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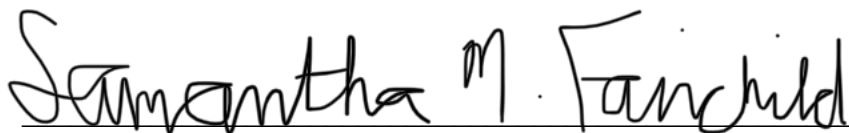
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Assessing Food Allergen Onset, Early Diagnosis, and Nutrition
Education

Samantha Mae Fairchild

April 15, 2021

An Undergraduate Thesis Submitted
in Partial Fulfillment of the Requirements for the
Nutrition Honors-in-Discipline Program
of the Honors College, and the
College of Clinical and Rehabilitative Health Sciences
East Tennessee State University



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Samantha M. Fairchild, Author

Date



4/15/2021

Mary Andreae, Faculty Advisor

Date



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Dr. Michelle Johnson, Faculty Reader

Date

Abstract

Background: The purpose of this research study was to assess the role of healthcare in the diagnosis and treatment of food allergens. A food allergy is defined as an “adverse health effect arising from a specific immune response which occurs reproducibly on exposure to a given food” (Academy of Nutrition and Dietetics, n.d.). There are eight major food allergens, which account for the majority of food allergies.

Methods: Data was obtained using a survey posted on Facebook and Instagram with a shareable feature after obtaining IRB approval from East Tennessee State University. The survey was comprised of six questions and was posted for 28 days. There were 70 responses; however, 13 data sets were incomplete and therefore removed.

Results: In total there were 98 food allergens reported. 75.5% of these fell into the “Big Eight” categories, and the remaining 24.5% were “other” food allergens. These included 27 different allergens. Most commonly, food allergens were diagnosed during adolescence (40.4%) due to a severe reaction (54.4%). Trial-and-error was the most common form of diet education (40.4%), and zero participants received education from a Registered Dietitian. When asked about knowledge, at diagnosis, 80.7% reported no to some knowledge of their food allergen. Currently, 78.9% of participants report being knowledgeable to very knowledgeable.

Conclusions: Healthcare should further explore the role of the RD when it comes to food allergen diagnosis and treatment. Further studies could include a larger population and minors. Other related studies could involve healthcare professionals to determine their roles in the food allergen diagnosis and treatment process.

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Literature Review

Food Allergens Background

A food allergy is defined as an “adverse health effect arising from a specific immune response which occurs reproducibly on exposure to a given food” (Academy of Nutrition and Dietetics [AND], n.d.). It is estimated that approximately 12 million—or 4% of— Americans are affected by a food allergy (“Overview,” n.d.; Palmer 2010). Additionally, each year there are about 200 deaths resulting from anaphylaxis due to food allergies, most of which are attributed to peanut and tree nut allergies (“Overview,” n.d.). Based on this information, this research study was conducted to assess how healthcare diagnoses, treats, and educates on food allergens.

IgE-mediated vs non-IgE-mediated

Food allergies are an acquired immunological response to a non-pathogenic antigen (Mahan & Raymond, 2017). After the allergen is consumed, the body responds by producing specific immunoglobulin E (IgE) antibodies, which attach to mast cells resulting in the release of inflammatory mediators (Mahan & Raymond, 2017). IgE-mediated reaction onset occurs rapidly—from minutes to a few hours—after exposure (Mahan & Raymond, 2017). Symptoms can vary, from gastrointestinal upset to rashes or hives to anaphylaxis. Anaphylaxis is an acute and often severe immune response that can be fatal. Some of the more severe symptoms of anaphylaxis are respiratory distress, cyanosis, shock, cardiac arrest, and death (Mahan & Raymond, 2017). Anaphylaxis is treated with doses of epinephrin, which should be administered immediately (Rance & O’Laughlen, 2014).

Another IgE-mediated reaction to food allergens is oral allergy syndrome (OAS), also called pollen-food syndrome. This type of reaction is a result from contact with a food allergen whose protein structure is similar to pollen that the individual is allergic to (Mahan & Raymond,

2017). The reaction's most common source is to fresh fruits and vegetables by those allergic to tree or weed pollens (Rance & O'Laughlen, 2014). Symptoms presented are often an itchy mouth, scratchy throat, swelling of the lips, mouth, or tongue, as well as hives, wheezing, vomiting, diarrhea, and low blood pressure (Mahan & Raymond, 2017). Occasionally, however rarely, anaphylaxis can occur as part of an OAS reaction (Mahan & Raymond, 2017).

Non-IgE-mediated reactions are less well-understood and still being researched. These reactions do not result IgE production, and therefore does not involve an immunologic response. It appears that the immune system treats the food as a "threat" and therefore sensitizes the body to it (Mahan & Raymond, 2017). When the food is consumed next, the body releases defensive mediators that result in vomiting and diarrhea (Mahan & Raymond, 2017).

Both IgE- and non-IgE-mediated reactions involve an immune system reaction. This reaction is what defines food allergies. Conversely, food intolerances do not involve an immune system response. Food intolerances are a reaction to a food that "results from the body's inability to digest, absorb, or metabolize a food or component of food" (Mahan & Raymond, 2017, p. 481). An example of a food intolerance is the macronutrient carbohydrate. Some carbohydrates, such as sugars, starches, and polysaccharides, have complex structures. If the body does not have the correct enzymes or the correct quantity of the enzymes, it may be unable to digest or absorb the carbohydrate (Mahan & Raymond, 2017). This does not mean that a person is allergic to carbohydrates, rather they may have an intolerance to a specific carbohydrate such as lactose or sucrose (Mahan & Raymond, 2017). Symptoms to food intolerances are often similar to those of food allergies, such as gastrointestinal symptoms, respiratory symptoms, and neurological (such as headaches) (Mahan & Raymond, 2017).

However, unlike food allergies, food intolerances cannot cause anaphylactic reactions or other life-threatening immune-mediated reactions (Mahan & Raymond, 2017).

Food Allergen Diagnosis

There are multiple ways in which food allergies can be diagnosed. The “gold standard” for diagnosis is the double-blind, placebo-controlled food challenge (or DBPCFC) (AND, n.d.). Testing entails exposing a patient to the suspected food in gradually increasing amounts hidden in a matrix (Utrecht Center for Food Allergy [UCFA], n.d.). Once the patient exhibits either objective symptoms or subjective symptoms after at least three subsequent doses, the DBPCFC is ended, and appropriate medications are administered as needed (ECFA, n.d.). Objective symptoms include urticaria, facial swelling, rhinoconjunctivitis, vomiting, diarrhea, dyspnea, bronchoconstriction, and tachycardia (UCFA, n.d.). Subjective symptoms include nausea, abdominal pain, and oropharyngeal symptoms (UCFA, n.d.). DBPCFCs are administered in hospital settings, with trained nurses and emergency medications on standby. Because these tests can induce severe reactions, are expensive, and time-consuming, physicians are often hesitant to perform them (AND, n.d.).

