Evaluation of Food Safety Practices at Louisiana Summer Feeding Sites and Food Safety Communication via Social Media During Crises

Peyton E. Haynes
Louisiana State University and Agricultural and Mechanical College

Follow this and additional works at: https://digitalcommons.lsu.edu/gradschool_theses

Part of the Food Science Commons, and the Nutrition Commons

Recommended Citation

This Thesis is brought to you for free and open access by the Graduate School at LSU Digital Commons. It has been accepted for inclusion in LSU Master's Theses by an authorized graduate school editor of LSU Digital Commons. For more information, please contact gradetd@lsu.edu.
EVALUATION OF FOOD SAFETY PRACTICES AT LOUISIANA SUMMER FEEDING SITES AND FOOD SAFETY COMMUNICATION VIA SOCIAL MEDIA DURING CRISIS

A Thesis

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural and Mechanical College in partial fulfillment of the requirements for the degree of Master of Science

in

The School of Nutrition and Food Sciences

by
Peyton E. Haynes
B.S., Louisiana State University, 2018
August 2021
ACKNOWLEDGEMENT

My sincerest gratitude to God, for with His guidance and love, anything is possible.

I wish to thank my family for their continued support over the past few years. Without their constant love, encouragement, and gluten-free snacks on hand, I would not be the woman I am today. To Keagan, my forever travel buddy, my best friend: you are my biggest motivation for making a better life for us. I hope I have made you proud.

To my advisor, Dr. Wenqing Xu, I wish to extend the greatest of thank you. Through the stress of a global pandemic, you have guided and supported this research. You have always had an ear to listen, advice to give, and I could not be more thankful for the opportunities you have given to me. Also to my committee, Dr. Denise Holston and Dr. Melissa Cater, for their guidance from my proposal to my graduation, I extend my appreciation.

I wish to thank my lab mates and classmates in Food Science – you all have put in countless hours to make sure our projects are of the highest quality. For all the late nights, the weekends, the birthdays spent in a lab, thank you.

To the faculty and staff of the School of Nutrition and Food Sciences, Louisiana State University, and the LSU AgCenter, I wish to extend my thanks. You all have shaped me into a knowledgeable, hardworking food safety professional, and it is with this experience I go into the workforce looking to make safe, tasty food accessible for all people.
# TABLE OF CONTENTS

Acknowledgement ......................................................................................................................... ii

List of Tables ................................................................................................................................. iv

List of Figures ................................................................................................................................. iv

Abstract .......................................................................................................................................... v

Chapter 1. Literature Review .......................................................................................................... 1
  1.1. Introduction .......................................................................................................................... 1
  1.2. Food Safety Education ......................................................................................................... 2
  1.3. Food Safety Risk Communication ....................................................................................... 3
  1.4. Food Safety Risk Communication During Crises ................................................................. 8
  1.5. Conclusion ........................................................................................................................ 9

Chapter 2. Evaluation of Food Safety Practices at Louisiana Summer Feeding Sites ................... 11
  2.1. Introduction ....................................................................................................................... 11
  2.2. Materials and Methods ..................................................................................................... 15
  2.3. Results and Discussion ..................................................................................................... 17
  2.4. Conclusion ....................................................................................................................... 22

Chapter 3. Food Safety Communication Via Social Media During Crises ................................... 23
  3.1. Introduction ....................................................................................................................... 23
  3.2. Materials and Methods ..................................................................................................... 25
  3.3. Results and Discussion ..................................................................................................... 28
  3.4. Conclusion ....................................................................................................................... 35

Chapter 4. The Future of Food Safety Education ......................................................................... 36

References ..................................................................................................................................... 37

Vita ................................................................................................................................................ 47
LIST OF TABLES AND LIST OF FIGURES

Tables

2.1. Observed Food Safety Violations by Summer Feeding Sites......................................................17
3.1. Frequencies of Food Safety Practices Observed in YouTube Videos........................................31

Figures

2.1. Insulated Coolers Used to Store Hot Foods..............................................................................20
3.1. Video Selection for Analysis..................................................................................................28
3.2. Professions of Video Hosts and Guests..................................................................................32
ABSTRACT

The United States Department of Agriculture’s Summer Food Service Program (SFSP) provided children under the age of 18 in low-income areas 145 million free meals in 2018 through summer feeding sites. Food safety issues arise for Louisiana feeding sites due to time-temperature controlled foods served, weather patterns in Louisiana, seasonal staff and short operation time, and lack of equipment. The purpose of this study was to assess food safety practices at Louisiana feeding sites through observational study with intention to compare food practices at institutional and noninstitutional sites. A rubric following USDA food safety guidelines based on categories: hot holding, cold holding, cross contamination prevention, personal hygiene, and cleaning was developed for observations. Data obtained during observations (n=22) was compiled to determine frequent practices. Sixteen institutional and six noninstitutional sites were observed. Common violations include lack of temperature checking, lack of proper equipment, and personal hygiene. Noninstitutional sites all had improper holding, mostly due to lack of equipment. This study demonstrated the need for targeted food safety educational materials.

The COVID-19 pandemic put the food system on alert and identified food safety as an important pillar in this crisis. Popular media is used as a disseminator of food safety information for public use; YouTube being one of the most highly trafficked websites on the internet. However, YouTube can contain misleading or untrustworthy information that contradicts validated information. This study evaluates food safety information circulated on YouTube during the COVID-19 pandemic. A video search on YouTube using the keywords “Food and COVID-19,” “Food safety and COVID-19,” and “Groceries and COVID-19” was conducted. In total, 85 videos from the U.S. and Canada were evaluated. More than half (59%) of videos
presented handwashing procedures. Multiple and different produce washing procedures were also shown throughout videos. Food was not considered hazardous by 33% of the videos, but 20% mentioned that food packaging is potentially hazardous. Most videos had a host or guest who was a healthcare professional or professor/expert in their field. These findings demonstrate the need to develop educational interventions that increase awareness of social media as a tool for food safety dissemination.
CHAPTER 1. LITERATURE REVIEW

