

# **Gluten Free Food Deserts: Determining Their Existence and Expanse**

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## **Part 1: Introduction to the Study and Background Information**

Part 1 of the paper primarily provides background information relevant to the research, including who eats gluten free, what adhering to a gluten free diet looks like, and why this topic needs a geographic perspective.

### **Introduction**

While researchers in the United States have treated food deserts as a prevalent concern, and conducted numerous studies on food accessibility, almost no one has looked at the availability of gluten free products in the context of food deserts. Celiac Disease and Non-Celiac Gluten Sensitivity, for both of which the only known cure is a lifelong adherence to the gluten free diet, affect over 1 in 100 Americans (Celiac Foundation) (Moore 2001). When studying food deserts, the needs of people with dietary restrictions ought to be considered not only because everyone deserves access to adequate food, but also since scholars believe food intolerances and allergies function as an emerging modern plague, with the number of people requiring access to specialized food products increasing by the day (Jackson 2001). Within this study, I will be determining the existence of gluten free food deserts, or, in other words, areas where there is little to no access to gluten free products. To determine the existence of gluten free food deserts, I will begin by surveying the availability of gluten free products in the grocery stores, restaurants, bakeries, and food pantries of two Pennsylvania counties. Then, with the data I gather, I will create a series of maps, on which I will be able to demonstrate how the residents of the two counties either do or do not have adequate access to gluten free foods. Overall, I hope to determine if gluten free food deserts exist, and, if they do exist, their extent.

Regarding the overall structure of this research paper, the paper centers on how, by way of a series of questionnaires, I determine the existence of gluten free food deserts and the

availability of gluten free foods at food pantries, restaurants, and bakeries. Part 1 of the paper provides background information necessary for understanding the thought behind and the need for this research. Then, Part 2 explains my methodology and the results of the questionnaire surveys. Finally, Part 3 analyzes the results and examines how this research relates to social justice.

### **Inspiration for Project**

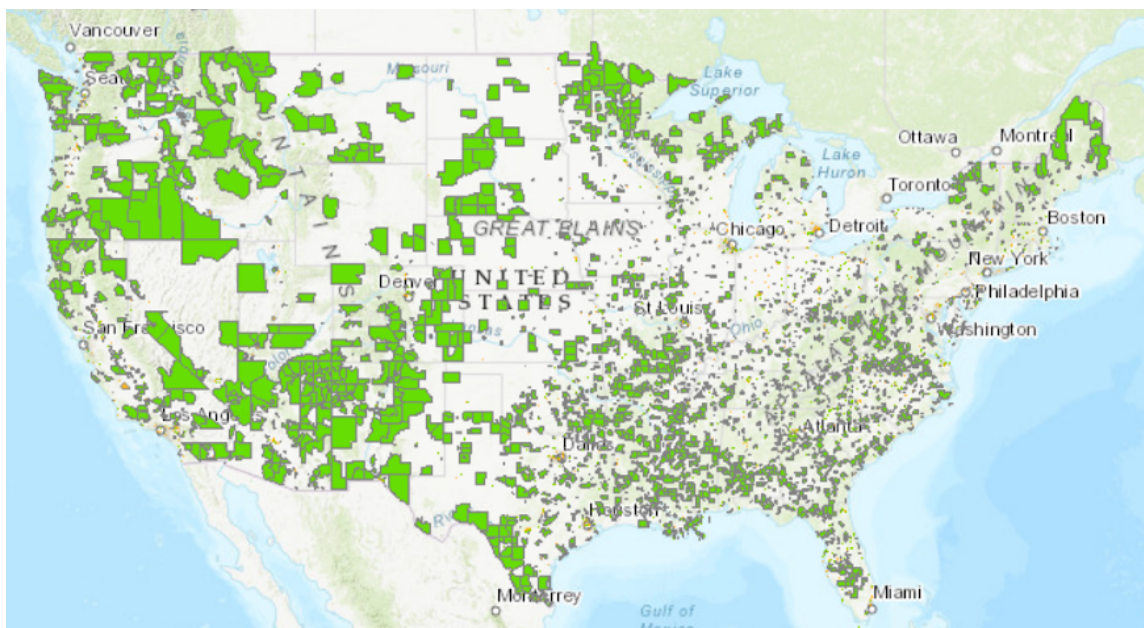
After my diagnosis with Celiac Disease, I developed a concern over the availability of gluten free foods, and that concern grew significantly following an experience I had while volunteering with the food pantry, Community Solidarity. I was first diagnosed with Celiac Disease at the age of sixteen, after experiencing symptoms of the disease for over eight months. As such, at this point in time, I have now been eating gluten free for over six years. Despite mainly living in areas not classified as food deserts by the United States, there have been times in my life when I struggled to find the gluten free products I needed. Often, gluten free foods I have eaten for years disappear from the shelf, and I have to shop at several stores in order to find all the products my diet requires. While in my hometown, I rarely eat food prepared outside my own home since only one gluten free friendly restaurant resides in my town. Essentially, my diagnosis demonstrates to me the lack of availability of gluten free food every day. My personal perspective on the lack availability of gluten free food was then expanded when I volunteered with Community Solidarity two years ago.

Once a week, Community Solidarity, a nonprofit located in Hempstead, New York, distributes fresh fruits and vegetables, as well as bread, and a few nonperishable items to anyone who wants them. Essentially, they aim to provide nutritious foods to those living in low-income



areas (Community Solidarity). Parts of Hempstead are considered to be food deserts, including the area where Community Solidarity distributes food (United States Department of Agriculture). As a volunteer, I was helping pass out a variety of bread products, when a person collecting food asked if there was any gluten free bread. Hoping to accommodate their needs, I searched through the bags of bread that had been donated, and failed to find a single gluten free bagel, bun, or loaf of bread. As I was forced to send them away disappointed, I realized how the lack of availability of gluten free food could negatively impact those in poor socioeconomic circumstances. Ever since that conversation, I have been seriously concerned as to whether or not those living in food deserts have adequate access to foods that meet their dietary requirements, and that concern has driven me to complete this study.

### Definition of a Food Desert



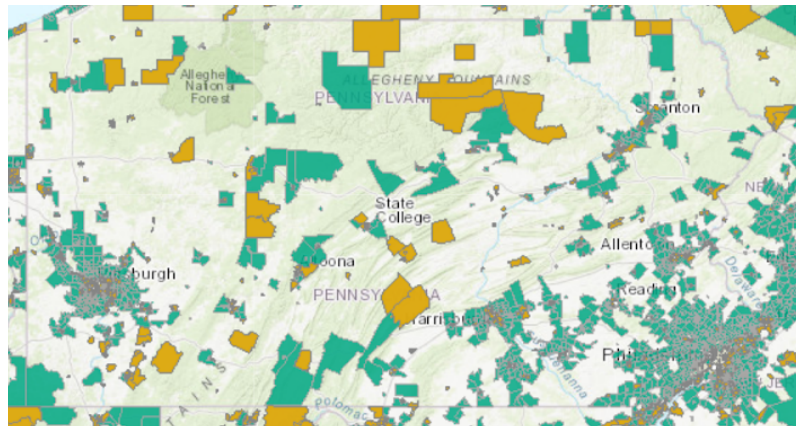
**Figure 1A:** The map above displays the food deserts in the United States. The areas highlighted in green are food deserts in which people have low access to grocery stores and low incomes.

Source: United States Department of Agriculture. *Food Access Research Atlas*.

<https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/>.

Food deserts are a pressing issue in the United States, as an estimated 29.7 million Americans live in areas, where they have little, to no access to affordable, fresh food (The Food Trust) (For a map of food deserts in the continental United States, please examine Figure 1A). In food deserts, a healthy diet remains out of reach for most residents, as these areas lack grocery stores and healthy food retail outlets that sell nutritious foods (The Food Trust). Generally, food deserts tend to be located in communities of color and low-income areas. Also, they can be found in both rural and urban locations (The Food Trust). In food deserts, a lack of access to nutritious foods can negatively impact a person's health, and lead to medical complications such as diabetes, childhood obesity, and other diet-related diseases (United States Department of Agriculture). One of the main complications associated with living in a food desert, is that, in some food deserts, residents have easier access to fast food restaurants than grocery stores with nutritious food. As such, people may rely on fast food restaurants for food as their options at local stores remain limited. Studies report that they, "...have found that greater availability of fast food restaurants and lower prices of fast food restaurant items are related to poorer diet" (United States Department of Agriculture). Not known for their nutritious options, fast food restaurants only contribute to the dietary challenges that those who live in food deserts face on a day to day basis. (United States Department of Agriculture). Furthermore, access to nutritious food remains important to the whole of a community as healthier communities have healthier economies. In regions where grocery stores that sell healthy foods are introduced, there is an increase in the number of jobs in the area and additional business investment into the community (The Food Trust). Overall, the people living in food deserts face an array of both health and economic complications.

Regarding Pennsylvania, where my study is centered, access to nutritious food is unevenly distributed. (A map of deserts in Pennsylvania can be seen in Figure 1B).



**Figure 1B:** The map above displays the food deserts in Pennsylvania. The orange areas are food deserts in which people have both limited access to grocery stores and low incomes. Meanwhile, the turquoise areas are food deserts in which people have limited access to grocery stores, but not necessarily low incomes. Source: United States Department of Agriculture. *Food Access Research Atlas*. <https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/>.

Currently, 2 million Pennsylvanians, including 500,000 children, live in low-income areas classified as food deserts. In these low-income communities, there are high rates of diet-related death, such as heart disease and diabetes, which stem from a lack of access to nutritious foods (The Food Trust). One study on Pennsylvania food deserts reports that, “...towns and neighborhoods without grocery stores miss out on the economic benefits created by local businesses, such as jobs and local tax revenues” (The Food Trust). Essentially, without grocery stores, the food deserts in Pennsylvania communities suffer economically. Food deserts are just as large of an issue in Pennsylvania as they are anywhere else in the United States.

## Who Eats Gluten Free

While some people personally choose to remove gluten from their diet, there are actually two main medical conditions that require people to adhere to a gluten free lifestyle. The first condition is Celiac Disease and the second is Non-Celiac Gluten Sensitivity (NCGS). Both Celiac Disease and NCGS conditions involve the body's negative reaction to gluten, which is a protein found in wheat, rye, barley, sometimes oats, and several other grains (Celiac Foundation). The increased presence of gluten is believed to be the result of the cross breeding of crops (Celiac Foundation). Celiac Disease is an inherited, autoimmune disease that can develop at any point in a person's lifetime once they have begun to eat solid food. The disease remains one of the most underdiagnosed in the United States, and some believe the condition affects over 1% of the country's total population (Celiac Foundation). When those with Celiac Disease eat so much as a crumb of gluten "... their body mounts an immune response that attacks the small intestine. These attacks lead to damage on the villi, small fingerlike projections that line the small intestine, that promote nutrient absorption" (Celiac Foundation). In result, once a person's villi suffer damage, their body fails to properly absorb nutrients until the villi have healed. For those with Celiac Disease, the villi healing process can take up to three months to complete (Celiac Foundation). Often, Celiac Disease is hard to diagnose as there are a myriad of ways in which the disease can manifest, as well as differing degrees in the severity of symptoms. Possible symptoms include, but are not limited to, abdominal pain, chronic diarrhea, vomiting, weight loss, iron-deficiency anemia, fatigue, osteoporosis, depression, and anxiety (Celiac Foundation). For those with Celiac Disease, a consistent lack of compliance to the gluten free diet can lead to several serious consequences, such as infertility, vitamin and mineral deficiencies, gastrointestinal cancers, and neurological conditions (Celiac Foundation). In

addition to dealing with the symptoms of the disorder, those with Celiac Disease face a higher risk of developing several other health complications, including diabetes, liver disease, and dermatitis herpetiformis (Celiac Foundation). Celiac Disease acts as a serious medical condition that can severely hinder a person's physical wellbeing.

The second medical condition requiring a gluten free diet, Non-Celiac Gluten Sensitivity (NCGS) remains somewhat controversial and not well understood by doctors, as no official method for diagnosing the disorder exists. Celiac Disease is diagnosed by either a blood test or endoscopy, but no such test exists for the diagnosis of NCGS (Intermountain Healthcare 2018). Instead, NCGS is determined by simply seeing if symptoms persist once gluten is removed from the diet. Nevertheless, doctors take NCGS seriously and estimate that NCGS affects just as many, if not more people than Celiac Disease (Moore 2020). While those with NCGS do not experience an immune reaction, and do not suffer from stomach or organ damage when eating gluten, they experience similar symptoms to those with Celiac Disease. Common symptoms of NCGS include stomach pain, fatigue, depression, and digestive system complications (Intermountain Healthcare). As such, adhering to a gluten free diet is just as important for those with NCGS as it is for those with Celiac Disease.

When discussing the gluten free diet, noting that those unable to eat gluten suffer from an intolerance, and not an allergy, is important. As people with Celiac Disease undergo an immune reaction to gluten, their inability to properly digest the protein is referred to as an intolerance (Celiac Foundation). Though NCGS remains somewhat undefined, doctors still consider sufferers of NCGS to have an intolerance to gluten. However, studies on these medical conditions will occasionally refer to the disorders as allergies as opposed to intolerances, since the medical community lacks a universal agreement on what to call a negative reaction to gluten

(Aaron 2017). Additionally, Celiac Disease and NCGS are often treated as food allergies and included in food allergy studies. Furthermore, many people with an intolerance to gluten refer to their intolerance as an allergy, as people take allergies more seriously than they do intolerances, and thus better respect a person's dietary needs (Copelton 2011). Essentially, while I will consistently refer to the inability to eat gluten as an intolerance, some of the sources used in this paper will refer to gluten intolerance as an allergy.

### **The Gluten Free Diet**

Dieticians describe the gluten free diet as both complex and limiting. In the United States, gluten serves as the basis of a balanced diet, which means that the majority of foods eaten daily by Americans contain gluten (Litwinek 2014). Everyday foods that are not gluten free include breads, pastas, baked goods, cereals, soups, sauces, and salad dressings. Due to the presence of gluten in several commonly consumed foods, people with a gluten intolerance depend on naturally gluten free foods, which are fruits, vegetables, meat, rice, potatoes, and dairy products.<sup>1</sup> In a food desert, where fresh food is often unavailable, a gluten intolerant person lacks easy access to the fresh foods they rely on. Even the processed versions of naturally gluten free foods, such as canned fruits and vegetables, may come into contact with gluten, or have gluten added to them while being processed.