Other forms of diagnosis include skin prick tests, atopy patch tests, radioallergosorbent tests, and fluorescence enzyme immunoassay tests (Manea et al., 2016). Skin prick tests involve the allergist (or healthcare provider administering the test) placing a small amount of the suspected allergen on the skin, then puncturing the skin with a prick to allow a small amount of the substance to go beneath the skin (MedlinePlus, 2020). If the injection site becomes red and irritated, it indicates an allergy to the substance. For atopy patch tests, a food-containing solution is topically applied for 48 hours (Manea et al., 2016). However, there is currently little standardization or guidelines, so it is not often recommended. Radioallergosorbent tests and

fluorescence enzyme immunoassay tests are both forms of *in vitro* testing. These tests require blood draws, which are then analyzed to identify serum IgE antibodies (Manea et al., 2016).

These forms of testing all identify sensitization, not clinical allergies (Manea et al., 2016).

Food Allergy Treatment

The only treatment for food allergens is to omit them from the diet. As part of the nutrition intervention, the patient should be taught what foods contain the food allergen, how to read food labels to determine if foods contain the allergen, and if there are products that are “hidden sources” of the allergen (“Nutrition Intervention,” n.d.). It is also essential to understand cross-contamination, its effects, and how to avoid it (“Nutrition Intervention,” n.d.). Cross-contamination occurs when a product comes in contact with products containing the allergen. Contamination can occur either directly or indirectly, through handling food with the same gloves as a food containing the allergen or using the same cutting board as a food containing the allergen. It is also vital to ensure that the patient receives adequate nutrient intake despite the omission of products containing the allergen or entire food groups due to the allergen’s presence.

The Big Eight

There are over 170 foods that are reported to cause an IgE-mediated response (AND, n.d.). However, of those 170 foods, 8 contribute to 90% of all food allergies (AND, n.d.). These foods are wheat, eggs, milk, peanuts, tree nuts, soy, shellfish, and fish.

Wheat. Wheat is found in many products. Some common products include baked goods such as cookies and brownies, breads, crackers, and pastas (“Wheat Allergy Nutrition Therapy,” n.d.). However, foods such as batter-fried items, beer, some candies, processed meats, and even condiments such as soy sauce and salad dressing can contain wheat as well (“Wheat Allergy

Nutrition Therapy,” n.d.). There are also some “hidden” sources of wheat, which should be avoided.

Reading food labels is very important when it comes to food allergies. When reading a food label, items including any ingredient containing the word “wheat” (such as wheat bran, wheat malt, wheat berry, cracked wheat) should be avoided, as well as bulgur, cereal extract, emmer, einkorn, farina, farro, kamut, semolina, spelt, triticale, vital gluten, or any flour (such as all-purpose, cake, durum, enriched, or pastry) (“Wheat Allergy Tips,” n.d.; “Wheat Allergy Nutrition Therapy,” n.d.). If an item is regulated by the Food and Drug Administration (FDA), then it will state the word “wheat” in the food label (“Wheat Allergy Nutrition Therapy,” n.d.). Cross-contamination is also an issue. Some manufacturers include an advisory label stating, “may contain wheat” or “produced in a facility that also produces products containing wheat” (“Wheat Allergy Tips,” n.d.). One is not necessarily safer than the other, and both should be avoided. When shopping, it is suggested to read the labels of all items being purchased (“Wheat Allergy Tips,” n.d.). For food items, the ingredients can change at any time and may vary between product sizes or versions. Items such as soaps, shampoos, lotions, or medications may contain wheat allergens as well (“Wheat Allergy Tips,” n.d.).

Wheat products are often fortified and provide many micronutrients as well as carbohydrates and fiber in the diet. When wheat is eliminated from the diet, these micronutrients can be diminished. Some micronutrients include thiamin, niacin, riboflavin, iron, and folic acid (“Wheat Allergy Tips,” n.d.). Alternatively, there are other sources of these nutrients that can be consumed to avoid deficiency, which include fortified alternative grain products, lean meats, nuts and seeds, eggs, beans, fruits, vegetables, and more (“Wheat Allergy Tips,” n.d.).

Eggs. Egg is another major allergen that is found in many foods. Aside from being a common food option by itself, it can also be found in foods such as baked goods (like brownies and cookies), custards, candy, canned soups, marshmallows, and even salad dressings (“Egg Allergy Nutrition Therapy,” n.d.). Like all major allergens, the FDA requires that the word “egg” be included on packaging of all foods that contain egg and egg products (“Egg Allergy Nutrition Therapy,” n.d.). However, when reading packaging labels, there are some lesser-known forms of egg to be aware of. These include albumen, lysozyme, ovumocin, surimi, and meringue (“Egg Allergy Tips,” n.d.). All forms of egg, as well as products “produced in a facility that also processes...” or “may contain...” eggs and egg products should be avoided (“Egg Allergy Tips,” n.d.).

Egg is a common ingredient in baked goods and serves as a binding ingredient. Besides using an egg replacement powder, some other options can be used in place of eggs. These include potato starch, pureed fruit, canned pumpkin, mashed potatoes, or egg-free mayonnaise (“Egg Allergy Tips,” n.d.).

As with most foods, eggs provide micronutrients that are important to the diet. These micronutrients include vitamin B-12, riboflavin, pantothenic acid, biotin, and selenium (“Egg Allergy Nutrition Therapy,” n.d.). Most of these can be obtained through other food sources, such as lean meats, poultry, legumes, and enriched grain products (“Egg Allergy Nutrition Therapy,” n.d.).

Milk. Like eggs, milk is a common allergen that is found in many foods, as well as a common food item itself. Not only is milk a common beverage, but it can be found in many baked goods, desserts (such as ice cream and pudding), cereals, butter, margarines, cold cuts,

hotdogs, crackers, gum, and even foods advertised as “non-dairy” products (“Milk Allergy Nutrition Therapy,” n.d.).