1.1. Introduction

Food safety is a major global health concern. Contaminated food may cause harm, increase health spending, and enact other social and economic costs to consumers. The Centers for Disease Control and Prevention (CDC) in the United States estimates that 48 million people are sickened by foodborne illnesses each year, and 3,000 die as a result (CDC, 2018). Most foodborne illnesses are caused by a handful of pathogens: norovirus (58%), nontyphoidal Salmonella spp. (11%), Clostridium perfringens (10%), and Campylobacter spp. (9%) being the top causes (Scallan et al., 2011). Symptoms of foodborne illnesses range from gastrointestinal upset to respiratory paralysis and death, with each pathogen being unique in onset and attack rate (CDC, 2018). Some foods pose higher risk than others. Hazardous foods identified by the Food and Drug Administration (FDA) include raw or undercooked meat, poultry, and fish, unpasteurized milk and cheeses, raw or undercooked eggs or egg products, and unwashed produce (Center for Food Safety and Applied Nutrition, 2020). Transmission of foodborne pathogens is mainly fecal-oral route. Person-to-person transmission is common as well especially for foodborne viruses. Food contract surfaces can also serve as vehicles for pathogen transmission. Previous research has linked norovirus to infected kitchen staff handling salad (Schmid et al., 2007; Wadl et al., 2010), oysters (Alfano-Sobsey et al., 2011; Westrell et al., 2010), and frozen raspberries (Falkenhorst et al., 2005), although multiple transmission routes have been identified. Identifying sources of outbreaks, such as affected foods, people, and locations, and the resulting root cause analysis may prevent future outbreaks by stopping the pathogen at its source. It is however, challenging to pinpoint the source for multiple reasons. First, most cases of foodborne illnesses occur sporadically and are difficult to traceback. Second,
foodborne illnesses are notoriously underreported to local and national health agencies (Scallan et al., 2011). Last but not least, due to the perishable nature of foods and the lengthy epidemiological process, suspicious food samples may be off shelves before they are able to be evaluated. The food supply chain is becoming increasingly complicated due to globalization and improved logistics, and food safety risks can be introduced at any point along the supply chain. Consumers serve as the last defense line for foodborne illnesses. Consumer food safety education is a valuable tool used to prevent foodborne illnesses as well. Pregnant women, children, elderly adults, and those with autoimmune deficiencies are at higher risks for contracting foodborne illnesses, and consumer education may be targeted to these populations (Center for Food Safety and Applied Nutrition, 2020). Food safety risk communication, platforms for dissemination, and communication during health crises are dynamic due to a number of factors: population, a needs assessment, target audiences, availability of equipment or aids, training of educators, and more.

1.2. Food Safety Education

Food safety education encompasses a wide range of methods and tools. A reliable needs assessment is critical for effective education. Surveys have been popular needs assessment tools in previous research (Medeiros et al., 2004; Meer and Misner, 2000; Byrd-Bredbenner et al., 2007), which may seek attitude information or general knowledge levels related to development of educational materials. Individual food safety practices may also be evaluated. Knowledge of handwashing practices and personal hygiene scored high in previous studies (Medeiros et al., 2004), but this does not always translate to proper practices while actually preparing or serving foods (Abbot et al., 2007). This suggests that food safety knowledge may not positively correlate with actual practice.
Different populations may also have varying attitudes towards food safety: students anticipating careers in the food industry where safety is held to high standards had higher scores on attitude about food safety practices (Medeiros et al., 2004). Where and how consumers receive their food safety education may also vary. In one survey, 52% of respondents reported having no previous food safety education, and television was the primary source for current food safety information for half of respondents (Meer and Misner, 2000). Educational materials, classroom instruction, and non-formal education have shown to positively affect thermometer use amongst consumers looking to prevent foodborne illness (McCurdy et al., 2006). For younger students, a Positive Deviance model has shown effective food safety knowledge increase by incorporating in-person class instruction, online questionnaires, and take-home tasks (Whited et al., 2019). As an alternative to traditional classroom-style education or media, music has been shown to have significant recall of food safety information when included in lyrics (Winter et al., 2009).

Food safety knowledge of foodservice workers was not shown to be affected by education level nor length of employment in the food industry, suggesting that attention of food safety education should be given to general planning, implementation, monitoring, and evaluation (Webb and Morancie, 2015). Pre- and post-assessments may still provide valuable information during educational interventions.

1.3. Food Safety Risk Communication

Public awareness and concern about food safety has increased dramatically over the last few decades. With an increase in recalls, contamination, and reported illnesses worldwide, consumers are seeking food safety information from a variety of sources. Effective risk
communication between food safety authorities and consumers is vital for prevention of foodborne illness.

Food safety incidences have great influence over socio-economic policies and governmental guidelines. Risk assessment is critical for protecting public health at all levels of food production and distribution, including at-home food safety practices. Countries such as China have implemented Centers for Food Safety Risk Assessment to perform functions like risk assessment and monitoring, collection of data, researching food safety trends, and the development of training programs (Liu et al., 2013). One important duty of the Centers for Food Safety Risk Assessment is publicizing communications for consumer use, which could be disseminated in a variety of platforms. Similarly, Canada has high levels of trust in the food safety risk assessment system, but concerns like with communications and lack of overall transparency by government agencies (Sutherland et al., 2020). By increasing accessibility to information about food safety risks, consumers may be able to make more educated decisions and build trust within the food sector (Sutherland et al., 2020).

On the other side, government agency officials experience both successful and failed risk communications. Previous research has shown that risk communication recommendations cannot alone be based off of strategy, planning, resources, trust, dialogue or credibility – government agencies must take into account practice or case-based lessons in collaborative settings (Boholm, 2019).

Perception of risks and benefits must also be evaluated, as this can change between countries and the regulations they have set. A food safety practice that is adopted in one geographical area as commonplace may not be in other cultural areas. Furthermore, previous research shows effective communication is enhanced when communication between governing
organizations is increased, and this is critical in decreasing uncertainty and hazards to public food safety risks (Liang et al., 2021).

Risk communication by different sources may also affect efficacy of change. Healthcare workers may be perceived as role models during public health crises, but only 30% of surveyed physicians offered food safety information to their patients (Wong et al., 2004). This suggests that food safety educational interventions may be created for physicians as a tool for risk communication. Similarly, Registered Dietitians and Registered Nurses were found to provide inconsistent food safety information to patients at a high risk for foodborne illnesses, again highlighting the need for educational interventions to better streamline risk communication between healthcare professionals and consumers (Buffer et al., 2013). Limited time and interest may play a factor in food safety risk communication and education by healthcare professionals (Chen et al., 2020). By providing healthcare professionals with factual food safety information, effective risk communication may happen between them and patients.

1.3.1. Food Safety Risk Perception and Consumer Behavior

Linkages between perceived risks of food safety hazards, risks of common foods, and perception of food safety risks in general have previously been found (Ha et al., 2020). Negative food risk information disseminated to the public reduced trust in the food industry, but it also increased perception of risks (Ha et al., 2020). This “bad publicity” may negatively affect trust, but it makes consumers aware of risks they take when consuming certain high-risk foods. Trust in food manufacturers and retailers has been positively correlated to food safety perception (Chen, 2013). The linkages and distrust of the food industry after incidents coupled with positively correlated perceptions may be considered when designing food safety education materials and food policy. Consumer perception of restaurant food safety depends on a variety of
visual cues, including those of personal hygiene and handwashing of restaurant staff (Liu and Lee, 2018). Food safety risk perception may be enhanced with strong visual cues that are knowingly associated with food safety risks, such as pathogen transmission by unwashed hands. Behaviors such as restaurant avoidance or infrequent dining may be associated with negative perceptions.

