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Food Safety and Risk of Foodborne Illness at a Food Center Extension: Toolkit for Front-line Volunteers

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Food Safety and Risk of Foodborne Illness at a Food Center Extension:

Toolkit for Front-line Volunteers

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Table of Contents

Abstract4

Introduction5

 Background.....6

 Problem Statement6

 Organizational “Gap” Analysis of Project Site.....7

Review of the Literature8

 Diversity.....8

 Teaching Methods.....9

 Food Safety Educators11

 Donated food shelf-lives and expiration dates11

 Conclusion/Evidence Based Practice: Verification of Chosen Option.....12

Theoretical Framework Evidence-Based Practice Model.....12

 Personal Factors13

 Relationships.....13

 Community14

 Societal.....14

Project Design14

 Project Site and Population.....14

Methods.....16

 Timeline16

 Data Collection Procedures.....16

 Ethical Considerations and Protection of Human Subjects17

Results.....	18
Data Analysis.....	19
Feedback from food center leadership and mentors	21
Discussion.....	22
Objectives and Goals	24
Barriers.....	24
Theoretical Framework Reexamined.....	25
Cost-Benefit Analysis/Budget	26
Conclusion	27
References.....	28
Appendix (All inclusions are listed sequentially in order they appear in paper).....	31
Appendix A.....	31
Appendix B.....	32
Appendix C.....	33
Appendix D.....	34
Appendix E.....	35
Appendix F.....	37
Appendix G.....	42
Appendix H.....	43
Appendix I.....	44

Abstract

Background: Foodborne illness is a serious public health issue. One in six Americans has an episode of foodborne illness each year and over 50,000 are hospitalized. Food distribution centers are instrumental in decreasing food insecurity, however, some of the food donated is expired or may be damaged leading to increased risk of foodborne illness.

Purpose: The purpose of this project was to educate front-line volunteers at a local food center regarding food safety.

Methods: A toolkit was developed to teach food safety to the front-line volunteers. Seven classes were given to front-line volunteers including a pre and post intervention survey to evaluate if teaching and objectives were met. Reports of foodborne illness by recipients of the food center as well as number of toolkits given to the extension were also tracked.

Results: During the seven classes given over a two-month period, participants had a greater than 25% increase in learning regarding safety and foodborne illness as measured by the pre and post intervention survey given. Fifteen copies of the educational toolkit were given to the extension as well as pamphlets regarding dates on packages and shelf-life of common foods. Furthermore, there were no increases or reports of foodborne illness from the recipients and food center's extension.

Conclusion: Front-line volunteers at the local food distribution centers were effectively taught food safety and how to prevent foodborne illness. Developing a toolkit for front-line volunteers to use on food safety and foodborne illness and providing on-site teachings enhancing the knowledge of this high impact population resulting in strong public health regarding food safety.

Keywords: food safety, toolkit, consumer education, community, foodborne illness

Food Safety and Risk of Foodborne Illness at a Food Center Extension:

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Introduction

Food safety is critical in our country especially for populations that are at higher risk for foodborne illness. Pregnant women whose immune system becomes compromised during development of the fetus, diabetics, young children, immigrants, and elderly are considered high-risk groups for foodborne illness (Buffer, J., Kendall, P., Medeiros, L., Schroeder, M., Sophos, J., 2013; Cates, S., Kosa, K., Brophy, J., Hall, A., Fraser, A., 2015 ; Gold, A., Yu, N., Buro, B., Garden-Robinson, J., 2014; Marx, A., 2016).

In 2015, food insecurity existed in over 12% of the United States' population (Bierma, T., Jin, G., Bazan, C, 2019). According to the Montgomery County Food Council where the proposed DNP project is located, many citizens are impoverished. Sixty thousand of them are unaware of where their next meal will come from ("Montgomery County Food Council", 2014). Food centers, banks, and pantries are pivotal in decreasing these issues yet public health departments have little power in ensuring that the food received is free from contaminants (Bierma, T., Jin, G., Bazan, C., 2019).

The food center's extension serves a rich and diverse population of Montgomery County, MD. Included in this population are seniors, those on disability, and recent immigrants to the area. Since most of the food center receives is donated and at times outdated and damaged it is critical to ensure that recipients of the food as well as staff and front-line volunteers are up to date on the current best practices for food safety. Questions about food safety often arise from the front-line volunteers at the center and its extensions. An identified problem is knowledge

deficit regarding food safety in volunteers and recipients who are in foodborne illness high risk groups at a food center's extension in Glenmont, MD.

Food centers, banks, and pantries can play a role in environmental public health in decreasing food waste by addressing nutrition, food insecurity, as well as foodborne illness and food safety. Generally, they help with health care disparities as often their recipients are rich in diversity. Furthermore, many serve the counties where they are located by allowing offenders to do community service in place of criminal justice sanctions.

Background

The increasing number of the food center's recipients from diverse cultures with a variety of food safety practices make it important to teach food safety to front-line volunteers at this center. Glenmont, Maryland where the DNP student worked at a branch of a food center has 9% of its residents' income below the poverty level (Glenmont CDP: ACS Demographic and Housing Estimates: 2010-2014 American Community Survey 5-Year Estimates, 2014). At least 25% were born in Maryland; about 30% were born in another state or U.S. territory; and 45% were born outside the U.S.

Problem Statement

Increased risk for foodborne illness at a Maryland food center's extension as evidenced by vulnerable populations per demographics of Glenmont, MD, the recipients servicing the food center's extension in Glenmont, MD., the expired and damaged food that the food center receives there and potential knowledge deficit regarding food safety in volunteers and recipients who are in foodborne illness high-risk groups.