Since milk is a major allergen, the FDA requires that all products containing milk be labeled with the word “milk” in the label (“Milk Allergy Nutrition Therapy,” n.d.). Besides milk itself, there are many forms of milk that must be avoided in food products. These include butter, buttermilk, casein, cheese in all forms, creams in all forms, curds, ghee, products with the “lact-” or “lacto-” prefix, whey in all forms, and milk derivatives, powders, proteins, and solids in all forms (“Milk Allergy Tips,” n.d.; “Milk Allergy Nutrition Therapy,” n.d.). It is also recommended to avoid food products “produced in a facility that also processes...” or “may contain...” milk or milk products (“Milk Allergy Tips,” n.d.). Nutrient deficiencies for those with an allergy to milk include calcium, vitamin A, vitamin D, riboflavin, pantothenic acid, and phosphorus intake (“Nutrition Intervention,” n.d.).

Peanuts. Peanuts are another major allergen recognized by the FDA. Therefore, all products containing peanuts must be labeled with the word “peanut” on the packaging (“Peanut Allergy Nutrition Therapy,” n.d.). Besides peanuts and peanut butter, other peanut-containing products include baked goods, cereals, cookies, candy, chocolates, energy bars, frozen desserts, granola bars, marinades, and even barbeque sauce (“Peanut Allergy Nutrition Therapy,” n.d.). Interestingly, while most peanut oils must be avoided, it has been found that refined peanut oil can often be consumed by individuals with peanut allergies (“Peanut Allergy Nutrition Therapy,” n.d.). However, since there is no guarantee that the oil did not come in contact with peanut proteins or peanut oil that was expeller-pressed, expelled, extruded, and cold-pressed during processing, a healthcare professional may suggest avoiding refined peanut oil as well (“Peanut Allergy Nutrition Therapy,” n.d.). Other forms of peanut that should be avoided are artificial

nuts, beer nuts, ground nuts, nut butter (that has been processed in proximity to peanut butter), nut pieces, and peanut flour (“Peanut Allergy Tips,” n.d.). As always, it is suggested to avoid foods that are “produced in a facility that also processes...” or “may contain...” peanuts or peanut products (“Peanut Allergy Tips,” n.d.).

Many micronutrients can be found in peanuts. These include vitamin E, niacin, magnesium, and chromium (“Peanut Allergy Nutrition Therapy,” n.d.). Other food sources for these nutrients include whole or enriched grains, lean meats, legumes, and vegetable oils (“Peanut Allergy Nutrition Therapy,” n.d.). Those with peanut allergies should be aware of potential allergies to legumes since they are in the same family. While most people can continue eating legumes such as beans and peas, they are often at a higher risk for a lupine allergy (“Peanut Allergy Nutrition Therapy,” n.d.). (Lupine is often used as a flour substitute in Europe) (“Peanut Allergy Tips,” n.d.). Another potential allergy related to peanuts is tree nuts. While some people with a peanut allergy can consume tree nuts, some also have an allergy to tree nuts as well. A healthcare provider can determine this.

Tree nuts. Another major food allergen recognized by the FDA is tree nuts. As with all major allergens, the FDA requires food products containing tree nuts be labeled (“Tree Nut Allergy Nutrition Therapy,” n.d.). However, many different nuts fall under this category. Those recognized by the FDA include almonds, beech nuts, brazil nuts, butter nuts, cashew, chestnuts, chinquapin, coconut, ginkgo, hazelnut, hickory, lychee nut, macadamia nut, pecan, pili nut, pine nut, pistachio, shea nut, and walnut (“Tree Nut Allergy Nutrition Therapy,” n.d.). Under FDA labeling, the specific nut found in the product must be listed on the packaging (“Tree Nut Allergy Nutrition Therapy,” n.d.). Depending on the allergy, it may be that only certain nuts need to be avoided in the diet. What tree nuts need to be eliminated can be determined by a

healthcare professional. It is also wise to avoid products “produced in a facility that also processes...” or “may contain...” tree nuts (“Tree Nut Allergy Tips,” n.d.). Often peanuts, tree nuts, and seeds are processed on shared equipment, allowing for cross-contamination, meaning these products may need to be avoided as well (“Tree Nut Allergy Nutrition Therapy,” n.d.). Besides the nuts themselves, some products that may contain tree nuts include baked goods, cereals, cookies, candy, chocolate, flavored coffee, granola bars, frozen desserts, marinades, and barbeque sauces (“Tree Nut Allergy Nutrition Therapy,” n.d.).

Soy. Soy is another major food allergen. As with all major allergens, it is recognized by the FDA and products containing soy must be labeled (“Soy Allergy Nutrition Therapy,” n.d.). However, much like refined peanut oil is often safe for those with a peanut allergy, highly refined soybean oil and often soy lecithin are frequently safe for consumption by those with a soy allergy (“Soy Allergy Nutrition Therapy,” n.d.). Because of this, refined soybean oil does not have to be labeled as an allergen on the packaging. Soy can be found in breads, cookies, canned meats, cereal, protein bars, low-fat peanut butters, processed meat, and more (“Soy Allergy Nutrition Therapy,” n.d.). Other foods to avoid include edamame, hoisin, miso, natto, shoyu sauce, soy sauce, tamari, tempeh, and tofu (“Soy Allergy Nutrition Therapy,” n.d.). Also included is soy nuts, milk, ice cream, flour, cheese, et cetera (“Soy Allergy Nutrition Therapy,” n.d.). As always, those with a soy allergy should avoid all foods labeled by the FDA as containing soy, as well as precautionary labels of “produced in a facility that also produces...” or “may contain...” soy (“Soy Allergy Tips,” n.d.).

Shellfish. There are two categories of shellfish, one of which is considered a major food allergen. These categories are crustaceans and mollusks. Crustaceans are considered major allergens and are regulated by the FDA (“Shellfish Allergy Nutrition Therapy,” n.d.). These

include lobster, crab, shrimp, prawn, crawfish, and barnacles (“Shellfish Allergy Nutrition Therapy,” n.d.). Per the FDA, the specific crustacean species must be listed on the product label (“Shellfish Allergy Nutrition Therapy,” n.d.). Mollusks include abalone, clam, cockle, mussel, oyster, octopus, scallop, snail, and squid (“Shellfish Allergy Nutrition Therapy,” n.d.). These are not considered major allergens and are not required to be labeled on products as an allergen. Depending on the allergy and severity of the allergy, one may be required to eliminate certain shellfish or all shellfish and shellfish derivatives from the diet. Therefore, it is also suggested to avoid foods with labels such as “may contain...” or “produced in a facility that also produces” (“Shellfish Allergy Tips,” n.d.).