Consumers may have disillusioned judgement when it comes to their own preparation of foods and could perceive an invulnerability to foodborne illnesses (Redmond and Griffith, 2004). This perception of invulnerability may lead to decreased food safety practices, which would be dangerous for consumers. Many foods prepared at home such as meat and poultry, salads, flour for baking, and even frozen vegetables have been involved in foodborne illness outbreaks (Seltzer, 2019). Previously, people who believed they had experienced a foodborne illness had greater awareness of foodborne pathogens and concern about issues of food safety, but they were also less likely to practice safe food handling compared to those who did not perceive they had experienced a foodborne illness (Fein et al., 1995).

Consumers may have an altered perception of food safety risks based on their level of trust and reliance on different disseminators of information (Tonsor et al., 2009). Consumers who had less trust in doctors had higher levels of risk perceptions in general. This suggests that, contrary to popular belief, healthcare professionals may not be perceived as the most appropriate disseminators of food safety risk information. Furthermore, trust in European Union food safety policies was associated with low levels of risk concern and perception, but trust in information was associated with high levels of risk concern and perception (Vainio et al., 2013). This suggests that, while governing agencies may garner trust, the information given to the public may not hold the same.
1.3.2. Consumer Risk Behavior, Food Safety Education, and Social Media

Consumers depend heavily on popular media for public health information. Sources such as local news, social media platforms, and television shows may all disseminate food safety information; whether or not that information is factual and effective at enacting behavior change is the question. Social media may provide a chaotic platform for information during health crises (Kaufhold et al., 2019), but sites tend to be user-friendly, free to use, accessible, and widely available. In both short and long term, health interventions found on social media have previously had positive effects (Hunter et al., 2019; Welch, 2016). Research has shown that consumers report that they are less likely to purchase foods that have been problematic topics on social media, regardless of the source (Soon, 2020). This highlights the need for factual and trustworthy sources of information on social media, as it directly affects consumer behavior. Social media sites like Facebook employ risk communication by determinants of perception, emotion, social trust, and support (Wu, 2015). Previous research has shown that Facebook interventions for young adults have positive impacts on food safety attitudes, practices, and overall knowledge (Mayer and Harrison, 2012). YouTube, as one of the most trafficked websites on the internet (Alexa Internet, 2021), serves as another social media outlet with a plethora of food safety information. On the subject of *E. coli* infections, consumer authors on YouTube account for over half of most popular surveyed videos, suggesting that wider consumer education for YouTube creators on foodborne pathogens may be necessary (Basch et al., 2019). Weibo, a popular microblogging platform based in China, contributed to cognitive and behavioral responses to food safety concerns when sampled (Mou and Lin, 2014). Emotional responses towards food safety incidences were stronger predictors of food safety risk perception and
preventative actions. Comments made on social media have also been examined; a significant interaction effect was found between source credibility and content of comments (Seo et al., 2015). Social media affects risk perception of food safety through attention and credibility (Yang et al., 2015), which may be considered for targeted educational interventions.

1.4. Food Safety Risk Communication During Crises

Food safety knowledge of volunteers and staff at emergency food relief organizations has been shown to be lacking in the areas of temperature control, hand hygiene, and serving of physically vulnerable populations (Finch and Daniel, 2005). Previously, it has been shown that stakeholders value the need to engage food safety risk communication during crises on social media but lack the strategy needed to integrate the two (Regan et al., 2016). After the 2011 Fukushima nuclear accident in Japan, the risk of radioactive contamination of foods was poorly communicated, leading to the development of risk communication books and visual aids for consumers (Cho et al., 2017). This demonstrated a need for effective risk communication after crises be planned before the crises may happen. During the 2013 Ebola outbreak, a study found over 26% of surveyed YouTube videos containing misleading information (Pathak et al., 2015), which highlights poor risk communication on social media.

1.4.1. Food Safety Risk Communication During COVID-19

Concern over foodborne transmission of COVID-19 has been a topic of conversation since the beginning of the pandemic. There is currently no evidence to suggest that COVID-19 spreads through food or food packaging, but consumers may perceive food to be risky (CDC, 2020). Since the pandemic began, 85% of Americans have stated they made changes to the foods they ate or how they prepared foods (Institute of Food Technologists, 2020). Through a survey, researchers found that 70% of respondents were concerned about foodborne transmission of
COVID-19, but less than half of respondents considered local authorities disseminating information to be trustworthy in risk communication (Faour-Klingbeil et al., 2021). In this study, social media, local news outlets, and the World Health Organization were primary sources for COVID-19 information. Furthermore, media dissemination of food safety information during COVID-19 has shown a positive impact on food safety knowledge and behavior (Min et al., 2020). Food safety educators must find ways to increase trust in media during public health crises, and in turn may see positive impacts on food safety behaviors of consumers. In a multi-country study, it was shown that food company staff awareness and hygiene were the two most important attributes in combating COVID-19, but less than half of the food companies surveyed had documented emergency plans for pandemics and other public health emergencies (Djekic et al., 2021). By having emergency plans in place, companies may disseminate factual food safety information and risk assessments related to the crisis at hand in a timely manner, reducing panic and fear amongst consumers. Consumers were also concerned about contracting COVID-19 from restaurant foods, especially cold, raw, or uncooked foods and food packaging (Byrd et al., 2021). While there is no evidence to suggest foodborne transmission of COVID-19, consumers may still perceive food as risky due to social media speak.