A toolkit for front-line volunteers was created to remedy this with easy to read information as well as lists of current resources including those from USDA's *FightBAC*, and *Be*

Food Safe, food safety charts from Foodsafety.Gov, and resources from state public health departments. Toolkits have been proven to be successful in teaching health care providers about working with adults with intellectual disabilities (O'Neill, A., 2016), heart failure patients and self-monitoring (Green, T., 2015) as well as caregivers taking care of persons with dementia (Grippin, L., 2017). A well-developed food safety toolkit can exist at the site long after the author has finished her DNP project. Educational classes associated with the toolkit will assure that its components are in the best working order.

Organizational “Gap” Analysis of Project Site

Maryland has an average of four foodborne illness outbreaks per million (All Over the Map, 2015). Following a ten-year period, the median number of reported outbreaks was 20.5 per year (All Over the Map, 2015). In that ten-year period, Maryland's state and local health departments had reports of 246 outbreaks that were reported to the Centers for Disease Control and Prevention (CDC) (All Over the Map, 2015). The most common pathogen found in food-related outbreaks in Maryland was Norovirus (28 outbreaks, 40%), followed by *Salmonella* (16 outbreaks, 23%) (All Over the Map, 2015).

Permanent staff at the food center is trained in food safety and the main facility is inspected regularly by the health department; front-line volunteers working at their extensions are not trained in food safety. Though there are staff members at the extension the volunteers are not directly supervised by staff and there have not been regular trainings of volunteers regarding food safety of donated products.

Via the DNP student's experience volunteering at the extension there are often questions regarding food products that have been donated. As a rule of thumb, these products are thrown out if: 1) meat that appears dark, 2) anything that has mold on it and 3) anything whose

wrapping is broken. Recipients are instructed not to handle fruit and vegetables in boxes until they have chosen which box they want. Volunteers do not appear to be wearing gloves when working with open boxes of fresh fruits and vegetables.

The front-line volunteers are in a critical position in terms of food safety: they are often the last to see the food products before it is given to the recipients. Front-line volunteers can easily identify food that might have become moldy or been damaged in transport. Many volunteers have questions regarding how safe some of the donated food is. Thus there is a strong need to train front-line volunteers who directly interact with the food center's recipients based on feedback from the food center's headquarters and other volunteers.

Review of Literature

The literature search included finding the best evidence-based practice on food safety for diverse populations in the United States. A consultation with a librarian at the Food and Drug Association focused on the Embase, Web of Science, and Ebsco databases. This was followed up by a consultation with a librarian from the University of Massachusetts in which databases such as PubMed was searched for terms were included such as *food safety*, *consumer education* and *cultural diversity*. The articles publishing dates were limited to the period from 2013 to 2018 and only English articles were accepted.

Initially, 42 articles were provided. Nine were chosen as being applicable as most subject matter did not relate directly to the DNP project. Another literature search was done with UMASS Discovery to locate three existing toolkits related to this subject as well as two research articles related to shelf-lives and expiration dates of products and any other articles pertinent to this topic.

Diversity

Pivotal articles from the literature review included a mixed methods study of food safety knowledge, practices, and beliefs, in Hispanic families with young children living in the Midwest giving insight into the Hispanic culture (Stenger, M., Ritter-Gooder, P., Perry, C., Albrecht, J., 2014). Made up of about ninety subjects, the study sought to determine their food safety, knowledge, practices, and beliefs (Stenger, M., Ritter-Gooder, P., Perry, C., Albrecht, J., 2014). This IIB level of evidence study applied very well to the Spanish population that the food center's extension serves but is limited due to the non-random and limited sampling effecting generalization (Stenger, M., Ritter-Gooder, P., Perry, C., Albrecht, J., 2014).

In their cohort study, George, Perin, Neiswender de Calani, Norman, Perry, et. al. (2014) found that 80% of Bolivian parents knew that handwashing was a preventive factor for diarrhea in children under five years of age. Only 17% reported hand washing before and after cooking and preparing food. Consisting of 952 children, the authors underscored the need for community education (George M., Perin, J., Neiswender de Calani, K., Norman, W., Perry, J., et. al., 2014). This insightful article supported the need for teaching proper hand washing in Spanish communities is at an evidence level of IIB. This prospective cohort study was limited by the sampling methods they used.

A survey was developed to determine safe food handling practices in Korean culture. This was the level of evidence at III. The 417 participants surveyed showed that there was a large gap of knowledge regarding safe food handling. Its results lead to the formation of a food safety booklet on this subject (Kang, H, Min-Woo, L., Hwang, I., Kim, J., 2015). This article was helpful to underscore the need for education and further insight into this culture.

Teaching Methods

A further level IA randomized controlled study of 394 participants of pregnant WIC clients or their caregivers who were 18 years of age or older and able to speak or read English was assessed. The study determined if interactive multimedia was a more effective method of teaching than pamphlets (Trepka, M., Newman, F., Davila, E., Matthew, K., Dixon, Z., Huffman, F., 2008). It was limited, however, by the fact that it was self-reporting and that 35% did not complete the survey (Trepka, M., Newman, F., Davila, E., Matthew, K., Dixon, Z., Huffman, F., 2008). However, the study was useful in showing that multimedia can be an effective and safe means in teaching food safety.

Feng, Bruhn, and Marx (2016) evaluated different safety education interventions via the use of positive deviance support groups. Positive deviance support groups are based on observations that in communities there are groups whose uncommon behaviors and strategies help them to find better solutions to problems than their peers who have the same resources and face similar or worse challenges (Feng, Y., Bruhn, C., Marx, D., 2016). Eighty-nine pregnant women and 93 people with diabetes received food safety via three different methods (Feng, Y., Bruhn, C., Marx, D., 2016). The positive deviance support groups had the largest impact. This study was limited by self-reporting and has a IIA level of evidence. The study shows that another method could be used to increase consumer food safety practices in the community.