Shellfish contribute a few nutrients to the diet. These include zinc, magnesium, copper, and selenium (“Shellfish Allergy Nutrition Therapy,” n.d.). However, these nutrients can be obtained through foods such as lean meats, eggs, whole or enriched grains, seeds, fruits, and vegetables (“Shellfish Allergy Nutrition Therapy,” n.d.).

Fish. The last of the major food allergens is fish. Like with shellfish, the FDA regulates that packaging must list the specific fish product on its label (“Fish Allergy Nutrition Therapy,” n.d.). However, it is suggested that all foods with precautionary labels of “may contain...” or “produced in a facility that also produces...” (“Fish Allergy Tips,” n.d.). Many types of fish fall into this allergen category: anchovy, bass, bluefish, bonito, carp, catfish, codfish, drum, eel, flounder, grouper, haddock, hake, halibut, herring, jack, mackerel, mahi-mahi, marlin, menhaden, mullet, orange roughy, perch, pike, plaice, pollock, pompano, porgy, puffer, salmon, sardine, scrod, shad, snapper, sole, sturgeon, sunfish, swordfish, tilapia, trout, tuna, and whitefish (“Fish Allergy Tips,” n.d.). Other foods that should be avoided include Caesar salad, Caesar salad dressing, caviar, surimi, and Worcestershire sauce (“Fish Allergy Tips,” n.d.). The fish allergy

and the severity of the allergy will dictate whether an individual must avoid certain fish products or all fish products and derivatives. As with all foods, fish provide a variety of nutrients. These include protein, niacin, vitamin B6, vitamin B12, vitamin E, phosphorus, and selenium (“Nutrition Intervention,” n.d.).

Role of Registered Dietitians

Registered Dietitians (RDs) serve many important roles in the treatment of food allergies. Not only do they provide education on avoiding the food allergy, but they also educate on food substitution, food label reading, nutrient adequacy, and additional nutrition-related concerns (AND, n.d.; “Nutrition Intervention,” n.d.). Reading food labels is very important in avoiding food allergens, and there are sometimes “hidden” forms of the allergen in foods which dietitians can help identify. When certain foods are eliminated from the diet, many nutrients are also inadequately consumed. Dietitians can not only help patients identify these nutrients, but also provide advice on other sources or supplementation of these nutrients (“Nutrition Intervention,” n.d.). In addition, they can provide advice for eating out or managing food allergies in a school setting (AND, n.d.).

Prevention of Food Allergies

Research is being conducted to determine the roles of certain factors in the development of food allergens. These include various genetics, epigenic, and environmental factors (Mahan & Raymond, 2017). Currently, the focus is on promoting lifestyle factors. Recommendations include breastfeeding infants and introducing solid foods at 4-6 months, and avoidance of smoking, especially around infants and children (Mahan & Raymond, 2017). Other recommendations include regular physical exercise to strengthen immunity, increased exposure

to the natural environment, pets, and farms, and using antibiotics only when necessary (Mahan & Raymond, 2017).

Methodology and Approach

For this research project, data was collected via an online survey. The survey contained six questions (Appendix 1) and was publicly posted on Facebook and Instagram with a shareable feature after obtaining Institutional Review Board approval from East Tennessee State University (IRB# c0221.8e) (Appendix 2). Participation was voluntary and completed online at the participant's convenience. Requirements to partake in the study included being at least 18 years of age, physically present in the United States, and the presence of a food allergy. Exclusion criteria included those under the age of 18, not physically present in the United States, and those without food allergies. An informed consent form was agreed to before partaking in the survey, and the participants were informed that incomplete surveys would be excluded from the data. The survey was posted on February 15, 2021, and was closed on March 15, 2021. There were 70 responses. 13 data sets were incomplete and removed.

Once the data was obtained, it was put into a spreadsheet for analysis. Percentages were found by dividing the number of responses for the respective answer by 57—the number of data sets in the study. The percentages for the “Big Eight” allergens and “other” allergens were calculated by dividing the number of responses to each by the total number of reported allergies. Although not listed in the survey, “fish” is a “Big Eight” allergen and was counted as such rather than “other.” Under “other” there were also reports of hazelnut, tuna, and wheat, which were grouped into tree nuts, fish, and gluten respectively. For the sake of this research, coconut was considered “other” as it is also considered a fruit.

Results and Findings

Of the 57 responses, 22 people reported having multiple food allergies. In total, between the 57 participants, there were 98 reported food allergies. Of these 98, 75.5% fell into the “Big Eight” categories, and 24.5% were classified as “other” (Appendix 3, Graph 1). The “other” food allergies totaled 27 different allergens (Appendix 3, Graph 3). The “Big Eight” allergens were represented as follows out of all allergens reported: gluten 13.3%, dairy 17.3%, eggs 5.1%, peanut 8.2%, tree nuts 14.3%, soy 5.1%, fish 2%, and shellfish 10.2% (Appendix 3, Graph 2).

The most common age groups in which food allergies were diagnosed or discovered were adolescence (40.4% participants) and early adulthood (28.1% participants). Of the participants, only 12.3% learned of their allergy as a toddler, and 12.3% as a school-age child. 7.0% participants also learned of their allergy during middle adulthood, and none as a senior (Appendix 3, Graph 4).

Of the choices for “How did you find out you have a food allergy?” 7 participants selected multiple options, all of them including “received a diagnosis from a healthcare provider” as well as another option. The most common form of allergy realization occurred due to a severe reaction (54.4% of participants), and 2 reported being hospitalized as part of their diagnosis. 29.8% of participants reported receiving a diagnosis from a healthcare provider (7 of which were reported in combination with a severe reaction, hospitalization, and experimenting on their own). 28.1% participants experimented on their own to discover their food allergy. (Appendix 3, Graph 5).

A majority (40.4%) of participants reported that they learned what to/not to eat through trial-and-error. 10.5% of participants used Google/internet surfing for information, and 7.0% of turned to family/friends. 22.8% of participants reported consulting with an allergist, and 19.3%

reported consulting with a healthcare provider. Zero participants reported seeking a Registered Dietitian. (Appendix 3, Graph 6).

When asked “On a scale of 1-5 (with 1 being no knowledge and 5 being very knowledgeable), how much knowledge did you have of your food allergy at the time of diagnosis?” 80.7% of participants reported either no knowledge or some knowledge, while only one participant reported being very knowledgeable. However, when asked the same question regarding their current knowledge, 78.9% reported that they were knowledgeable or very knowledgeable and only 2 participants reported having no knowledge. (Appendix 3, Graph 7). For both questions, 8.8% of participants reported “neutral” knowledge. At diagnosis, 8.8% of participants were knowledgeable, and currently 8.8% report “some knowledge” regarding their food allergy.