1.5. Conclusion

With many different methods of disseminating food safety education information to the public, it is vital for educators to determine the best solutions for their target audiences, environment, location/cultural influences, platforms, and more. In order to best serve consumers, food safety education must be customized for targeted food handlers, especially those who do not have access to adequate resources. In Chapter 2 of this thesis, we evaluated how different foodservice settings and serving staff affected perception of food safety and
food safety practices. Furthermore, the recent COVID-19 pandemic highlighted the importance of food safety risk communication during crises. Food safety risk communications must be timely, efficient, and serve to dispel panic during crises. Social media, so widely used today, is vital for reducing misinformation and spreading accurate, timely information for consumers. Chapter 3 of this thesis analyzed how food safety information was spread over social media during COVID-19 and how this affected accuracy and consumer perception.
CHAPTER 2. EVALUATION OF FOOD SAFETY PRACTICES AT LOUISIANA SUMMER FEEDING SITES

2.1. Introduction

The United States Department of Agriculture’s (USDA) Summer Food Service Program, or Summer Meals Program, provides children under the age of 18 in low-income areas free meals when school is not in session. The Summer Food Service Program (SFSP) offers nutritious meals with the necessary vitamins, minerals, and other essential nutrients needed for children to learn, grow, and stay healthy. The SFSP is federally-funded and state-administered through providers known as summer feeding sites. The three main entities involved in the Summer Food Service Program include state agencies, sponsors, and feeding sites where meals are served. The state agencies administer the program and communicate with the USDA, and sponsors running the individual programs are reimbursed by the SFSP. Sponsors may be school districts, local government agencies, camps, religious organizations, and other non-profit organizations (7 CFR 225.14). The majority of sponsors are school food authorities (USDA, 2019). The summer feeding sites may be institutional or non-institutional settings, including parks, recreation centers, libraries, and religious centers. Summer feeding sites that are camps may serve up to three meals or two meals and one snack per day, and sites that are not camps may serve one meal each day, or two meals each day if one is lunch and the other is breakfast or a snack (7 CFR 225.6). Young children under the age of six may be served smaller portions, and teens may be served larger portions in compliance with nutrition guidelines. The main goal of the SFSP is to alleviate food insecurity and hunger in children most in need when school meals are not available. Summer feeding sites are eligible to open in areas where at least 50% of children come from families with incomes at or below 185% of the federal poverty level, making them eligible for free or reduced-price school meals.
In 2018, the SFSP served over 145 million nutritious meals and snacks to children when school was not in session. The most common summer feeding sites were schools in urban areas, and 54% of schools prepared the meals on-site. Nationwide, summer feeding sites serve up to 900 children per day per site with over half of children served enrolled in elementary school (USDA, 2019). In Louisiana alone, there are about 500 operating summer feeding sites. On average, sites are open for seven weeks.

Foods served by feeding sites are often TCS foods – foods that are time and temperature controlled for safety. TCS foods include milk and dairy products, meat (beef, pork, and lamb), poultry, eggs, fish, shellfish, baked potatoes, tofu or other alternative protein products, sliced fruits and vegetables, and cooked grains (S.C. Department of Health and Environmental Control, 2019). A sample menu from a summer feeding site could include a hamburger, side salad, sliced peaches, milk, and fruit juice. Each of these sample foods is a TCS food needing either proper cold holding, internal cooking temperature, hot holding, and reheating temperature and time to be safe. Temperature is also related to weather patterns in the summer, as soaring temperatures may prove a problem for feeding sites without proper cold holding equipment. When the temperature outside reaches 90°F or higher, food kept at room temperature for more than one hour must be discarded, which may be difficult for summer feeding sites operating with limited resources such as refrigerators and freezers (U.S. Food and Drug Administration, 2017). During warmer months in Louisiana, it is average to have upwards of 30 days of temperatures 95°F and above (NOAA, 2019).

All SFSP sponsors must agree with the state agency that the site will maintain proper sanitation and health standards in storing, preparing, and serving food in conformance with all applicable state and local laws and regulations (7 CFR 225.16). Summer feeding sites must have
state or local health certification for the facilities in which they propose to prepare SFSP meals, and that the sanitation standards outlined in the certifications are always met. Prior to the start of service, each state agency must make training available to sponsor personnel, food service management companies, auditors, and health inspectors who will participate (7 CFR 225.7). Personnel responsible for storing and handling food must adhere to all sections outlined in the Louisiana Administrative Code, including proper dress, handwashing, general cleanliness, removal of jewelry, and take any other necessary precautionary measure to ensure non-contamination of food products, including but not limited to tobacco, chewing gum, personal food and drink, and other microbiological risks (Louisiana Department of Health, 2010).

Even considering the legislation governing the SFSP in the Code of Federal Regulations, food safety at sites is still a concern for many reasons. Since summer feeding sites are seasonal and operate for less than two months on average, adequately trained staff and regular inspections may lack. Currently, the main source of food service education is ServSafe® which is mandated by many state health agencies (or its equivalent). ServSafe® is often an online-only training service and lacks an in-person or educational setting training, with the in-person training sessions only offered at select locations and times. ServSafe® is also geared towards restaurants and their personnel, as ServSafe® is administered by the National Restaurant Association (ServSafe®, 2019). The educational resources offered by ServSafe® may not recognize the additional challenges of operating a summer feeding site. Additionally, some summer feeding sites will lack the necessary equipment needed for TCS foods such as refrigerators, freezers, hot holding receptacles, ovens, and clean serving utensils. This is more common at non-institutional summer feeding sites rather than institutional, since school settings are often serving meals throughout the school year. In 2015, 10% of summer feeding sites were located at parks and playgrounds,
meaning no kitchen-like equipment was available unless brought in specifically for the service
time (USDA, 2019).

There is currently limited research published on food safety aspects of the SFSP, with
most research focusing on nutrition and food security. Although outbreaks related to restaurants,
catering operations, and even farmer’s markets have been reported, estimating actual outbreak
numbers is challenging because food may become contaminated by many agents (bacteria,
viruses, parasites), transmission can occur by nonfood mechanisms (contact with animals or
drinking contaminated water), the prevalence of disease transmitted by food differs by pathogen
and by host factors, and only a small number of illnesses are confirmed by laboratory testing and
reported to public health agencies (Scallan et al, 2011). An outbreak of foodborne illness at a
small catering event at a noninstitutional setting saw ninety-three people sickened by a human
norovirus. A continuing investigation found that an undertrained catering staff member was
likely to blame. In the study, it was found that food service operations with trained personnel
received better inspection reports from local health authorities than food service operations
without trained personnel and were less likely to contribute to foodborne outbreaks (Kassa
2001). The underreporting of foodborne illness, especially from temporary food service
operations like the SFSP, makes it difficult to determine which food safety educational directives
would be most beneficial for both institutional and noninstitutional settings. A report published
in 2017 showed that in 28 summer feeding sites from seven states, proper handwashing, glove
changing, and thermometer use were the most common out of compliance practices (Patten et al.,
2017).

Within institutional settings, such as elementary schools, staff are mostly year-round
cafeteria food service workers. These food service workers undergo regular training and
inspections throughout the school year, and this carries over to summer; however, a high turnover rate at any given school could negatively affect food safety practices during the summer feedings.

The objectives of this research were to assess food safety practices at Louisiana summer feeding sites through observational study with the intention to compare food practices at institutional and noninstitutional sites. Results from this study may serve as needs assessment for developing food safety education materials targeting summer feeding sites.