A random controlled study was done to find out if discussion maps were effective in teaching food safety to 78 immigrants and refugees who may have poor English-speaking skills. Though the teaching method was very time consuming and subject bias may have occurred since recruitment was done via word of mouth amongst the subjects, this subject matter applied well to the population of Montgomery County and proved to be an effective means to teach food safety (Gold, A, Yu, N., Buro, B., Garden-Robinson, J. 2014).

Kendall, Scharff, Baker, LeJeune and Sofas (2017) found that food safety instruction does improve risk and protection factors for foodborne illness in women especially in pregnant women. The researchers randomly assigned five hundred and fifty low income English and Spanish speaking women to two treatment groups in two areas of the United States; one treatment group included a food safety class while the other group did not have this. This study was a prospective and longitudinal intervention trial with the level of evidence being 1B. The study was limited, however, by bias that may have occurred by self-reporting. It was useful, however, as showing another means to improve food safety in the community.

Food Safety Educators

So who is better at teaching food safety in the community: nurses or dietitians? Buffer, Kendall, Medeiros, Schroeder, and Sofos (2013) via a descriptive, cross sectional, web survey (Level III evidence) of 232 nurses and 267 dietitians discovered that registered dietitians had more training and were most likely to provide more comprehensive teaching than nurses regarding food safety. However, all varied greatly in consistencies. This interesting study risked sample bias and response bias. It provided great insight for the need of health care professionals to teach food safety in the community.

Donated food shelf-lives and expiration dates

A follow up review of literature focused on research articles and community resources pertaining to shelf-lives and expiration dates related to food donated to food centers, banks, and pantries. It concluded that there are existing staff and private sector toolkits related to this area as well as observational and scientific data related to individual food products. Though materials could be extracted from the already existing toolkits such as Tarrant Area Food Bank's Food

Safety Toolkit there appears to be no existing toolkit addressed solely front-line volunteers; just references in their overall toolkits to front-line volunteers such as a single page.

Conclusion/Evidence Based Practice: Verification of Chosen Option

The above studies highlighted successful teaching methods to high risk groups like recipients of the food center's extension. Studies addressing different cultures and ages gave insight on how to teach to these groups as well as staff and volunteers. These assessing teaching methods or interventions gave practice tips on community education. Many of the studies referred to the *Fight BAC!*, a food safety program developed by the Partnership for Food Safety Education. All the chosen studies above were pertinent to the author's DNP project.

A review of published UMASS DNP projects concluded that a strong educational program intervention would include a toolkit for front-line volunteers. A toolkit was created to educate the front-line volunteers who could in turn help educate the recipients of the food center's extension. See Appendix A for list of federal, state, and private sector, resources that are being considered for input into the toolkit.

Theoretical Framework or Evidence-Based Practice Model

The Social-Ecological Model: a Framework for Prevention was selected as a model and theoretical framework for this project. This model, which is often used by the Centers for Disease Control, provides a framework to stop foodborne illness before it begins. Prevention requires understanding factors that influence foodborne illness such as lack of education, challenges found with donated food, available resources, as well as outdated cultural practices. The four-level, social-ecological model could be used to better understand foodborne illness and the effect of potential prevention strategies.

The model takes into consideration the relationships between individual, relationship, community, and societal factors (“The Social-Ecological Model: A Framework for Prevention”, 2019). It allows for an understanding of the range of factors that put people at risk for foodborne illness or protects them from experiencing foodborne illness.

The overlapping rings in the model (See Appendix B) demonstrate how factors from one level influence factors at another level (“The Social-Ecological Model: A Framework for Prevention”, 2019). This model serves to underscore the dynamic relationships between individual, relationship, community, and societal factors (“The Social-Ecological Model: A Framework for Prevention”, 2019). Besides clarifying these factors, the model also suggests that in order to prevent foodborne illness, it was necessary to act across multiple levels of the model simultaneously (“The Social-Ecological Model: A Framework for Prevention”, 2019).

Personal Factors: This first level of individual identifies biological and personal history factors that increase the likelihood of contracting foodborne illness (“The Social-Ecological Model: a Framework for Prevention”, 2019). Some of these factors includes education, age, substance use, income, or history of abuse. Prevention strategies at this level promote beliefs, attitudes, and behaviors, that prevent foodborne illness. Specific strategies might include education and life skills training. This level is critical given the diverse population of Glenmont, Maryland as well as the recipients of the food center’s extension (“The Social-Ecological Model: A Framework for Prevention”, 2019).

Relationships: The second level examines close relationships that may increase the risk of experiencing foodborne illness. This includes a person’s closest social circle-peers, partners, and family members and how this influences their behavior and contributes to their experience. Prevention strategies at this level might include mentoring and peer programs to foster problem

solving skills, and promoting healthy relationships, parenting, or family-focused prevention programs (“The Social-Ecological Model: A Framework for Prevention”, 2019).

Community: This third level explores the settings, such as workplaces, schools, and neighborhoods, in which social relationships take place and seek to identify the characteristics of these settings that are associated with foodborne illness. Prevention strategies at this level impact both the social and physical environment – for example, by improving economic and housing opportunities in neighborhoods, reducing social isolation, as well as the climate, processes, and policies within school and workplace settings (“The Social-Ecological Model: A Framework for Prevention”, 2019).

Societal: This fourth level examines the broad societal factors that help create a climate in which foodborne illness is encouraged or inhibited. These factors include social and cultural norms that support foodborne illness and poor food safety practices. Other large societal factors considered are the economic, health, educational and social policies, that help to maintain social or economic inequalities between groups in society (“The Social-Ecological Model: A Framework for Prevention”, 2019).

Project Design

Project Site and Population

This project took place at the food center’s extension at a church in Maryland. This extension utilizes front-line volunteers from a local senior living area, the church’s Social Outreach Committee, and individuals serving court ordered community service. Permanent food center staff also assisted. Necessary resources for the project included time, space to teach, as well as the toolkit. Though the food center utilized volunteers in a variety of roles only (i.e.

driver, food delivery, food sorter, communications), the extension only utilized front-line volunteers who had the most contact with the recipients of the food.