Discussion

Based on the data collected in this survey, there is much room for growth in healthcare as far as food allergies are concerned. One noticeable lack is the utilization of Registered Dietitians in the process of food allergen diagnosis and education. Although multiple participants reported hospitalization as part of their food allergen diagnosis, no participants in this study received diet education from an RD. RDs can provide a variety of assistance to those diagnosed with food allergies. For example, the largest reported allergen in this study was dairy. Those with a dairy allergy may be deficient in calcium, vitamin A, vitamin D, riboflavin, pantothenic acid, and phosphorus. A Dietitian can help those with this allergy find alternate sources of these nutrients, and guide the patient in food label reading, preventing cross-contamination, and education regarding eating out with a food allergy. A majority of participants learned about their food

allergy through trial-and-error. By seeking education from an RD, the transition to living without the food allergen would be a lot smoother and involve a lot less “error.”

Conclusion

Future studies could make multiple changes. For one, this study did not reach its goal participant number of 100. Having more participants in future studies may provide different figures, including potentially more of a role of RDs. Future studies could also involve minors (using parental/guardian responses) to see if there are more toddler or adolescent food allergens that were underrepresented in this study. Other studies should include surveys to healthcare professionals to better determine the roles played in the food allergen diagnosis and treatment process—specifically Allergists, Registered Dietitians, and Physicians.

Healthcare should also look at the current role of the RD and how it can be better utilized. Whether this is more hospital consults or outpatient treatment, those with food allergens need to receive better treatment and education regarding their food allergies.

Appendix 1: Survey

1. What food allergies/intolerances do you have?

- Dairy
- Eggs
- Peanuts
- Tree nuts
- Shellfish
- Soy
- Gluten
- Other (please specify)

2. What age were you diagnosed with the food allergy?

- Toddler (1-4 years)
- School age (5-9 years)
- Adolescent (10-19 years)
- Early adulthood (20-39 years)
- Middle adulthood (40-64 years)
- Senior (65+ years)

3. How did you find out you have a food allergy?

- Received a diagnosis from healthcare provider
- Experimented on my own
- Had a severe reaction
- Was hospitalized

4. How did you learn what to/not to eat?

- Registered Dietitian
- Allergist
- Healthcare Provider
- Google/Internet surfing
- Family/friends
- Trial-and-error

5. On a scale of 1-5 (with 1 being no knowledge and 5 being very knowledgeable), how much knowledge did you have of your food allergy at the time of diagnosis?

6. On a scale of 1-5 (with 1 being no knowledge and 5 being very knowledgeable), how would you rate your current knowledge of your food allergy?

Appendix 2: Informed Consent

Dear Participant:

My name is Samantha Fairchild, and I am an Undergraduate Student at East Tennessee State University. I am working on a thesis in Nutrition and Dietetics. In order to finish my studies, I need to complete a research project. The name of my research study is Assessing Food Allergen Onset, Early Diagnosis, and Nutrition Education.

The purpose of this study is to see how healthcare diagnoses and treats food allergens. I would like to give a brief online survey to adults who have food allergies using Qualtrics. It should only take about 5 minutes to finish. You will be asked questions about your food allergy, such as diagnosis and treatment. Since this study deals with food allergies, the risks are minimal. However, you may also feel better after you have had the chance to express yourself about your experience. This study may benefit you or others by providing information that may help improve the diagnosis and treatment processes of food allergens.

Your confidentiality will be protected as best we can. Since we are using technology no guarantees can be made about the interception of data sent over the internet by any third parties, just like with emails. We will make every effort to make sure that your name is not linked with your answers. Qualtrics has security features that will be used: IP addresses will not be collected and SSL encryption software will be used.

Although your rights and privacy will be maintained, the research records may be looked at by individuals that have the legal right to see that information. This may include the ETSU IRB overseeing this research, other individuals at the University with the responsibility for ensuring we follow the rules related to this research, the federal Office of Human Research Protections (OHRP) that protects participants like you, and the research team.

Taking part in this study is voluntary. You may decide not to take part in this study. You can quit at any time. You may skip any questions you do not want to answer or you can exit the online survey form if you want to stop completely. If you quit or decide not to take part, the benefits or treatment that you would otherwise get will not be changed.

If you have any research-related questions or problems, you may contact me, Samantha Fairchild, at (315)525-1520. I am working on this project together with my Advisor Mary Andreae. You may reach her at (423)439-7538. This research is being overseen by an Institutional Review Board (IRB). An IRB is a group of people who perform independent review of research studies. You may also contact the ETSU IRB at 423.439.6054 or irb@estu.edu for any questions you may have about your rights as a research participant.

Sincerely,
Samantha Fairchild

Clicking the AGREE button below indicates:

- I have read the above information
- I agree to volunteer

Ver. 02/06/21

Approved by ETSU Campus IRB / Approval Date: February 15, 2021

- I am at least 18 years old
- I am physically present in the United States
- I have a food allergy
- I understand that if I do not answer all questions my data may not be included in this research study