2.2. Materials and Methods

2.2.1. Rubric Development

The USDA offers online resources for food safety assessment (USDA, 2021). In order to properly observe summer feeding sites, a rubric following USDA food safety guidelines based on categories – hot holding, cold holding, cross contamination prevention, personal hygiene, and cleaning, was created. From these categories, individual food safety practices were noted. For example, in the personal hygiene category, it was observed whether or not effective beard or hair restraints were worn by staff, stocked handwashing stations, eating and drinking by staff were done away from storage, cooking, and serving areas, and clean and appropriate clothing was worn by staff. For cross contamination prevention category, it was observed that raw and cooked items were stored separately, raw and cooked foods had separate utensils, clean cutting boards, utensils, and receptacles were used each service, and gloves changed/hands washed between handling of raw and cooked foods. For hot holding category, it was observed that food was temperature checked by staff, food was in shallow containers, and holding was limited to service time. For cold holding category, it was observed that refrigerator and freezer daily logs kept by staff were reading at appropriate temperatures (41°F and 0°F, respectively), frozen foods were
defrosted appropriately, such as in the refrigerator, and logs of temperatures for cold holding
equipment were kept on a daily basis by staff. Lastly, for the cleaning category, it was observed
that all food was wrapped, labeled, and stored correctly, leftover food that remained at room
temperature for two or more hours was discarded, sanitation was performed of all prep, cooking,
and serving areas, and pest control measures were in place. Other demographic information was
coded, such as site name and location, date and time of service, children served and number of
staff, number of serving lines and serving method, and food served. Within the rubric, a grammar
check was made, along with a pilot to an initial summer feeding site to assess any changes that
need to be made. After initial pilot, additional edits were made based on internal reviews from
two faculty members in the School of Nutrition and Food Sciences.

2.2.2. Observation of Summer Feeding Sites

Prior to the observational study, a formal ethical approval from Louisiana State
University Agricultural Center (LSU AgCenter) Internal Review Board was obtained (IRB
#HE19-20). A comprehensive list of 500 summer feeding sites in Louisiana was kindly provided
by the Louisiana Department of Education. From this list, an initial selection was made based on
sites that were open and operational at least three days per week (a majority of what would be a
normal school week), sites that offered at least a two-hour service time, and sites that had correct
contact information. From the contact information, initial visits were scheduled with school
administrators by phone. The school administrator provided suggestions on which service to
observe. Upon arriving, the site was observed first for demographic information as listed on the
rubric, general cleanliness, and then categories beginning with personal hygiene of staff. Sites
were observed from preparation of food, through service, and cleanup. If categories on the rubric
had any “no” answers under “observed,” descriptive notes were taken as to the reason for
potential violation. After observations were completed for summer 2019, data was logged into Microsoft Excel and descriptive statistics were performed.

Unfortunately, during the COVID-19 pandemic beginning early 2020, sites were extremely limited as to service and operations. No in-person dining was allowed in Louisiana due to state regulations on social distancing, so many sites offered drive-up pick-up from their locations during summer. Because of the extreme differences in service from summer of 2019 to summer of 2020, potential for a change in safety practices to prevent virus transmission, and social distancing/work from home guidelines, no sites were observed in summer 2020.

2.3. Results and Discussion

2.3.1. Summer Feeding Site Demographics

In total, 22 summer feeding sites were observed between June and August of 2019 in the Baton Rouge Metropolitan area. Most sites were considered institutional (school-based, n=16), and six sites were noninstitutional – summer camps based at denominational churches (n=3), libraries (n=2), and a meeting room at an apartment complex (n=1). Most services observed were during lunch (n=16), and six breakfast services were observed. Most sites (n=18) had two employees or volunteers serving food. Few noninstitutional sites had ten or more volunteers serving food (n=2). Institutional sites staffed employees, and noninstitutional sites were staffed by a mixture of volunteers, seasonal staff, parents, and other family members. Each site gave a range of children served per day, which varied from 50 to 200. Number of children served depended greatly on the population of the area, and if there were other organizations that brought children to the site such as summer camps. Most sites (n=20) had one serving line, and two sites made pre-packed boxes and distributed them individually.
2.3.2. Frequent Violations

Table 2.1. Observed Food Safety Violations by Feeding Sites

Noninstitutional sites had an average of 9.6 food safety violations per site. The most commonly observed violations were within the hot holding category – no site staff temperature checked any hot food at any time, so it was not possible to record if food was heated or kept at appropriate temperatures. Also, cross contamination prevention measures were limited at these sites. No observable measure was taken to wash hands or change gloves between raw and cooked foods at any site, and raw and cooked foods were frequently stored together or had the same utensils (Table 2.1).
Institutional sites had an average of 2.9 violations per site. The most commonly seen violations were in the hot holding category, similar to noninstitutional sites. No hot foods were temperature checked by staff at any time at any site. Also, some sites (n=5) did not sanitize prep, cooking, or serving areas before or after service (Table 2.1). Most sites had effective personal hygiene and cross contamination prevention measures.

2.3.3. Noninstitutional Sites

Temperature check of the hot food have not been observed at any noninstitutional sites at any time. In another words, there was no way to monitor the temperature of the food items throughout the service time. The main purpose of hot holding is to prevent two foodborne pathogens - *Clostridium perfringens* and *Bacillus cereus*. Together, both spore-formers contribute to 250,000 foodborne illness cases per year (FDA, 2017). To prevent the growth of these organisms in food, maintaining adequate hot holding temperatures (57 °C or 135°F) is an important public health intervention. Without periodically temperature monitoring, it is an immediate food safety concern, as children could be consuming temperature-abused TCS foods.

Noninstitutional sites were observed lacking hot holding equipment such as steam baths. In one site volunteers used large, insulated coolers to keep food warm (See Figure 2.1). Unfortunately, the coolers were used for over six hours, with constant opening and closing during serving. Previous research shows the efficiency of insulated coolers on various foods for up to four hours, but extended times have not been evaluated (Li et al., 2014). Another site at an apartment complex used aluminum serving trays covered with foil to keep food warm. Considering the cooking time (two to four hours prior) plus the service time, the TCS foods had high risk of temperature abuse. These violations of temperature control may be due to lack of proper equipment and/or training for feeding site staff. It has been shown that previous
institutional and foodservice workers have a knowledge gap in the areas of temperature control, cross contamination, and cooling and reheating (Manning, 1994; Sharif et al., 2013). Research shows a lack of knowledge about “high risk” foods or storage of cooked rice or potatoes, which feeding sites may serve (Medeiros et al., 2004).