Now, when eating gluten free, people additionally rely on the gluten free versions of traditional diet staples, such as spices, pizza crusts, and taco shells. When determining whether or not a product contains gluten, knowing how to properly read food labels is incredibly

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<sup>1</sup> The majority of the information used in the gluten free diet section comes from the following source: Celiac Disease Foundation. (2020). *What is Celiac Disease*. Celiac. <https://celiac.org/about-celiac-disease/what-is-celiac-disease/>

important, as gluten tends to hide in unexpected places. In the United States, the Food and Drug Administration only allows products with less than 220ppm of gluten to receive a gluten free designation. Thus, if a product is labeled gluten free, that product is most likely safe for those with a gluten intolerance to eat. However, there remains significant debate on what the threshold is for the amount of gluten allowed in products that receive a gluten free label (Aaron 2017). Also, a product without a gluten free label may still be gluten free, a person would just have to check the product's ingredient and allergen list for gluten containing grains. Though, a gluten intolerant person should always exercise caution when eating products not labeled as gluten free, but do not appear to contain gluten, as the product could have been prepared on machinery that also processes gluten containing foods. Furthermore, even if a product appears gluten free, gluten can still be hiding in one of the ingredients. Overall, gluten intolerant people need to carefully scrutinize everything they eat throughout the day.

### **The Difficulty of Adhering to the Gluten Free Diet**

Adhering to the gluten free diet comes with several difficulties, which would only increase the number of problems already faced by the gluten intolerant living in gluten free food deserts. First and foremost, the gluten intolerant view eating gluten free as an inconvenience, as the diet plays a direct role in determining a person's daily routine. After diagnosis, many people suffer from anger, fear, and anxiety (Aaron 2017). The daily inconvenience of the diet was demonstrated in one study, which found that the treatment burden of caring for a partner or child on the gluten free diet is comparable to caring for a person in the final stages of cancer (Celiac Foundation). Secondly, there is a lack of nutrition counselors who are knowledgeable of the gluten free diet, which means that the gluten intolerant often have little guidance as to what



foods they can consume. Then, they are encumbered with misinformation on eating gluten free from food stores, alternative practitioners, and family and friends (Aaron 2017). Thirdly, once on the gluten free diet, people often suffer from nutritional deficiencies, and continue to experience symptoms (Aaron 2017). Adhering to the diet can lead to new problems and fail to eliminate old ones. Fourthly, eating gluten free is particularly difficult at this time, “... due to the actual surge in incidence, wheat content, gluten intake, CD-related T-cell stimulatory epitopes in wheat, usage in the processed food industries...” (Aaron 2017). In other words, the reach of gluten in food products continuously expands, which means there are fewer and fewer food products that the gluten intolerant can eat everyday. Finally, the cost of gluten free foods far surpasses the cost of their gluten-containing counterparts (Cureton 2007). As such, when a person goes gluten free, their families often cannot afford to eat gluten free with them (Cureton 2007). A lack of family compliance then leads to an increased possibility of cross-contamination, which puts the gluten intolerant family member at risk (Aaron 2017). For the people living in food deserts situated in low-income communities, the high cost of gluten free products could be particularly debilitating.

Furthermore, the gluten free diet often goes misunderstood. One scholar writes that, “Dismissing the potentially very real or even transformative experience that can occur when an individual with food allergy changes their diet; mainstream media and much of the general public view food allergy as little more than a “trend” (Page-Reeves 2014). Essentially, when a person is diagnosed with gluten intolerance, the media and the public will often see their choice to eat gluten free as a fad, and not as the result of a medical condition. As such, when the gluten intolerant inform others about their dietary concerns, they may not be taken seriously. Often, even their family members and friends will attempt to pressure them into continuing a gluten containing diet (Aaron 2017).



Page-Reeves further discusses how dietary restrictions can interrupt culturally significant meals, such as birthday cakes and the Thanksgiving stuffing (Page-Reeves 2014). The inability to no longer consume cultural meals can be upsetting and disappointing, as the gluten free diet infringes upon tradition. Additionally, the gluten intolerant may also no longer be able to eat dishes made from special family recipes, and family members do not always react well to needing to alter recipes that generations of relatives passed down (Page-Reeves, 2014). Eating gluten free comes with several complications, and for the people living in gluten free food deserts, the preexisting complications serve to worsen their circumstances.

### **Eating Gluten Free at Restaurants and Bakeries**

As I will be including restaurants and bakeries in my study of food deserts, understanding what eating at these establishments entails for the gluten intolerant is important.<sup>2</sup> One scholar offers insight into the dining process, writing, “Persons with CD [Celiac Disease] must be on guard when dining out... To ensure that foods are safe, persons with CD must educate hosts and food service workers about CD and the GF [Gluten Free] diet.” When eating at an establishment, whether the eatery is a bakery or a restaurant, the gluten intolerant take on the task of ensuring staff members know how to prepare gluten free food in a way that prevents the gluten free food from coming into contact with gluten containing products. To prevent cross-contamination, chefs need to confirm that all the meal’s ingredients are gluten free, that all the equipment used to prepare the meal, including spatulas and stove tops, have been wiped clean, and that the entire

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<sup>2</sup> The majority of the information in the eating gluten free at restaurants section comes from the following source: Copelton, Denise. (2011). Advocacy and Everyday Health Activism among Persons with Celiac Disease: A Comparison of Eager, Reluctant, and Non-Activists. *Taking Food Public: Redefining Foodways in a Changing World*. 561-575.

staff knows that the meal needs to be carefully prepared. Even when a restaurant has a gluten free menu, the gluten tolerant may still need to educate staff members. Due to the fact that so many precautions need to be taken when eating at a restaurant or bakery, the gluten intolerant worry that kitchen staff will either misunderstand their needs or ignore them as they find them bothersome.

The gluten intolerant embody the role of advocates when eating out. The gluten intolerant belong to one of three advocate types, the non-activist, the reluctant activist, and the eager activist. Non-activists are too afraid or embarrassed to eat at restaurants, while eager activists feel comfortable sharing their needs with staff. The reluctant activist falls in between the other two types, as they will eat at a restaurant, but express discomfort or guilt at the idea of doing so. Additionally, a person with a gluten intolerance needs to have access to places where they can purchase prepared food, as eating out is an important social activity, and several people with a gluten intolerance struggle to maintain their social life once diagnosed. Furthermore, everyone deserves the right to go out and eat. Currently, in Pennsylvania, no regulations or laws exist regarding the handling of allergen foods in kitchens (Food Empowerment Project). Overall, eating at a restaurant or bakery is a complicated, and often risky experience for the gluten intolerant.

### **Food Pantries and Gluten Free Food**

Food pantries serve as a primary source of food for impoverished Americans throughout the United States, and awareness of the need for food pantries and what items they typically distribute is important to this study. Prior to the COVID-19 Pandemic, over 35 million people in the United States dealt with hunger, including 10 million children. Now, an estimated 42 million

American's suffering from food insecurity (Feeding America). In attempting to get an overview of how food pantries in the United States handle the distribution of gluten free food items, I turned to Feeding America, which is the largest hunger-relief organization in the United States. The organization alone has 200 food banks and distributes food to over 200,000 food pantries (Feeding America). In 2014, a spokesperson for the organization stated that they were working on providing more healthful, naturally gluten free foods to more pantries. Though, he further noted, that they rarely received requests for gluten free food (Manke 2014). Currently, on their website, they mention nothing about providing food for people suffering from food allergies or intolerances. Plus, the spokesperson only discussed providing more naturally gluten free foods to pantries, such as fruits and vegetables not necessarily packaged ones, like bread and pasta (Feeding America). Feeding America's failure to address dietary needs is concerning, as the lack of availability of gluten free foods at food pantries is a countrywide issue (Manke 2014).

Kara Manke investigated the lack of food pantries accommodating the needs of the gluten intolerant in her article, "Gluten Free Food Banks Bridge Celiac Disease and Hunger." In her article, she interviews three organizations, who provide gluten free food to the food insecure. Two of the organizations stated that they regularly receive calls about gluten free food from people and food pantries around the country, which demonstrates the breadth of the issue (Manke 2014). One of the problems with food pantries identified by the organizations is that, "[...] no one really knows how many people with Celiac need food assistance, because no one is collecting the data" (Manke 2014). When researchers examine food insecurity, they overlook the dietary concerns of the gluten intolerant, and, as such, the needs of the gluten intolerant remain ignored. Furthermore, the article describes how food pantries may be receiving food that is gluten free, but they are not educated on how to determine what foods are gluten free and which

are not (Manke 2014). As such, a major step towards ensuring that the gluten intolerant receive gluten free foods at food pantries is teaching the people sorting the food how to read labels (Manke 2014). Finally, one woman who was interviewed in the article, and who has Celiac Disease, discussed how she received so little gluten free food at food pantries, stating that, “ ‘It got to the point where it was almost not worth going to the food pantry because at that point there was nothing that I could have’ ” (Manke 2014). Her testimony demonstrates how the items a food pantry typically passes out cannot be considered gluten free. The availability of gluten free foods at food pantries remains a widely overlooked issue that deserves further attention.

### **Current Research on the Availability of Gluten Free Foods**

In the United States, the literature on the availability of gluten free foods remains limited, and I failed to find any studies that addressed gluten intolerance in the context of food deserts. However, the few sources I did find do confirm that the gluten intolerant struggle to find sufficient food. One article from 2017 claims that one of the most common problems the gluten intolerant deal with upon diagnosis is the low, or poor availability of gluten free products (Aaron 2017). Another study, which was conducted in London, found that 80% of the people with Celiac Disease struggled to find gluten free foods and find them expensive (Singh 2011). A startling statistic noted by the authors of this same study is that 70% of manufactured food products contain gluten (Singh 2011). As such, a person living in a food desert, where there is a lack of fresh, naturally gluten free foods, would only be able to eat 30% of the items available at the stores they have access to. Furthermore, one study writes that, “High cost and limited availability of GF [Gluten Free] foods is associated with poorer dietary adherence” (Hanci 2019). Failure to

comply with the gluten free diet leads to serious, as well as life threatening health consequences, such as cancer, for those with Celiac Disease (Celiac Foundation).

In her article on the difficulty of dealing with food allergies and intolerances, Page-Reeves hints at the relationship between gluten intolerance and disadvantaged groups. Page-Reeves writes, “Minorities and individuals from low socioeconomic status households are at a higher risk for food allergy [...] are more likely to have a food allergy that is undiagnosed and are more likely to experience food hardship and economic stress in relation to food allergy” (Page-Reeves 2015). Food deserts are already concentrated in areas with large minority populations and groups of people with low socioeconomic status. As these populations disproportionately suffer from hardship and economic stress when they have food intolerances, their problems are then exacerbated if they live in food deserts. She further writes that the public health literature has demonstrated time and time again that women are disproportionately affected by food intolerances. (Page-Reeves 2015). Thus, women with food tolerances, especially those who are of color or are impoverished, are particularly compounded if they live in food deserts. One further point that Page-Reeves notes, and that offers a possible explanation as to why the relationship between food deserts and the gluten free diet has been overlooked, is that studies of food allergies and intolerances tend to leave out people of low socioeconomic status (Page-Reeves 2015). As the impoverished are not equally represented in studies of food intolerances, awareness of their needs is lacking.

Three studies conducted outside of the United States attempted to determine the availability of gluten free foods at grocery and convenience stores. Two of the studies were completed in England, and one of them was conducted in Mexico. Essentially, all three studies made use of the same methods. Each study formulated a list of the gluten free versions of around

twenty diet staples, including items such as bread, flour and pasta (Whelan 2011) (Hanci 2018) (Arias-Gasterium 2018). Then, the researchers went into stores to determine if the products they were looking for were available. With the results they gathered, they then concentrated on what types of stores sold, or did not sell, gluten free foods, as well as how many of the items on their lists were available at each location (Whelan 2011) (Hanci 2018) (Arias-Gasterium 2018). Even though the studies were completed at different times in different locations, they all still share similar results.

The first study that took place in England was published in 2011 and is called “Limited availability and higher cost of gluten-free foods.” The scholars who conducted the study, J. Singh and K. Whelan, examined 30 London stores, including grocery, convenience, and health food shops. (Whelan 2011). Ultimately, they concluded that, on average, the stores they examined sold 8.2 out of the 20 gluten free foods on their lists. However, they note that availability varied across store categories. Basically, they found that supermarkets sold an average of 18 of the 20 foods on their list, while budget supermarkets and corner markets only sold an average of 1.8 of the 20 items on their list (Whelan 2011). Overall, they concluded that the availability of gluten free foods in London is limited.

The second study, which is entitled, “Are gluten-free food staples accessible to all patients with coeliac disease,” was conducted in London in 2018. Reflecting the results of the 2011 study, this report concluded that the amount of gluten free food sold at premium markets had increased, while remaining extremely low at convenience and budget stores, which sold few, if any gluten free products (Hanci 2018). The authors further concluded that, the lack of gluten free food in convenience and budget stores, “... will continue to disproportionately impact poor socioeconomic cohorts, the elderly and physically disabled” (Hanci 2018). In other words, a lack

of gluten free food in stores can have serious, and far-reaching impacts for those already disadvantaged in society, the poor, the elderly, and the disabled. The researchers further conclude that, “A lack of GF [Gluten Free] foods impacts GF dietary adherence, increasing related comorbidities and healthcare costs” (Hanci 2018) Without access to gluten free food, the gluten intolerant are additionally faced with health concerns and costs.

In 2018, the final study, “The gluten-free diet: access and economic aspects and impact on lifestyle,” was conducted by four researchers in Northwestern Mexico. Within their study, they broke down stores that sold food into a series of categories. Then, they selected a few stores from each category, in which to search for a series of preselected items, throughout cities across the region (Arias-Gasterium 2018). Ultimately, their results reflected the other two studies, as they found that convenience stores and corner markets sold almost no gluten free food, while supermarkets sold an array of gluten free products (Arias-Gasterium 2018). While the United States offers little research on the availability of gluten free foods, the lack of availability has been noted on numerous occasions by the gluten intolerant and has been proven in other world regions.