I AGREE

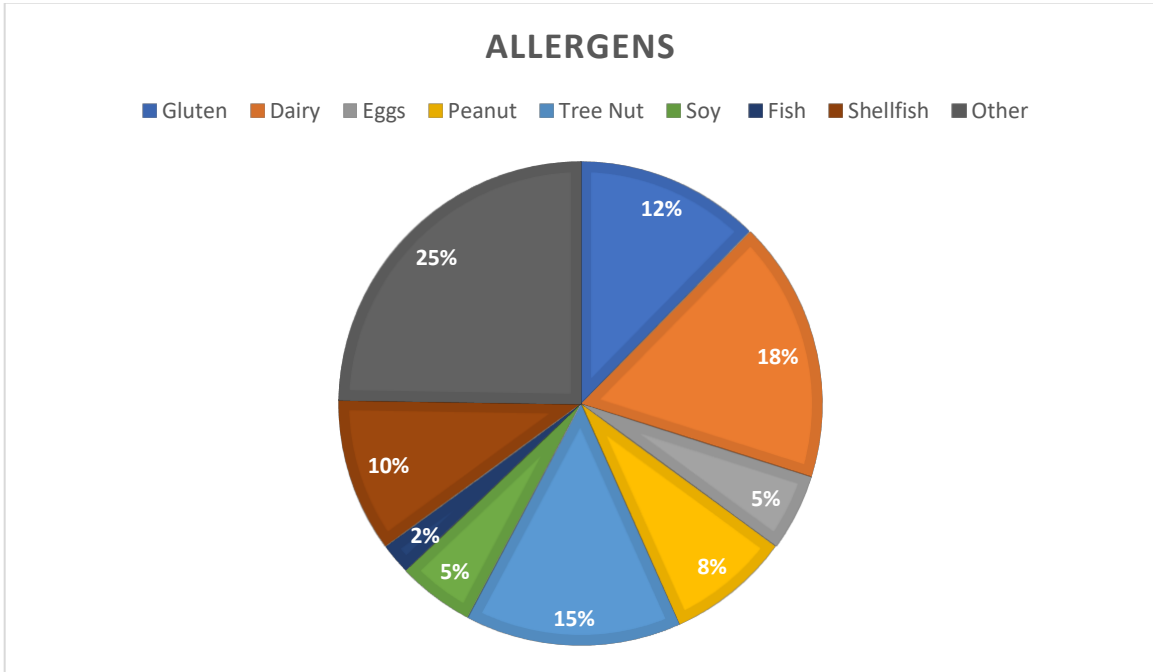
I DO NOT AGREE

Ver. 02/06/21

Approved by ETSU Campus IRB / Approval Date: **February 15, 2021**

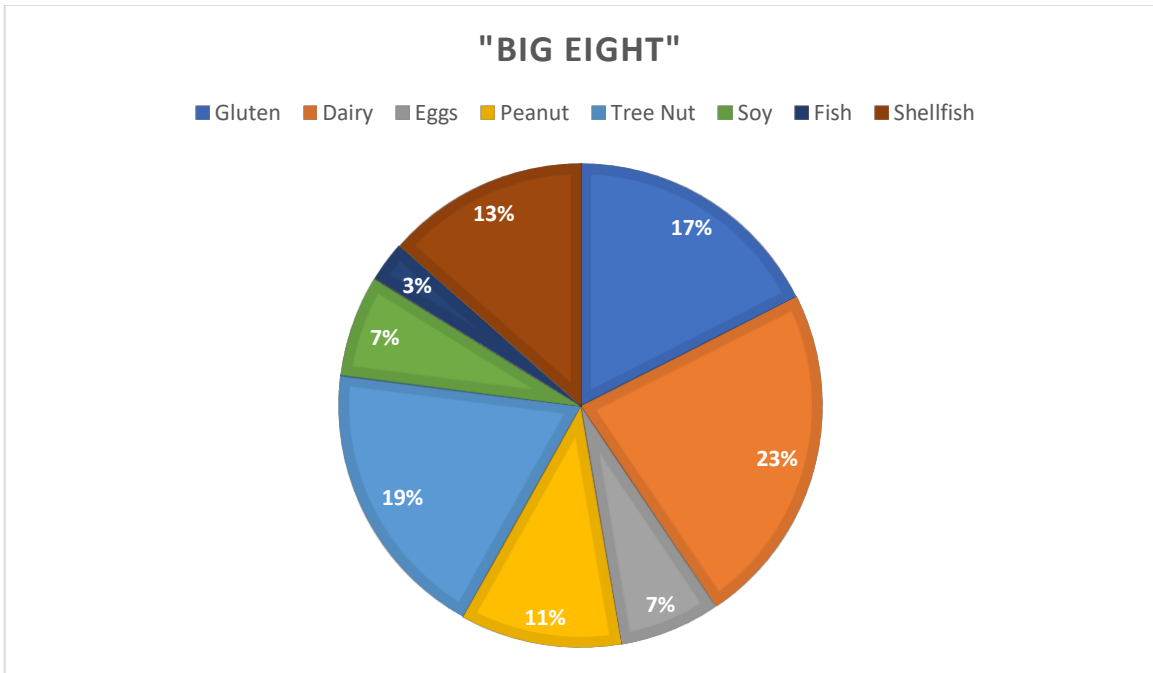
Appendix 3: Graphs

Graph 1



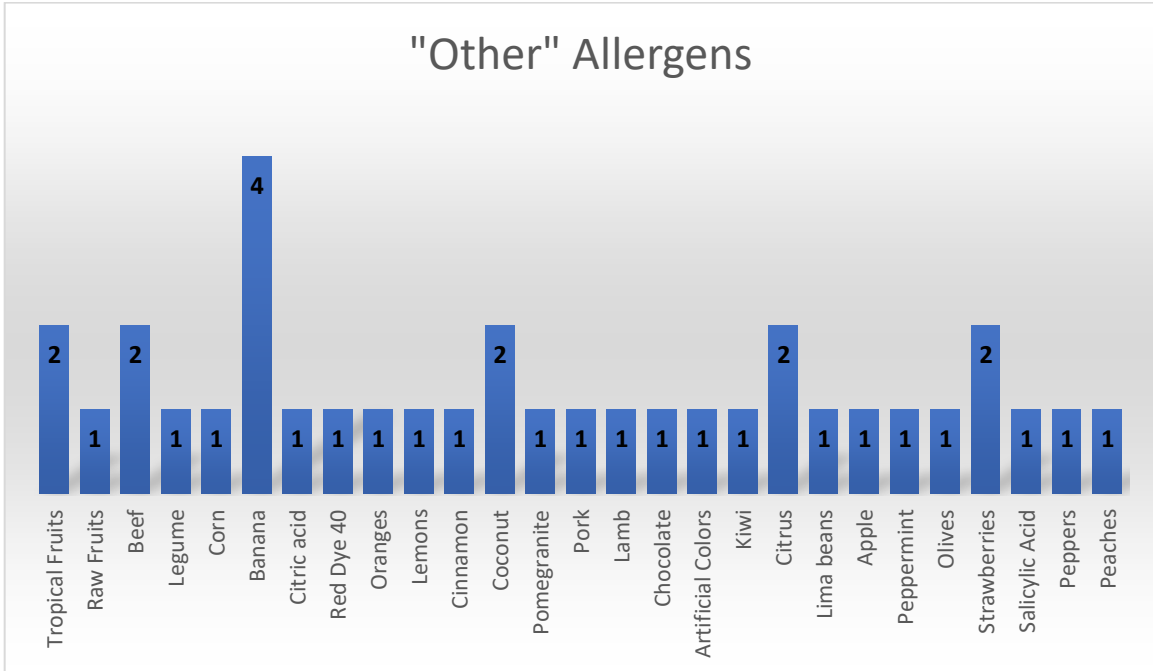
*numbers rounded to the nearest whole percentage

