is adequate support for the mental health of those with food allergies? ✱ *Required*

- Yes
- No

60.a. If No, what would you like to see improved with regards to quality and access of mental health care?

Page 9: Final page

Thank you for taking the time to complete this survey. The findings will help to further our understanding of the current food choice for late adolescents with food allergies.

Appendix 2 - Distance travelled of 8 to 10 miles and > 10 miles by food allergic participants by postcode region

HEALTHY NUTRITOUS FOOD	
8 TO 10 MILES	**>10 MILES**
BB2	PR2
BB3	LA9
BB7	LA13
PR1	BL5
LA11	BL9
FY5	L12
BL1	L17
BL5	L19
M4	L23
M12	L34
M50	CH36
WN6	CH65
L15	CW10
L16	
CW10	
ALLERGEN FREE FOOD	
8 TO 10 MILES	**>10 MILES**
BB3	PR2
PR7	PR4
LA9	M9
FY8	WN3
BL3	WN4
BL5	L12
M6	CH32
M7	CW10
WN2	
L23	
L27	
CH28	

PRIMARY CARE	
8 TO 10 MILES	**>10 MILES**
BB2	PR2
M6	PR4
M11	BL3
L16	BL6
	BL8
	L12
	CH61
SECONDARY/TERTIARY CARE	
8 TO 10 MILES	**>10 MILES**
BB9	BB2
	BB3
	BB8
	FY5
	PR1
	PR2
	PR4
	PR7
	LA9
	LA14
	LA17
	BL5
	BL6
	BL8
	M6
	M7
	M9
	M12
	WN6
	L12
	L19
	L23

SECONDARY/TERTIARY CARE	
8 TO 10 MILES	**>10 MILES**
	L27
	L34
	CH28
	CH65
	CH70
	CW10

Appendix 3 – Healthcare Access Questionnaire

Health Care Access

Page 1

An Investigation into the Current Health Care Access for Late Adolescents with Food Allergies

Page 2: Consent

Project Background:

The period of transition from late adolescence to adulthood (18 to 25 years) is a challenging developmental stage. It is a time of physical, cognitive, psychological and social development. This coupled with responsibility of self-management of a food allergy, makes it an extremely stressful and significant period.

Access to adequate healthcare is a basic requirement for all those suffering from food allergies. It is imperative that late adolescents with food allergies have the means to obtain sufficient knowledge, skills and confidence, allowing them to gain independence and enhance individual self-management abilities. Despite this, allergy service provision across the UK is severely lacking, with a shortage of allergy clinics and specialists available, who can provide the necessary advice and treatment.

Furthermore, an under recognition of food allergies exists in those with a lower socio-economic status. These individuals have poorer access to health care and once diagnosed, cost of medication and continued support (e.g. travelling long distances for safe quality food and health care) presents an economic burden.

Limited research is currently available investigating the current health care access for those with food allergies, undergoing this period of transition from late adolescence to adulthood.

Aim:

The research aims at understanding the impacts of food allergy and socioeconomic status on food access, nutritional status and health care access in late adolescents with and without food allergies.

Participant Criteria:

You have been invited to take part in this study because you are a health care professional, who has worked with or currently works with 18 to 25 year olds with one or more existing food allergies.

1. If you agree to participate in this research, please select 'I agree' * *Required*

- I agree
- I disagree

Page 3: Questions

2. What is your Age? ✱ *Required*

- ○ 20-29
- ○ 30-39
- ○ 40-49
- ○ 50-59
- ○ 60+

3. What is your Gender? ✱ *Required*

- ○ Male
- ○ Female
- ○ Transgender
- ○ Prefer not to say

4. What is the postcode of the place in which you currently work? ✱ *Required*

5. Which of the following best describes where the patients you see live? *(Tick all that apply)* ✱ *Required*

- ☐ City
- ☐ Town
- ☐ Countryside

- [ ] Village
- [ ] Other

5.a. If you selected Other, please specify:

6. What is your current profession? ✱ *Required*

- ○ Doctor
- ○ Nurse
- ○ Pharmacist
- ○ Dietitian
- ○ Speech and Language Therapist
- ○ Psychologist
- ○ Health Care Assistant
- ○ Other

6.a. If you selected Other, please specify:

7. Which of the following fields do you currently specialise in at the place in which you work? *(Tick all that apply)* ✱ *Required*