### **Need for a Geographic Perspective**

While the lack of availability of gluten free foods has traditionally been investigated by health care researchers, a geographic perspective on the issue is needed. The health care literature states that 80% of the gluten intolerant struggle to find gluten free products, but that struggle remains to be physically proven and measured (Singh 2011). No one has actually demonstrated what the “lack of availability” looks like. Furthermore, even though the studies that took place in England and Mexico displayed how certain stores did not sell gluten free food,

they failed to denote how people either did or did not have access to those stores. Additionally, despite the three studies concentrating on specific regions, they only looked at select stores within these areas, and did not measure accessibility to them. As such, in applying a geographic perspective, one can physically demonstrate how gluten free foods are not available in every community, and clearly define what the lack of availability looks like.

A geographic perspective on the availability of gluten free foods at restaurants, bakeries, and food pantries is further needed in this study. Regarding restaurants and bakeries, the United States Department of Agriculture states, “In considering the effect of food access on diet and health, access to restaurants and other foodservice establishments is important because food from these sources accounts for a significant part of the total diet” (United States Department of Agriculture). Leaving restaurants and bakeries out of this study would be negligent, as these sources of food are just as important as grocery stores, and people need access to them. Meanwhile, though food pantries are not traditionally included in studies of food deserts, I felt adding them to the discussion was important, as food pantries are not only a source of food, but they only serve so many zip codes. For the gluten intolerant, this means that if your community food pantry does not distribute gluten free food, you have nowhere else to turn, as there is no other food pantry you can turn to. A geographic perspective is then important, as a geographic perspective can clearly demonstrate who can and cannot access gluten free food pantries. Overall, adding a geographic perspective to the study of gluten free food deserts is both necessary and overdue.



## **Part 2: Data, Methodology, and Results**

Part 2 of the paper is centered on the methods I used and the results I obtained. I begin by explaining the questionnaire surveys and how the gluten free food deserts were mapped then I display and describe my results.

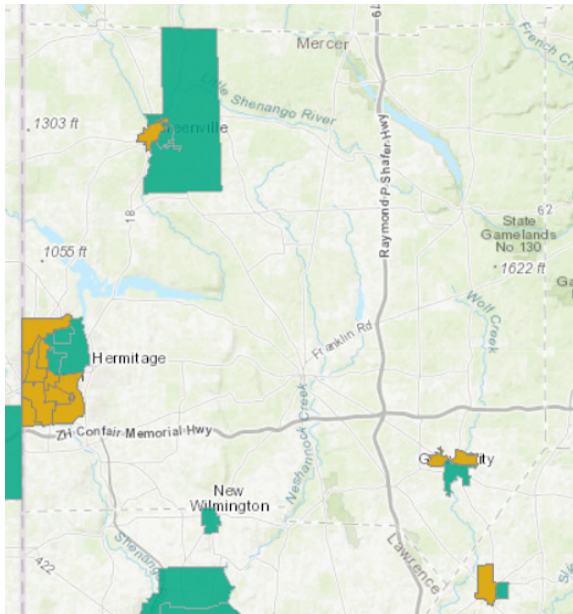
### **County Background Information**

The two counties I selected, Mercer and Lawrence, lie in western Pennsylvania along the Ohio border. I selected these two counties as I wanted to work with areas that both contained and did not contain food deserts. Selecting these counties allows me to compare the areas in which there are gluten free food deserts to the areas in which there are and are not traditional food deserts. I feel that this comparison has importance because if a person with a gluten intolerance lives in an area classified as a both food desert and a gluten free food desert, they not only lack access to gluten free foods, but also the fresh foods the gluten free diet relies on. According to the United States Census Bureau, as of 2019, Mercer County houses around 110,000 people, 18.2% of whom are children, (United States Census Bureau). The county is predominantly composed of people who racially identify as white, with white people making up 90% of the population. Then, 5.9% of the county identifies as black or African, 1.6% as Hispanic, and 0.7% as Asian. Regarding the socioeconomic status of the county's residents, the median household income is \$50,696, and 13.1% of the population lives in poverty (United States Census Bureau). As of 2015, within Mercer County, there are a few areas that the United States Department of Agriculture has classified as one, or more types of food deserts.<sup>3</sup> As the map of food deserts in

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<sup>3</sup> The USDA maps 4 specific types of food deserts. One: Rural areas where the nearest grocery store is more than 10 miles away. Two: Urban areas where the nearest grocery store is more than 1 mile away. Three: Urban areas where the nearest grocery store is more than ½ mile away. Four: Areas with low vehicle access. Furthermore, they indicate whether these areas are low income when mapping (United States Department of Agriculture).

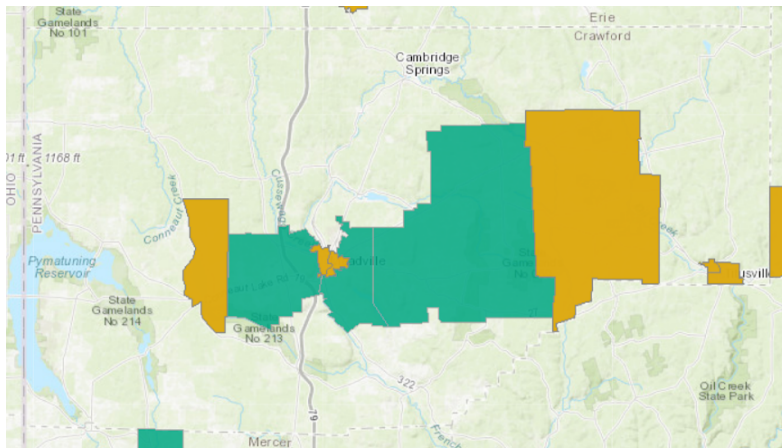
Figure 2A shows, the low-income areas with limited access to grocery stores, include parts of Greenville, as well as most of the cities of Sharon and Farrell. Then, the communities that are not considered low income, but still have limited access to grocery stores include parts of Sharpsville and Wheatland.



**Figure 2A:** This is a map of Mercer County, PA that displays two types of food deserts. The dashed lines are the county borders. Then, the orange areas are food deserts in which people have both limited access to grocery stores and low incomes. Meanwhile, the turquoise areas are food deserts in which people have limited access to grocery stores, but not necessarily low incomes. Source: United States Department of Agriculture. *Food Access Research Atlas*.

<https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/>.

Conversely, the population of Crawford County is estimated to be around 85,000 as of 2019, and 20.4% of the population is under the age of 18 (United States Census Bureau). A total of 95.8% of the county residents identify as white, 2.0% as black, 1.4% as Hispanic, and 0.6% as Asian. Additionally, the county has a poverty rate of 12.6% and the median household income is \$50,304 (United States Census Bureau). Regarding food deserts in the region, Figure 2B displays the areas that the USDA defined as low income and low access food deserts in 2015.



**Figure 2B:** Here is a map of food deserts in Crawford County, PA. The dashed lines are the county borders. Then, the orange areas are food deserts in which people have both limited access to grocery stores and low incomes. Meanwhile, the turquoise areas are food deserts in which people have limited access to grocery stores, but not necessarily low incomes. Source: United States Department of Agriculture. *Food Access Research Atlas*.

<https://www.ers.usda.gov/data-products/food->

The food deserts with low income and low access include parts of Meadville, Townsville, Harmonsburg, Athens Township, Titusville, and Conneaut Lake. Then, the areas that are only considered low access food deserts include additional parts of Meadville, Townville and Conneaut Lake, as well as areas within Blooming Valley and Richmond Township (United States Department of Agriculture). Both Mercer and Crawford County serve as examples of US counties that contain and do not contain food deserts.

## Questionnaire Overview

The central method I employed to gather information on the availability of gluten free products in Mercer and Crawford counties was a series of questionnaires. I developed four separate questionnaires for the grocery stores, restaurants, bakeries, and food pantries (See Appendix A for the complete questionnaires.) I conducted all the interviews over the phone and kept track of the conversations using a series of spreadsheets. The purpose of each questionnaire was to first determine if the location offered gluten free food, and then to determine the extent of the need for gluten free food in these counties.

The first questionnaire was aimed at grocery, convenience, and health food stores as well as pharmacies. I included all these types of stores, as I wanted to ensure that my mapping of gluten food deserts was as thorough as possible. When I called these stores, I spoke to either a sales associate or a manager. Altogether, the aim of this questionnaire was to determine whether the stores sold gluten free products. The first question I asked when calling was, “Do you have a gluten free section in your store.” I decided to start with this question, as, based on my personal experience with shopping gluten free, if a store does not have a gluten free section, their chances of selling the gluten free versions of foods like bread, pasta, and flour are slim. As such, in opening with this question, I could quickly gauge the breadth of a store’s gluten free options. Then, the second question, which is “What gluten free versions of food do you sell,” fed into the third question. In short, the third question asked the stores if they sold a series of gluten free products, including gluten free bread, pasta, crackers, pancake mix, etc. Initially, my plan was to determine the extent of a store’s gluten free offerings based on the number of products from the third question that they carried. As such, the second question was meant to prevent me from having to ask for the items one by one and prevent the person on the phone from getting annoyed with my questions. However, after making the first few phone calls, I quickly realized two things. First, the people I was talking to on the phone did not know how to read labels in order to determine what was gluten free and what was not. Secondly, the stores either sold nearly all of the items I was asking for, or none of them. Only two out of the 80 stores I talked to fell in the middle. As such, while asking the second and third questions, I wrote down what items the stores did sell, but did not end up asking the stores for all 10 of the items on my list. I narrowed down the questions, and always asked if they sold gluten free bread, pasta, and flour, and then let them tell me what additional items they sold. After navigating my way through the second and third

questions, I then asked the fourth, which was how often they were asked about gluten free foods. With the final question, I intended to determine the extent of the need for gluten free foods in the store's communities.

The questionnaires I used while talking to restaurants and bakeries are similar to one another, and only differ in the first question. At both locations, I would ask to speak with a manager, and did so for the majority of the interviews. For restaurants, I would begin the survey by asking if they had a gluten free menu. If they said no but told me that they could accommodate people with food allergies, I would then ask what they meant by this, and if they had gluten free bread or buns. I specifically asked if they had gluten free bread products, as, based on personal experience, if a restaurant has gluten free bread, but not a gluten free menu, they have a decent understanding of gluten free food. Conversely, for bakeries, the first question I asked was whether they baked or sold gluten free products. The aim of the first question of both studies was to simply determine whether the stores could be considered sellers of gluten free foods.

The rest of the survey questions for the bakeries and restaurants are the same. The second question of the surveys was how often the locations were asked about gluten free options and was meant to assess the demand for gluten free foods at these eateries. I followed this question by asking, "Does your staff receive any training on preparing food for people with food allergies and intolerances? If so, what is the extent of that training?" The purpose of this question was to determine how safe eating at the restaurant or bakery would be for a gluten intolerant person, as, even if a location sells gluten free food, they do not necessarily know how to properly prepare gluten free meals and baked goods. Then, the final question was "Do you have an allergy friendly kitchen." By way of this question, I was asking if the staff knew to use separate pans and

utensils when preparing gluten free food, as well as the need to wipe off stove tops and counters. Essentially, this question was an extension of the third, in which I was trying to further assess the eateries ability to properly handle food for the gluten intolerant.

The fourth, and final questionnaire survey, was for food pantries and food banks. As every food pantry is set up differently, and their employees and volunteers tend to work odd hours, my survey questions were answered by everyone from church secretaries to administrators. When I called the food pantries, I began by asking if they offered a gluten free option when distributing food. Then, I asked what items they typically distributed, and if they distributed fresh fruits and vegetables, as well as meat and dairy products. Through these questions, I was attempting to determine how much of what the food pantry distributed could be considered gluten free. Finally, I would ask the food pantries how often they were asked for gluten free foods as a way of determining if the community needed a food pantry that distributed gluten free foods.

### **Ethics Statement**

At this point, I would like to state my positionality in regard to this study. As I have Celiac Disease, I do bring a lot of personal experiences and preconceptions to the study. I know firsthand the difficulties that the gluten intolerant face and the importance of the issue. However, I attempted to be as unbiased as possible while formulating and conducting the questionnaire surveys. Furthermore, I am from Mercer County. I decided to use Mercer County in the study, as I wanted to work with an area that I was already familiar with. I felt that by choosing my home county, I was less likely to overlook any grocery stores, food pantries, restaurants, and bakeries.

Essentially, I tried to use my experience with Celiac Disease and my residence in Mercer County to enhance, rather than hinder, the quality of my research.

### **Defining Gluten Free Food Deserts**

In order to create the maps generated through this project, I used ArcGIS PRO. ArcGIS has a base map of the world. On the base map, I outlined Mercer County and Crawford County, and then uploaded the data I gathered, including the coordinates for the grocery stores, restaurants, bakeries, and food pantries.

Regarding the determination of what areas could be considered gluten free food deserts, I based my system of measurement off the USDA's method for food desert measurement. According to the USDA, there are several different ways to define a food desert. Some food deserts do not only measure access to grocery stores with fresh foods, but also look at socioeconomic factors, such as the number of people in a given area who own cars and a community's public transportation system<sup>4</sup>. Low access food deserts are food deserts in which people live a significant distance from their nearest grocery store, and this is the type of food desert I concentrated on mapping. When determining what areas of the US can be considered low access food deserts, the USDA looks to census tracts. Census tracts are created by the US Census Bureau, who subdivides counties into a series of tracts, that generally hold between 1,200 and 8,000 people, with 4,000 being the ideal population (United States Census Bureau). To determine whether a census tract can be considered a food desert, the USDA first determines if a tract encompasses an urban or a rural community. According to their guidelines, a rural

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<sup>4</sup> All the information on the United States Department of Agriculture's method of food desert measurement comes from the following source: United States Department of Agriculture. *Food Access Research Atlas*. <https://www.ers.usda.gov/data-products/food-access-research-atlas/documentation/>.

community has a population of less than 2,500 people, while an urban community houses any amount of people over that number. Next, the USDA takes population data, which is, "...aerially allocated down to ½-kilometer-square grids across the United States. For each ½-kilometer-square grid cell, the distance was calculated from its geographic center to the center of the grid cell with the nearest supermarket." In urban communities, if the distance between the center of the grid cell being examined to the nearest grid cell with a supermarket is more than ½ a mile, the grid cell being examined is considered to have low access to grocery stores. Meanwhile, in rural communities, if the distance between the center of the grid cell under examination to the nearest grid cell with a supermarket is more than 10 miles, the area is considered to have low access to grocery stores. Finally, in order for a tract to be considered a food desert by the USDA, based on the grid cell measurements, there has to be at least 500 people within the tract who live a distance from the grocery store that qualifies as low access in that community.