At the extension food or meals were not served; instead perishables were provided via bags of frozen proteins including chicken, meats, pork; breads; enclosed boxes of boxed and canned items; open boxes of fresh fruits and vegetables; and packaged desserts when available. The food center staff was available at the site to help check in recipients and/or deliver the food. A total of ten rotating volunteers and permanent staff came on Tuesdays. Food donations came from local stores, restaurants, and farms. The food center's mission is "*Ending hunger in the county through food distribution, education and advocacy is the guiding force of all we do.*" and their vision "*That our community is a place where all people at all times have access to safe, sufficient, nutritious food in order to lead fulfilling lives and contribute to making the county a place where all live-in dignity.*"

Of the county's residents, 55% were U.S. citizens at birth, where as 21% are naturalized U.S. citizens, and 24% are not U.S. citizens (Glenmont CDP: ACS Demographic and Housing Estimates: 2010-2014 American Community Survey 5-Year Estimates, 2014). Ethnicities that were most frequently reported were sub-Saharan African (9%), German (5%), Irish (4%), English(4%), Italian (3%), West Indian (3%), American (3%), and Russian (2%), and a large Spanish-speaking population (Glenmont CDP: ACS Demographic and Housing Estimates: 2010-2014 American Community Survey 5-Year Estimates, 2014). Thirty-six percent of the populations is Hispanic or Latino (Glenmont CDP: ACS Demographic and Housing Estimates: 2010-2014 American Community Survey 5-Year Estimates, 2014).

Montgomery County, Maryland, where the foodbank is located, will have an unprecedented growth in their senior population in the coming decades. It is estimated that by

2030, seniors (those aged sixty years and older) will consist of 25% of the County population, compared to 19% currently (Umbriac J., Weinstein, S., 2014). The senior population in Montgomery County as of 2013 was 19% or 194,000 individuals (Umbriac, J., Weinstein, S., 2014). Montgomery County, Maryland, contained the third highest percentage of low-income minority adults in the state of Maryland; at 13% according to 2010 Census reports (Umbriac, J., Weinstein, S., 2014).

In terms of immune disorders, based on statistics from 2007, Maryland was tenth in cumulative number of AIDS cases and second among U.S. states and territories in AIDS case report rate. Montgomery County, Maryland, represented 17% of the total population in Maryland and 10% of living HIV/AIDS cases (“Healthy Montgomery, 2019).

Methods

A toolkit regarding food safety for front-line volunteers at a food center’s extension was created to prevent foodborne illness in the community resulting from food donations from the food center. It was taught in English but also contained resources listing links to teaching materials and pictorials in different languages since many of the recipients do not speak English. The sections, resources, and references of the toolkit included basic knowledge regarding food centers, banks, and pantries; food safety; acceptable donations; and resources for teaching food safety.

Timeline

This project began implementation about October 2019. The DNP student created and finalized the toolkit in 2019 and updated it in April 2020. The education sessions were implemented and evaluated from December 2019 to February 2020. See Appendix C for the timeline.

Data Collection Procedures

Quantitative data on the educational interventions' success was collected via the use of pre and post surveys. Qualitative data from written comments on the surveys as well as statements collected in the question and answer section were also recorded and analyzed. Data was collected through the pre and post intervention surveys to determine if there was an increase in knowledge regarding food safety. There was a no increase in the number of foodborne illnesses related to the center within a three-month period compared to the previous three months.

This educational intervention of front-line volunteers at a food center on food safety included individual presentations by the DNP student and an evidence-based toolkit which was distributed including available resources from regulatory and food safety organizations. Seven classes were presented during the time period of December 2019 to February 2020 to volunteers (See Appendix D for Teaching Plan) as needed to capture as many volunteers.

The teaching strategies consisted of a lecture with a PowerPoint (see Appendix E) presentation with room afterwards for questions and answers as well as interaction with learning tools such as the toolkit. Pre and post surveys are presented in Appendix F. These were given to the front-line volunteers before and after the classes with the PowerPoint presentation. Areas for comments and questions afterwards allowed for open-ended statements, which were collected and reviewed for themes.

Foodborne illness reported to the food center's extension during the three-month period compared to the previous three months based on data reported to the food center's headquarters was also solicited.

Ethical Considerations and Protection of Human Subjects

The University of Massachusetts, Amherst (UMass) Internal Review Board (IRB) approval was obtained prior to initiating the DNP Project. The official IRB Determination Form was submitted as soon as the proposal was approved by mid-October 2019 (See Appendix G). No patients were involved, nor did the DNP Project take place at a clinical setting; healthcare information, thus, did not exist so did not have to be protected. Personal information about recipients and their health status was protected. Benefits included increase food safety awareness in a very diverse population and front-line volunteers, decreased foodborne illness, and increased esprit de corps of the front-line volunteers; risks included conveying wrong information due to language and cultural barriers of the recipients.

Results

Seven teaching sessions with a total of ten participants were done regarding the toolkit with front-line volunteers. These sessions were completed over a two-month period with ten pre and post surveys collected. Two surveys (#3 and #4) were deleted as the volunteers did not fill them out correctly and there was too much missing data to be useful in the comparison. Table 1 shows descriptive statistics related to participants increases in learning related to each question.