Figure 2.1. Insulated Coolers Used to Store Hot Foods

Most noninstitutional sites (n=4) had volunteers or employees eating or drinking within the service area, which could have potentially contaminated the serviced food. In these sites, raw and cooked foods were often stored together due to limited space. It was observed in most sites (n=5) that the same utensils such as tongs, forks, or serving spoons, were used for both cooked and raw foods. At one site, the same tongs used to cook ground beef burgers were used to serve salad into cups.

Effective hair or beard restraints were rarely used (n=4 did not use). When inquired about at one site, volunteers responded that they were not instructed to nor they did not find it necessary. A lack of hair restraints has been associated with higher levels of bacterial contamination in food samples (Idris Ali and Immanuel, 2017).
2.3.4. Institutional Sites

Surprisingly, even with proper equipment, institutional sites also had an issue with temperature checking for hot holding foods. It revealed that the risky food safety practices for hot holding food are mainly due to lack of training rather than accessibility to equipment. School sites often had access to thermometers, but they were not observably used. Institutional sites’ staff were observed with less violation in personal hygiene category, even though eating and drinking next to the serviced foods were still observed at two sites. When asked about personal hygiene like handwashing or hair restraints, employees stated that they were trained year-round on those categories, which was in agreement with other studies. Previous research shows that role, years worked, and level of food safety training received significantly affected food safety knowledge (Gruenfeldova et al., 2019). However, knowledge cannot be directly translated into behaviors. In previous studies, personal hygiene and handwashing were identified to be the most inconsistent in practice for food service workers (Kwon et al., 2014). Catering employees have been found to be knowledgeable about personal hygiene when preparing, storing, or serving food, but actual practices lacked during functions (Hertzman and Barrash, 2007). Due to the small sample size and convenience sample of sites in our study, it would be risky to assume that personal hygiene is not important because of the small number of violations.

Few institutional sites had food safety information posted in the service area (n=2). These sites had Hazard Control and Critical Control Point (HACCP) information posted on a bulletin board along with danger zone temperatures, and one site had food allergy information posted. It was previously found that only 16% of foodservice workers could name all top allergens (Gruenfeldova et al., 2019), and allergen control is crucial for proper food safety. All other sites (n=14) had food safety information in a binder or folder away from the service area.
2.4. Conclusion

Violations have been observed at summer feeding sites in Louisiana. These violations showed different patterns in institutional and noninstitutional sites. Noninstitutional feeding sites had more food safety violations per site, which may due to a lack of proper equipment to hold TCS foods, and/or a lack of training for staff. Institutional sites showed higher performance in personal hygiene. However, they performed as poorly in time/temperature monitor as the noninstitutional sites. To enhance the compliance of food safety practices, food safety educational interventions should focus on temperature control and its importance, how to properly temperature check a food, and how to keep foods out of the temperature danger zone with limited equipment.
CHAPTER 3. FOOD SAFETY COMMUNICATION VIA SOCIAL MEDIA DURING CRISIS

3.1. Introduction

Since late 2019, the COVID-19 pandemic has become a worldwide public health emergency. With over 30 million cases and 557,000 deaths in the United States and Canada as of March 2021, one of the deadliest events in history has led to strict lockdown procedures in many countries (CDC, 2021; Public Health Agency of Canada, 2021). Retail shopping, indoor dining, attending sporting events, public gatherings, and more have been severely restricted for public safety. News media gave major coverage to empty shelves in the grocery stores, shuttered sit-down restaurants, closing of meat processing facilities due to employee sickness, as well as growers’ surplus during the first couple weeks of the pandemic. At the time of writing for this paper, a universal vaccine has been distributed, but cases still continue.

COVID-19 has not been proven to be a foodborne illness, but food safety has previously been identified as one of four pillars vital to the food industry during the pandemic (Galanakis, 2020). When the pandemic started, food safety generated great concerns; people began to question whether our food supply was safe. These concerns extended to food handlers, facilities, and even animal foods. Although SARS-CoV-2, the virus that causes COVID-19, is not a gastrointestinal virus such as human norovirus, and foodborne exposure to this virus is not known to be a route of transmission (FDA, 2021), the concerns remained. This speculation drove consumers to search multiple or different sources for food safety information, one source being social media or other online outlets; however, consumers were sometimes left with confusion or misinformation.
Media sources, including movies, tv shows, the internet, and social media serve as crucial disseminators of food safety and public health information. Previously, it has been shown that television chefs, often viewed as role models, have poor food safety handling that, when mimicked by consumers, could increase consumer risk of foodborne illnesses (Maughan et al., 2017; Woods and Bruhn, 2016). Another study looking at television cooking shows found that only 13% of episodes surveyed mentioned any kind of food safety practices (Cohen and Olson, 2016). Another media source of food safety information is recipe blogs. A popular trend of creating almond milk from scratch made its way through many blogs, but some were found to show unsafe time and temperatures for soaking almonds that may contribute to dangerous pathogen growth (Feng et al., 2020).

As one of the most highly-trafficked websites on the internet, YouTube is accessible to a wide demographic, freely available in most countries, and inclusive with both audio and visual communication (Alexa Internet, 2021). Previously, YouTube has been found to contain nonfactual and misleading information that directly contradicts public health standards set by governing agencies and public health officials (Hansen et al., 2016; Madathil et al., 2015). During the 2013 Ebola outbreak, a study found over 26% of surveyed YouTube videos containing misleading information (Pathak et al., 2015). Concerning YouTube videos containing COVID-19 information, a more recent study found 27.5% of surveyed videos contained non-factual information and accounted for 64 million total views (Li et al., 2020). Researchers found that independent users were seven times less likely to upload COVID-19 health information that was useful when compared to hospitals or academic institutions (Khatri et al., 2020). Due to the pattern of misinformation found on YouTube during past public health crises like the Ebola outbreak, it is useful to assess how accurate food safety information is during COVID-19 on
YouTube. The objectives of this study are to assess the type and quality of food safety information and the professions of people delivering COVID-19 information on YouTube videos during the pandemic. This study was conducted as a collaboration between Louisiana State University AgCenter (Baton Rouge, Louisiana) and Purdue University (West Lafayette, Indiana).