- [ ] Primary Care
- [ ] Paediatrics
- [ ] Adult Medicine

- [ ] Allergy
- [ ] N/A - I do not specialise in any field
- [ ] Other

7.a. If you selected Other, please specify:

8. In which setting do you currently work? *(Tick all that apply)* ✱ *Required*

- [ ] Primary Care (e.g. health centre/walk-in clinic)
- [ ] Secondary Care (e.g. hospital setting with a specialist)
- [ ] Tertiary Care (e.g. hospital setting providing highly specialised services)
- [ ] Private Practice
- [ ] Other

8.a. If you selected Other, please specify:

9. Which age ranges does your service cover? *(Tick all that apply)* ✱ *Required*

- [ ] All ages
- [ ] 0-14
- [ ] 15-17
- [ ] 18-24
- [ ] 25+
- [ ] Other

9.a. If you selected Other, please specify:

10. How many years has your current work involved seeing 18 to 25 year olds with one or more existing food allergies? ✱ *Required*

- 0-5 years
- 6-10 years
- 11-20 years
- 20+ years

11. Have you had any specific training in how to care for 18 to 25 year olds with one or more existing food allergies? ✱ *Required*

- Yes
- No
- Unsure

11.a. If Yes, provide details

12. In the last year, how many patients between the ages of 18 and 25 years with one or more existing food allergies did you see? *(Note: This could be for any reason relating*

to their food allergy). ✱ *Required*

- ○ 0-5
- ○ 6-10
- ○ 11-15
- ○ 16-20
- ○ 20-25
- ○ 26+

13. How many patients between the ages of 18 and 25 years with one or more existing food allergies, regularly attend their appointments at the place in which you currently work? ✱ *Required*

- ○ 0-10%
- ○ 11-25%
- ○ 26-50%
- ○ 51-75%
- ○ 76-100%
- ○ Unsure

14. Will irregular attendance by 18 to 25 year olds with one or more existing food allergies, at the place in which you currently work, lead to them being discharged from your services or lead to the removal of their name from the GP practice list? ✱ *Required*

- ○ Yes
- ○ No
- ○ Sometimes
- ○ Unsure

15. How confident are you in providing tailored advice for 18 to 25 year olds with one or more existing food allergies? ✱ *Required*

- ○ Not confident at all
- ○ Somewhat confident
- ○ Fairly confident
- ○ Completely confident

16. What resources does the place in which you currently work have, that are tailored to meet the needs of 18 to 25 year olds with one or more existing food allergies? *(Tick all that apply)* ✱ *Required*

- ☐ Designated phone hotline
- ☐ Appointments with the designated practice/service lead
- ☐ E-resources
- ☐ Webinars
- ☐ Workshops
- ☐ Transition guidelines for health care professionals
- ☐ Transition assessment tools
- ☐ N/A - no specific resources
- ☐ Other

16.a. If you selected Other, please specify:

17. In your current place of work, who is responsible for deciding when patients should transfer from paediatric to adult allergy services? *(Tick all that apply)* ✱ *Required*

- [ ] Allergy Consultant
- [ ] Allergy Nurse
- [ ] GP
- [ ] Patient
- [ ] Other
- [ ] Unsure

17.a. If you selected Other, please specify:

18. At what age do you believe that transition care should begin? ✱ *Required*

- ○ 10-14 years
- ○ 15-17 years
- ○ 18-25 years
- ○ 26+
- ○ Other

18.a. If you selected Other, please specify:

19. At what age does transition care for individuals with one or more food allergies begin, at the place in which your currently you work? ✱ *Required*

- ○ 10-14 years
- ○ 15-17 years

- 18-25 years
- 26+
- Other
- N/A - There is currently no transition care

19.a. If you selected Other, please specify:

20. How important do you believe transition care is for 18 to 25 years olds with one or more existing food allergies? ✱ *Required*

- Not important at all
- Slightly Important
- Important
- Fairly Important
- Extremely Important

21. How would you rate the communication regarding your patients (18 to 25 year olds with one or more existing food allergies), between the local allergy clinics and their primary care providers? ✱ *Required*

- Very Poor
- Poor
- Average
- Good
- Excellent

22. Please use the space below to provide any additional thoughts you may have, about the transition process for 18 to 25 year olds with one or more existing food allergies.