When I measured the gluten free food deserts, there were a few key differences between the USDA method and my own. To begin with, I did not determine which census tracts could be considered gluten free food deserts, and instead determined whether specific communities, and parts of them, could be considered gluten free food deserts. Since the USDA looks at food deserts on a nationwide scale, their decision to determine what areas are food deserts based on census tracts, rather than by specific towns and cities, makes sense. However, since I am looking at food deserts on a more localized scale, I was able to break down the counties I was examining and look at specific areas. I feel justified in this decision, as, when the USDA physically maps food deserts, they do not mark an entire census tract as a food desert, only the areas within the tract that are either ½ a mile or 10 miles from the nearest grocery store. As such, they are using tracts more so as a system of organizing their results, than anything else. Since I decided against



determining what census tracts could be considered gluten free food deserts, I no longer needed to apply the rule that within a census tract, 500 people had to live either a ½ a mile or 10 miles from the nearest grocery store in order for the tract to be considered a food desert.

Another key difference between the USDA method and my own is that instead of breaking the counties down into a grid of ½ a kilometer cells, and then measuring the distance from the center of each cell to the nearest grocery store, I employed a technique in GIS that allowed me to essentially do the opposite. On the map, I marked all of the stores that carried gluten free products. Then, for the stores located in urban areas, I used a tool that enabled me to draw a ½ a mile buffer around them. For the rural areas, I then used the same tool to draw a 10 mile buffer around the stores that sold gluten free food. Any locations not encompassed by the buffers put in place were then low access gluten free food deserts. While my method for measuring the food deserts differed from the USDA's, I still based my method off of theirs. In general, with my method, I found gluten free food deserts in both counties and now will be offering specific details on them.

### **The Grocery Store Questionnaires Demonstrated that the Majority of the Counties' Grocery Stores Fail to Carry Gluten Free Food**

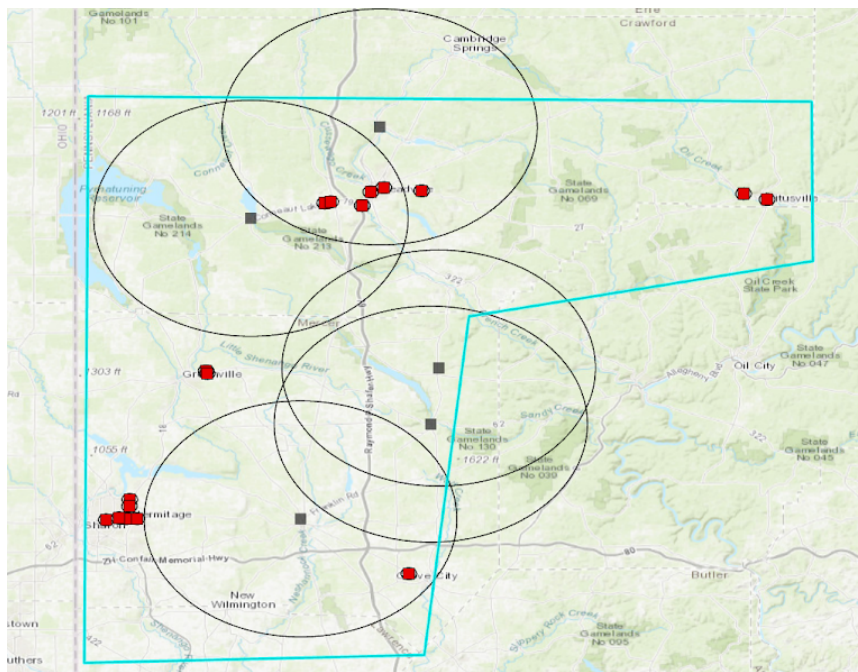
In Mercer County, there are a total of 46 supermarkets, convenience stores, health food businesses, and pharmacies (For a table of results, see Appendix B (Table does not include grocery stores for which no information was gathered)). Over the phone, I was able to talk with 38 of these businesses. Meanwhile, 3 of the supermarkets, which all belonged to the same grocery store chain, could not be called directly; however, I was able to determine whether they sold gluten free food through the chain's website. There were 4 stores I was unable to contact

entirely, 2 of whom were located in towns or cities that contained stores that sold gluten free food, and 2 of whom did not have working phone numbers. My inability to contact these locations should not significantly skew my findings, as these stores were either in areas not determined to be gluten free food deserts, or the stores' lack of working phone numbers most likely derives from the fact they have closed. Overall, out of the 41 stores surveyed, 13 carried gluten free foods, and 28 did not. I broke the stores down into categories based on their type and found that none of the convenience stores or pharmacies sold gluten free food. Also, 6 out of the 9 commercial grocery stores sold gluten free food, as did 5 out of the 11 locally owned grocery stores and 2 out of the 3 health food stores. Furthermore, excluding unincorporated towns, out of 16 boroughs, cities, and towns were surveyed, only 5 had at least one store that sold gluten free food. Before even mapping the results of the conversations, I could predict that gluten free food deserts were present in the county.

Meanwhile, in Crawford County, in total, there are 39 supermarkets, convenience stores, and pharmacies. No health food stores reside in the county (For a table of results, see Appendix B (Table does not include grocery stores for which no information was gathered)). Out of the 39 stores, I was able to survey 34 of them on the phone. For 1 of the 5 stores I was unable to contact, I discerned through their website that they sold gluten free food. Then, as for the 4 uncontacted stores, who did not have websites, they either had no phone number or their phone number no longer worked. As such, I am assuming that the stores have gone out of business, and my inability to contact them would not alter my results. Out of the 35 stores I spoke with, 10 sold gluten free food and 23 did not. Then, 2 of the stores fell somewhere in the middle, as they had moderate gluten free offerings. 1 of the 2 stores with moderate gluten free offerings sold gluten free flour and pasta, but not gluten free bread. The other store sold even less gluten free food,

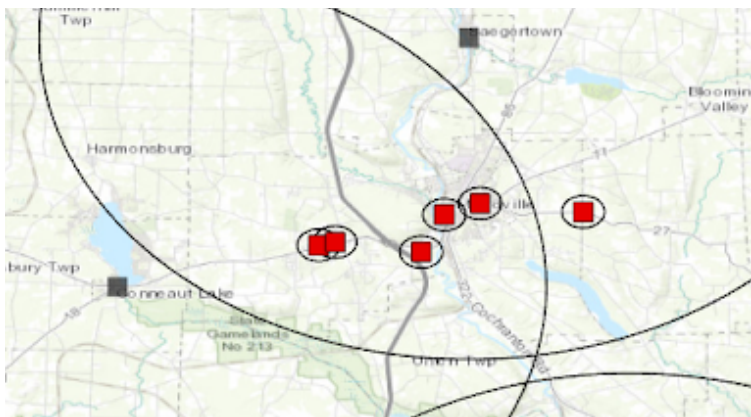
only having gluten free pasta and a few obscure items. As both stores only offered a few gluten free products, I did not include them as gluten free food sellers when I mapped the gluten free food deserts. Neither one of the stores provided enough gluten free food to fulfill the dietary requirements of those with a gluten intolerance. The inclusion of 1 of them would not have made a significant difference in my findings as the store is located in an area that is not defined as a gluten free food desert. Additionally, out of the 9 commercial supermarkets interviewed, 5 sold gluten free food, as did 4 out of the 13 locally owned grocery stores, and 1 out of the 4 pharmacies. Not one of the 10 convenience stores sold gluten free foods. Finally, excluding the unincorporated towns in the county, only 4 out of 22 had gluten free food sellers. The results of the questionnaire in Crawford County indicated the existence of gluten free food deserts even more so than the questionnaire results in Mercer County.

Using the results of the questionnaires in Mercer and Crawford Counties, I mapped out which areas of the counties are gluten free food deserts. As you can see in Figures 2C, 2D, 2E, 2F, 2G, and 2H the blue polygon outlines the border of the two counties. The dashed lines further



**Figure 2C:** The map to the left displays the gluten free food deserts of both Mercer and Crawford County.

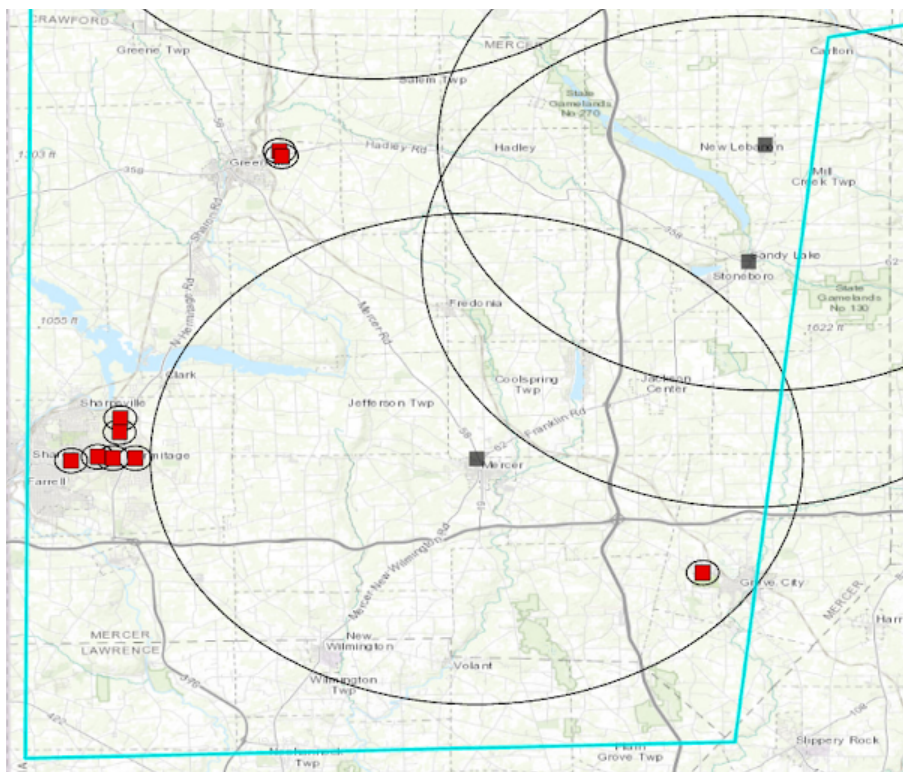
display the county borders. On the maps, the black rectangles represent stores that sell gluten free food in rural areas, and the red rectangles represent stores that sell gluten free food in urban areas. The buffers then surrounding the marked stores encompass the areas in which people have access to gluten free food. Generally, any areas outside of the buffers are gluten free food deserts. However, some of the stores in Crawford County's urban areas are situated inside of the buffers surrounding rural stores. Even though the urban communities are inside of the rural area buffers, in the urban communities, any areas not included in the buffers surrounding the red squares are gluten free food deserts. The reason for this is that in an urban area, if you are more than  $\frac{1}{2}$  a mile away from a grocery store, you are in a gluten free food desert. Thus, the majority of the grocery stores in rural areas are too far away to serve the urban communities. In order to visualize this conundrum, please look to figure 2D, which is a closeup image of this area, and ignore the buffers surrounding the black squares.



**Figure 2D:** The map to the left is a close up of the urban areas of Crawford County.

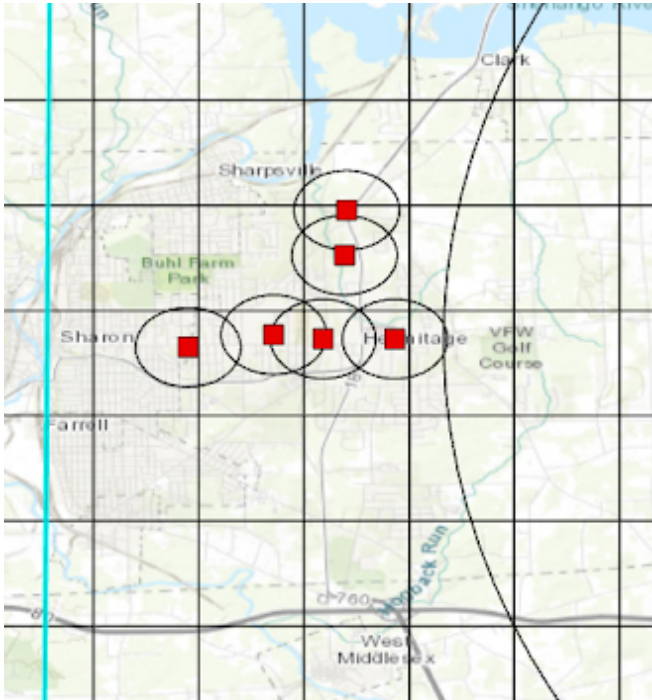
Additionally, the buffers surrounding the red rectangles are difficult to see in Figure 2C since they only stretch for  $\frac{1}{2}$  a mile around the stores. In the closeup images of the gluten free food deserts, like Figure 2D and 2E, the buffers in the urban communities are easier to discern.

In Mercer County, as can be seen below, in Figure 2E and 2F, the majority of the following communities are gluten free food deserts: West Middlesex, Farrell, Sharon, Sharpsville, Pymatuning, South Pymatuning, Greene Township, Wheatland, Clark, and Greenville. Out of these 8 communities, 2 are in rural areas and 6 are located in urban areas. The gluten free food deserts overlap with the traditional food deserts in Sharon, Farrell, Sharpsville, Greenville and Wheatland. However, the gluten free food deserts extend beyond the traditional food deserts, by further encompassing West Middlesex, Pymatuning, South Pymatuning, Greene Township, and Clark. Accordingly, the reach of gluten free food deserts in Mercer County is greater than that of traditional food deserts.