3.2. Materials and Methods

3.2.1. Survey of Youtube Videos For Content Analysis

With an impressive 2 billion-plus users, YouTube is a popular website (YouTube, 2021). Multiple previous studies have used YouTube as a way to gather consumer viewing data, especially concerning public health and food safety (Bora et al., 2018; Pandey et al., 2010; Pathak et al., 2015; Barrett and Feng, 2020). For this research, a video search was conducted on YouTube on June 8, 2020. Specific keywords were used: “Food and COVID-19,” “Food safety and COVID-19,” and “Groceries and COVID-19.” These terms had the broadest search and yielded the most relevant videos. Each keyword was searched separately, and loaded videos were then sorted by “view count” as a popularity measure. Videos selected for inclusion met the following criteria: English-speaking or English text, must have at least 500 views, the location must be specified as the United States or Canada (found in author’s “About” section), and the video must be less than 20 minutes long. Different descriptive items were recorded for each video, including author, title, URL, length in minutes, the date posted, the current amount of views, the current number of comments and the top five comments, the number of both likes and dislikes on the video, the number of subscribers the author’s channel had, and the publishing category. An independent review was conducted on 386 collected videos to determine any exclusions, and any videos appearing in more than one keyword were counted as one video. Exclusion criteria was as follows: the author copied another channel’s video (or video clips
within the video), the video did not contain both COVID-19 and food safety information, the video upload date was before February 12, 2020, or the video contained obscene or inappropriate language or information. The upload cutoff was chosen as such because COVID-19 was officially named by the World Health Organization (WHO) the day before, on February 11, 2020 (World Health Organization, 2020). A one-day time gap was chosen to allow the information to spread. After exclusions, 85 different videos met the selection criteria. These 85 videos were then screen recorded for analysis on June 23, 2020 (Figure 2).

3.2.2. Coding Process For Content Analysis

Previous studies on YouTube content analysis were used to adapt a coding system for this study (Barrett and Feng, 2020; Feng et al., 2020; Morrison and Young, 2019). This coding system was intended to assess quality of food safety information and food handling in YouTube videos during the pandemic. Topics chosen to be coded included: hosts and guests (people in the video), handwashing, package handling, sanitation of kitchen and surfaces, produce washing, any mention of hazardous or dangerous foods, and food utensil or package handling. For this study, hosts were defined as the person or people who spoke as the authority in the video, and guests were those interviewed by the host or invited to speak. Instances were coded as hazardous or dangerous if a host or guest mentioned that ingestion of the specified food or use of the utensil would result in a consumer contracting COVID-19.

All coding was recorded on a Microsoft Excel spreadsheet. Professions of hosts and guests were coded, as previous studies suggest the accuracy of information given depends on such (Barrett and Feng, 2020; Khatri et al., 2020; Li et al., 2020). Food safety procedures were coded if any were mentioned, showed, or performed by the people in the video, and a description of such was noted. Each of the 85 selected videos were coded, and a third party reviewed to
reach consensus. Data collection for videos was performed ten videos at a time to reduce fatigue and assure consistency of data collection.

3.2.3. Statistical Analysis

The selected YouTube videos were analyzed for content both quantitatively and qualitatively. A descriptive analysis was performed in IBM SPSS Statistics for Windows to reveal frequencies in coded information. This process was adapted from Barrett and Feng to fit information coded for this study (2020). A cross-reference was performed to look at possible connections between descriptive coded information and food safety practices.
3.3. Results and Discussion

3.3.1. Video Descriptions

Nearly all videos used for analysis were produced in the United States versus Canada (89%). Additionally, many videos were found under multiple keywords: more than half (52%) were found under “food safety and COVID-19.” The most popular video at the time of analysis was *PSA Grocery Shopping Tips in COVID-19 (see important notes below)* [www.DrJeffVW.com](http://www.DrJeffVW.com). Interestingly, YouTube videos that were posted earlier (such as March 2020 versus May 2020) had higher total view counts. This may be due to an initial surge of interest and/or panic by consumers looking for COVID-19 information at the start of multi-country transmission.
3.3.2. Handwashing Procedures

Many types of information were given in each video (See Table 3.1). Over half of videos analyzed demonstrated or presented handwashing procedures (69%), but less than half mentioned soap (41%). Less than one-third of videos (31%) presented information on the use of hand sanitizer.

Handwashing is widely accepted as a primary means to prevent infectious disease (Conover and Gibson, 2016). Studies on handwashing efficiency can be traced back to 1985 (Stiles and Sheena, 1985). The 2017 Food Code specifically lists the importance of steps in handwashing (FDA, 2017), including rinsing under clean, running warm water, applying the amount of cleaning compound recommended by the cleaning compound manufacturer, rubbing hands together vigorously for at least 10 to 15 seconds, thoroughly rinsing under clean, running warm water, and drying. Every abovementioned step had been studied for its impact on handwashing efficiency (Sickbert-Bennett et al., 2005; Fuls et al., 2008; Montville and Schaffner, 2011; Huang et al., 2012). Even though the efficiency of handwashing has been intensively researched, the compliance of handwashing has been reported low in various settings, such as healthcare (Whitby and McLawns, 2004), the food industry (Strohbehn et al., 2008), or the general public (Mardiko and von Lengerke, 2020). During COVID-19, hand sanitizer and gloves also have been widely used by consumers; however, neither hand sanitizer nor gloves can be used as replacement for hand washing.

3.3.3. Fresh Produce Washing

Different methods for produce sanitation and washing were also presented. The CDC and FDA recommend to rinse produce in running water only, which 27% of videos presented
Some videos presented produce washing procedures that are not supported by government agencies: 16% of videos showed soap and water to wash produce, and 12% of videos showed alternative methods, including a peroxide-water wash and the use of a dishwasher. These methods are not only ineffective at removing pathogens from the surfaces of produce, but also may be a health hazard. Detergents such as dish soap and unapproved produce “washes” may cause gastrointestinal distress when ingested and are not manufactured for safe consumption (Government of Canada, 2020; U.S. Food and Drug Administration, 2018; U.S. Department of Agriculture, 2020). Past research comparing methods has shown that running water is the most effective at removing pathogens from produce surfaces (Fishburn et al., 2012; Kilonzo-Nthenge et al., 2006). The use of ultrasonic dishwashers have been studied to remove pesticides from fruit surfaces (Zhou et al., 2019), but no studies have been able to suggest efficacy of pathogen removal. Furthermore, COVID-19 is not known to be spread by contaminated produce like *E. coli* O157:H7 or *Salmonella* spp., so concern should lie with removal of dirt, contaminants, and known pathogens.
3.3.4. Profession of Video Participants

Video participants were separated into two groups: hosts and guests. Both hosts and guests came from a wide variety of professional and health-related backgrounds. Hosts and guests were further separated into two more groups: professors or experts and healthcare professionals. Healthcare professionals made up the majority of hosts (62%), while 38% of videos featured professor or expert hosts (See Figure 3.2). Most videos (68%) had a guest professor or expert while only 32% of videos featured a healthcare professional guest.
The professions of both hosts and guests in the videos varied; doctors, professors, experts in food microbiology, safety, and infectious diseases all offered recommendations on YouTube. During an outbreak, the CDC states that scientists and experts, such as microbiologists and epidemiologists, and key for response efforts (Centers for Disease Control and Prevention, 2019). During the 2003 SARS outbreak (a similar virus to SARS-CoV-2), scientists provided information to the public that influenced medical treatments, restrictions on travel and gatherings, and trade agreement policies (Gronvall et al., 2006). Scientists are under pressure during the COVID-19 pandemic; with the virus rapidly spreading, new and emerging research being published, and disruptive local and national policy changes occurring, the need for the accurate dissemination of information is critical. Miscitations or misinterpretations have
previously led to contradictory information, which may have lead consumers to attempt risky food safety practices in order to prevent virus transmission (Park, 2020).