Page 4: Final page

Thank you for taking the time to complete this survey. The findings will help to further our understanding of the current health care access for late adolescents with food allergies

Appendix 4 – Topic guides

Food Allergic Patients

Transitioning to Independence: Late Adolescents Access to Food and Health Care and Self-Management of Food Allergies

Topic Guide

Introduction:

Hi everyone, thank you all for attending today. My name is Zainab Laheri and I am a PhD student at the University of Central Lancashire. I will be facilitating todays focus group. With me is my colleague (name of colleague…). He/she will observe the procedure, take notes and record the session.

Purpose and Guideline:

We are here today to explore how your food allergy influences your attitudes, behaviours, beliefs and experiences when it comes to choosing food. We have a list of pre-determined factors of food choice that will be used to initially prompt the discussion. However, these are not extensive and if you would like to discuss any additional determinants of food choice not mentioned, please feel free to do so. There are no right or wrong answers. You can agree or disagree with each other and you may change your mind at any time during the session. This is an open space and I would like you to feel comfortable speaking your mind and sharing your views. You will not be judged on what you say. Your participation is voluntary and if at any point you feel uncomfortable, you may leave.

During the session, my colleague will be taking notes and tape-recording the session, to ensure nothing is missed. Please speak one at a time and speak clearly. Show respect to others when they are speaking and sharing their views. If possible, please turn off your phones before the session begins to ensure there are no disruptions. Everything you say will of course be confidential. You will not be able to be identified from what you say during this discussion. For the sake of analysis, each participant will be assigned a code to ensure anonymity. However, to illustrate certain points, direct quotes will be included within the final thesis.

Before we begin does anyone have any questions?

Focus Group Discussion

Food Choice

- Social aspects - *family, peers, culture, eating out*
- University Environment - *living on campus, student life, exams*

Prompt individuals – Why do certain factors influence you more? Do you actively try to eat healthily? What challenges do you face when trying to eat healthily - particularly on campus during your time at university. Is there a difference between your diet at home in comparison to your diet when you are at university?

Food Allergy

- Do you feel you are more restricted in your food choices because of your food allergy?
- Do you feel you have enough access to allergen free foods?
- Do you regularly read food labels? If not, why?
- Are there any barriers when eating out? If yes, what are they?
- Do you openly discuss your food allergy with your peers/individuals at university/colleagues? Have you had to compromise eating healthily, in order to stay safe and not risk an allergic reaction?
- Do you feel you are able to eat more healthy whilst keeping safe at home?
- How often do you use food banks? Do you feel that food banks include enough options for allergen free foods?

Are there any factors that impact your food choice that have not been discussed? If so, what are they? To what extent do these influence your food choice?

Health Care Access

- Do you feel you are being provided sufficient care for your food allergy?
- Have you experienced any challenges when trying to access care for your food allergy? If so, what are they? Online access of Health Care? Self-Help?
- GP's – Sufficient care being provided?
- Typically how long do you travel to access secondary or tertiary care for your food allergy?
- How do you feel about the current mental health support that is being provided by health care professionals? Psychological impact of food allergies?

Is there anything else that you would like to discuss?

Thank you for taking the time to explore your current food choice, food access and health care access. Everything discussed has been extremely helpful.

Once you have left, if you have anything further to add or you forgot to mention anything during this session, please feel free to email me (contact information can be found on the participant information sheet). Thank you once again for your participation. You will receive your £25 gift voucher via email in the next week.

Parents/Carers

Transitioning to Independence: Late Adolescents Access to Food and Health Care and Self-Management of Food Allergies

Topic Guide

Introduction:

Hi everyone, thank you all for attending today. My name is Zainab Laheri and I am a PhD student at the University of Central Lancashire. I will be facilitating todays focus group. With me is my colleague (name of colleague…). He/she will observe the procedure, take notes and record the session.

Purpose and Guideline:

We are here today to explore your childs diet in relation to their food allergy and health care access.

There are no right or wrong answers. You can agree or disagree with each other and you may change your mind at any time during the session. This is an open space and I would like you to feel comfortable speaking your mind and sharing your views. You will not be judged on what you say. Your participation is voluntary and if at any point you feel uncomfortable, you may leave.