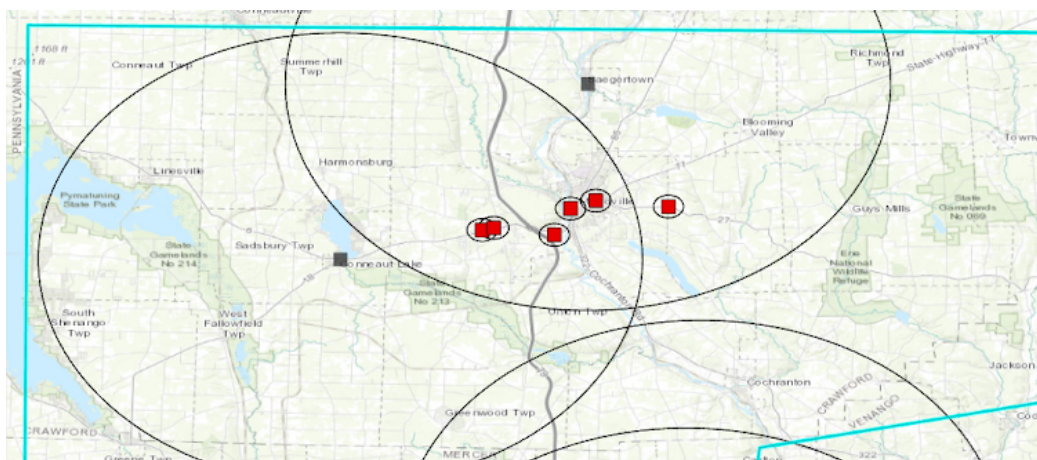
**Figure 2E:** The map to the left is the whole of Mercer County.





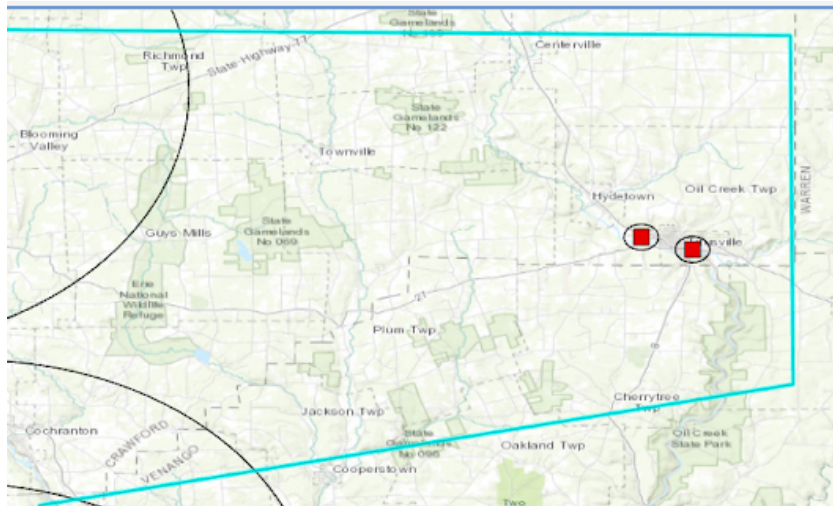
**Figure 2F:** The map to the left is a zoomed in image of the urban areas of Mercer County.

Meanwhile, in Crawford County, as can be seen in Figure 2D above and Figures 2G and 2H below, the entirety of or parts of the following communities are gluten free food deserts: Conneaut Township, Guys Mills, Meadville, Townsville, Titusville, Jackson Township, Centerville, Athens Township, and Richmond Township. Out of these 9 communities, 3 are rural and 6 are urban. Interestingly, three of the rural areas that are traditional food deserts,



**Figure 2G:** The map above displays the gluten free food deserts in the left half of Crawford County.

Harmonsburg, Conneaut Lake, and Blooming Valley, are not gluten free food deserts. As the USDA last measured traditional food deserts in 2015, between now and then, more grocery stores could have been added to the county. Meanwhile, the gluten free food deserts in Meadville, Townsville, Titusville, Athens Township, and Richmond Township are all located in traditional food deserts. Then, the gluten free food deserts that do not overlap with traditional food deserts are in Conneaut Township and Guys Mills. Overall, the gluten free food deserts in Crawford County both extend beyond and fail to encompass traditional food deserts.



**Figure 2H:** The map to the left displays the gluten free food deserts in the right half of Crawford County.

One potential flaw with the mapping is that I only looked at food sellers within the two counties. If a store that sold gluten free food was located along the border of one of the counties, this could mean that some communities were incorrectly marked as gluten free food deserts. However, as most of the gluten free food deserts are in areas already classified as traditional food deserts, the chances of a store selling gluten free food outside of the bounds of the county, yet close enough to overturn a community's status as a gluten free food desert, are slim. Additionally, the majority of the gluten free food deserts, whether or not they were located in the

same areas as traditional food deserts, were in urban communities. Since in an urban community, the stores selling gluten free food need to be within  $\frac{1}{2}$  a mile of the community, stores that sell gluten free food beyond the counties' borders would not affect the status of the urban gluten free food deserts.

One concerning aspect of the maps of the gluten free food deserts is that several of the rural communities only have one store that sells gluten free food, and the stores that are selling gluten free food are spaced far apart. When I talked with one of the grocery stores in a rural community in Crawford County, the sales associate told me that the store used to sell gluten free food but stopped as almost no one bought the products. As such, if one of the stores that sells gluten free foods in one of the rural communities decides there is not enough demand for the products, then several locations would quickly become gluten free food deserts.

The fourth question I asked while conducting the questionnaire with supermarkets, convenience stores, health food outlets, and pharmacies was how often people asked the locations about gluten free foods. I broke the stores' responses down into 4 categories: Never, Not Really, Sometimes, and Often (A table of the responses can be seen in Appendix B). In Mercer County, 38 of the stores responded to this question. 25 replied that they were Never Asked, 6 said Not Really, 1 said Sometimes, and 6 said Often. Responses of Never and Not Really were prevalent across all the store categories, except for Health Food Stores, 2 out of the 3 of which responded Often. The 1 store that responded Sometimes was a locally owned grocery store. Then, the 4 remaining Oftens came from 1 commercial grocery store, 1 locally owned grocery store, and 2 commercial convenience stores. Only 4 out of the 6 stores that responded with Often sold gluten free food. A few of the stores I talked with in the county offered further comments on the question. 5 of the people I spoke with told me I was the first person to ever ask



them about gluten free food. A locally owned grocery store that sold gluten free food stated that if they did not have a gluten free product someone wanted, they would order the product for them. Also, one of the health food stores said that they have been selling gluten free food for over 20 years and are frequently asked about gluten free products. A final comment of interest came from a commercial grocery store that stated that they were frequently asked about gluten free foods in the past, but as people grew accustomed to where the foods were located in the store, fewer and fewer people asked for the products.

In Crawford County, the responses to the 4th question were similar to Mercer County's replies. 34 of the stores I spoke with responded to the question. 16 stores responded Never, 11 Not Really, 4 Sometimes, and 3 Often. The vast majority of the Never and Not Really responses came from locally owned grocery stores and convenience stores, none of which responded with Sometimes or Often. At commercial grocery stores, the responses were heavily mixed, with 2 stores responding Never, 2 Not Really, 1 Sometimes, and 2 Often. Then, at pharmacies, the responses were moderately mixed, with 1 store responding never, 1 responding not really, and 2 responding sometimes. 4 of the people I talked with told me that I was the first person to ever ask them about gluten free foods.

When asking the 4th question, I was not expecting a lot of people to reply with Often, or even Sometimes, as only around 1% to 2% of the population suffers from a gluten intolerance. As such, the fact that only 9 out of the 71 stores stated that they were Often asked for gluten free food, and only 5 out of the 71 stores stated that they were Sometimes asked for gluten free food, is unsurprising. However, after speaking with the store who commented that people ask about gluten free foods less than they did in the past as people now know where the products are located, I believe a better question would have been, "Do you sell a lot of gluten free food?"

Even though a sales associate or manager may be infrequently asked for gluten free food, that does not necessarily indicate that their store is not selling a significant amount of gluten free products. Additionally, I was not expecting a lot of Often and Sometimes responses as several people with a gluten intolerance are embarrassed about their condition and may be uncomfortable with asking for gluten free food. Thus, they may be more inclined to search the store for gluten free food than ask for assistance. While a prevalent need for gluten free food in the counties was not strongly evidenced through the 4th question, there are several possible reasons for this, and though the need may seem small, that does not mean the needs of the gluten intolerant should be overlooked.

### **The Food Pantry Questionnaires Determined that Very Few Food Pantries in the Counties Consistently, If Ever, Offer Gluten Free Food**

As I stated before, the availability of gluten free foods at food banks and pantries needs to be examined from a geographical perspective, as these organizations serve a limited number of towns and cities. 1 food bank and 7 food pantries reside in Mercer County (See Appendix C for a table of results). When I talked to the food bank, which provides food to the pantries throughout the county, they stated that they do not distribute gluten free foods, such as gluten free bread or pasta, and that they have never been asked for them. Generally, they distribute nonperishable items, such as canned goods, and give out fresh foods, including fruits, vegetables, meat and dairy products. Thus, though they are not distributing gluten free products to the food pantries, some of the items they distribute are naturally gluten free.

Then, the food pantries in Mercer County gave me mixed responses regarding whether or not they offer a gluten free option to pantry attendees. Out of the 7 food pantries, 3 of them do

not offer a gluten free option at all. Then, 2 of the food pantries do not offer a gluten free option but did state that they could potentially accommodate a person with a gluten intolerance as when they distribute food, pantry attendees can trade any items they do not want for those they do. Thus, while a gluten intolerant person would not receive the gluten free versions of foods like gluten free bread, they would at least be able to eat all of the food they received. Out of the 5 food pantries without a gluten free option, 3 distributed fresh foods, and 2 of them did so intermittently. Hence, a person with a gluten intolerance would be able to receive naturally gluten free foods at most of the food pantries. Furthermore, out of the 5 food pantries without a gluten free option, 2 stated that they were asked at least once for a gluten free food.

The final 2 food pantries offer gluten free foods to pantry attendees. The first food pantry said that every month, 4 families consistently ask for the gluten free option. However, the food pantry only serves families who belong to the Grove City School District. Thus, they serve an extremely limited segment of the county's population. Then, the second food pantry stated that even though they do not necessarily have a gluten free option, and even though no one ever asked them for one, they still set gluten free foods aside as they suspect that someone will eventually need the products. The pantry resides in Farrell and offers food to everyone with an interest in Mercer County. However, while the food pantry may be open to everyone in the county, the pantry is not centrally located, and resides in the righthand bottom corner of the county. When measuring food deserts, depending on whether a community is rural or urban, having to travel more than  $\frac{1}{2}$  a mile or 10 miles is considered as low access. Thus, even though the food pantry offers a gluten free option, the pantry may be too far out of reach for most of the county's residents, especially as driving a long distance can be costly.

Meanwhile, in Crawford County, there is 1 food bank and 14 food pantries (For a table of results, see Appendix C). When I spoke to the county's food bank, they told me that they do give out gluten free products, like bread or flour, to the county's food pantries, and that providing gluten free foods is mainly up to the pantries themselves. They further stated that they receive all their food from the government. The fact that the government does not distribute gluten free products to food banks demonstrates how food allergies and intolerances are overlooked at food pantries nationwide. The items that the food bank does distribute include fresh fruits and vegetables, meat and dairy products, and nonperishables. When asked how often people or pantries ask for gluten free food, the food bank replied that they were rarely, if ever, asked for these products.

Out of the 14 food pantries in the county, I was only able to speak with 7 of them. Despite repeatedly calling the 7 uncontacted food pantries, the majority of whom were based in churches, I never received an answer from any of them. However, I did use the internet to look up information on the 7 food pantries I failed to speak with. Online, I found no information to suggest that any of them offered gluten free or allergen friendly options to pantry attendees. While I cannot be certain that they do not offer a gluten free option as I did not speak with them, based on the information I found, I assume that at least most of them do not.

Furthermore, not one of the 7 food pantries I spoke with, one of whom has 7 locations, offers a gluten free option. Out of the 7 pantries, 5 of them stated that if someone were to ask them for gluten free products, and if they happened to have them, they would give them to that person. 2 of the pantries further stated that they only have gluten free food if the products are donated, and 1 of them noted that the donation of gluten free products was a rarity. Also, 1 of the food pantries offered additional commentary on the matter, stating that they did not have time to

sort out what foods were gluten free and what foods were not. Essentially, within Crawford County, as far as I was able to determine through my research, none of the county's food pantries regularly, if ever, offer gluten free products.

Through the rest of the questionnaire, I gathered additional information on the food pantries. Out of the 7 food pantries I spoke with, 4 of them stated that they regularly distribute fresh fruits and vegetables, meat and dairy products. The other 3 pantries stated that they pass out these products if they are able to obtain them or if they have been donated. Basically, a gluten intolerant person could consistently receive fresh foods at 4 of the interviewed pantries. Then, all 7 pantries always distribute nonperishables. Finally, regarding how often the pantries are asked for gluten free foods, 1 pantry responded that 1 person occasionally comes and asks for gluten free products, and 1 other pantry replied that they have 1 regular attendee who asks for gluten free food. The others stated that they were never asked.