Graph 2



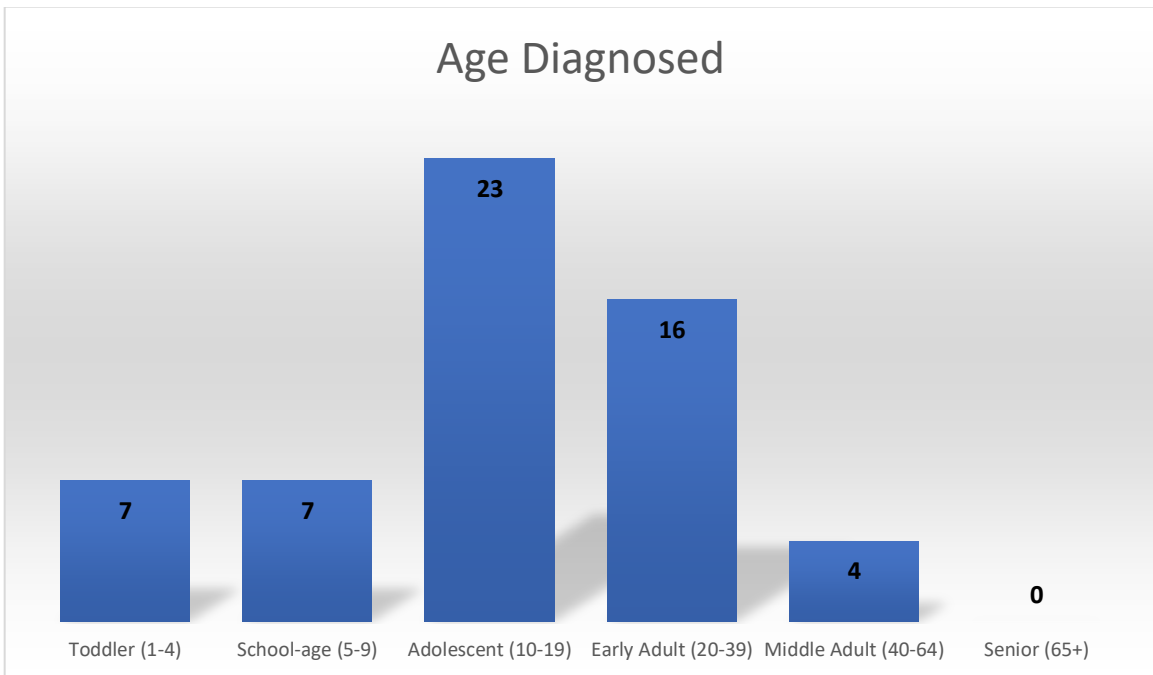
*numbers rounded to the nearest whole percentage