During the session, my colleague will be taking notes and tape-recording the session, to ensure nothing is missed. Please speak one at a time and speak clearly. Show respect to others when they are speaking and sharing their views. If possible, please turn off your phones before the session begins to ensure there are no disruptions. Everything you say will of course be confidential. You will not be able to be identified from what you say during this discussion. For the sake of analysis, each participant will be assigned a code to ensure anonymity. However, to illustrate certain points, direct quotes will be included within the final thesis.

Before we begin does anyone have any questions?

Focus Group Discussion

Food Allergy and Diet

- What challenges do you as parent/carers face when trying to ensure that your child is able to eat healthily with a food allergy.
- Do you feel as though your child is having to compromise the nutritional quality of their diet, because of their food allergy?
- How often do you read food labels? Do you find the current food labelling challenging to interpret?
- How do you prepare your child to manage their food allergy and diet when they are moving away from home for the first time.

Health Care Access

- Have you faced any challenges when accessing health care for your child?
- What sort of guidance and support have you been exposed to so far, when accessing health care for your child.
- Do you feel you have enough guidance and support to make informed decisions about your child's healthcare, with regard to their food allergy?
- At what age do you think transition care between paediatric and adult health care services should start? Why do you think this?
- What additional healthcare support do you feel would benefit your child?

Is there anything else that you would like to discuss?

Thank you for taking the time to explore your child's impact of food allergy on their diet and their health care access. Everything discussed has been extremely helpful.

Once you have left, if you have anything further to add or you forgot to mention anything during this session, please feel free to email me (contact information can be found on the participant information sheet). Thank you once again for your participation. You will receive your £25 gift voucher via email in the next week.

Health Care Professionals

Transitioning to Independence: Late Adolescents Access to Food and Health Care and Self-Management of Food Allergies

Topic Guide

Introduction:

Hi everyone, thank you all for attending today. My name is Zainab Laheri and I am a PhD student at the University of Central Lancashire. I will be facilitating todays focus group. With me is my colleague (name of moderator). He/she will observe the procedure, take notes and record the session.

Purpose and Guideline:

We are here today to explore the current health care access available for late adolescents (18-25years) with food allergies. We will also discuss any barriers or facilitators you may have experienced when providing care for these individuals. There are no right or wrong answers. You can agree or disagree with each other and you may change your mind at any time during the session. This is an open space and I would like you to feel comfortable speaking your mind and sharing your views. You will not be judged on what you say. Your participation is voluntary and if at any point you feel uncomfortable, you may leave.

During the session, my colleague will be taking notes and tape-recording the session, to ensure nothing is missed. Please speak one at a time and speak clearly. Show respect to others when they are speaking and sharing their views. If possible, please turn off your phones before the session begins to ensure there are no disruptions. Everything you say will of course be confidential. You will not be able to be identified from what you say during this discussion. For the sake of analysis, each participant will be assigned a code to ensure anonymity. However, to illustrate certain points, direct quotes will be included within the final thesis.

Before we begin does anyone have any questions?

Focus Group Discussion

Health Care Access

- What support is currently available in your practice?
- How important do you feel transition care is? Is it necessary for late adolescents with food allergies? Will it be of benefit to them?
- At what age do you feel transition care should start? Why is this?
- What sort of training have you received to improve the care you provide for late adolescents with food allergies? Is there any of you who have not received any training? Why not? What training do you feel would benefit you?
- Do you think the place in which you work will benefit from a transition guideline?
- What resources are already in place at your practice?
- What additional resources do you think late adolescents with food allergies will benefit from?
- Have you found anything in particular that has allowed you to provide better care for late adolescents with food allergies? Would you recommend this to other practices?
- What barriers have you experienced when providing care for late adolescents with food allergies?
- What is your current stance on mental health and food allergies? Is there enough support being provided for late adolescents? What about specialist psychological support? Is this available for this group of individuals?

Is there anything else that you would like to discuss?

Thank you for taking the time to explore the current health care access for late adolescents with food allergies. Everything discussed has been extremely helpful.

Once you have left, if you have anything further to add or you forgot to mention anything during this session, please feel free to email me (contact information can be found on the participant information sheet). Thank you once again for your participation. You will receive your £25 gift voucher via email in the next week.