Overall, in both Mercer and Crawford County, there is great variance as to how the food pantries handle gluten intolerances. Only 2 of the interviewed pantries consistently offer gluten free products to their attendees, and 1 one of the locations serves an extremely limited number of people. Meanwhile, several pantries at least attempt to accommodate food needs. Then, in some capacity, many of the pantries distribute fresh foods, which the gluten intolerant rely on. Neither one of the food banks within the counties passes out gluten free food, which demonstrates how the lack of availability of gluten free foods at food pantries is a systemic issue that stretches all the way to the centers who lead food distribution. Furthermore, the questionnaire revealed that even though only a handful of the counties' pantry attendees have asked for gluten free food, there are still gluten intolerant people in these communities who are struggling to accommodate their dietary needs. The need for gluten free options at pantries may be even greater, but as the

gluten intolerant are often uncomfortable discussing their dietary needs, and as they are receiving free food at the food pantries, they may not want to ask for additional help from organizations attempting to do them a service. The availability of gluten free products at food pantries deserves greater attention as the issue is not only prevalent, but often overlooked.

### **The Restaurant Questionnaires Depicted How Few Restaurants Offer Gluten Free Meals to Customers**

When determining which restaurants I would contact, I decided to only speak with the restaurants in 6 of the counties' communities. I made this decision as, throughout the counties, there are easily over 600 restaurants, and I did not have the time or resources to contact them all. Ultimately, I ended up interviewing restaurants in 4 rural communities not defined as gluten free food deserts and 2 urban areas that are. I chose to interview the restaurants of four rural communities not defined as gluten free food deserts, as the majority of the rural communities that are gluten free food deserts have very few, if any restaurants, and I worried that judging entire communities off of only 1 or 2 restaurants was unfair and limiting. Then, I decided to interview the restaurants of 2 urban areas that are gluten free food deserts as I wanted to balance out my choice to not interview the restaurants of rural gluten free food deserts, and there is only 2 urban areas in the counties not defined partially, or entirely, as a gluten free food desert. I recognize how not contacting all the restaurants in the communities limits the scope of this project, but the results I found still offer insight into the availability of gluten free foods within and outside of gluten free food deserts.

When compiling a list of restaurants for each of the towns and cities, I included traditional sit-down restaurants, cafes, fast food, and pizza places. While when I called the

restaurants, I tried to speak with managers or owners, I often ended up speaking to the general wait staff as no one on a managerial level was present or available. The restaurants in rural towns that are not defined as gluten free food deserts, and that I chose to speak with are in Mercer, which is in Mercer County, and in Cochranton, Saegertown, and Conneaut Lake, which are in Crawford County. Between the 4 towns, there are a total of 34 restaurants (For a table of results, see Appendix D). After speaking with the restaurants, I divided their responses to the first question, which was “do you have a gluten free menu” into 3 categories. Restaurants in the yes category have a gluten free menu, restaurants in the no category do not have a gluten free menu, and restaurants in the moderate category do not have a gluten free menu, but still said they were able to accommodate requests for gluten free food. Restaurants without a gluten free menu were asked what gluten free meals they offered and if they had gluten free bread, in order to determine the breadth of their gluten free options, and whether or not they truly fell into the moderate category, which all of them did. Out of the 34 restaurants, I was unable to speak with 9 of them. I called these 9 locations several times, but some of them were closed due to the COVID-19 pandemic, a few had disconnected phone numbers, and 4 of them were in Conneaut Lake, which is a small tourist town, so the restaurants would not open until the summer. Out of the 25 restaurants I spoke with, 5 fell into the yes category, 17 into the no category, and 3 into the moderate category. Specifically, in Mercer there are 2 in the yes category, 6 in the no category, and 3 in the moderate category. In Cochranton, there was 1 yes and 3 nos. Then, in Conneaut Lake there were 3 nos and 2 yeses, while Saegertown had 5 nos. Interestingly, 3 of the 5 restaurants in the yes category were pizza places. All the restaurants that had a gluten free menu or fell into the moderate category told me that their employees receive training on how to handle gluten free food and told me that their employees know to use separate equipment when

preparing gluten free food. A few staff members even said that their staff had received certifications on the proper treatment of allergen foods in the kitchen. If a restaurant did not have a gluten menu or moderate gluten free offerings, I did not ask them about the training they receive, as, if they received training in any form, they would be able to prepare moderate gluten free options available at the very least.

When speaking with the restaurants of the 4 rural towns, I further inquired as to how often they were asked for a gluten free menu or options (For a table of results, see Appendix D) . Not all the restaurants responded to the question. Yet, I still received a wide array of answers from 21 of the 25 interviewed restaurants. I divided the answers into three categories: never/rarely asked, sometimes asked, and often asked. Out of all the restaurants interviewed, and that answered the question, 6 said they were often asked, 4 said sometimes, and 11 said never. Generally, the restaurants that said that were sometimes or often asked had a gluten free menu or moderate gluten free options. One restaurant in Cochran with a gluten free menu even told me that they sell more gluten free food than regular menu items.

The results of the questionnaire when conducted in the four rural towns demonstrates how even in areas not defined as gluten free food deserts, there is still a lack of restaurants at which a gluten intolerant person can eat. Only 9 restaurants out of the 25 between the 4 towns offered gluten free food in some capacity. Furthermore, the questionnaire displays how there is at least a moderate need for gluten free food in these communities, as 10 of the restaurants, especially those with gluten free menus, were sometimes or often asked for gluten free options.

When conducting the questionnaire in urban areas defined as gluten free food deserts, I examined two cities in Mercer County, which were Sharon and Greenville. Between the two cities, there were a total of 32 restaurants, 6 of which I was unable to contact, often for the same



reasons I could not contact some of the restaurants in the rural areas (see Appendix D for a table of results). Dividing the questionnaire results into the same categories I applied to the rurally located restaurants, I found that, within the 2 cities, 8 restaurants fell into the yes category, 3 into the moderate category, and 15 into the no category. In Sharon, there were 4 yeses, 1 moderate, and 6 nos. Meanwhile, in Greenville, there were 4 yeses, 2 moderates, and 9 nos. Like the restaurants in the rural towns, all the eateries with a gluten free menu or moderate gluten free options trained their staff on how to safely prepare and handle gluten free food. In 2 of the restaurants in Sharon, the staff was required to partake in certification programs on safely preparing allergen foods. One diner in Sharon even told me that they have a gluten free frier, which is a rarity.

Then, for the question on how often they were asked for gluten free food, I received an array of responses from 24 of the 26 restaurants I called, with 1 restaurant not responding to the question and 1 restaurant stating that they were unsure how to answer. Between the two cities, 6 restaurants said that they were often asked, 6 said they were sometimes asked, and 12 said they were never or rarely asked. Interestingly, 2 of the pizza places in Sharon said that they used to receive frequent requests for gluten free food, but, as time went on, received fewer and fewer inquiries. Also, 1 other pizza place in Sharon said that they sell up to 5 gluten free pizzas a day.

Through the questionnaires conducted in urban communities defined as gluten free food deserts, I discerned that around half of the restaurants offer gluten free food in some capacity, which is a fairly decent number of eateries. Oddly, in comparison to the rural communities, which were not gluten free food deserts, only around a third of the restaurants offered gluten free food. Perhaps the reason for this disparity is that with larger populations, urban areas would have larger numbers of people requiring gluten free food even if they are in gluten free food deserts.

Then, regarding the overall need for gluten free food in the urban areas around half of the restaurants were often or sometimes asked for gluten free food. In rural communities, only a third of the stores were often or sometimes asked. However, in all of the communities surveyed, there is potentially a far greater need than the questionnaire demonstrates. As people with gluten intolerances are often unwilling to ask restaurant staff for a gluten free menu or options, the need for gluten free food in these communities is likely underreported. Overall, at the very least, the questionnaires displayed how gluten free options are available at less than half of the interviewed restaurants, and how there is a need for gluten free offerings at restaurants in the counties.

### **The Bakery Questionnaire Determined that Around Half of the Bakeries in the Counties Offer Gluten Free Baked Goods**

Since both Mercer and Crawford county contained no more than 15 bakeries each, I decided to contact all of the bakeries within the two counties. In Mercer County, there are 14 bakeries in total (For a table of results, see Appendix E). Unfortunately, I only managed to speak with 9 of them as, due to the COVID-19 pandemic, some of the bakeries temporarily closed or have reduced their operating hours. Yet, the results I did obtain still offer insight into the availability of gluten free foods in the county. Out of the 9 bakeries interviewed, 4 offer gluten free food to their patrons and 5 fail to offer any gluten free baked goods. 1 of the bakeries selling gluten free food has gluten free products available in their display cases everyday, while the other 3 bakeries primarily prepare gluten free food on a made to order basis. When I asked the bakeries the survey questions on whether or not their staff members received training on how to prepare gluten free food and what steps they took to prevent cross-contamination in the kitchen, all 4 of the bakeries selling gluten free food assured me that their staff members either received

training on how to prepare gluten free food and/or that they had separate sections of their kitchens in which they prepared the food.

Then, the bakeries' responses to the question of how often they were asked for gluten free food fell into only two categories, rarely asked and frequently asked. 3 of the bakeries stated that while they occasionally receive requests for gluten free food, those requests are rare. Then, the other 6 bakeries stated that they were frequently asked for gluten free food. Specifically, 2 of the bakeries simply answered yes to the question, while the other 3 stated they were either asked about once every two weeks, once every week, or multiple times a week. While not all the bakeries received an overt number of requests for gluten free foods, even with just one percent of the population being gluten intolerant, 5 of the bakeries still received frequent requests for gluten free baked goods.

Geographically speaking, the gluten free bakeries are located in Mercer, Sharpsville, Sharon, and Hermitage. Neither Mercer nor Hermitage contains a gluten free food desert, but, interestingly, Sharon and Sharpsville are gluten free food deserts. Additionally, the bakeries are not well spread throughout the county, as three of them reside in the lower western half of the county, and the remaining bakery is located at the county center. As such, thousands of the county's residents lack easy access to the bakeries and would have to travel more than a half a mile or ten miles to reach them. Of the 5 uncontacted bakeries, 2 reside in either Mercer or Hermitage, so whether they sell gluten free baked goods, they are already located in areas with gluten free bakeries available. The other 3 uncontacted bakeries inhabit either Grove City or Greenville.

Conversely, Crawford County contains 15 bakeries, and I spoke with 14 of them (For a table of results, see Appendix E). Out of the 14 bakeries, 7 sell gluten free baked goods. Like the

bakeries selling gluten free food in Mercer County, each of the bakeries selling gluten free food in Crawford County has their own approach to selling the products. Some of Crawford County's bakeries only make gluten free pastries when a person orders them while others always offer gluten free baked goods in their display cases. One bakery of note told me that they only sell gluten free baked goods on Fridays. They made this decision, as, when they attempted to sell gluten free items every day of the week, they discovered that there was not enough daily demand to justify baking large amounts of gluten free food, as a lot of the baked goods they made went unsold. Another bakery also offered additional commentary on their sales and told me that a gluten free cupcake they bake remains among their daily bestsellers. Additionally, when asked the survey questions on training and safety, all 7 of the bakeries affirmed that their employees were trained on how to handle gluten intolerances, and that their employees knew how to prevent cross contamination. However, one bakery did state that they hesitate to offer their products to people with Celiac Disease, as while they thoroughly wash their baking equipment before making gluten free products, a potential for cross contamination always remains.

As for the bakeries' answers to the question on how often people request gluten free baked goods, 13 responded, and their responses either fell into the category of rarely asked or frequently asked. Specifically, 3 bakeries responded that were rarely asked, with one specifically stating that they received around 1 request a month. Meanwhile, the other 10 bakeries responses fell into the frequently asked category. Among these 10 bakeries, a few noted that were asked weekly, and one even stated a person had called and asked for a gluten free cake just a half hour before I called. Also, one bakery said that they receive the majority of their requests for gluten free baked goods around the holidays, and another bakery replied that over the years more and more people have contacted them looking to order gluten free food. A final bakery claimed that

even though they only opened a few months ago, the demand for gluten free pastries at their bakery was enough for them to always offer a display case of gluten free baked goods. Based on the bakeries' responses, within Crawford County, a high demand for gluten free baked goods abides.

Finally, the bakeries selling gluten free foods in Crawford County both did and did not reside in gluten free food deserts. Meadville and Titusville, both which are partially gluten free food deserts, each contained 2 bakeries that sold gluten free food. Then, Cochranton and Conneaut Lake, neither of which fall into the bounds of a gluten free food desert, respectively contained 1 or 2 bakeries offering gluten free baked goods. The bakery that failed to respond to the questionnaire survey resides in Meadville, so whether the bakery sells gluten free baked goods, their status would not significantly alter the results. Overall, the bakeries are actually spread fairly well throughout the county, and the majority of county residents would have access to them.

Interestingly, since around half of the bakeries I contacted in both counties sell gluten free products, the counties' bakeries were likelier than the counties' grocery stores, food pantries, and restaurants to offer gluten free food. While I remain uncertain as to the exact reasoning for this phenomenon, I believe the fact that bakers often make their products not for individuals, but for large gatherings, serves as a possible explanation. The larger a group of people, the greater the possibility that someone at the gathering has a gluten intolerance. As such, a baker must come across people with dietary restrictions fairly often. One bakery I spoke to offered commentary on this finding, as they noted that when they make cakes and cupcakes for large events, people often ask them to make two dozen gluten free cupcakes to set on the side.

Nevertheless, in both counties, while around half of the bakeries offered gluten free baked goods, the other half did not, and not everyone had easy geographical access to those that did.

### **Comparison of the Counties' Results**

By choosing two counties, I hoped to not only prevent my research from being too narrow, but to also compare the results of each county. Overall, the results for both counties were fairly similar. As Mercer County had a larger population than Crawford County, the former had more grocery stores than the latter. Yet, 32% of the interviewed grocery stores in Mercer County sold gluten free food as did 29% of Crawford County's, which is not a huge difference. Also, in both counties, gluten free food deserts did exist and encompass areas that were and were not traditional food deserts. These findings suggest that the lack of availability of gluten free foods could be a trend, and similar patterns may occur in other areas. However, the counties did differ in that 3 of Crawford County's traditional food deserts were not gluten free food deserts. The results for both counties were further similar in that Mercer County had 2 rural gluten free food deserts and 6 urban ones while Crawford County had 3 and 6 respectively. As such, this suggests that urban areas are likelier than rural areas to be gluten free food deserts. Regarding food pantries, the results in both counties were somewhat similar. In Mercer County, 2 food pantries out of 7 offered a gluten free option, while none of Crawford County's did. Possibly, Mercer County has 2 food pantries with a gluten free option as they have a larger population, making the pantries likelier to come across people with a gluten intolerance. Either way, the lack of food pantries with gluten free options in both counties hints that this may be a systemic problem. Interestingly, for bakeries, in each county around half of the bakeries sold gluten free baked goods. This finding does suggest that there is a fairly decent demand for gluten free baked goods,

and that the need for them is not limited to a single area. In comparing the two counties, several potential trends come to light.