Table 1

Mean Increased in Participants Knowledge Regarding Food Safety after Receiving Toolkit Presentation

Questions	Mean Increased in Learning	Range of Increased in Learning
#1 How would you rate your level of understanding Foodborne Illness?	25%	0-50%
#2 How would you rate your level of understanding Food Safety?	18.75%	0-50%
#3 How would you rate your understanding of challenges related	34.375%	25 – 75%

to Glenmont Community and this food center’s extension?		
#4 How would you rate your understanding of using the Toolkit?	34.375%	25 – 75%
#5 How would you rate your understanding of prevention?	15.635%	0 – 50%
a. “When in doubt throw it out.”		
b. Handwashing.	12.5%	0-50%
c. Not coming with personal illness.	18.75%	0-50%
d. No repackaging	40.625%	25-50%
<hr/>		
e. Advise recipients not to touch fresh fruits and veggies.	18.75%	25-50%
<hr/>		
Total averages	25.32%	11.11% to 55.55%
<hr/>		

Data Analysis

The data presented show that the participants had an average 25.25% increase in learning related to the variables captured in the pre and post-test questions/surveys. Thus, the goal of having participants increase their learning by 25% was reached.

The results also demonstrated that front-line volunteers had different baseline knowledge regarding food safety and areas in which the participants had the most learning in. There was a 34% increase in learning for the questions: *“How would you rate your understanding of challenges related to the food center’s extension”* as well as *“How would you rate your understanding of using the toolkit?”* There was a 40% increase in learning regarding not to repackage food. These areas with higher percentages tell the author that these were important and well needed areas to focus on as obviously the participants had less prior knowledge regarding this. For example, at the site the author saw often volunteers repackaging food. If it appeared that there might not be enough deserts, volunteers would break down a large package of cookies into smaller bags of cookies though it violated regulations. The author’s presentation

went into detail why not to repackage: an area based on observation and above results that needed attention.

Meanwhile, the areas with lower percentages of increased learning such as the question regarding: “*handwashing*” (12.5%), “*when in doubt throw it out*” (16%), and “*how would you rate your level of understanding of food safety* (19%), indicate areas that the participants were mostly aware but did also increase their understanding a little. See Appendix H for further results.

Qualitative data consisted of comments shared directly on the surveys and/or in the question and answer area after the presentation. These included: “*Great presentation!*”, “*very thorough, organized,*” “*the toolkit is a great idea to include volunteers*”. Participants thought the information was very relevant and insightful to help non-professionals learn about public health related to food safety and were very appreciative of being included in the education sessions as well as having a graduate project focused on their needs.

Verbal feedback shared in the question and answer periods after the teachings almost in the form of ideas for future action on the issue included:

“Putting up food safety posters in multiple languages would not work as when we tried to hang posters before they always fell down.”

“We should create a banner in several languages telling recipients not to touch the food in the open baskets.”

“This is a great, well-needed presentation.” and

“I will begin practicing better food safety in my own home including washing fruit before eating and cleaning out my refrigerator once a week.”

The project was later shared with the food center's administration who were pleased with the project.

Feedback from food center leadership and mentors

After the classes regarding the toolkit started taking place, it was presented to facilitators including the food center's staff and second mentor. Both gave constructive feedback and were impressed regarding how the project turned out as well as evolved. The director expressed gratitude about the project and was impressed with the information by the project.

With an eye towards the sustainability of the intervention to use for future volunteers, constructive feedback from the participants was shared with the facility. The following suggestions were collaboratively made and created by the director of program and DNP student in a meeting:

- 1. Not to make a banner in several languages telling participants not to touch the open food per suggestion of the front-line volunteers to prevent cross contamination. This should continue to be reinforced verbally and individually.*
- 2. To reinforce with volunteers that they should not open or change packaging of food. Volunteers did not have training or rights to do so.*
- 3. To do reinforcement with the volunteers regarding dates (sell by, packaging, and expiration) and shelf-lives of foods via following up teachings.*
- 4. To create an easy to read tool regarding the dates above with the participants.*
- 5. Decrease the number of copies of toolkits as there were not 25 to 50 front-line volunteers at the site; instead print out only 10 to 15 copies.*
- 6. Compress some of the information in the toolkit, as some may have been repetitive.*
- 7. To print out the toolkit in color to make it more reader friendly.*

Reinforcement and follow up lectures were done with the front-line volunteers/participants regarding the dates on food. A pamphlet was created regarding dates on packaging and shelf life of foods. The revised toolkit was finalized and given to the site for

future education purposes. There have been no reports of foodborne illness from this extension or the food center in general as well as any increases in the three-month period after the educational intervention.

Discussion

There was a wide range of increase in learning in terms of overall learning as well as question specific learning between the participants. This may be explained that some of the participants came from very educated backgrounds. Several had advanced degrees and were retired federal workers. One, a volunteer from the church, was already certified in Safeserv, a food and beverage safety training and certificate program administered by the National Restaurant Association. This volunteer had been involved with food projects at the church including organized luncheons. At least three participants came from a healthcare and medical background.

What was equally helpful was the qualitative data that came from not only comments in the surveys, but discussions afterwards almost in the form of focused groups from the participants. Constructive feedback was shared with leadership at the food center. One positive response was that volunteers noticed was how much the project was instrumental in increasing the esprit de corps of the volunteers.

Based on literature reviews, no specific toolkit had been developed for food centers, banks, or center's front-line volunteers or even existed. Only a couple of pages or comments were directed to volunteers in preexisting toolkits. There were little education programs for front-line volunteers at this food center's extension.

This review of literature showed the need for teaching of the recipients of the food as well as best methods but nothing regarding teaching the front-line volunteers. Recipients of food

centers, banks, and pantries are at high risk for foodborne illness as many recipients are immune comprised, older, pregnant and in other high-risk groups. Varying, out of date, practices including poor hand washing techniques (George M., Perin, J., Neiswender de Calani, K., Norman, W., Perry, J., et. al., 2014) and food safety practices (Stenger, M., Ritter-Gooder, P., Perry, C., Albrecht, J., 2014), (Kang, H, Min-Woo, L., Hwang, I., Kim, J., 2015), (Gold, A, Yu, N., Buro, B., Garden-Robinson, J. 2014) by the diversity of different ethnic backgrounds coming to the site food increased risk of foodborne illness.