Interventions

Transitioning to Independence: Late Adolescents Access to Food and Health Care and Self-Management of Food Allergies

Topic Guide

Introduction:

Hi everyone, thank you all for attending today. My name is Zainab Laheri and I am a PhD student at the University of Central Lancashire. I will be facilitating todays focus group. With me is my colleague (name of moderator). He/she will observe the procedure, take notes and record the session.

Purpose and Guideline:

We are here today to discuss how we can improve the current food and health care access available for late adolescents with food allergies. The aim is to conceptualise and co-develop one or more preventive interventions that will provide the necessary support for this group of individuals to successfully self-manage their food allergy.

There are no right or wrong answers. You can agree or disagree with each other and you may change your mind at any time during the session. This is an open space and I would like you to feel comfortable speaking your mind and sharing your views. You will not be judged on what you say. Your participation is voluntary and if at any point you feel uncomfortable, you may leave.

During the session, my colleague will be taking notes and tape-recording the session, to ensure nothing is missed. Please speak one at a time and speak clearly. Show respect to others when they are speaking and sharing their views. If possible, please turn off your phones before the session begins to ensure there are no disruptions. Everything you say will of course be confidential. You will not be able to be identified from what you say during this discussion. For the sake of analysis, each participant will be assigned a code to ensure anonymity. However, to illustrate certain points, direct quotes will be included within the final thesis.

Before we begin does anyone have any questions?

Focus Group Discussion

The findings from the questionnaire and previous focus group indicate that … were the most influential factors of food choice. This suggests that … What are your thoughts? How can we improve this?

With regard to the current health care access, the questionnaire and previous focus group indicate that … These were the barriers mentioned …. And these were the facilitators … These are the up to date resources proposed by EAACI for the most effective transition for this group. What are your thoughts? How can we improve?

In terms of the nutritional status of late adolescents with food allergies, we found… How do you propose we can improve the diet for this group, particularly in the university setting?

What potential interventions based on these findings would seem appropriate and beneficial? How can we improve the current food choice, food access and health care access for 18-25year olds with food allergies?

Is there anything else that you would like to discuss?

Thank you for taking the time to provide your knowledge, thoughts and expertise in the co-development of the intervention/s. Everything discussed has been extremely helpful. Once implemented, the intervention/s will undoubtedly prove useful – to firstly empower late adolescents with food allergies to make better food choices and secondly, to allow them to easily access the necessary support from health services, to assist in the successful self-management of their food allergy.

Once you have left, if you have anything further to add or you forgot to mention anything during this session, please feel free to email me (contact information can be found on the participant information sheet). Thank you once again for your participation. You will receive your £25 gift voucher via email in the next week.

Appendix 5 – Nutrition Client Information Survey

Nutrition Client Information

Page 1: Nutrition Client Information Survey

1. First Name

2. Surname

3. Date of Birth

4. Gender

5. Weight (kg)

1 / 5

6. Height (m)

7. Postcode

8. Occupation Activity Level

- Sedentary
- Lightly Active
- Moderately Active
- Very Active
- Extremely Active

9. Exercise Activity Level

- Sedentary
- Lightly Active
- Moderately Active
- Very Active
- Extremely Active

10. Dietary Preference

- Vegetarian
- Vegan
- Halal
- Kosher

11. Please list all existing food allergies that have been clinically confirmed. If you don't have any food allergy please write N/A

Page 2: Thank you for your participation

Appendix 6 – Mann Whitney U Tests

Macronutrient Between Groups

Test Statistics[a]

	Protein (g)	Fat (g)	Carbohydrate (g)	Energy (Kcal)	Fibre (g)
Mann-Whitney U	546.000	507.000	485.000	479.000	528.000
Wilcoxon W	1366.000	1327.000	1305.000	1299.000	1348.000
Z	-.858	-1.310	-1.565	-1.635	-1.067
Asymp. Sig. (2-tailed)	.391	.190	.118	.102	.286

Test Statistics[a]

	Saturated Fat (g)	Monounsaturated Fat (g)	Polyunsaturated Fat (g)	Cholesterol (mg)	Sugars(g)
Mann-Whitney U	487.000	496.000	492.000	490.000	551.000
Wilcoxon W	1307.000	1276.000	1272.000	1193.000	1371.000
Z	-1.542	-1.283	-1.330	-1.028	-.800
Asymp. Sig. (2-tailed)	.123	.200	.183	.304	.424

a. Grouping Variable: Food Allergy

Vitamins Between Groups

Test Statistics[a]