### **Part 3: Interpreting the Results**

In Part 3, I offer my interpretation of the results by describing how this research relates to social justice, by denoting the potential root causes for this issue, and by analyzing what these results mean.

#### **Framing Gluten Free Food Deserts as a Social Justice Issue**

The existence of gluten free food deserts and the lack of availability of gluten free foods at food pantries, restaurants, and bakeries is a social justice issue. Adequate access to sufficient food serves as a basic human right, no matter a person's dietary requirements. According to the United Nations, food security is defined as, "... when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet dietary needs for a productive and healthy life" (United Nations). The definition first states that food security requires "physical" access to adequate food, which means that gluten free food deserts generate food insecurity and put people at a geographical disadvantage. Then, the resolution states that a person deserves "social" access to food. As such, unless restaurants or bakeries, which act as hubs for social activities, serve gluten free food, they are contributing to food insecurity. Furthermore, the definition proclaims that people deserve "economic" access to adequate food. Thus, food pantries, which aim at combating food insecurity amongst the economically disadvantaged, only truly overcome food insecurity when they offer gluten free products to their attendees. Additionally, the definition dictates that food security includes meeting a person's dietary requirements so that they may lead a "productive" life. People with gluten intolerance already deal with a wide array of difficulties that prevent them from leading a productive life, as their difficulties stretch from the disruption of traditional meals to the stress of managing a food



allergy identity while traveling. Food insecurity within the gluten free community is a hindrance to a person's pursuit of a productive life. Finally, the UN claims, food security means a person can lead a "healthy" life. Without sufficient access to gluten free food, the gluten intolerant will be unable to comply with the gluten free diet and will suffer serious health consequences. Until the erasure of the problem of gluten free food accessibility, thousands of gluten intolerant people will deal with food insecurity on a daily basis.

### **Root Cause / How This Problem Can Be Solved**

The study has demonstrated the lack of availability of gluten free foods at grocery stores, food pantries, restaurants, and bakeries, and I propose that there are 3 potential reasons for this lack. First, as only 1-2% of the population suffers from gluten intolerance, food sellers and providers may view the need for gluten free food as minimal and see no reason to sell gluten free products. When I conducted the questionnaire surveys, I found that a lot of the locations I spoke with rarely, if ever, received requests for gluten free food. Without a large demand for the products, selling or providing gluten free foods remains outside of several locations' radars. This is interesting considering that the majority of the gluten free food deserts were in urban areas, which have higher populations, and are thus likelier to have customers with a gluten intolerance. Secondly, the treatment of the gluten free diet as a fad diet as opposed to a medical condition serves as another potential reason for the lack of availability. As one scholar writes, "Given pervasive public concerns about the nature of food produced in the global industrial food system, people try out allergen avoidance diets and products (e.g. gluten-free) in a way that makes them seem *en vogue*. As a result, there is a tendency to trivialize the significance of food allergy as a health issue" (Page-Reeves 2014). With the gluten intolerant reduced by the public to nothing

more than fad dieters, food retailers and providers may view gluten intolerance as a passing trend not worth accommodating. Finally, a third potential reason for the lack of availability lies in the fact that the US Federal Government overlooks Celiac Disease and NCGS. According to the Celiac Foundation, "... celiac disease has largely been ignored by our federal government which provides little to no funding for research nor for public awareness of its serious consequences" (Celiac Foundation). As the disease receives almost no recognition on a national scale, gluten intolerance remains overlooked by several people and industries. The lack of federal government recognition leaks down to the states, which is evidenced through how only six of them legally require restaurants to train their employees on how to properly prepare allergen and intolerance friendly foods. Any one of these potential reasons, or even a combination of them, serves as a possible explanation for the lack of the widespread availability of gluten free foods.

Nevertheless, solutions to the lack of availability do exist, and I have a few ideas for potential remedies. For example, the Federal Government could pursue three main initiatives: Investing in research on gluten intolerance, distributing gluten free foods to food banks, and establishing nationwide food allergy and intolerance training programs at food pantries, restaurants, and bakeries. If the Federal Government took on any one of these initiatives, at the very least, gluten intolerance would receive greater recognition, which could potentially lead to greater availability. Then, for gluten free food deserts and grocery stores specifically, I suggest two possible solutions. First, the US could follow England's lead, and have gluten free food prescribed to the gluten intolerant in the same way a person receives a prescription for medication (Singh 2011). With gluten free food treated as a prescription, the gluten intolerant would at least consistently have access to gluten free food at their local pharmacies. Secondly, the obvious solution would be to simply have every grocery store begin selling gluten free food,

but I argue that even if one specific chain store began selling gluten free food, accessibility could be marginally increased. Dollar Generals, which currently do not sell gluten free food, have received a lot of attention for flourishing in small, rural towns without grocery stores. Across the US, over 15,000 Dollar Generals reside, including 19 in Mercer and Crawford Counties (Morris). As the stores reside in remote, grocery store starved communities, their becoming sellers of gluten free food could go a long way in reducing gluten free food deserts. Improving accessibility to gluten free food remains possible, but large steps will need to be taken before everyone with a gluten intolerance has easy access to the foods their diet requires.

### **Counter Arguments**

Two possible counter arguments exist regarding the problem of gluten free food deserts. First, one could argue that a person with a gluten intolerance could simply order gluten free food online as opposed to purchasing the products in a store. However, one study conducted in the United Kingdom found that 82% of the gluten free foods they examined cost significantly to purchase online than in the store (Hanci 2019). Then, one dietician in the US states that gluten free foods cost twice as much online as they do in the store and denotes that purchasing the products online means one has to pay shipping costs, which can be high (Cureton 2008). Gluten free foods are already expensive, and even a person in good financial standing may not be able to afford to pay increased costs on already expensive products. Furthermore, as one researcher writes, “Contemporary barriers exist to accessing GF food from online stores, such as poor access to the internet, costs associated with being online, and poor digital literacy: these disproportionately impact those socioeconomically disadvantaged, of poor literacy, rural communities, those with disabilities, and include the older generation” (Hanci 2019). Not

everyone has easy access to online shopping. Furthermore, online shopping cannot overcome inaccessibility to food pantries, restaurants, and bakeries that sell gluten free food. Another point of note is that several fresh, naturally gluten free foods, such as vegetables, meat, and dairy cannot be purchased online. Ultimately, the availability of gluten free products online does not solve the problem of gluten free food deserts.

A second counter argument derives from the problem of affordability, which is not so much a counter argument, as another aspect of the overall problem of accessibility. The question remains that even if gluten free food deserts suddenly sold gluten free products, would everyone actually be able to afford the items. One of the main difficulties associated with gluten intolerance is the inability to afford gluten free food (Aaron 2017). The expense of the diet is evident through how when a person suffers from a gluten intolerance, often their entire family cannot afford to eat gluten free along with them (Cureton 2007). In order to overcome this multi-layer problem, if a gluten free food desert introduced gluten free food, the food would have to be subsidized somehow.

### **The Limits of the Study and How the Research Can Be Expanded**

Throughout the study, two main limitations presided. First, while the study thoroughly investigated the availability of gluten free foods in two Pennsylvania counties, the geographic scope of the study remains limited. Within the United States, there are thousands of counties, and an examination of gluten free food deserts in any one of them could garner very different results than the present study found. Secondly, the counties examined lacked a diverse population. Even though more research is needed to determine the qualities of the relationship between food intolerances and race, understanding how gluten free food deserts impact minorities is still

important (Greenhawt 2013). If the study had centered on counties with larger minority populations, the relationship between race and gluten free food accessibility could have been explored. Both of the limitations present in the study could be overcome through additional research in different locations.

Ultimately, the findings of this study deserve to be expanded, not only because the study identifies an overlooked social justice issue, but also because food allergies and intolerances are considered a modern plague. The lack of research on gluten intolerance and the availability of gluten free foods in the US has allowed for the problem of gluten free food deserts to remain virtually unknown. By expanding the study, the prevalence of the problem would be better understood, and steps could be taken to overcome the issue. Then, several recent studies have treated the growth of food allergies and intolerances in the US as an epidemic (Jackson 2001). Throughout the twentieth century, the prevalence of allergic diseases drastically rose, and today, an estimated 8% of children suffer from a food allergy or intolerance (Jackson 2001) (Gupta 2013). According to one scholar, “At one level, the current epidemic of allergic diseases is clearly linked to modern civilization” (Gupta 2013). The rising numbers of allergic diseases is viewed as the consequence of a myriad of modern phenomenon, such as consumer culture and a changing environment (Jackson 2001). Since the number of allergic diseases has increased in recent years, not only should the study of gluten free food deserts be expanded, but additional studies on the availability of other allergen-free foods, such as dairy, nuts, and other grains, should be completed. An increasing number of people with food allergies and intolerances, including gluten, could equate to greater levels of food insecurity in the United States. As such, this study ought to be expanded in more ways than one.

## Conclusion

An array of speculations and conclusions can be drawn from the results of this study. First and foremost, the results of the study suggest that gluten free food deserts can be thought of as being distinct from traditional food deserts. While both food desert types did overlap, gluten free food deserts were located in areas that were and were not traditional food deserts. As such, when examining gluten free food deserts, the causes and problems associated with traditional food deserts do not necessarily apply and need to be reassessed. Generally, traditional food deserts are found in communities of color and communities that contain large numbers of people with low socioeconomic statuses. In both counties, over 90% of the population identified as white. This leaves a lot of questions open as to whether there is a link between race and the availability of gluten free food, especially as the medical field has not yet determined if race is a factor in diagnoses of Celiac Disease and NCGS. Also, the gluten free food deserts stretched far beyond the counties' traditional food deserts that were defined as being in low-income areas. Each county only had a poverty rate of around 12-13%, yet still had only around 30% of their grocery stores offer gluten free products. From a social justice perspective, there is not a clear link between gluten free food deserts and common social issues regarding race and class. Overall, gluten free food deserts are far from being one in the same as traditional food deserts.

Additionally, what deserves further scrutiny is how around 50% of the bakeries in the counties offered gluten free baked goods, but only around 30% of the grocery stores sold gluten free products. The fact that 50% of bakeries are regularly selling gluten free food clearly denotes how there is a demand for gluten free food in these counties. Perhaps this finding points to issues with how the grocery store industry defines demand. Though they may see gluten free food as a niche market, people are still in want of the products. Another interesting finding was that there

was not much of a difference between the number of restaurants that sold gluten free food in rural areas not defined as gluten free food deserts and in the urban areas that were. While only the restaurants of a few communities were examined, this does potentially point to a system wide trend wherein only around a third of restaurants sell gluten free food. Finally, one large question that does remain regarding accessibility is access to transportation. In the counties, there is no mass transportation system in place. As such, understanding how car ownership factors into whether or not a person has access to gluten free food is important to determine. Determining this link would require further research and analysis.

In conclusion, through this study, I demonstrated the existence and expanse of gluten free food deserts in Mercer and Crawford Counties. The existence of gluten free food deserts acts as a social justice issue that deserves further examination not only in these two counties, but also throughout the rest of the United States. Already, the gluten intolerant confront several challenges and access to the food they need to survive ought not serve as one of them. For this issue to be addressed and overcome, there needs to be greater recognition and understanding of gluten allergies, as well as training for everyone who works with food, whether they be a grocer, food pantry volunteer, chef, or baker. I fear gluten free food deserts will only grow, rather than shrink, unless serious steps are taken to conquer their presence. With more and more people being diagnosed with a gluten intolerance every day, this social justice issue needs be addressed as soon as possible.

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## Appendix A

### Gluten Free Food Deserts Questionnaires

Surveys will be conducted over the phone.

#### Grocery / Convenience / Health Food Stores

1. Do you have a gluten free section at your store?
2. Which gluten free versions of foods do you sell?
3. Do you sell gluten free versions of any of the following items?
  - Bread
  - Pasta
  - Flour
  - Crackers
  - Cookies
  - Cake Mix
  - Pancake Mix
  - Cereal
  - Taco Shells
  - Pizza Crust
  - Granola Bars
4. Are asked about gluten free items very often?

#### Restaurants

1. Do you have a gluten free menu?
  - If they say no, but that they will work with people with food allergies, ask if they have gluten free bread and buns.
2. How often are you asked about gluten free options?
3. Does your staff receive any training on preparing food for people with food allergies? If so, what is the extent of that training?
4. Do you have an allergy friendly kitchen? (ie a gluten free fryer, separate utensils, etc.)

#### Bakeries

1. Do you make or sell any gluten free products?
2. Are you asked very often for gluten free baked goods?
3. Does your staff receive any training on preparing food for people with allergies? If so, what is the extent of that training?
4. Do you have an allergy friendly kitchen? (i.e. separate utensils, separate storage area, etc.)

#### Food Pantries

1. Do you have a gluten-free option?
2. What sort of items do you usually distribute?
3. Do you pass out fresh fruits and vegetables, meat, or dairy products?
4. Are you asked about gluten free options very often?