Though multiple studies regarding teaching methods to recipients of food centers, banks, and pantries, had been done including interactive multimedia (Trepka, M., Newman, F., Davila, E., Matthew, K., Dixon, Z., Huffman, F., 2008), positive deviance support groups (Feng, Y., Bruhn, C., and Marx, D., 2016), discussion maps (Gold, A, Yu, N., Buro, B., Garden-Robinson, J., 2014), food safety instruction (Kendall, P., Scharff, R., Baker, S. LeJeune, J., Sofos, J., Mederios, L., 2017), none considered doing an intervention by teaching the front-line volunteers who have the most contact with the food center's recipients. By recognizing how critical the front-line volunteers are regarding food safety and developing a first of a kind, specialized, educational program for them had a strong positive effect for the volunteers as well as preventing foodborne illness in the community.

It was rewarding to do a special project for the already highly committed volunteers at this extension of the food center as well as the volunteers in general whose work is instrumental to the success of the food center. The volunteers greatly appreciated this special focus and teaching program.

Goals and Objectives

The goals of this DNP project were to increase food safety knowledge in front-line volunteers at the food center's extension thus also decreasing the risk of foodborne illness in the food center's recipients. The following objectives and outcomes update are provided:

1. *Objective 1- Deliver education via presentations and Toolkit to front-line volunteers at Food Center's extension.*

Outcome 1- 6 to 12 front-line volunteers will be educated on food safety and demonstrate improved knowledge on pre and post-tests of at least 25%.

Update: Achieved. Ten participants were educated on food safety and demonstrated improved knowledge on pre and post-tests of at least 25%.

2. *Objective 2- No increases in foodborne illness arising from the food center's extension and any reports to the food center regarding foodborne illness an/or increases of from this extension.*

Outcome 2- There will not be an increase in reports to the food center's officials regarding foodborne illness within a three-month period compared to the previous three months related to the extension.

Update: Achieved. No reports as of increases as of as March 25, 2020 about three months after the first teaching began.

3. *Objective 3- Up to 10-20 copies of the toolkit will be distributed at the food center's extensions.*

Outcome 3- There will be adequate access to the toolkit at the extension.

Update: Achieved. Ten to fifteen copies of the updated toolkit were left at the site as well as copies of a flyer regarding dates on food packaging and shelf-lives of common foods.

Barriers

There were initially many barriers to this project including language, regulatory, availability of the food center's staff, time, and space. Language barriers as well as diversity of food practices and beliefs represented by the many cultures in this area were initially a challenge to this project. Many of the diverse recipients spoke little English and were unable to read, especially English. Potential language barriers amongst the diverse recipients were addressed by teaching the front-line volunteers who spoke and read English and providing resources in different languages for the recipients with lists of websites that had resources such as easy to read posters, fact sheets, and handouts.

There were also potential regulatory requirements that had to be met in teaching food safety. For example, the food center has a restored school bus with a kitchen which allows cooking demonstrations. Current regulations in the county made it harder to fully utilize this bus so the project did not include the school bus.

Having two mentors as facilitators was greatly helpful to this project. Both gave different perspectives (one was a nurse scientist who had a Ph.D. and the other a dietician and public health nutritionists) and expertise. The nurse scientist provided availability when the dietician and staff from the food center could not be available due to time constraints related to renovation of its headquarters' warehouse.

Theoretical Framework Reexamined

The Social Ecological Model fit well into this project. This model is used widely with prevention and is one that the Centers for Disease Control often uses. This model focuses on the dynamics between individual, relationships, community, and societal. Individuals are the recipients of the food center's extension. Relationships exist between the recipients, front-line

volunteers, staff at food center's headquarters as well as the food center's relationship with the county.

Community fits in nicely as the extension was part of a community outreach team at a local church and took place at the local church. All of these fit into society as a whole including public health priorities of decreasing food hunger; supporting diverse, vulnerable, and underserved communities such as the elderly, legal, and illegal immigrants; increasing environmental public health by decreasing food waste as well as allowing community participants to do community service per order of the courts at this site.

Cost-Benefit Analysis/Budget

The total cost of the DNP Project was approximately \$200 of which the student covered the cost of. Front-line volunteers who participated did not have to be financially compensated. They did not have to receive food and/or beverages where the teachings took place as the teachings were done at the church's extension versus originally planned at a restaurant afterwards. Thus, costs originally assessed to include space to present toolkit to staff and volunteers did not occur. Costs did occur however for were printing out of the toolkit, pamphlet, as well as pre and post tests for teaching. These costs came to \$200 as oppose to the initial estimate of \$25 due to the size and amount of colored copies in the toolkit. See Appendix I for explanation of projected cost.

Benefits of the program included increasing front-line volunteers' knowledge regarding food safety as well as creating a strong toolkit for the front-line volunteers. An overall goal was to decrease foodborne illness in the community. A potential risk involved was inability of front-line volunteers to transmit information correctly due to ongoing language barriers. These benefits outweighed the costs and potential risk.

Conclusion

One of the goals of Healthy People 2020 is to “reduce foodborne illnesses in the United States by improving food safety-related behaviors and practices” (“Healthy People 2020, Food Safety”, 2019). States Healthy People 2020:

“Foodborne illnesses are a burden on public health and contribute significantly to the cost of health care. Each year foodborne illnesses sicken 48 million Americans (approximately 17% of people in the United States) and lead to 128,000 hospitalizations and 3,000 deaths...Foodborne illnesses are a preventable and underreported public health problem. These illnesses are a burden on public health and contribute significantly to the cost of health care. They also present a major challenge to certain groups of people...Safer food promises healthier and longer lives and less costly health care, as well as a more resilient food industry (“Healthy People 2020, Food Safety”, 2019).”

Developing cultural awareness in diverse communities such as Glenmont, Maryland, increasing food safety education via a toolkit for front-line volunteers and teaching classes to introduce the toolkit will address the Healthy People 2020 objective.