	Vitamin A (ug)	Vitamin D (ug)	Vitamin E (mg)	Thiamin (mg)	Riboflavin (mg)
Mann-Whitney U	495.000	530.500	487.000	515.000	503.000
Wilcoxon W	1315.000	1271.500	1307.000	1335.000	1323.000
Z	-1.449	-.706	-1.542	-1.217	-1.356
Asymp. Sig. (2-tailed)	.147	.480	.123	.223	.175

Test Statistics[a]

	Niacin (mg)	Vitamin B6 (mg)	Biotin (ug)	Folate (ug)	Vitamin B12 (ug)
Mann-Whitney U	591.000	495.000	610.000	481.000	489.500
Wilcoxon W	1411.000	1315.000	1430.000	1301.000	1269.500
Z	-.336	-1.449	-.116	-1.611	-1.360
Asymp. Sig. (2-tailed)	.737	.147	.908	.107	.174

Test Statistics[a]

	Vitamin C (mg)
Mann-Whitney U	598.500
Wilcoxon W	1418.500
Z	-.018
Asymp. Sig. (2-tailed)	.986

a. Grouping Variable: Food Allergy

Minerals Between Groups

Test Statistics[a]

	Sodium (mg)	Potassium (mg)	Calcium (mg)	Magnesium (mg)	Phosphurus (mg)
Mann-Whitney U	466.000	526.000	602.000	586.000	614.000
Wilcoxon W	1286.000	1346.000	1422.000	1406.000	1110.000
Z	-1.785	-1.090	-.209	-.394	-.070
Asymp. Sig. (2-tailed)	.074	.276	.835	.693	.945

Test Statistics[a]

	Iron (mg)	Copper (mg)	Zinc (mg)	Chloride (mg)	Manganese (mg)
Mann-Whitney U	517.000	519.000	572.000	432.000	557.000
Wilcoxon W	1337.000	1339.000	1392.000	1252.000	1377.000
Z	-1.194	-1.171	-.556	-2.180	-.730
Asymp. Sig. (2-tailed)	.232	.242	.578	.029	.465

Test Statistics[a]

	Selenium (ug)	Iodine (ug)
Mann-Whitney U	560.000	553.000
Wilcoxon W	1380.000	1373.000
Z	-.696	-.777
Asymp. Sig. (2-tailed)	.487	.437

a. Grouping Variable: Food Allergy

Appendix 7 – Extra Quotes from Focus Groups

FOOD ALLERGY PATIENTS (Section 6.3.1)

Theme 1: The Social Challenges in Food Choice

'My social life is definitely affected, you know its different than before but I do still go out. If there's food involved, I just don't eat. I'll stick to drinks really. That's the best way' (FAP 1, Male, Milk, Egg and Peanut Allergy).

'*I do still go out socially, but I am selective about which gatherings I go to because not everyone understands. You can tell that the staff there, they don't really know much so for me I definitely don't eat because well I just don't like to risk it.' (FAP 8, Female, Peanut and Milk Allergy)*

'When I'm with my family it's okay because my family they know the kind of food I can eat and most of them are careful in what they serve me so it has been helpful. I feel more relaxed with them' (FAP 8, Female, Peanut and Milk Allergy)

'I eat so much better with my family. Like my mum she'll always prepare a variety of stuff and its everything that I can eat which is really good.' (FAP 6, Male, Soy and Egg Allergy)

'Sometime it gives my friends a sense of unacceptance. Like I'm trying to dissociate myself from them. So if I reject the kind of things they eat, it makes them feel like I'm not of their standard. Like I'm way higher than their standard. So that actually makes it very difficult to eat when I'm with them.' (FAP 1, Male, Milk, Egg and Peanut Allergy).