Graph 3



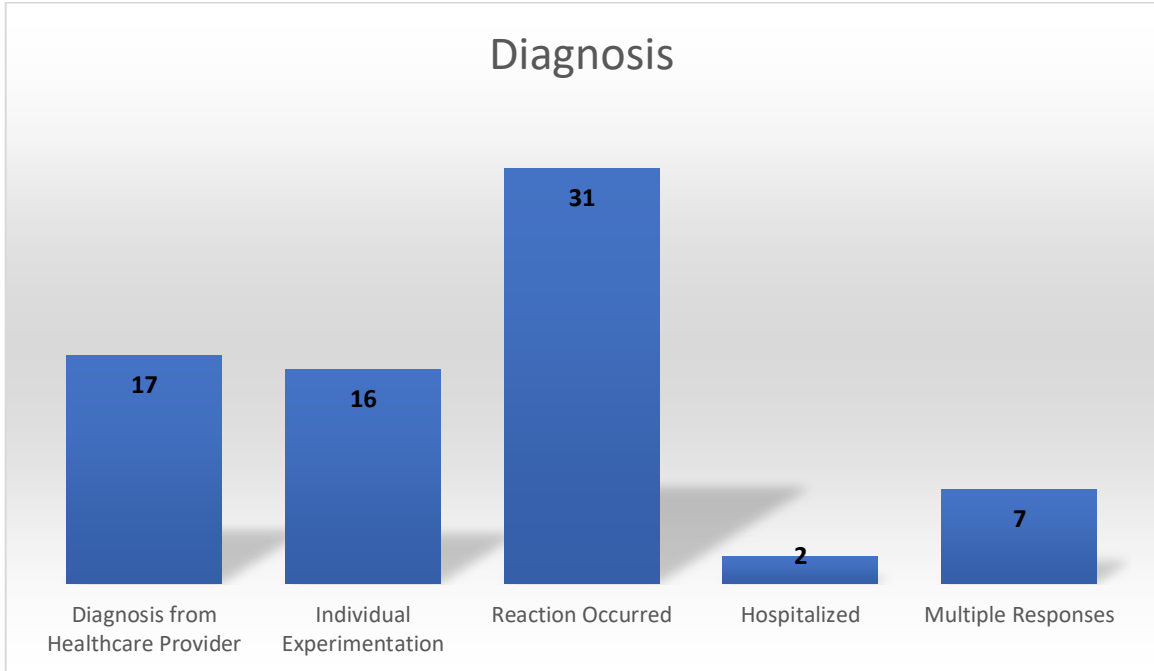
*represented as number of responses

Graph 4



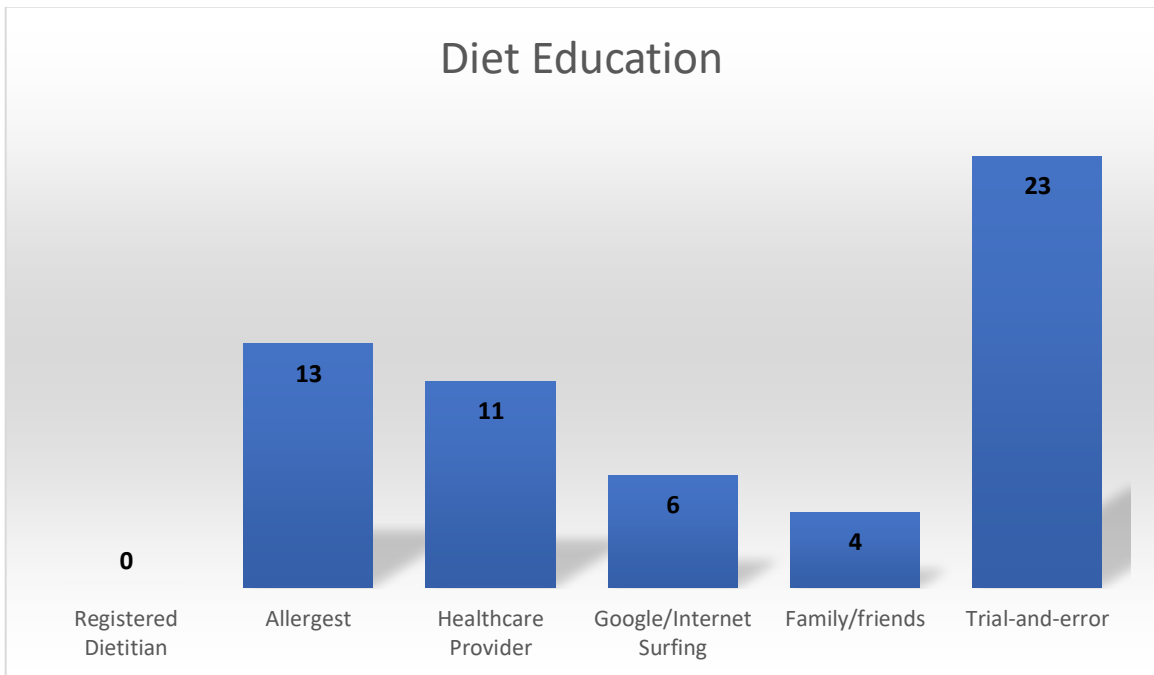
*represented as number of responses

Graph 5



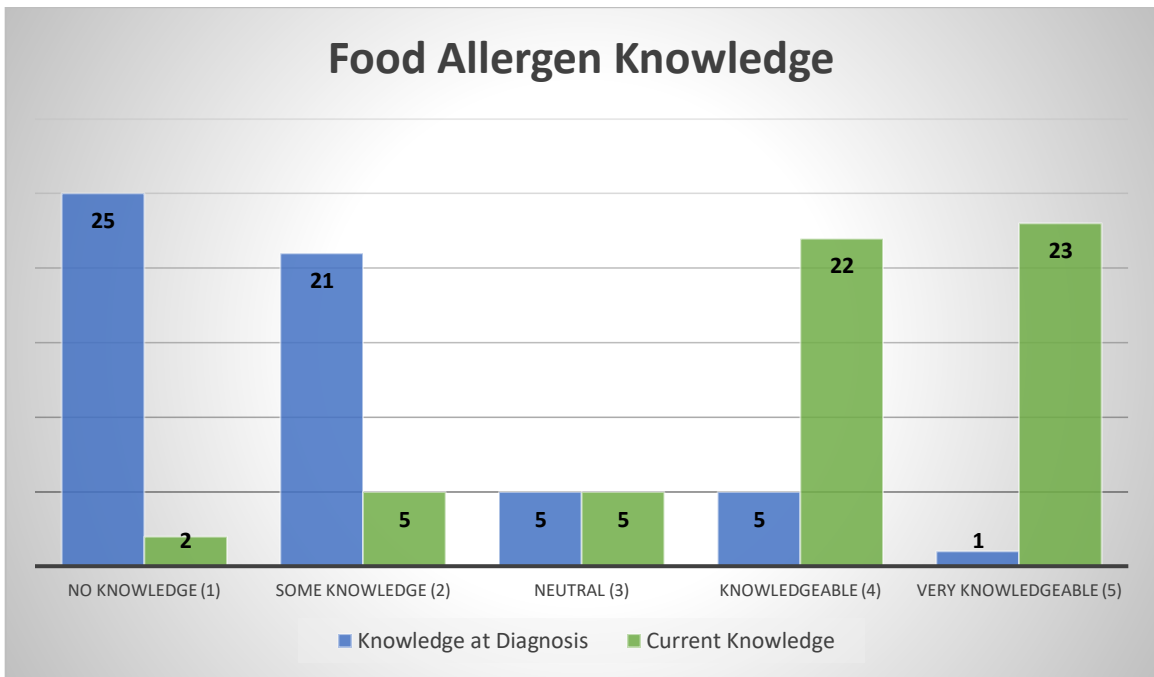
*represented as number of responses

Graph 6



*represented as number of responses

Graph 7



*represented as number of responses

References

- DBPCFC*. (n.d.). Utrecht Center for Food Allergy. <https://ucfa.nl/food-allergy/diagnostics/dbpcfc/>
- Diagnosing food allergies: Current guidelines*. (n.d.). Academy of Nutrition and Dietetics. <https://www.eatrightpro.org/news-center/nutrition-trends/diseases-and-conditions/diagnosing-food-allergies-current-guidelines>
- Egg Allergy Nutrition Therapy*. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=14
- Egg Allergy Tips*. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=82
- Fish Allergy Nutrition Therapy*. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=28
- Fish Allergy Tips*. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=83
- Food allergy testing*. (2020, July 31). MedlinePlus. <https://medlineplus.gov/lab-tests/food-allergy-testing/>
- Mahan, L. K., & Raymond, J. L. (2017). *Krause's food & the nutrition care process* (14th ed.). Elsevier.
- Manea, I., Ailenei, E., & Deleanu, D. (2016). Overview of food allergy diagnosis. *Clujul medical* (1957), 89(1), 5–10. <https://doi.org/10.15386/cjmed-513>
- Milk Allergy Nutrition Therapy*. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=15

- Milk Allergy Tips.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=85
- Nutrition Intervention.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu:3443/topic.cfm?ncm_toc_id=270016
- Overview.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu:3443/topic.cfm?ncm_toc_id=269065
- Palmer, S. (2010). *Food allergies: When food bites back.* Environmental Nutrition, 33(10), 1–4. <https://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=2f295098-b1e3-4256-b2f6-75a9b1df0e6b%40pdc-v-sessmgr06>
- Peanut Allergy Nutrition Therapy.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=16
- Peanut Allergy Tips.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=87
- Rance, K., & O’Laughlen, M. (2014). Managing food allergies in primary care. Clinical Advisor, 17(2), 53–60 <https://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=0&sid=4f7786e4-bfa2-4f02-a867-50ec1f357b74%40pdc-v-sessmgr04>
- Shellfish Allergy Nutrition Therapy.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=18
- Shellfish Allergy Tips.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=88
- Soy Allergy Nutrition Therapy.* (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=26

Soy Allergy Tips. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=89

Tree Nut Allergy Nutrition Therapy. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=17

Tree Nut Allergy Tips. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=90

Wheat Allergy Nutrition Therapy. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=47

Wheat Allergy Tips. (n.d.). Nutrition Care Manual. https://www-nutritioncaremanual-org.iris.etsu.edu/client_ed.cfm?ncm_client_ed_id=91