Toolkits have been effective in teaching health care providers about working with adults with intellectual disabilities (O’Neill, A.R., 2016), self-monitoring for heart failure patients (Green, T., 2015) and caregivers taking care of persons with dementia (Grippin, L., 2017). A successful food safety toolkit for front-line volunteers at a food center’s extension helped decreased the risk of foodborne illness in some of the vulnerable recipients of the extension as well as help achieve this Healthy People 2020 goal.

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Appendix A: List of potential federal, state, and private sector resources for the toolkit.

- Be Food Safe materials from USDA. It has flyers, educational materials that can be provided in multiple languages representing the great diversity of the Glenmont area.
- Fight BAC!, a food safety program developed by the Partnership for Food Safety Education
- Food Safety Resources from local public health departments such as that from the state of Minnesota.
- Data and research regarding food safety and damaged food products.
- Resource from <http://healthyshelves.org>
- University of Wisconsin's Safe and Healthy Food Pantries Project and Toolkit.
- Snap-Ed regarding food safety.
- Center for Climate Change's "Safe Surplus Food Donation Toolkit"
- Tarrant Area Food Bank's Food Safety Toolkit.
- Feeding America's Online Marketplace and Retail Food Safety Guidelines.
- NC State Extension's Food Pantries and Food Banks' Presentations.
- Manna's list of food unsuitable for donation (<http://www.mannafood.org/give-food/donate-food-to-manna/>)

Appendix B: Social Ecological Model



Appendix C: Timeline

Simplified Project Timeline

Task	August 2019	Sept 2019	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	March 2020	April 2020	May 2020
Volunteering at Food Center	X	X	X	X	X	X	X	X	X	X
Create Tool Kit	X	X								
Implement, Intervention, Evaluation, Toolkit			X	X	X	X	X	X	X	
Post-test and Analysis of outcomes			X	X	X					
Results presented to stakeholders					X	X	X	X		

Appendix D: Teaching Plan

- 1) Hand out Pre-test and post-tests.
- 2) Gather 6-12 front-line Volunteers and Interested Stakeholders in an area away from the high-volume food center's extension at Glenmont Methodist Church such as a private room or restaurant
- 3) Present a Power Point or General Discussion of the Tool Kit to include
 - a. Understanding Foodborne Illness
 - b. Understanding Food Safety
 - c. Understanding of challenges related to Glenmont Community and Food Centers, Banks, and Pantries
 - d. Understanding of Using the Toolkit
 - e. Prevention
 - i. When in doubt throw it out
 - ii. Handwashing
 - iii. Not coming with personal illness
 - iv. No repackaging
- 4) Allow time period to ask questions
- 5) Hand out Pre and post

Appendix E: PowerPoint Presentation Outline Summary

Front-line volunteer food safety toolkit

Sara Anderson, BA, BSN, MPH

Sara J. Anderson, BA, BSN, MPH

Captain and Nurse Officer in the Commissioned Corps of the United States Public Health Service

BA in American Studies, Georgetown University, 1987

BS in Nursing, Georgetown University, 1995

MPH in Nutrition, University of Massachusetts, Amherst, 2013

Student, Doctorate of Nursing Practice in Public Health Leadership, University of Massachusetts, Amherst

Interests: Nutrition, Hospice, Regulatory Work, Animal Rescue

Background

Food Center

Food Insecurity

Public Health

Food Safety and Food Bourne Illness

Prevention

How my project developed

Goals

Understanding what a toolkit is

Understanding Food Bourne Illness

Understanding Challenges

Prevention

When in doubt throw it out

Handwashing

Not coming with personal illness

No repackaging

Advise recipients not to touch fresh fruits and veggies.

How My Project Developed

What is a Toolkit?

A collection of already existing resources.

Food Center at the University of Wisconsin and North Carolina has already created one.

Created one regarding food safety for front-line volunteers.

Foodborne Illness

Every year, foodborne illness affects more than 48 million individuals in the United States alone. A recent study reports that factors that increase the risk of foodborne illness include stress, pregnancy, age under five years or between 60-65 years, nutritional deficiency, and the ingestion of fatty foods.

Food center visitors may be more susceptible to serious consequences from foodborne illness than the general population.

Foodborne illness can affect anyone. But those who are elderly, the very young, those with compromised immune systems, and pregnant women have an even greater risk of getting sick

from contaminated food. Many of the guests visiting your food center are in these high-risk groups.

Front-Line Volunteers

Last in the change of command.

Sees food just before its released to recipients.

Recipients often ask the front-line volunteers directly.

Challenges

Diversity, multiple languages: hard to teach a class.

Inability to read written materials.

Time.

Space.

Donated food often expired.

Food Safety Information

Food Safety Policy.

For front-line volunteers

When in doubt throw it out.

Handwashing.

Not coming with personal illness.

No repackaging.

Advise recipients not to touch fresh fruits and veggies.

When in Doubt Throw it out

Moldy food.

Blackened meat.

Damaged package food.

Expiration dates.

Cans.

Handwashing/Good hand hygiene

Wash your hands regularly and thoroughly with soap and warm water after:

Using the restroom and before handling food

Touching animals

Sneezing, blowing your nose and coughing

Touching a cut or open sore

Outside and before starting to work with food

Handling ready-to-eat foods like fresh fruits and vegetables

Handling trash

Sorting food, especially packaged items, and before handling fresh food

Carrying boxes to and from storage or vehicles

Handling non-food items and before handling food (even if that food is packaged)

Preventing Recipients from Touching Food

Easily spread of germs.

Look not touch.

Illness

You help protect those you serve when you take care of yourself! Do not come to the center, even to volunteer, if you are experiencing any of the following symptoms:

Abdominal cramps, diarrhea, fever, vomiting

Open, oozing sores on your hands, lower arms or any exposed body parts

Sore throat with fever If you have had, or are experiencing, vomiting, diarrhea or jaundice, you may not come in to work until you have been symptom-free for 24 hours or you have a written release from a medical practitioner.