Theme 2: The Impact of the University Environment on Food Choice

'I don't eat at university, because there is limited allergen free options. Maybe once a week they have something in the university cafeteria but that's it.' (FAP 13, Male, Milk and Soy Allergy)

'There are lots of fast food places outside campus which is close and not too expensive so I eat a lot there' (FAP 3, Female, Fish Allergy)

'I think that the healthier stuff is actually more expensive. So I just stick with the cheaper stuff because money well sometimes you know financially it can be difficult.' (FAP 16, Male, Shellfish, Milk, Soy Allergy)

'I just need to plan ahead when I'm at university... I have my steady lunch box that I use to make sure that I have all my supplies, all my food supplies for the day are available in my backpack that way I'm not tempted to, you know, eat in the cafeteria. Yeah. So that's how I've been trying to survive.' (FAP 17, Male, Milk, Egg, Wheat and Soy Allergy)

'During exam weeks and deadlines I have to rely on convenience foods because there is not much time to prepare foods.' (FAP 15, Male, Egg, Fish and Milk Allergy)

Theme 3: 'Labelling makes it hard'

'And plus the labelling really confuses me. Sometimes it says its got no peanuts in but then it will also say that it might have this or it might have that and then it just gets really frustrating and it stresses me out. I don't really trust a lot of the foods now.' (FAP 9, Male, Soy, Mil, Peanut and Tree Nut Allergy)

Theme 4: Barriers in Accessing Allergen Free Foods

'Yes I think being at uni, it is hard financially. There are quite a few expenses already. And then with food especially allergy free food cos it's just too expensive I'll try and wait for offers and shop in bulk when I have vouchers.' (FAP 3, Female, Fish Allergy)

'The supermarkets I think are really expensive but I'll just try and go to the convenience stores, it's cheaper and quicker especially during the weekdays when I'm still on campus, but I think definitely I do struggle with getting allergy free food there. They might have the odd one thing but I just stick to the same foods really.' (FAP 12, Male, Milk, Egg and Egg Allergy)

'I don't always have time to get it because it's is quite a long way out. Cos for me I normally just go to the Tesco express down from the where I live and they do have some stuff but to be honest they don't have many choices and I have well multiple allergies so it means for me there really isn't too many options.' (FAP 17, Female, Milk, Egg, Soy and Peanut Allergy)

Theme 5: 'Allergen Free Doesn't Mean It's Safe'

'Sometimes when I've got allergen free food, once I remember on the back it said that it was egg free but I still had a reaction and it did get bad.' (FAP 15, Male, Egg, Fish and Milk Allergy)

'Twice now I've still ended up having a reaction after eating free from foods. I don't get it because it clearly said on the packaging that it didn't have milk or egg but then it still affected me. Now I make sure I don't get that brand anymore.' (FAP 2, Male, Milk Allergy)

Theme 6: 'My Diet Is Affected.'

'A lot of my meals are not well prepared, because I can't use a lot of ingredients and its actually really quite difficult to find like proper alternatives that meet all the nutrients.' (FAP 19, Male, Egg, Peanut, Soy and Wheat Allergy)

Theme 7: Challenges in Accessing Adequate Healthcare – GPs and Specialist Care

'I've had a lot of bad experiences when trying to get support for my food allergy. Like once first they said that I was allergic to this food and then that food and then it kept changing so I was avoiding a lot to begin with. It can be quite taxing when you have to go for tests and the results takes ages. The whole process just took too long and my weight dropped a lot in that time. By the time they referred me to the allergist I was in quite a bad state. It wasn't good at all. I don't even understand why it took them that long and all of it the whole process has just put me off. Now I don't even bother going to my GP, I'll try and just manage it myself really' (FAP 11, Male, Shellfish and Fish Allergy)

'So first at the beginning when they gave me the epi-pen it was a bit confusing the information they gave on how to use it. I tried to ring up to ask but the GP was really busy I didn't even get through. It was taking ages so I just went online and then watched a video. That was so much easier for me now I'll first just check online without asking.' (FAP 3, Female, Fish Allergy)

'OK, yeah for me, it's not always that easy because although we have like the insurance, but there are still like some out of pocket costs including like the coping and then prescription medications. Its difficult, sometimes I don't know what to do.' (FAP 1, Male, Milk, Egg and Peanut Allergy).

Theme 8: 'The Best Option Is To Manage It Myself'

'I just get prescriptions myself and do what I have to do. I feel like I'm fine doing it myself cos I know what works and what doesn't. I'll use online websites and stuff and they've really helped me and I've been managing it myself for quite a while now.' FAP 11, Male, Shellfish and Fish Allergy)

'Most importantly you just need a proper diagnosis, after this yeah its fine to manage it yourself. It's the better option really cos everything's online now. (FAP 17, Female, Milk, Egg, Soy and Peanut Allergy)

PARENTS/CARERS (Section 6.3.2.)