## Appendix B

<b>Grocery Stores in Mercer County</b>			
<b>Location / Store Number</b>	<b>Store Type</b>	<b>Sell Gluten Free Food (Yes or No)</b>	<b>How Often Asked</b>
<b>Mercer</b>			
M1	Mom and Pop	Yes	Sometimes
M2	Commercial Convenience Store	No	Often
M3	Commercial Convenience Store	No	Not Really
<b>Sharon</b>			
M4	Commercial Grocery Store	No	Never / Not
M5	Convenience Store	No	Never / Not
M6	Mom and Pop	No	Never / Not
M7	Mom and Pop	No	Never / Not
<b>Grove City</b>			
M8	Commercial Grocery Store	No	Not Really
M9	Mom and Pop	Yes	N/A
M10	Commercial Grocery Store	Yes	N/A
M11	Commercial Convenience Store	No	Never / Not
M12	Commercial Convenience Store	No	Never / Not
M13	Commercial Grocery Store	No	Never / Not
<b>Hermitage</b>			
M14	Commercial Grocery Store	Yes	N/A
M15	Commercial Grocery Store	Yes	Often
M16	Mom and Pop	Yes	Often
M17	Health Food Store	Yes	Often

M18	Health Food Store	Yes	Often
M19	Health Food Store	No	Not Really
M20	Commercial Convenience Store	No	Often
M21	Commercial Convenience Store	No	Never / Not
M22	Pharmacy	No	Never / Not
M23	Commercial Grocery Store	Yes	Never / Not
<b>Greenville</b>			
M24	Commercial Convenience Store	No	Never / Not
M25	Mom and Pop	No	Never / Not
M26	Commercial Convenience Store	No	Never / Not
M27	Commercial Grocery Store	Yes	Never / Not
M28	Commercial Grocery Store	Yes	N/A
M29	Mom and Pop	No	Never / Not
<b>Farrell</b>			
M30	Commercial Convenience Store	No	Never / Not
M31	Mom and Pop	No	Never / Not
M32	Pharmacy	No	Never / Not
<b>West Middlesex</b>			
M33	Commercial Convenience Store	No	Never / Not
<b>Stoneboro</b>			
M34	Commercial Convenience Store	No	Never / Not
<b>Sandy Lake</b>			
M35	Mom and Pop	Yes	Not Really
M36	Mom and Pop	Yes	Not Really
M37	Convenience Store	No	Never / Not

<b>Jackson Center</b>			
M38	Commercial Convenience Store	No	Not Really
<b>Jamestown</b>			
M39	Commercial Convenience Store	No	Never / Not
M40	Convenience Store	No	Never / Not
M41	Mom and Pop	No	Never / Not
Total Number of Stores: 41			
Total Number of Stores with Gluten Free Food: 13			
Total Number of Stores without Gluten Free Food: 28			
Total Number of Commercial Grocery Stores: 9			
Total Number of Mom and Pop Stores: 11			
Total Number of Commercial Convenience Stores: 13			
Total Number of Convenience Stores: 3			
Total Number of Pharmacies: 2			
Total Number of Health Food Stores: 3			
Responded Never / Not: 25			
Responded Not Really: 6			
Responded Sometimes: 1			
Responded Often: 6			

<b>Grocery Stores in Crawford County</b>			
<b>Location / Store Number</b>	<b>Store Type</b>	<b>Sell Gluten Free Food (Yes, No, or Moderate)</b>	<b>How Often Asked</b>
<b>Meadville</b>			
C1	Commercial Grocery Store	Yes	Never / Not
C2	Commercial Grocery Store	Yes	N/A
C3	Commercial Convenience Store	No	Not Really
C4	Commercial Grocery Store	Yes	Sometimes
C5	Commercial Grocery Store	No	Not Really
C6	Commercial Grocery Store	Moderate	Sometimes
C7	Mom and Pop	Yes	Never / Not
C8	Mom and Pop	Yes	Often
C9	Mom and Pop	Yes	Never / Not
C10	Pharmacy	No	Never / Not
C11	Pharmacy	No	Not Really
<b>Conneaut Lake</b>			
C12	Mom and Pop	No	Never / Not
C13	Mom and Pop	No	Never / Not
C14	Pharmacy	Yes	Sometimes
<b>Titusville</b>			
C15	Mom and Pop	No	Not Really
C16	Commercial Grocery Store	Yes	Often
C17	Commercial Grocery Store	No	Never / Not
C18	Commercial Convenience Store	No	Never / Not

C19	Commercial Grocery Store	Yes	Often
C20	Pharmacy	No	Sometimes
<b>Saegertown</b>			
C21	Commercial Convenience Store	No	Never / Not
C22	Mom and Pop	Yes	Not Really
<b>Cochranton</b>			
C23	Mom and Pop	No	Not Really
C24	Commercial Grocery Store	No	Not Really
<b>Linesville</b>			
C25	Mom and Pop	No	Never / Not
C26	Commercial Convenience Store	No	Not Really
C27	Mom and Pop	No	Never / Not
<b>Cambridge Springs</b>			
C28	Mom and Pop	Moderate	Never / Not
C29	Commercial Convenience Store	No	Never / Not
<b>Conneautville</b>			
C30	Commercial Convenience Store	No	Never / Not
<b>Townville</b>			
C31	Commercial Convenience Store	No	Never / Not
<b>Spartansburg</b>			
C32	Mom and Pop	No	Not Really
C33	Commercial Convenience Store	No	Often
<b>Guys Mills</b>			
C34	Mom and Pop	No	Not Really



<b>Hartstown</b>			
C35	Commercial Convenience Store	No	Never / Not
Total Number of Stores: 35			
Total Number of Stores with Gluten Free Food: 10			
Total Number of Stores with Moderate Gluten Free Food: 2			
Total Number of Stores without Gluten Free Food: 29			
Total Number of Commercial Grocery Stores: 8			
Total Number of Mom and Pop Stores: 13			
Total Number of Commercial Convenience Stores: 10			
Total Number of Convenience Stores: 0			
Total Number of Pharmacies: 4			
Total Number of Health Food Stores: 0			
Responded Never / Not: 16			
Responded Not Really: 11			
Responded Sometimes: 4			
Responded Often: 3			

## Appendix C

<b>Mercer County Food Pantries</b>			
<b>Location / Pantry</b>	<b>Have or do not have a gluten free option</b>	<b>Fresh Foods (Yes, No or Sometimes)</b>	<b>How Often Asked</b>
<b>Sharpville</b>			
Food Bank	No	Yes	N/A
FPM1	No, but people can exchange foods they do not want with those they do	Sometimes	Never
<b>Greenville</b>			
FPM2	No	Yes	Rarely
<b>Grove City</b>			
FPM3	Yes	Yes	Fairly Often
<b>Farrell</b>			
FPM4	Yes	Yes	Never
FPM5	No	Sometimes	Sometimes
<b>Stoneboro</b>			
FPM6	No, but they try to take allergies into consideration	Sometimes	Never
<b>Sharon</b>			
FPM7	No	Yes	Never
Total Number of Pantries: 7			
Total Number of Pantries with a Gluten Free Option: 2			
Total Number of Pantries that Somewhat have a Gluten Free Option: 3			
Total Number of Pantries without a Gluten Free Option at all: 3			
Total Number of Pantries with Fresh Food: 4			
Total Number of Pantries that Sometimes Have Fresh Food: 3			

Total Number of Pantries Without Fresh Food: 0
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<b>Crawford County Food Pantries</b>			
<b>Location / Pantry</b>	<b>Have or do not have a gluten free option</b>	<b>Fresh Foods</b>	<b>How Often Asked</b>
<b>Erie (Not Within County)</b>			
Food Bank	No	Yes	Not Often
<b>Meadville</b>			
FPC1 (7 Locations Throughout the County)	No, but if they have something gluten free and someone wants it they will give it to them	Yes	Occasionally have one person
FPC2	Only if the items are donated	Yes	N/A
FPC3	Only if the items are donated	No	Never
FPC4	Only if the items are donated	No	N/A
<b>Titusville</b>			
FPC5	No, but if they have something gluten free and someone wants it they will give it to them	No	Have one person who regularly asks
<b>Harmonsburg</b>			
FPC6	No	Sometimes	Never
<b>Conneaut Lake</b>			
FPC7	No	Sometimes	Never
Total Number of Pantries: 7			
Total Number of Pantries Without a Gluten Free Option: 7			
Total Number of Food Pantries with Fresh Foods: 3			
Total Number of Pantries that Sometimes have Fresh Foods: 2			
Total Number of Pantries that do not have Fresh Foods: 2			

## Appendix D

<b>Restaurants in Rural Areas Not Classified as Food Deserts</b>			
<b>Location / Restaurant</b>	<b>Have Gluten Free Options, Don't have Gluten Free Options, or have Moderate Gluten Free Options</b>	<b>Often, Sometimes, or Never asked for Gluten Free Food</b>	<b>Staff Receives Training / Have an Allergy Friendly Kitchen (Yes or No)</b>
<b>Mercer</b>			
R1	Yes	Often	Yes
R2	No	Never / Rarely	N/A
R3	Yes	Never / Rarely	Yes
R4	No	N/A	N/A
R5	No	N/A	N/A
R6	No	N/A	N/A
R7	Moderate	Sometimes	Yes
R8	Moderate	Never / Rarely	No
R9	No	N/A	N/A
R10	Moderate	Never / Rarely	Yes
R11	No	Never / Rarely	N/A
<b>Cochranton</b>			
R12	Yes	Often	Yes
R13	No	Never / Rarely	N/A
R14	No	Never / Rarely	N/A
R15	No	Never / Rarely	N/A
<b>Saegertown</b>			
R16	No	Never / Rarely	N/A
R17	No	Never / Rarely	N/A
R18	No	Never / Rarely	N/A
R19	No	Often	N/A

R20	No	Sometimes	N/A
<b>Conneaut Lake</b>			
R21	No	Never / Rarely	N/A
R22	No	Never / Rarely	N/A
R23	No	Sometimes	N/A
R24	Yes	Often	Yes
R25	Yes	Often	Yes
Total Number of Restaurants Interviewed: 25			
Total Number of Restaurants with a Gluten Free Menu: 5			
Total Number of Restaurants with Moderate Gluten Free Options: 3			
Total Number of Restaurants Without a Gluten Free Menu or Options: 17			
Total Number of Restaurants Often Asked: 6			
Total Number of Restaurants Sometimes Asked: 4			
Total Number of Restaurants Never / Rarely Asked: 11			

<b>Restaurants in Urban Areas Classified as Food Deserts</b>			
<b>Location / Restaurant</b>	<b>Have Gluten Free Options, Don't have Gluten Free Options, or have Moderate Gluten Free Options</b>	<b>Often, Sometimes, or Never asked for Gluten Free Food</b>	<b>Staff Receives Training / Have an Allergy Friendly Kitchen (Yes or No)</b>
<b>Sharon</b>			
U1	No	Often	N/A
U2	No	Never / Rarely	N/A
U3	Yes	Often	Yes
U4	Yes	Never / Rarely	Yes
U5	Moderate	Never / Rarely	Yes

U6	No	Sometimes	N/A
U7	No	Never / Rarely	N/A
U8	Yes	Sometimes	Yes
U9	Yes	Often	Yes
U10	No	Sometimes	N/A
U11	No	Never / Rarely	N/A
<b>Greenville</b>			
U12	No	Never / Rarely	N/A
U13	No	N/A	N/A
U14	No	Never / Rarely	N/A
U15	No	Sometimes	N/A
U16	No	Never / Rarely	N/A
U17	Yes	Often	Yes
U18	No	Never / Rarely	N/A
U19	Yes	Often	Yes
U20	No	N/A	N/A
U21	Yes	Never / Rarely	Yes
U22	No	Never / Rarely	N/A
U23	Yes	Sometimes	Yes
U24	Moderate	Never / Rarely	Somewhat
U25	No	Sometimes	N/A
U26	Moderate	Often	Yes
Total Number of Restaurants Interviewed: 26			
Total Number of Restaurants with a Gluten Free Menu: 8			
Total Number of Restaurants with a Moderate Gluten Free Menu: 3			
Total Number of Restaurants without a Gluten Free Menu: 15			

Total Number of Restaurants Asked Often: 6
Total Number of Restaurants Sometimes Asked: 6
Total Number of Restaurants Never / Rarely Asked: 12

## Appendix E

<b>Bakeries in Mercer County</b>			
<b>Location / Bakery</b>	<b>Have Gluten Free Options, Don't have Gluten Free Options, or have Moderate Gluten Free Options</b>	<b>Often, Sometimes, or Never asked for Gluten Free Food</b>	<b>Staff Receives Training / Have an Allergy Friendly Kitchen (Yes or No)</b>
<b>Mercer</b>			
MB1	Yes	Often	Yes
<b>Hermitage</b>			
MB2	No	Never / Rarely	N/A
MB3	No	Often	N/A
MB4	No	Never / Rarely	N/A
MB5	Yes	Often	Yes
MB6	No	Never / Rarely	N/A
<b>Sharpsville</b>			
MB7	Yes	Often	Yes
<b>Sharon</b>			
MB8	Yes	Often	Yes
<b>Transfer</b>			
MB9	No	Often	N/A
Total Number of Bakeries: 9			
Total Number of Bakeries that Sell Gluten Free Baked Goods: 4			
Total Number of Bakeries that do not Sell Gluten Free Baked Goods: 5			
Total Number of Bakeries Never / Rarely Asked: 3			
Total Number of Bakeries Often Asked: 6			



<b>Bakeries in Crawford County</b>			
<b>Location / Bakery</b>	<b>Have Gluten Free Options, Don't have Gluten Free Options, or have Moderate Gluten Free Options</b>	<b>Often, Sometimes, or Never asked for Gluten Free Food</b>	<b>Staff Receives Training / Have an Allergy Friendly Kitchen (Yes or No)</b>
<b>Meadville</b>			
CB1	Yes	Often	Yes
CB2	Yes	Often	Yes
CB3	No	Often	N/A
CB4	No	Often	N/A
CB5	No	Never / Rarely	N/A
<b>Conneaut Lake</b>			
CB6	Yes	Often	Yes
CB7	Yes	Often	Yes
<b>Cambridge Springs</b>			
CB8	No	N/A	N/A
<b>Titusville</b>			
CB9	Yes	Often	Yes
CB10	No	Never / Rarely	N/A
CB11	Yes	Often	Yes
CB12	No	Often	N/A
<b>Linesville</b>			
CB13	No	Never / Rarely	N/A
<b>Cochrannton</b>			
CB14	Yes	Often	N/A
Total Number of Bakeries: 14			
Total Number of Bakeries that Sell Gluten Free Baked Goods: 7			

Total Number of Bakeries that do not Sell Gluten Free Baked Goods: 7
Total Number of Bakeries Never/ Rarely Asked: 4
Total Number of Bakeries Often Asked: 10