You may not work with food if you have been diagnosed with Hepatitis A, Salmonella Typhi, E. coli, Norovirus, or Shigella. You must have a note from a medical practitioner to return to work.

Repackaging

Don't

Packaging is done under special controls

General Food Safety Resources

Foodsafety.gov www.foodsafety.gov

FDA Produce Safety Posters

www.fda.gov/Food/FoodborneIllnessContaminants/BuyStoreServeSafeFood/ucm114299.htm

USDA Safe Food Handling Posters www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/safe-food-handling

University of Nebraska Extension Hand Washing Posters www.food.unl.edu/free-handwashing-posters-activity-sheets-other-materials

Be Food Safe '10 Tips' from Choose MyPlate www.choosemyplate.gov/food-groups/downloads/TenTips/DGTipsheet23BeFoodSafe.pdf

USDA Kitchen Thermometers & Food Safety www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/appliances-and-thermometers

Hunger Task Force Standards of Excellence www.hungertaskforce.org/what-we-do/food-bank/standards-of-excellence

Continued

Safe and Healthy Food Pantries Project. SNAP-Ed. University of Wisconsin. UW Extension. Food Wise.

Which Foods are Safe to Donate to a Food Center? University of Maine Cooperative Extension. Food Safety Posters or Fact Sheets. Purdue Extension. Indiana's Emergency Food Resource Network.

Food Safety: Food Pantries and Food Banks. NC State Extension.

Donating Safe and Nutritious Food to Food Pantries and Soup Kitchens. Kansas State University. K-State Research and Extension.

Food Safety for Home Delivered Meals. Foodsafety.gov.

Posters

<https://www.purdue.edu/indianasefrnetwork/Home/DocList/publ>

Conclusion

Front-line Volunteers are instrumental in stopping food center's recipients from getting food borne illness.

Feedback/Questions

**Appendix F: Pre and posttest sample with teaching objectives served
as the data collection tool or paper survey.**

1) How you rate your level of understanding Foodborne Illness?

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

2) How would you rate your level of understanding Food Safety?

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

3) How would you rate your understanding of challenges related to Glenmont Community and food centers, pantries, and extension?

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

4) How would you rate your understanding of Using the Toolkit?

Participant	Pre-Presentation	Post-Presentation

Poor		
Fair		
Good		
Great		

5) How would you rate your understanding of prevention?

a. When in doubt throw it out

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

b. Handwashing

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

c. Not coming with personal illness

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		

Great		
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d. No repackaging

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

e. Advise recipients not to touch fresh fruits and veggies.

Participant	Pre-Presentation	Post-Presentation
Poor		
Fair		
Good		
Great		

Do you have any added comments?

Appendix G: IRB Response and Letter

Memorandum – Not Human Subjects Research Determination

Date: October 7, 2019

To: Sara Anderson, College of Nursing

Project Title: Food Safety and Risk of Foodborne Illness at a Food Center’s Extension: Toolkit for Front-Line Volunteers

IRB Determination Number: 19-185

The Human Research Protection Office (HRPO) has evaluated the above-named project and has made the following determination based on the information provided to our office:

The proposed project does not involve research that obtains information about living individuals [45 CFR 46.102(f)].

The proposed project does not involve intervention or interaction with individuals OR does not use identifiable private information [45 CFR 46.102(f)(1), (2)].

The proposed project does not meet the definition of human subject research under federal regulations [45 CFR 46.102(d)].

Submission of an Application to UMass Amherst IRB is not required.

Note: This determination applies only to the activities described in the submission. If there are changes to the activities described in this submission, please submit a new determination form to the HRPO prior to initiating any changes.

A project determined as “Not Human Subjects Research,” must still be conducted in accordance with the ethical principles outlined in the Belmont Report: respect for persons, beneficence, and justice. Researchers must also comply with all applicable federal, state and local regulations as well as UMass Amherst Policies and procedures which may include obtaining approval of your activities from other institutions or entities.

Please do not hesitate to call us at 413-545-3428 or email humansubjects@ora.umass.edu if you have any questions.

Iris L. Jenkins, Assistant Director Human Research Protection Office

Appendix H: Individual participants’ learning increases to questions.

Table 2

Individual participants’ learning increases to questions.

Question	Participant #1	Participant #2	Participant #5	Participant #6	Participant #7	Participant #8	Participant #9	Participant #10
#1	25%	25%	25%	25%	0%	50%	50%	0%
#2	25%	25%	0%	25%	25%	0%	50%	0%
#3	0%	25%	0%	25%	25%	50%	75%	75%
#4	50%	25%	25%	0%	25%	25%	75%	50%
#5a	0%	25%	25%	0%	0%	25%	50%	0%
b	0%	25%	25%	0%	0%	0%	50%	0%
c	25%	25%	25%	0%	0%	25%	50%	0%
d	25%	25%	25%	25%	0%	50%	50%	0%
e	25%	25%	0%	25%	25%	0%	50%	0%
Total Averages	16.6%	27.7%	19.4%	11.11%	13.88%	33.33%	55.55%	25%

Key for questions:

- 1) How would you rate your level of understanding Foodborne Illness?
- 2) How would you rate your level of understanding Food Safety?
- 3) How would you rate your understanding of challenges related to Glenmont Community’ Food Center’s extension?
- 4) How would you rate your understanding of Using the Toolkit?
- 5) How would you rate your understanding of prevention?
 - a. “When in doubt throw it out.”
 - b. Handwashing.
 - c. Not coming with personal illness.
 - d. No repackaging.
 - e. Advise recipients not to touch fresh fruits and veggie

Appendix I: Costs Table

Printing out Toolkit	\$25.00
Space to Present Toolkit to Staff/Volunteers	\$50.00
Pre and Post Tests	\$25.00
Total	\$100.00