Theme 1: 'It's challenging to make sure my child has a balanced diet'

'Dealing with allergy has been hard both for me and my child. There was a period when he wasn't growing properly but we weren't offered any support on how to deal with this. We need more contributions by the HCP. Because it's a problem. Some guidance at the beginning would really make a difference. We need to make sure our child actually eats a balanced diet irrespective of the allergies and the foods they react to negatively.' (P/C 2, Male)

Theme 2: 'Labelling Is Challenging and Limits Food Choice'

'The labelling has been quite difficult. I feel like now I'm getting more used to the different phrases but it's hard cos sometimes we'll buy something and then there's still a reaction and the shopping, yeah I have to factor in more time now, sometimes its hard.' (FC 8, Male)

Theme 3: 'It Is Difficult To Access Allergen Free Foods Because of the Limited Availability'

'It is expensive, yeah I do find that it is. But at the end of the day my child needs it, it's up to me right now to make sure they can have proper foods and some of the AFF have been quite good, I mean the taste, it's not the same as every normal food but it has been better than just avoiding everything altogether.' (P/C 9, Female)

Theme 4: 'Good Allergy Health Care Is a Challenge'

'When we went for an appointment the GP centre didn't have all the equipment to do the testing there and we had to wait a while before we were called again, it was quite odd. And then because my child she has not just one but multiple food allergies, there was no help on which foods to avoid and good replacements.' (PC 3, Male)

Theme 5: 'Managing My Child's Food Allergy Has Psychologically Impacted Me'

'I worry a lot when my son goes away at uni. It's hard because I know how difficult it is and now he has to do it himself and there's this constant worry and fear.' (P/C 5, Female)

'And it would be great to have healthcare providers who showed genuine empathy and understanding towards my concerns and worries about my child's health, so having health care providers that will take time to listen and provide reassurance and other personalised care to make a significant difference. Because in my personal experience, there really isn't hardly any care like this.' (P/C 1, Female)

HEALTHCARE PROFESSIONALS (Section 6.3.3.)

Theme 1: Challenges with Patient Engagement

'In the past a lot of the time the patient he/she won't actually come to the appointments so just even getting them here is hard. It's that age and when I have asked sometimes financially they find it difficult.' (HCP, Dietitian)

Theme 2: Challenges with Providing Psychological Support

'It's really hard to provide the patients with this support in the hospital, we don't really have much but it is very, very important and very, very necessary for people having food allergy, you know, there are some situations where they go through some kind of stress and other mental issues. So in this kind of situation, it's very necessary to provide them with a qualified mental health provider who would be able to take them through this stage.' (HCP 5, Dietitian)

'Also being able to direct patients to counselling and therapy. This is not always available for them and these services can help patients cope with the emotional and psychological impact of food allergy. Because you know the food allergy is more like a chronic disease, you may not suffer from the pain every day but every time you eat you may be afraid something bad might happen. So all those thoughts might make you have some kind of anxiety, which could actually develop into something worse if it isn't treated.' (HCP 6, Dietitian)

Theme 3: Issues with the Referral System

'As a dietitian I do work with the allergist and sometimes the patients have been wrongly referred, that can take up more time which isn't really helpful.' (HCP 5, Dietitian)

'A lot of the time what happens is the patient will get referred to the specialist, but the advice they require could have easily been dealt with earlier by the GP if they had the correct knowledge and the right training and this could have also saved a lot of time and I think this does frustrate the patient and I can understand why.' (HCP 4, Nurse)

Theme 4: Inconsistent Use of Transition Guidelines

'So my hospital where I work, there's a guideline. Yes. But I don't know if, I don't think that everyone will actually use them because sometimes we just know they are ready to move so then they will go to the adult allergy clinic.' (HCP 8, GP)

Theme 5: Ongoing Professional Development

'I have completed a certificate program in pediatric and adult immunology. I have also completed courses on diagnosis and management of FA and this has all helped me when I am treating my patients.' (HCP 4, Nurse)

Theme 6: Support Networks

'We have a list of community resources available for our patients, such as local allergy support groups and allergy-friendly restaurants and the patients will come back and say that this has helped them navigate their allergies a little better.' (HCP 7, Dietitian)