Healthcare professionals, given their heavy involvement in the pandemic from the beginning stages, may be role models for consumers looking for food safety information. Since the pandemic began, 85% of Americans have stated they made changes to the foods they ate or how they prepared foods (Institute of Food Technologists, 2020). Previous studies have shown that healthcare professionals give out food safety information to patients, and the confidence level for knowledge of foodborne illness was not high (Chen et al., 2020; Wong et al., 2004). Recent research shows that healthcare professionals are aware of the importance of food safety education, but the information is not typically given (Chen et al., 2020). Since healthcare professionals are seen as pillars of the community, it is important for them to not only have the correct information to combat foodborne illness, but also to have the vital information during global health crises to correct any misinformation they may come across. In this study, a healthcare professional (family medicine doctor) gave out incorrect information about produce washing with soap. They later posted an update video that corrected themselves on how to correctly wash produce with water only after consulting experts. Although they did correct themselves in the later video, the first video with incorrect information was still available for viewing at the time of writing. This may be confusing to consumers who only come across the first video and do not continue watching the second.

Most YouTube videos analyzed in this study contained healthcare professionals, professors, or experts as hosts or guests; therefore, it is important to look at consumer trust in these people. A 2018 study reported that consumers place the most trust in health professionals when looking for trustworthy food safety information (International Food Information Council
Foundation, 2018). The trust consumers have in these experts may influence how they mimic food safety behaviors.

3.3.5. The Role of Social Media in Food Safety Education

Consumers are seeking out information from social media or YouTube on a daily basis, especially popular news and public health and safety. In both short and long term, health interventions found on social media have previously had positive effects (Hunter et al., 2019; Welch, 2016). Even with its wide availability and ease of use, it is possible that consumers may come across dangerous misinformation from unreliable or even malicious sources. When authors post videos on YouTube, it becomes their responsibility to make sure they are posting the most accurate information available at the time. They must also be sure that their videos do not provide barriers to information such as high-cost paid videos, poor audio, or no accessibility for disabled consumers.

Handwashing, a pillar and often the first step to food preparation, was mentioned in over half of the analyzed videos for this study; however, only 41% showed soap and water being used. Handwashing is a very simple and easy food safety tip healthcare professionals could give out, but it is important that they are knowledgeable about all factors of the practice (and each step is necessary). It is possible that some consumers were relating handwashing to produce washing, as most guidelines recommend twenty seconds of hand washing with soap and water. Sixteen percent of videos mentioned washing produce with soap and water, which is where this information is based; however, this method has not been proven to stop transmission of virus particles from produce surfaces to the face via the hands, and soap may cause gastrointestinal sickness when consumed (Government of Canada, 2020; U.S. Food and Drug Administration, 2018).
Social media may provide a chaotic platform for information during health crises or emergencies (Kaufhold et al., 2019). Rapid sharing, blind following, and click-bait may disseminate dangerous misinformation, and it is the responsibility of authors to weed through this information. Authors who have very high view counts, likes, comments, and subscribers may be seen as “authority” figures in this pandemic, and must be aware that consumers who watch their videos may be closely following their advice. A famous psychological study conducted by Milgram showed that ordinary people are more likely to follow orders when they are given by authority figures (1969). When disseminating food safety information, these authority figures again have the responsibility to make sure their information is factual and clear.

3.4. Conclusion

Consumers are scouring the internet for information that can help them stay healthy during the COVID-19 pandemic. This virus has not been proven to be transmitted through food, but consumers are now more aware of food safety concerns. Healthcare professionals, experts, and regular consumers utilized YouTube as a social media platform to spread food safety information during the COVID-19 pandemic. People in the healthcare and public health fields must recognize that consumers on social media are more likely to follow their advice given their position in society. It is the responsibility of content creators to provide accurate, scientifically-validated information for their audience to reduce risk of foodborne illness during the pandemic. Educators in food safety should be aware of social media and YouTube specifically as a way to spread information during crises, and it could be useful for spreading awareness on general food safety practices. Educators may also create content on social media as a material for teaching healthcare professionals to address the food safety knowledge gap.
CHAPTER 4. THE FUTURE OF FOOD SAFETY EDUCATION

This research demonstrates the need for targeted food safety information. Food safety practices vary between environment, staff or consumers, sourcing of information, and more. Awareness of social media as a disseminator of food safety information must be recognized by educators and public health agencies alike. Healthcare professionals, scientific experts, and more utilize social media to spread public health information, and food safety educators should be aware of potential misinformation given by these creators.

By providing targeted food safety education to healthcare professionals, foodservice workers, and volunteers at locations such as summer feeding sites, the food safety knowledge gap may be properly addressed. Practices such as personal hygiene and temperature control should be addressed for summer feeding site staff, and proper handwashing and produce washing practices should be addressed for creators on YouTube. Educational interventions may be expanded to be spread on YouTube, Facebook, Instagram, and other frequented social media sites in order to reach a wide variety of consumers. All in all, food safety education must adapt with changing environments while still being focused on specific practices that most affect public safety.
REFERENCES


Mardiko, A. A., & von Lengerke, T. (2020). When, how, and how long do adults in Germany self-reportedly wash their hands? Compliance indices based on handwashing frequency,
technique, and duration from a cross-sectional representative survey. *International Journal of Hygiene and Environmental Health*, 230, 113590.


VITA
Peyton Haynes was born and raised in Lampasas, Texas. She obtained her bachelor’s degree in Nutrition and Food Sciences at Louisiana State University in 2018 in Baton Rouge, Louisiana. She began pursuing a master’s degree in Nutrition and Food Sciences in 2019 at Louisiana State University with special interest in food safety. She is currently a Graduate Research Assistant under Dr. Wenqing Xu at the LSU AgCenter and plans to receive her master’s in August 2021. She plans on making a difference in the lives of people with food allergies and intolerances from the food sector; her motto is “all people deserve safe, tasty food, no matter the dietary restriction.”